TA 4432-PAK

Asian Development Bank

CAPACITY BUILDING FOR ENVIRONMENTAL MANAGEMENT IN SINDH

Final Report

August 2006

Halcrow

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List of Abbreviations

ADB	Asian Development Bank
ADF	Asian Development Fund
ADP	Annual Development Program
AF	Affected Families
AJK	Azad Jammu and Kashmir
AP	Affected People/Person
BOT	Built Operate Transfer
CAD	Computer-Aided Design
CAP	Community Action Plan
CBO	Community-Based Organization
CCB	Citizen Community Board
CDLGP	Community Development And Local Government Project (ADB)?
CDM	Clean Development Mechanism
CIP	Community Infrastructure Project
COSTAB	ADB Financial Analysis Program
CPFPG	Compensation Policy Framework And Procedural Guidelines (ADB)
CSD	Consulting Services Division (ADB)
CSP	Country Strategy Paper
DCO	District Coordination Officer
DDO	Deputy District Officer
DED	Detailed Engineering Design
DERA	
DFID	Department For International Development (UK)
District	A District Notified Under The Sindh Land Revenue Act, 1967
DO	District Officer
DSSP	(Sindh) Devolved Social Services Program
EA	Executing Agency
EDO	Executive District Officer
EIA	Environmental Impact Analysis
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan (ADB)
EPA	Environment Protection Agency (Sindh)
ERD	
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
GAP	Gender Action Plan
GDI	General Development Index
GIS	Geographic Information System
GOP	Government Of Pakistan
GOS	Government Of Sindh
GPD	Gallons Per Day (1 Imperial Gallon = 4.546 Liters)
GPS	Global Positioning System
GST	General Sales Tax
GTZ	German Development Corporation
HDI	Human Development Index
HH	Household

HPI	Human Poverty Index
HPPD	Housing And Physical Planning Department
HQ	Headquarter
IA	Implementing Agency
IBRD	International Bank For Reconstruction And Development (Or World Bank)
ICT	Information Communication Technology
IDD	International Direct Dialing
IEC	Information-Education-Communication
IEE	Initial Environmental Examination
IP	Indigenous Peoples
IPDP	Indigenous Peoples' Development Plan (ADB)
ISA	Initial Social Assessment
IT	Information Technology
IUCN	The World Conservation Union
JBIC	Japan Bank For International Cooperation
JICA	Japan International Cooperation Agency
Kabari	Waste Dealer
KAP	Knowledge, Attitudes And Practices
Katcha	Poor, Bad Condition
katchi abadi	Unauthorized, Poor Settlements On Publicly-Owned Land
KfW	Kreditstalt Fuer Wiederaufbau (Germany)
LAR	Land And Resettlement
LB	Local Bodies
LBOD	Left Bank Outfall Drain
LCB	Local Competitive Bidding
LCD	Liquid Crystal Display
LGD	Local Government Katchi Abadi And Spatial Development Department ((Sindh Province)
LG&RDD	Local Government And Rural Development Department
M	Million
MDG	Millennium Development Goals
M&E	Monitoring And Evaluation
MGD	Million Gallons Per Day (4,546 M^3/D)
MIS	Management Information System
MOF	Ministry Of Finance
MOH	Ministry Of Health
MoHA	Ministry Of Home Affairs
MOU	Memorandum Of Understanding
MPA	Methodology For Participatory Assessments
MRM	Management Review Meeting Issues Paper (ADB)
MTRI	Municipal Training And Research Institute
Nazim (pl. nazmeen)	Governor Of Administrative Subdivision
NEQS	National Environmental Quality Standards
NGO	Nongovernmental Organization
NIPA	National Institute of Public Administration
Nullah	Naturally Occurring Storm-Water Channel
NWFP	North West Frontier Province
OCR	Ordinary Capital Resources

O&M	Operation And Maintenance
OPP	Orangi Pilot Project
OZT	Octroi Zila Tax
pacci abadi	Better Off Settlement/ Housing Area
PC	Planning Commission
PCR	Project Completion Report (ADB)
PFC	Provisional Finance Commission
PHAST	Participatory Hygiene And Sanitation Transformation
PHED	Public Health Engineering Department (Sindh Government)
PIHS	Pakistan Integrated Household Survey
PLF	Project Logical Framework
PMO	Project Management Office
PMR	Project Management Report (World Bank)
POL	Petrol, Oil, Lubricants
PPAF	Pakistan Poverty Alleviation Fund
PPA	Participatory Poverty Assessment
PPAR	Project Performance Audit Report (ADB)
PPMS	Project Performance Management System (ADB)
PPR	Project Performance Report (ADB)
PPTA	Project Preparation Technical Assistance
PRA	Participatory Rapid Appraisal
PRM	Pakistan Resident Mission (ADB)
PSDP	Public Sector Development Program
PSLM	Pakistan Social and Living Standards Measurement Survey
PSP	Private Sector Participation
Pucca	Good Condition (As Applied To A House Or Road, For Example)
RAP	Resettlement Action Plan
RFP	Request For Proposal (ADB Invitation Document)
Rft	Running Feet (Unit Of Measurement Of Pipelines, Etc)
ROW	Right Of Way
RP	Resettlement Plan (ADB)
R&R	Resettlement And Rehabilitation
RRP	Report And Recommendation Of The President (Of ADB)
RWSS	Rural Water Supply And Sanitation
SA	Special Account
SBUSP	Sindh Basic Urban Services Project
SDC	Swiss Development Cooperation
SEIA	Summary Environmental Impact Analysis
SEPA	Sindh Environmental Protection Agency
SGA	Sindh Graduates Association
SLGO	Sindh Local Government Ordinance 2001
SOP	Standard Operating Procedure
SPDC	Sustainable Policy Development Center
SPG	Sindh Provincial Government
SPRSS	Summary Poverty Reduction And Social Strategy (ADB)
SPSS	Statistical Package For Social Scientists (Software Program)
SRSP	Sindh Rural Support Program
SWM	Solid Waste Management
TA	Technical Assistance
Taluka	*Administrative Subdivision In Sindh (Subdistrict)*
TC	Taluka Council
Tehsil	*Administrative Subdivision In Other Provinces Of Pakistan*

	(Subdistrict)
TMA	Taluka Municipal Administration
TMO	Taluka Municipal Officer
TO	Taluka Officer
TOR	Terms Of Reference
TO (I & S)	Taluka Officer (Infrastructure and Services)
UC	Union Council
UK	United Kingdom
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UPS	Uninterrupted Power Supply
USA	United States Of America
USAID	United States Agency for International Development
USB	Universal Serial Bus
USD/$	United States Dollar
VDA	Village Development Associations
W&S	Water And Sanitation
WACC	Weighted Average Cost Of Capital
WASA	Water and Sanitation Authority
WB	World Bank
WHO	World Health Organization
WES	Water Supply And Environmental Sanitation
WSS	Water Supply And Sanitation
WTP	Willingness To Pay
WUG	Water User Group
XEN	Executive Engineer
Zila (pl. izla)	District
ZMC	Zila Mushavirat Committee

TABLE OF CONTENTS

Description Page No.

KNOWLEDGE SUMMARY ..... **i**

EXECUTIVE SUMMARY ..... **i**

1 INTRODUCTION **1**
1.1 TA Objectives and Scope 1
1.2 TA Implementation 1
2 SECTOR CONTEXT **2**
2.1 Socio-Economic Context 2
2.2 Local Government and Administration 13
3 SINDH WSS AND SWM POLICY **17**
3.1 Review of WSS and SWM Conditions in Sindh 17
3.2 Issues in WSS and SWM 21
3.3 The National Policy Context 26
3.4 Domestic Water and Sanitation Policy for Sindh 30
3.5 Solid Waste Management Policy for Sindh 35
4 SINDH PROVINCIAL STRATEGIES **40**
4.1 Process 40
4.2 Objectives 41
4.3 Key Policy Instruments and Strategies 41
4.4 Roles and Responsibilities of Stakeholders 50
4.5 Mechanisms for Implementation and Monitoring 51
5 PROMOTING PRIVATE SECTOR PARTICIPATION **53**
5.1 The Operational Environment 55
5.2 Improving the Operational Environment 56
5.3 Options for Private Sector Participation 56
5.4 Areas for Private Sector Participation 57
5.5 A Programme for Promoting Private Sector Participation 59
6 PUBLIC AWARENESS RAISING **61**
6.1 Messages 61
6.2 Mediums 62
6.3 Programme 62
7 CAPACITY BUILDING OF TMAs FOR STRATEGIC PLANNING **64**
7.1 Overview 64
7.2 Water Supply Situation in Selected TMAs in Sindh 64
7.3 Sewerage & Drainage Situation in Selected TMAs in Sindh 68
7.4 Solid Waste Situation in Selected TMAs in Sindh 71
7.5 Survey of Gender Perspective on Water and Sanitation 81
7.6 Capacity Building Workshops 82
8 TARIFFS AND TARIFF SETTING **87**
8.1 Introduction 87
8.2 Summary of Experience from the Selected TMAs 87

ANNEXURES:

Annex 1: Mirpur Khas Taluka – Strategic Plan for Water Supply & Sanitation
Annex 2: Umerkot Taluka – Strategic Plan for Water Supply & Sanitation
Annex 3: Johi Taluka – Strategic Plan for Water Supply & Sanitation
Annex 4: Larkana Taluka – Strategic Plan for Water Supply & Sanitation
Annex 5: Shikarpur Taluka – Strategic Plan for Water Supply & Sanitation

Annex 6: Sukkur Taluka – Strategic Plan for Water Supply & Sanitation
Annex 7: Consultation and Consensus Building
Annex 8: Gender Survey
Annex 9: Finance and Tariffs in Selected TMAs
Annex 10: Blank Forms for Developing Strategic Plan

LIST OF TABLES:

Table 2-1: Poverty Trends: Official Estimates 1993-99 3
Table 2-2: Sindh: District Position in Overall Deprivation Level 4
Table 2-3: Sindh Employment 5
Table 2-4: Population distribution and growth rates 6
Table 2-5: District Share in Provincial Population (1998 Census) 7
Table 2-6: Language distribution in Sindh (% population) 8
Table 2-7: Sindh Poverty and Literacy FY99 (% of poor and non-poor illiterate head of households) 8
Table 2-8: Literacy (%population) 9
Table 2-9: Health indicators (% population) 10
Table 3-1: Access to drinking water (% households) 17
Table 3-2: Sanitation Facilities 19
Table 3-3: Drainage facilities 19
Table 5-1: Situation regarding Water Supply, Sanitation and Solid Waste Management in Sindh 58
Table 7-1: Summary of SWM data from 6 TMAs 71
Table 7-2: Waste Generation Rates 73
Table 7-3: Performance analysis data 79
Table 7-4: Participation in Capacity Building Workshops 82
Table 8-1: TMA charges judged against best practice criteria 89
Table 8-2: Pros and cons of customer metering 95
Table 8-3: Hierarchy of financial goals – water supply 96
Table 8-4: Access for the poor – options 98
Table 8-5: Water tariff methodology 100
Table 8-6: Town baseline information 100
Table 8-7: Tariff setting goals and definitions 103
Table 8-8: Hierarchy of financial goals 105

LIST OF FIGURES:

Figure 8-1: Water Supply Cost Components in Percentage 91
Figure 8-2: Water Supply – Cost Components per connection per annum 91
Figure 8-3: Water Supply – Cost Components and Billings 92
Figure 8-4: Case Study TMAs: Financial characteristics of water 92
Figure 8-5: Financial characteristics of Sewerage/Drainage and SWM 93
Figure 8-6: Annual Sewerage/ Drainage cost per inhabitant 93
Figure 8-7: SWM cost per ton lifted 94
Figure 8-8: Operating expense breakdown 101
Figure 8-9: Operating expenses per m^3 101
Figure 8-10: Increasing tariffs and cost recovery 102
Figure 8-11: Tariff structure 108
Figure 8-12: Tariff Design Flowchart 109

KNOWLEDGE SUMMARY

The project goal was to improve sustainable environmental management, health and living conditions in Sindh by assisting the government in developing a participatory strategic planning framework to improve rural and urban environmental conditions, through the following:

a) **Issues Assessment and Sector Review:** Analysis and verification of data and publications; framing of issues to be addressed based on field visits and consultations.
b) **Formulating Policy for WSS and SWM Framework:** Formulating WSS and SWM policies for Sindh with due consultations and consensus of all stakeholders.
c) **Strategic Planning:** Formulating a medium-term strategic planning process for TMA in Sindh based on WSS and SWM needs identification;
d) **Stakeholder Participation:** Identification and consultation with key stakeholders, ensuring a broad census on the issue assessment and proposed policies.
e) **Tariff Administration Guidelines:** Reviewing existing revenue and expenditure on WSS and SWM; presenting to stakeholders: existing tariffs, international best-practices and a methodology and guidelines for developing appropriate tariffs.
f) **Capacity Building for Strategic Planning:** Capacity enhancement of TMA for strategic planning for WSS and SWM, based on material developed through case study/examples of TMA Strategic Plans.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

The quantity of water and the duration of the supply to the consumers are largely inadequate and households supplement this from other, often unsafe sources. In many cases, city/town water supplies are drawn from the irrigation canals at a point downstream of where largely untreated wastewater from the city/town is being discharged. The coverage of safe drinking water supply in rural areas is low; many rural water supply schemes are inoperative.

In most cases, open drains provide both surface drainage and carry sewerage, with human excreta directly discharged into the drains that get blocked due to a combination of inadequate gradient, solid waste (particularly polythene bags), street sweepings, large content of solids in the grey water and the general state of disrepair and lack of maintenance. Sewage held up in the drains, overflows and ponding is frequent.

There are no municipal systems for household level collection of solid waste, except on an informal level where municipal sanitation staff may provide their services against nominal payment. The quality of street cleaning is poor because of lack of litter bins, shortage of sanitation staff, inappropriate cleaning practices.

The provision of adequate and appropriate services are constrained by a lack of staff at the TMA, and compounded by the continuation of centralized, top-down and bureaucratic practices, with little reference to local needs or demand.

SLGO 2001 provides mechanisms for working with communities, transparency, participation and “bottom-up-planning” which are not fully operational in the TMA. The opportunity to voice views through lobbying elected representatives is highly restricted in the absence of access to information and operational transparency.

The recommended Provincial Policies and the Strategies for the TMA are designed to introduce decentralized, transparent processes based on public-private partnerships and community involvement. Technically appropriate alternatives and financial sustainability through user-charges and responsive tariff-structures have the potential for improving and enhancing the capacity and capability of TMA.

EXECUTIVE SUMMARY

1 INTRODUCTION

1. The Terms of Reference had identified the project goal, namely, to improve sustainable environmental management, health and living conditions in Sindh by assisting the government in developing a participatory strategic planning framework to improve rural and urban environmental conditions. The TA outputs are (i) a cross-sectoral review of development issues, and concerns in the Water Supply, Sanitation (WSS) and Solid Waste Management (SWM) sectors; (ii) policies, strategies and action plans for WSS and SWM sectors; and (iii) appropriate tariff methodology and tariff administration guidelines for improved governance, adapted to local needs and conditions.

2. The scope of the TA included the following:

   a) **Issues Assessment and Sector Review:** Analysis of existing data; verification of data; and publications on the sector; framing of issues to be addressed based on field visits and consultations.

   b) **Formulating Policy for WSS and SWM Framework:** Framing of issues to be addressed based on field visits and consultations; formulating WSS and SWM policies for Sindh with due consensus of all stakeholders.

   c) **Strategic Planning:** Developing a medium term strategic plan for WSS and SWM in Sindh, based on needs identification; and formulating strategic plans for TMAs.

   d) **Stakeholder Participation:** Identification and consultation with key stakeholders, ensuring that there is broad census on the issue assessment and proposed policies.

   e) **Tariff Administration Guidelines:** Reviewing existing revenue and expenditure on WSS and SWM; reviewing existing applicable tariffs; reviewing and presenting international best-practices to stakeholders; and developing methodology and guidelines for appropriate tariffs.

   f) **Capacity Building for Strategic Planning:** Capacity enhancement of TMAs for strategic planning for WSS and SWM, based on material developed through six different case study/examples (of the development of TMA Strategic Plans). Four training sessions to be held across the Province, to provide training for all the Sindh TMAs.

1.1 TA Implementation

3. The schedule of implementation and organisation of the project has been as follows:

   a) The consultants commenced services on 24 December 2005.

   b) The Inception report was submitted in January 2006

   c) The Interim Report was submitted in March 2006.

2 ISSUES IN WSS AND SWM IN SINDH

2.1 Water

4. The quantity of water and the duration of the supply to the consumers are inadequate (except in certain areas) and households need to supplement

this with water from other sources (even where water from other sources is unusable for drinking and washing):

- sufficient storage facility is not available to meet the supply requirements during periods of canal closure; existing overhead tanks are inadequate (causing pressure reduction, energy wastage);
- water does not reach the entire network (for instance in the northern area of Mirpurkhas city); lack of control valves adds to difficulties in uniform/equitable distribution of water;
- to meet water shortages, women have to fetch water over long distances.

5. The quality of water is poor (odour, colour, biological condition):

   - in most cases where supply is from a surface water source, "settled" water without filtration and disinfection, is supplied (except in some cases such as Sukkur city, where water treatment is carried out); even where treatment facilities exist, these are not in use (such as clarifier and filter at Mirpurkhas;
   - in many cases, city/town water supplies are drawn from the irrigation canals at a point downstream of where largely untreated wastewater from the city/town is being discharged. In addition, the Pinijari, Akram Wah, New Phulleli and Kalri Begar Feeder canals (and their branches downstream) off taking from the Kotri Barrage carry domestic and industrial effluent particularly from industry in Kotri and Hyderabad. This affects domestic water supply in five districts (as well as in Karachi via the Kalri Begar Feeder)

6. The coverage of safe drinking water supply in rural areas is low (even where there are rural water supply schemes, the water available is inadequate in quantity and quality); many rural water supply schemes are inoperative – in many cases because of the issues related to the Village Development Associations (VDA) which are required to operate the community-managed rural water supply schemes:

   - many VDA functionaries are unable to discharge their duties, either due to lack of understanding of the concept and process or inability to motivate households to contribute their share to operate the WSS services;
   - the role and responsibility of the community is not fully understood and/or appreciated;
   - the share of charges for WSS services demanded by the VDA from households are not proportionate to water consumption by the household or their level of affordability;
   - there is a perception amongst households of a lack of transparency with regard to expenditures incurred; some households complain that only receive payment demand but no water;
   - there is no technical advice or support available to the VDA in the operation and periodical maintenance of the WSS schemes; suction and delivery pumps, piping, pump houses, operator's quarters, boundary walls and gates are in poor state of repair (many pump houses are used as private stores or occupied by families).

7. In areas where groundwater is shallow and sweet, there is little demand for municipal supplies.

8. Arsenic contamination has been reported at some places (for instance at Khairpur).

9. The physical condition of the water supply system in most urban areas is poor and there is no regular maintenance or upkeep:

   - poor condition of water works (for instance at Mirpurkhas), water clarifiers and filters are not working, pumping machinery is non-operational (for instance Jamesabad water works);
   - poor condition of network causes leakages and wastages of water, and because of intermittent supply wherever the pipes are exposed or where they pass through open drains, polluted water is sucked-in and the water supply is polluted;
   - similarly, house connections from water distribution mains (comprising of galvanized iron pipes) are in poor condition, many have leakages and pass through drains full of sewerage causing both wastage of water and entry of pollution in the network.

10. There is no system of monitoring of quality of water (at source or water supplied for consumption) and there is a lack of water testing facilities.

2.2 Drainage and Sewerage

11. In most cases, open drains provide both surface drainage and carry sewerage, with human excreta directly discharged into the drains. The open drains get blocked due to a combination of inadequate gradient, solid waste (particularly polythene bags), street sweepings, large content of solids in the grey water and the general state of disrepair and lack of maintenance. Sewage held up in the drains, overflows and ponding is frequent.

12. In urban areas where sewerage has been laid out, poor operation and maintenance practices (for old and deteriorated main sewers such as in Sukkur and Shikarpur) aggravate the conditions.

13. The drainage disposal stations are not properly operated (effluent is held up), have capacity of limitations, the civil and mechanical works are in a poor state, and in may cases the stations are poorly located – they are pumping effluent into canals upstream of the intake for water pumped out of the canal for supply to the population.

14. Oxidation ponds, where they exist, are usually in a poor condition. There is generally absence of wastewater treatment facilities.

2.3 Solid Waste Collection and Disposal

15. There are no municipal solid waste collection and disposal systems in the rural areas.

16. There are no municipal systems for household level collection of solid waste, except on an informal level where municipal sanitation staff may provide their services against nominal payment.

17. The quality of street cleaning is poor: lack of litter bins, shortage of sanitation staff, type of cleaning equipment in use (broom, hand carts, donkey carts) and cleaning practices, resulting in street littered with refuse, and choking drains.

18. Refuse in communal storage structures get scattered around these structures due to wind and scavenging. These storages are health hazards (breeding larvae, rodents, etc.) and generate foul odour.

19. The widespread use of polythene bags that cannot be adequately disposed off due to the generally poor sanitation conditions, litter the rural and urban areas (and clog the drains).

2.4 Water and Sanitation Tariff

20. The water tariff in urban areas was fixed many years ago (prior to soaring electricity costs and salary increases) and is presently inadequate to meet even the salary costs. In most cases billing at the current tariff covers less than 50% of the cost of service delivery and (with few exceptions) does not cover the salary costs.

21. The poor quality of services provided has reduced the willingness-to-pay on the part of the consumers.

22. In some cases the rate of recovery of billed water tariff is low.

23. There are usually no direct charges for sewerage and solid waste collection.

24. There is, historically, no concept of calculating (i) total cost of service provision, (ii) unit cost of various services (water, solid waste) and (iii) cost recovery. The expenditure information in many cases is not arranged in a manner which would facilitate costing (and in many instances even the prescribed formats are not attached to the budgets).

2.5 Institutional Aspects

2.5.1 Creation of and Delineation of New Municipalities

25. New TMAs have recently been created without consideration for the integrated water supply, sewerage and drainage systems and the need for coordinated management of urban areas as envisaged in the SLGO:

- Sukkur urban area has been divided into “Sukkur’ and ‘Sukkur New’ whereas the WSS systems of the city are integrated.
- Mirpurkhas (Mirpurkhas City – Deh 109) has now been made part of the newly created Hussain Buksh Marri TMA, but continues to be managed by TMA Mirpurkhas.

2.5.2 Devolution and Centralization: Dual and Overlapping Responsibilities

26. SLGO 2001 provided for devolution of Public Health Engineering Department (PHED) and accordingly the Provincial Finance Commission (PFC) Award FY 05 allocated Rs.613 million to TMAs “on account of transfer of functions and to the extent of the transfer of establishment of PHED”. However recently PHED has been redesignated functions (Notification No. SO.11(LGD)/2/(45)/90 dated 24th January 2006) and new posts created (Director General, Superintendent Engineers at Hyderabad, Larkana, Mirpurkhas and Sukkur along with complete establishment) to execute and supervise all provincial ADP schemes, inter-district/inter taluka schemes, foreign funded projects, and schemes above Rs.10 million. The TO (I&S) of the TMA have been placed “under the command of the PHE” for this purpose.

27. In addition to large “mega” projects, small WSS schemes are also included in the provincial development program (PSDP). These supply driven schemes create differing levels of service in the area with adverse budgetary and O&M resource requirements and tariff implications.

28. The large “mega” projects are conceived as a single project but in real terms are implemented as “mini” or “micro” schemes due to the financial allocations and pace of execution:

    - two ”mega” projects, one for water supply and the other for sanitation/ drainage, costing Rs.1.2 billion are underway in Sukkur while the annual allocation in PSDP is 1% of the project cost;
    - two “mega” projects costing Rs.598 million are underway in Mirpurkhas while the annual allocation in the PSDP is 3% of the project cost;
    - overall, the PSDP allocations are 12% of the project cost of the Rs.5.9 billion PSDP, resulting in large throw forward.

29. The district governments are directly supporting water supply schemes through the VDA and constructing drainage schemes, although this falls within the functional mandate of the TMA.

30. The federal government has initiated a program to install water filtration units in every union administration. The O & M responsibility (staff, direct costs) has not been clarified.

2.5.3 Participation of Citizens and Communities

31. SLGO 2001 provides various mechanisms for working with communities, transparency, participation and “bottom-up-planning” which are not fully operational in the TMAs. The opportunity for citizens to voice their views is through lobbying elected representatives but this is highly restricted in the absence of access to information and operational transparency. One such mechanism, that of the Citizen Community Boards (CCB) to which 25% of the development budget of all local governments is to be allocated and the amount to be utilized for schemes co-funded and implemented by the CCBs, is not yet functional and many TMAs are not showing any allocations for CCBs in their budgets as required under the SLGO and budget rules.

32. There is lack of cooperation between the government agencies and the citizens. At the municipal level this is reflected in the low rate of recovery of even the low water tariffs, the use of household level pumps to draw in more water from the public water supplies, and the general attitude of people towards the municipality.

2.5.4 Staff

33. There is a shortage of front-end service providers in the TMA. For instance, of the budgeted posts in the case of sanitary workers, 52% in Juhi, 40% in Sukkur, 32% in Shikarpur, 20% in Umerkot and 17% in Larkana are vacant. TMAs report that they cannot recruit staff due to recruitment ban (and other administrative constraints).

34. The service provides and technical and administrative staff skills at all levels need to be upgraded.

2.5.5 Planning

35. Direct citizen participation and voice in planning (as stated above) is further constrained by the absence of basic information and data:

    - topographic maps are not available for the urban areas;
    - there is no record, inventory/data-base of WSS schemes, for instance, and in many cases records of municipal properties have not

been updated; maintaining a comprehensive database and information system is an obligation under the SLGO [Section 54 (K)]. The absence of information, and access to information by citizens, results in a number of WSS (and other) schemes being approved for the same locality by the same local government under various initiatives as well as lack of coordination and linkages between various schemes.

36. Planning for new capital works is given preference over maintenance of sunken investments.

37. There are no yardsticks for budgetary allocations for operation, repair and maintenance expenditure (even broad 'rule of thumb' type such as unit cost of service as a percentage of salary expenditure); there is no relationship of O & M costs with the standard of service delivery. In FY06, three TMAs have provided less than Rs.0.5 million while Sukkur has provided Rs.5.2 million for O & M expenditure for water supply. For electricity, the budget at Umerkot is Rs.2 million while at Sukkur (with more than five times the pumping requirement) the provision is of Rs.1 million.

38. There is no link of budgetary provision with outputs, outcomes, performance or performance targets as required under the rules (Budget Rule 99) which prescribe a number of formats (BDO 8 and 9) for preparing service delivery performance targets and reporting on their status during the year. A number of prescribed formats relating to policies, activities, targets etc. that can assist in performance budgeting are not included in the budget documents (such as BSF 1 on policies and activities; BSF 2 on service delivery targets, and BSF 3 on status of service delivery facilities).

2.6 Fiscal Resources

39. The overall fiscal resources available to the TMAs are limited. The PFC Award FY 05 allocated 20% more funds to TMAs to meet the statutory salary increases but soaring electricity costs and the low own source revenues of the TMAs impose severe budgetary constraints: for instance, salaries account for 61% - 89% of the FY 04 (revised) budgets in TMA Sukkur, Mirpurkhas, Larkana, Umerkot, Shikarpur and Johi; the FY 06 budget for TMA Sukkur shows a further increase of 30% in its salary budget.

2.7 Financial Management

40. Financial management in TMAs suffers primarily from non-compliance with prescribed rules (although system improvements to streamline procedures may contribute together with training of staff). For example, separate public accounts as required under the rules [Budget Rule 10, 51(1)(v)] are not prepared; charged expenditures (expenditure of council; interest payments; decree or awards against TMA) are not shown separately [SLGO Section (11)(b)]; outstanding liabilities and loans are, in many cases, not shown [Format BDO-5]; and justification and explanations of the receipts and expenditures (BDR-5 and BDC-8) are seldom provided.

3 SINDH WSS AND SWM POLICY

3.1 The National Policy Context

41. Over the preceding years, there has been an active process of formulating National Policies for Drinking Water and Sanitation. This has been done through an intensive and extensive process of consultation and the involvement of all stakeholders at all levels from National through Provincial and District. Attention has been paid to ensure that global best practices and standards of health and service delivery have been incorporated.

42. Unfortunately, the process was put on hold by the earthquake of last November, just as the culminating national consultation was about to take place to ratify the results and contributions of the provincial and other consultations. Therefore, no national policies have been formally agreed to or enacted.

43. For the purposes of drawing up recommendations for the Draft Policy for Sindh, the discussion document prepared for the final consultation sessions has been used as representing a fairly accurate view of opinion and aspiration.

3.2 Provincial Policy Guidelines

44. The national policy documents provide policy guidelines that the provincial policies would be expected to follow. The fundamental principle in formulating the policies is that health and access to water are fundamental human rights and should be accessible to all; the other principles on which the proposed policies should be based include:

    i) The need to ensure that they meet legislative requirements, in that they are in conformity with national policies, (National Sanitation Policy, Katchi Abadis, EPA, etc.) ensure adherence to NEQS and Pakistan Drinking Water Quality Standards, and provincial policies (SLGO, etc.);

    ii) The need to require that they are practical and feasible, and that they encourage participation and buy-in from all stake holders, while ensuring that the needs of poor and vulnerable sections of society, especially women and children, are adequately addressed;

    iii) The need to ensure that they facilitate local control through the facilitation of the provision of acceptable, affordable and sustainable SWM, sanitation and drinking water services, in accordance with SLGO 2001 and the mandate of the TMA, rather than merely enabling or upgrading the capacity and capability of local government and statutory undertakings to provide and supply such services;

    iv) The need to ensure that the services provided are sustainable, and that while the minimum level of provision may be free, users should pay progressively for increased levels of convenience and for increasing levels of consumption; and

    v) The component-sharing model should be adopted for all TMA schemes, whereby different aspects and components are handled by different organisations and entities, allowing for the costs to be more easily shared, and made more transparent, and therefore make cost recoveries easier.

4 SINDH PROVINCIAL STRATEGIES

45. The Provincial Strategies outline the various legislative, administrative, financial and technical measures that need to be instituted and implemented over the next few years, in order to move towards the goals of the Sindh Provincial policies for water, sanitation and solid waste management.

46. The Provincial Strategies are also intended to support and guide the Sindh City District Government and Taluka Municipal Administrations (TMA) to frame their own domestic water supply and sanitation strategies, plans and programmes and is the result of stakeholder consultations held at the Taluka and provincial levels

4.1 Process

47. The Sindh Strategies have been prepared after extensive consultations, detailed technical assessment in selected urban and rural areas and a process of consensus building The objective of the process was to ensure participation of stakeholder groups both in (i) identification of issues, and (ii) together with the technical, fiscal and financial assessment carried out by the TA Team, build a consensus on strategic response to the identified issues within the framework of the Provincial Policies.

4.2 Objectives

48. The objectives of the provincial strategies are to deploy available resources in the most effective way to ensure that it is possible to achieve the longer-term targets of the provincial policies. It allows for a framework within which the annual investment and action plans can make a cumulative and consistent impact, as well as allowing for greater transparency and accountability.

49. The overall objective of the strategies is to provide guidelines to improve health, reduce incidence of disease while conforming to environmental regulatory standards for disposal of solid and liquid waste. At the same time, the Strategies should ensure that all programs are addressed holistically, linking environment, housing, water and sanitation, city and settlement plans, as well as providing linkages to provincial and national initiatives. The Strategies also provide guidelines that will enable the TMA achieve an effective institutional, legal and financial framework for ensuring WATSAN coverage

50. The Strategies should allow the TMA to move towards a greater degree of sustainability in the provision and delivery of urban services by working towards a full-cost recovery of services provided. In keeping with National and Provincial policies, the users, and especially women, should be fully engaged in the decision-making process, and the private sector should be encouraged to participate in the provision and delivery of services.

5 CAPACITY BUILDING OF TMAs FOR STRATEGIC PLANNING

5.1 Overview

51. A programme of capacity-building of TMAs was developed and implemented to enable the development of strategic plans in line with the proposed Sindh Provincial policy and strategies for water supply, sanitation and solid waste management. Six TMAs were selected to carry out a pilot programme that was then used for all TMAs in Sindh. The

selected TMA were typical of the range of TMA in terms of size, situation and conditions of water availability etc,

52. Each of the selected TMA was visited by the consultants at least twice, and consultations and discussions held with the TMA staff, including, wherever possible, the Nazim and the TMO. Most of the time was spent with the TO (I&S), who are directly responsible for the sector. In addition, discussions were held with other officials and operators of water supply and sanitation facilities, including private contractors and vendors; surveys, and formal and informal discussions were also held with shop-keepers and community groups, including focus group surveys of women in residential areas in both urban and rural communities.

53. The information from these surveys and discussions, supplemented by participant observation and field notes was used to document the water supply and sanitation and solid waste management situation in the selected TMAs (Annex 1 to 6).

54. Guidelines for Strategic Planning were produced and field-tested with the six selected TMAs to produce Strategic Plans (see Annex 1 to 6). These were used to conduct a series of hands-on interactive training workshops in Hyderabad and Sukkur, to which all TMAs were invited.

6 TARIFFS AND TARIFF SETTING

55. This section is a “tool for the future”, should TMAs decide on radical reform of tariffs at some point. It focuses on water and sanitation charges, as formalised tariff setting of the sort described here is seldom practiced in the field of solid waste management.

56. This section looks first at the wage and non-wage costs of service-provision in the selected TMAs and goes on to evaluate their current tariff structure, practice and experience, as well as their accounting practices and their consequences. Based on this, and relevant global experience, some proposals for tariff reform are suggested, using different criteria, goals and objectives. The relevance and advantages of different basis for setting tariffs is discussed, and finally, a step-by-step procedure for tariff setting and tariff structure is described.

1 INTRODUCTION

1.1 TA Objectives and Scope

57. The Terms of Reference had identified the project goal, namely, to improve sustainable environmental management, health and living conditions in Sindh by assisting the government in developing a participatory strategic planning framework to improve rural and urban environmental conditions. The TA outputs are (i) a cross-sectoral review of development issues, and concerns in the Water Supply, Sanitation (WSS) and Solid Waste Management (SWM) sectors; (ii) policies, strategies and action plans for WSS and SWM sectors; and (iii) appropriate tariff methodology and tariff administration guidelines for improved governance, adapted to local needs and conditions.

58. The scope of the TA included the following:

a) **Issues Assessment and Sector Review:** Analysis of existing data; verification of data; and publications on the sector; framing of issues to be addressed based on field visits and consultations.

b) **Formulating Policy for WSS and SWM Framework:** Framing of issues to be addressed based on field visits and consultations; formulating WSS and SWM policies for Sindh with due consensus of all stakeholders.

c) **Strategic Planning:** Developing a medium term strategic plan for WSS and SWM in Sindh, based on needs identification; and formulating strategic plans for TMAs.

d) **Stakeholder Participation:** Identification and consultation with key stakeholders, ensuring that there is broad census on the issue assessment and proposed policies.

e) **Tariff Administration Guidelines:** Reviewing existing revenue and expenditure on WSS and SWM; reviewing existing applicable tariffs; reviewing and presenting international best-practices to stakeholders; and developing methodology and guidelines for appropriate tariffs.

f) **Capacity Building for Strategic Planning:** Capacity enhancement of TMAs for strategic planning for WSS and SWM, based on material developed through six different case study/examples (of the development of TMA Strategic Plans). Four training sessions to be held across the Province, to provide training for all the TMAs in Sindh.

1.2 TA Implementation

59. The schedule of implementation and organisation of the project has been as follows:

- The consultants commenced services on 24 December 2005.
- The Inception report was submitted in January 2006.
- The Interim Report was submitted in March 2006.

2 SECTOR CONTEXT

60. The case studies of the six TMA – selected as being representative of Sindh as a whole - were used to derive an assessment of the socio-economic, financial and tariff and the water and sanitation situation in Sindh. Wherever appropriate, international comparisons and Case Studies have been used to illustrate, compare and contrast with Sindh.

2.1 Socio-Economic Context

61. Socio-economic overview of Sindh with particular reference to the Water and Sanitation conditions vis-à-vis Pakistan and other provinces, and an identification of the major Stakeholders and recent and on-ongoing projects and technical assistance were undertaken.

2.1.1 Major Projects, Programs and Stakeholders

62. Over the last 5 years, the major programs in the sector have been ADB's programs in Sindh in the water and sanitation sector. These either revolve round social (health and education) and poverty alleviation concerns and strategies, such as the Sindh Rural Development Project (in 4 Districts), which includes establishing and upgrading community infrastructure, or they arise out of urban development programs in both large and small and medium sized towns, including Karachi, Hyderabad and (currently) 6 other cities.

63. The other major project in this sector was the World Bank's Rural Water Supply and Sanitation Project (1999) which covered all the districts in Sindh (as well as Balochistan and AJK).

64. The provincial departments/bodies that are important stakeholders include LG&RDD, EPA-Sindh, SKAA, PFC Secretariat, and the provincial level institutions involved in capacity building (Tando Jam Rural Academy).

65. In addition, at the provincial level important partners from the NGO/ private sector include OPP-RTI, IUCN, SGA, SAIBAN, WESNET, and local level NGOs / CBOs.

66. Government institutions at the federal level that are involved in the capacity development of this sector include Akhtar Hameed Khan Academy for Rural Development, MTRI, and NIPA.

67. Key donors in the W&S sector, nationally, include DFID (support for NWFP for rural W&S activities and capacity building of TMA and Faisalabad in Punjab); JICA (support for improvement of waterworks facilities, improvement of sewerage and waste management in Karachi); SDC (support for Water and Sanitation Program-SA focusing on capacity building of TMA through policy support and institutional strengthening); UNDP (support for UNDP-PLUS and National Urban Poverty Alleviation Program, replication of Jaranwala and Gujrat sanitation program in small towns; UNDP-LIFE support to Lodhran Pilot Project, UNICEF (support on linking W&S activities and improved hygiene practices in schools and communities, providing improved latrines and establishing safe water points, policy level water quality issues and affordable technology particularly supporting identification and monitoring of Arsenic contamination in ground water; USAID (part of health portfolio to provide clean drinking water via community run systems); World Bank (support for replication CIP in AJK and NWFP, ongoing support to PPAF for improved community level infrastructure including W&S, and DERA project.

Analytical work includes focus on municipal finance, privatisation of W&S and SWM in Karachi and Lahore, zoning land marketing etc).

2.1.2 Poverty and Economy

68. Poverty is a major obstacle to real economic and social progress. Poverty in Pakistan is now recognized not simply as an income related phenomenon. It is also reflected in deprivation of key quality of life opportunities as well as feelings of vulnerability and powerlessness. The denial of basic rights by public officials, feudal culture and practices, absence or non-implementation of legislation, substandard service delivery (due to lack of accountability and transparency in operations) and a lack of access to fair grievance settlement all exacerbate vulnerability.

69. The extent of poverty in Sindh has risen during the period FY1993-FY1999. It is further seen that the level of rural poverty remains significantly higher than urban poverty. (See Table 2-1).

Table 2-1: Poverty Trends: Official Estimates 1993-99

	Pakistan				Sindh			
	FY93	FY94	FY97	FY99	FY93	FY94	FY97	FY99
Overall	26.6	29.3	26.3	32.2	24.1	22.6	15.7	26.6
Rural	28.9	34.7	30.7	36.3	29.5	31.8	19.6	34.7
Urban	20.7	16.3	16.1	22.4	17.3	11.8	12.0	16.1

Source: Federal Bureau of Statistics, Government of Pakistan (2001): Pakistan Integrated Households Survey- Poverty in the 1990s. Second Draft, Islamabad

2.1.3 Perceptions of poverty

70. If poverty is considered as overall human deprivation entailing reduced opportunities, social exclusion, and vulnerability to shocks, a much bigger proportion of Sindh's population would fall in this category. According to the Sindh Participatory Poverty Assessment (PPA) the "perceptions of poverty" among the poor also include political, cultural, and institutional dimensions. Thus, a poor person is one who does not have access to resources and is reliant on charity; who is powerless and helpless and without societal support systems and 'dignity' (primarily determined by societal norms).[1]

71. The PPA also shows that "well-being" is determined by several characteristics including economic position, employment status, land ownership, gender, age, family structure and local conditions.[2]

2.1.4 Spatial Dimensions of Deprivation

72. There are great disparities among rural and urban Sindh in terms of human development and level of deprivation. Living conditions in rural areas compared to urban ones are much tougher with, for example, electricity available only to 52.62% of the rural population compared to 93% of the urban population. While the urban areas have the highest HDI ranking within Pakistan (0.659), higher than that for Pakistan as a whole,

[1] For a summary description of referred texts, please see Annotated Bibliography attached at Annex 13. Government of Sindh. Pakistan Participatory Poverty Assessment Balochistan Report. Planning and Development August 2003. pp. 70-71
[2] Ibid., p. 72-76

the rural areas have an HDI of 0.465, the lowest in Pakistan.[3] Rural Sindh has been hit by drought in the past four years due to which more than 8 million people have been pushed below the poverty line. Thus, despite the fact that Sindh has the highest per capita income, over two thirds of the household in rural areas may be classified as 'vulnerable'.

73. It is further estimated that while 63% of the urban population resides in areas of low deprivation, 49% of the rural population lives in regions of high deprivation.[4] Urban Sindh is the least deprived area nationally. However, this is largely due to the fact that over 60% of the urban population belongs to Karachi. It has been estimated that almost one fourth of the urban areas fall into the category of high deprivation. This is indicative of the gap in development not simply between Karachi and rural areas but also between Karachi and other urban centres.[5]

74. A district wise analysis also shows immense disparity among the districts with Karachi's HDI at 0.629 and Tharparkar's at 0.343.[6] Focusing on deprivation levels it is seen that 31% of the population resides in 8 districts of high deprivation while 27% and 42% reside in districts of medium and low deprivation respectively. Again, only Karachi and Hyderabad fall under the category of low deprivation districts (See Table 2-2).

Table 2-2: Sindh: District Position in Overall Deprivation Level

Deprivation Level								
High			Medium			Low		
Overall Deprivation Rank Order								
District	Provincial	National	District	Provincial	National	District	Provincial	National
Population Share								
31%			27%			42%		
Tharparkar	16	84	Dadu	8	39	Hyderabad	2	12
Thatta	15	78	Khairpur	7	38	Karachi	1	1
Badin	14	76	Nawabshah	6	29			
Jacobabad	13	63	Naushero Feroz	5	28			
Ghotki	12	59	Larkana	4	27			
Mirpur Khas	11	52	Sukkur	3	21			
Sanghar	10	47						
Shikarpur	9	44						

1 = Least Deprived
100 = Most Deprived
High, medium, and low deprivation classification is on the basis of one -third national population in each of the categories. High deprivation refers to the one -third national population residing in the highest deprived areas (highest magnitudes of the Index of Multiple Deprivation).

Source: Jamal et al. (2003) "Mapping Spatial Deprivation in Pakistan". The Pakistan Development Review Vol 42 (2) pp.91-111

[3] ADB, 2002; Social Development in Sindh
[4] Jamal et.al. (2003) "Mapping the Spatial Deprivation of Pakistan". The Pakistan Development Review, Vol 42 (2) pp: 91-111
[5] In order to formulate more realistic conclusions and assessments of the overall provincial socioeconomic situation the case of Karachi needs to be studied separately.
[6] National Human Development Report of 2003

75. It has been estimated that 11 million men and women are unemployed and 15 million people live below the poverty line. Unemployment has been rising steadily and it is suggested that the growing trend of privatisation has contributed significantly to raising unemployment in this region (See Table 2-3).

Table 2-3: Sindh Employment

	Labour Force Participation Rates			Unemployment Rates		
	Male	**Female**	**Both Sexes**	**Male**	**Female**	**Both Sexes**
Sindh						
All Areas						
Total (10 years and above)	70.78	6.59	40.47	4.83	19.58	5.97
Rural						
Total (10 years and above)	75.79	43.59	7.43	3.16	18.25	4.38
Urban						
Total (10 years and above)	49.34	4.35	28.05	6.50	21.04	7.56
Pakistan						
All Areas						
Total (10 years and above)	70.61	15.93	43.74	6.59	12.75	7.69
Rural						
Total (10 years and above)	72.62	19.45	46.25	5.65	10.88	6.74
Urban						
Total (10 years and above)	67.08	9.44	39.24	8.37	19.82	9.70

Source: Labour Force Survey of Pakistan 2003-2004

76. The major industries in the province include oil, gas, livestock and fisheries. Sindh occupies the primary position, nationally, in fisheries as 100% of brackish, 65% of fresh water and 71% of Pakistan's marine fish resources of Pakistan are produced here.[7]

77. Development of industrial centres is restricted to a few major cities and as a result, Karachi and other major urban centres have received a steady inflow of migrant labour. However, the main cities including, Karachi, Hyderabad, Larkana, Sukkur, Nawabshah and Shikarpur, in which 48% of the provincial population lives, have witnessed a decline in employment opportunities (in the 1990s) and in economic growth. In general, the state of industry in Sindh has been deteriorating due to problems of economic management and governance and, a worsening law and order situation.

78. 65.5% of the rural labour force is employed in the agriculture, fishery and forestry sectors. Sindh has a vast network of agro-based industries including flour, rice, sugar, cotton ginning, and brick kiln. The region is also a major producer of grain, fruit and vegetables. However, due to several factors such as drought crop yield has been low and almost stagnant for the last decade.

[7] Quoted in Sindh State of Environment and Development, IUCN, 2004. p. 7

79. The pattern of land ownership in rural Sindh is skewed with large landowners (zamindars) exercising inordinate power over sharecroppers (haris). Landed wealth has been identified as a significant determinant of power in rural Sindh.[8] According to a 2002 study a large number of sharecropper households live in the condition of debt bondage. That is, they are indebted to their landlords and repay in the form of labour services. It was further found that the practice of getting credit often involved poor work conditions, exploitation and coercion. Some households were also subjected to conditions of extreme bondage which involved physical violence, verbal abuse, and restricted mobility.[9]

2.1.5 Population Settlement Pattern

80. Sindh is Pakistan's second largest and southern province. It consists of 23% (30 million) of Pakistan's population and covers 17% (140, 914 sq.km) of the country's land area. 1/3 (350 km) of Pakistan's coastline (1050 km) and the country's port is located in Sindh. (See Table 2-4). According to the 1998 population census, the proportion of urban and rural populations is almost equal.

Table 2-4: Population distribution and growth rates

Year	Population		Population density (persons/ sq.km)	Urban population		Rural population		Average annual growth rate (%)
	No. (in thousand)	% (distribution of total)		No. (in thousand)	%	No. (in thousands)	%	
SINDH								
1951	6,047.7	17.9	43	1,768	29.20	4,286	70.80	3.3
1961	8,367.1	19.5	59	3,167	37.82	5,207	62.18	4.6
1972	14,155.9	21.7	100	5,726	40.44	8,432	59.56	
1981	19,028.7	22.6	135	8,243	43.32	10,786	56.68	3.6
1998	30,439.9	23.0	216	14,662	48.89	15,329	51.11	2.71
PAKISTAN								
1951	33,740.2	100	166	5,985.5		27,754.7		
1961	42,880.4	100	106	9,654.6		33,225.8		
1972	65,309.3	100	82	16,593.7		48,715.7		
1981	84,253.6	100	54	23,841.5	3.55	60,412.2		3.06
1998	13,2352.3	100	42	43,036.4		89,315.9		

Source: Population of Pakistan: An analysis of 1998 Population and Housing Census. PIDE, 2003. Islamabad, Pakistan

81. The province is distinguished as Pakistan's most urbanised region having 163 urban places (including 10 cantonments) and an urban population proportion of almost 50% (14.84 million) which is much higher than the national urban population average of 32.5%. Excluding the three large

[8] Government of Sindh. August 2003. op.cit. pp. 131-133
[9] Federal Bureau of Statistics and International Labour Organization. 2002. Survey of Bonded Labour in Two Sectors in Pakistan: Brick Kiln Workers (Punjab) and Sharecroppers (Sindh).

cities, the province has the highest share of urban places among all the provinces.[10]

82. The urban provincial population however, is not distributed equally across Sindh and instead the vast majority, 71%, resides in the three major cities of Karachi, Hyderabad and Sukkur. Of these Karachi, a port city is the largest urban centre containing 62% of the provincial urban population and 30% of Sindh's total population.[11] The second and third largest cities of Hyderabad and Sukkur account for a combined 10% of the population. 46 urban places with a population of under 10,000 account for 2% of the provincial urban population; 61 places between 10-24,999 account for 6.7%; 14 places between 50-99,000 account for 6.3%; 11 places between 100-499,999 account for 13%; and 2 above one million for 66% (See Table 2-5).

83. If Karachi and Hyderabad are excluded 107 urban areas under 25,000 would account for 23.1% of the provincial urban population, 25 between 25-49,000 would account for 16.7%; between 50,000-100,000 16.3 %; and over 10,000 for 42.9%.

Table 2-5: District Share in Provincial Population (1998 Census)

	%age share in provincial population				
Province	**+ 10%**	**7-10%**	**5-7%**	**3-5%**	**1-4%**
Sindh (21 districts)	Karachi (32.4%)	Hyderabad (9.5%)	Larkana (6.3%), Khairpur (5.1%), Dadu (5.6%)	16 districts	

Source: Generated from data in Section 4.2, Chapter 10, Spatial Distribution of Population with Special Reference to the 1998 Census.

84. Sindh has been the recipient of a large number of migrants since Independence in 1947. The inflow of migrants after 1947 and their population settlement pattern had a significant effect in transforming the sociology, economic and politics of the province. In recent times there is evidence of continuing intraprovincial rural to urban migration and this too plays an important role in influencing the socioeconomic and political character of this region.

85. Language is a significant marker of ethnic distinction in Pakistan. This is especially true for Sindh where 60% of the provincial population speaks Sindhi, 21% speaks Urdu and 7% speaks Punjabi. The urban rural divide in Sindh also has a language dimension (See Table 2-6). Thus, whereas the vast majority (92%) of the rural population speak Sindhi, 50% of the urban population speak Urdu while the other half are divided between speakers of Sindhi and other regional languages such as Punjabi and Pushto.

[10] An urban place is defined by the Census as a "locality that is either a metropolitan corporation, municipal corporation, municipal committee, town committee or cantonment at the time of the census". Other characteristics, population, size, density, extent of non-agricultural employment or activity etc. that typify urban areas are not taken into consideration, except insofaras the administrative status of a place does reflect and influence them.
[11] Population Census 1998.

Table 2-6: Language distribution in Sindh (% population)

	1981			1998			
	Region						
Language spoken	Urban	Rural	Total	Urban	Rural	Total	Karachi
Sindhi	18.28	78.23	52.40	25.79	92.02	59.73	7.22
Urdu	49.68	2.17	22.64	41.48	1.62	21.05	48.52
Punjabi	12.05	4.38	7.69	11.52	2.68	6.99	13.94
Pushto	6.48	0.46	3.06	7.96	0.61	4.19	11.42
Balochi	3.03	5.63	4.51	2.74	1.50	2.11	4.34
Siraiki	0.77	3.44	2.29	1.70	0.32	1.00	2.11
Brahvi	0.30	1.67	1.08	-	-	-	-
Hindko	0.74	0.06	0.35	-	-	-	-
Others	8.65	3.94	5.97	8.80	1.25	4.93	12.44

Source: Population Census Reports 1991-1998

86. Sindh is also characterised by an acute shortage of housing and as a result has the largest number of katchi abadis or informal settlements in Pakistan. A total of 3.53 million people across Sindh and 50% of Karachi's population live in such settlements.[12] The proliferation of katchi abadis and informal settlements is largely due to a gap in the demand and supply of housing. While the province has an annual housing requirement of 120,000 new units (80,000 in Karachi alone) the formal sector can only provide 40,000 units.[13]Ineffective infrastructure in cities across Sindh has also led to changes in patterns of land use and demolition of the provincial built heritage. 1157 of the 1293 recognized katchi abadis have been marked for regularization.[14]

2.1.6 Socio-Economic Conditions

87. In addition to insufficient income, poor households are also marked by low levels of education, poor drinking water and sanitation facilities and unmet needs for health and welfare services.

2.1.6.1 Education

88. The state of education in the province is also poor (See Table 2-8). There is a significant correlation between literacy status of head of household and poverty. Thus, a greater proportion of poor head of households are illiterate compared to those from non-poor households (See Table 2-7 below).

Table 2-7: Sindh Poverty and Literacy FY99 (% of poor and non-poor illiterate head of households)

	Poor	Non-Poor
Overall	35.70	60.92
Rural	33.09	50.04
Urban	43.74	72.06

Source: Federal Bureau of Statistics, 2001, op.cit

[12] Government of Pakistan, National Policy on Urabn Katchi Abadis
[13] Hasan, Arif. Understanding Karachi. City Press, Karachi. 1999
[14] National Policy, op.cit

89. Sindh has the lowest primary school enrolment ratio among the provinces, the largest number of ghost schools in the country and, the worst student teacher ratio. The overall literacy average of 56%, is marginally higher than the national literacy average of 53%. However, this is largely due to the inclusion of the urban literacy rate of 72%. In general, the literacy rates for both males and females in rural areas, where the majority of the poor live, are significantly lower than urban literacy rates.

90. From the 1990s onwards there has been a continual decrease in public expenditure on education and in 2001/2002 the allocation of Rs. 1,150 million was reduced to 643 million for public sector school education. The condition of public schools is abysmal with 30% without buildings, 34% without electricity, 15% without water, and 33% without toilets.

Table 2-8: Literacy (%population)

	Pakistan		Sindh								
	2001-02 PIHS	2005 PSLM	1998-99 PIHS			2001-02 PIHS			2005 PSLM		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Indicator											
Literacy rate (10 years and above)	45	53	69	35	51	64	33	46	72	38	56
Male	58	65	79	53	65	74	51	60	80	56	68
Female	32	40	58	15	35	54	14	31	62	18	41
Adult literacy rate (15 years and above)	43	50	67	33	49	64	32	45	70	36	54
Male	57	63	78	52	64	74	50	60	80	54	68
Female	29	36	55	11	32	53	11	29	59	14	38
Net enrolment rate: primary level	42	52	60	29	41	53	33	40	61	38	48
Male	46	56	63	37	47	56	41	46	64	45	53
Female	38	48	57	21	35	50	25	34	59	29	4211

Source: Pakistan Integrated Household Survey (1998/99-2001/02) and PSLM 2004-05

2.1.6.2 Health

91. The health indicators for the province are generally poor (see Table 2-9). The rate of child mortality is higher than the national average (109 per 1000 deaths compared to 103 per 1000 deaths) while women's healthcare, especially in rural areas, is ignored.

92. A large proportion of diseases, especially those resulting in child and infant deaths, are water borne. According to a study conducted in 2000 in Karachi, 75% of the stored drinking water samples were contaminated.[15] Lack of safe drinking water is one of the main reasons why the incidence of diarrhoea among under-5 children, especially in the peak summer months, is higher in Sindh (33%) than that in the rest of the country

[15] Luby S. and Agboatwalla M, 2001. A Low Cost Intervention for Cleaner Drinking Water in Karachi, Pakistan, Int J. Dis 5:144-100 (REF IUCN REPORT P 265 REF 8)

(26%).[16] Another national survey conducted in 1996 also shows a high incidence of diarrhoea (35%) among children in Sindh.[17] Water contamination also leads to a high incidence of disease such as Hepatitis and Typhoid (especially in urban slums). A study conducted in Karachi in 1984 showed that 94% of children developed IgG antibodies against the Hepatitis A virus by the age of 3.[18] This is largely due to consumption of contaminated drinking water and food.

Table 2-9: Health indicators (% population)

	Pakistan		Sindh								
	2001-02 PIHS	2005 PSLM	1998-99 PIHS			2001-02 PIHS			2005 PSLM		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Indicator											
Infant Mortality Rate, per 1000	82										
Male	84										
Female	81										
Children (5 and under) suffering from diarrhoea (in past 30 days)	14	16	13	10	10	15	9	11	17	19	18
Male	14	16	12	10	10	16	8	11	17	19	18
Female	13	15	14	9	10	14	9	10	17	18	18
Full immunization rate, 2-23 months, record and recall	53	77	60	27	38	64	33	45	87	62	73
Male	53	78	66	31	42	66	39	49	86	64	74
Female	52	77	54	24	35	63	26	40	87	60	72
Total fertility rate	4.47										
Contraceptive prevalence rate	19		32	7	17	27	8	15			

Source: Pakistan Integrated Household Survey (1998/99-2001/02) and PSLM 2004-05

93. It is widely agreed that diarrhoea is one of the leading causes of child morbidity in Pakistan. According to a study on determinants of diarrhoeal morbidity in Pakistan it was found that the probability of occurrence of the disease (among under-5 children) increased with reduced access of the household to sanitary facilities such as connection of house to a drainage system. It was further found that consumption of piped water also raised the probability of occurrence of diarrhoea. This is because piped water is mostly contaminated. As expected, the probability of having diarrhoea was lower for children from high income groups compared to those from lower income groups.[19] This is largely due to the lack of access of such households to adequate drinking water, sanitation, and healthcare facilities.

[16] Multiple Indicator Cluster Survey of Pakistan 1995. MoH, GoP and Unicef
[17] National Health Survey of Pakistan, 1995. PMRC
[18] Agboatwalla, M. and Isomura S. 1995. Entric Viral Infection in Pre-school Children in Karachi, Pakistan, Ind. J Paed 62: 345-351.
[19] Iram, Uzma and Butt, Muhammed S.(2003) "Child Diarrhoeal Morbidity and its Determinants in Pakistan: An application of logistic model". Applied Economics Research Centre. Discussion Paper # 247. pp. 14-15.

94. Household size was also seen as a significant, positive, determinant of diarrhoeal occurrence. It was found that the larger the household the higher the probability of diarrhoea among under 5 children of the household.[20] This is probably because larger households do not have sufficient economic resources for suitable housing, adequate nutrition of all the children, and proper healthcare. It was further seen that increasing the level of education (number of years of schooling) of the mother and increased age of mother had a positive impact on reducing the probability of diarrhoea.[21] Better educated mothers (compared to illiterate or less educated ones) are thought to have an increased understanding of the needs of child health and proper hygiene practices while older mothers have greater experience in childcare and treatment of illnesses such as diarrhoea. Finally, easy access to public health facilities was also seen to reduce the chances of diarrhoea among children.[22] The shorter the distance between the residence and the health facility, the lower the chances of the illness occurring.

95. According to a survey conducted in Sindh, household level visits from health workers, regarding safe hygiene and sanitation practices, significantly reduce the risk of diarrhoea among children. It is estimated that if full coverage of such visits could be achieved 67 cases of diarrhoea may be prevented per 1000 children.[23]

96. It is further suggested that diarrhoea and other diseases such as dysentery, growth stunting in very young children, and worms can also be prevented by spreading the practice of washing hands after using the toilet and before eating. It is estimated that this practice, if adopted by the entire population, could prevent 180 cases of acute diarrhoea per 1000 children per year, 30 cases of stunting, 13 cases of worms, and 11 cases of dysentery per 1000 children per year.[24]

2.1.6.3 Environment

97. The level of environmental degradation has been increasing rapidly in Sindh. Noise and air emissions and discharge of hazardous effluence far exceeds allowable National Environment Quality Standards (NEQS).

98. There is no system for the collection, treatment and proper disposal of industrial effluence. As a result municipal and industrial effluence (such as that generated by the mining industry) is discharged directly into the waterways of Sindh leading to pollution and contamination of its water resources and a high incidence of water borne diseases. Waste water in Sukkur is released directly into the Indus; in Hyderabad into the Phuleli canal; and, in Kotri into the Kalri Baghar canal.

99. Sewage collection and disposal services are only available to approximately 3 million of Sindh's urban population. In small towns, 30 to 40% of solid waste is collected while 50 to 70% of this is transported to a dumping site. Consequently, urban areas are littered by heaps of solid waste leading to degradation and pollution of the environment.

[20] Ibid. 13
[21] Ibid. 13-14
[22] Ibid.15
[23] CIET International. Community response to sanitation risk Action Summary: Reinforcing the community response (Sindh)
[24] Ibid.

100. The heavy industry and port activity of Karachi are also a main source of environmental degradation. For example, the Karachi nuclear power plant is a source of thermal pollution. Amongst other things, organic matter, heavy metal and toxic chemicals are dumped into the sea. Only 20% of Karachi's sewage is treated before being released into the sea. For disposal of garbage the city relies on a very large industry of waste pickers. However, this facility is not available in the rest of Sindh.

2.1.6.4 Gender

101. Gender has a pronounced poverty dimension. Women, especially in rural areas, are subject to retrogressive customary norms and practices such as karo kari (honour killings), have few social safety nets and reduced access to formal systems of justice and other mechanisms of redress. Women are generally marginalized in both public and private spheres and are also known to have a limited role in household decision making about critical choices such as marriage.[25]

102. According to the 1998 population census, the female labour force participation, especially in rural Sindh, is very low (2.52% compared to the national equivalent of 23.13%). 47.62% of the Sindh female labour force belongs to rural areas. It is suggested that the rural female labour force participation rate is determined by and varies according to both economic (rural male labour force participation rate, structure of female employment and cropping intensity) and socio-cultural (rural sex ratio, rural female literacy rate and mean age at marriage of currently married rural females) variables. Thus, the rate of female labour force participation is positively effected by low rural male labour force participation rate, low cropping intensity (multiple cropping, a proxy for agricultural development), high rural sex ratio (more females than males), and higher rural female literacy rate.[26]

103. Women have reduced access to healthcare and education services and the situation worsens in rural areas. Only 22% of rural expectant mothers had pre-natal check-ups as compared to 68% in urban areas while only 30% of rural pregnant women received a tetanus toxoid injection compared to 68% of those in urban areas. A meagre 6% of rural mothers (compared to 19% in urban areas) went for post-natal consultations (PIHS 2001-02). The health of rural women also suffers due to the lack of accessible medical facilities such as government hospitals, dispensaries and health units. According to the PIHS (2001) 36% of rural households in Sindh had a lady health worker in their village while only 33% and 28% respectively had access to a trained dai and a traditional birthing attendant.

104. Women generally have lower literacy rates as compared to men: 80 and 62% respectively of urban men and women are literate compared to 56% and 18% of those in rural areas. Thus, the literacy gap widens in rural areas. Similarly, the net primary school enrolment rates for males are also higher than those for females and the gap widens when moving from urban to areas (64% and 59% compared to 45% and 29%).

105. Lack of adequate drinking water and sanitation facilities and garbage disposal facilities also place an extra burden on women, especially in rural

[25] Government of Sindh. August 2003. pp. 137-142
[26] Wasim, Pervez. "Rural female Labor Force Participation Rate in Sindh: An interdistrict analysis". Applied Economic Research Centre. January 2004. Discussion paper # 254. pp. 9-10

areas. The task of fetching water from an external source falls upon women. Significantly, the high incidence of disease (due to absence of WSS) places a greater burden on women as they are responsible for providing nursing care for unwell children and other family members.

2.2 Local Government and Administration

106. **Previous System:** Before 14th August 2001, the local governments were functioning under the Sindh Local Government Ordinance 1979. There were district councils and union councils in the rural areas, and, urban local councils namely municipal corporations, municipal committees and town committees (based on population of the city/town) in the urban areas. Municipal functions (water supply, sewerage, sanitation, roads, streets and streetlights, fire fighting, etc) were the primary responsibility of these local governments in the rural and urban areas. However, many local governments also operated primary schools, dispensaries and livestock dispensaries.

107. **Reform:** The local government system was extensively reviewed and the objectives of the reforms were to "devolve political power and decentralize administrative and financial authority to accountable local governments for good governance, effective delivery of services and transparent decision making through institutionalised participation of the people at grass-roots level"[27]. On the basis of extensive review and public consultation, the Local Government Plan took effect when the new elected bodies assumed office under the SLGO 2001 on August 14, 2001 (Sindh Ordinance XXVII of 2001).

108. **New System:** The new local governments under the SLGO 2001 are Zila Councils and District Governments (City District Government in Karachi - the provincial capital), Taluka Councils and Taluka/Town Municipal Administrations (TMA) and Union Councils and Union Administrations[28]. The SLGO 2001 provides clear functional jurisdiction for different local governments and has paved the way for major reforms in three important areas – Political (by creating these three new levels of elected local governments), Administrative (by devolving the administrative and management authority and staff of provincial departments involved in provision of essential social and economic services to the district governments and TMAs), and, Financial (by providing the system of inter-government transfers through a formula decided by the Provincial Finance Commission). The first cycle of elections was held in 2001 while a new cycle of elections has been held in 2005. After the election of Naib Nazims/ Convenors, the elected councils have started functioning from early 2006.

109. **Representation of Women:** Under the new system, in Sindh there are over 14,000 directly elected people's representatives at the Union Council level, of which nearly 1/3rd are women. Similarly in the zila and taluka councils at least 33% of the members are women. It is hoped that due to representation of women in the councils, the decision making process (specially in connection with WSS and SWM) will improve.

[27] Preamble of SLGO 2001.

[28] Section 2 (xvi) of the SLGO 2001. In Sindh, there are 22 District Governments, 1 City District Government, 23 Zila Councils, 103 Taluka Municipal Administrations (and Taluka Councils), 18 Town Municipal Administrations (and Town Councils), and 1,103 Union Administrations (and Union Councils) – January 2006.

110. **The Taluka Council:** The Taluka Council consists of the Naib Nazim of each UC in the taluka who is elected on the basis of adult franchise on a joint ticket with the Union Nazim[29]. In order to ensure representation of women in the Taluka Council, special seats (1/3rd of the number of UCs in the taluka) are reserved for women. Special seats are also reserved for peasants/ workers and persons from the minority communities (5% of the number of UCs in a taluka).

111. **The Taluka Municipal Administration:** From 14th August 2001 Urban Local Councils (ULC) were abolished. Now in each taluka, the Taluka Municipal Administration (TMA) a body corporate has the exclusive responsibility for municipal services. It is the successor to all the defunct ULCs of the taluka. The municipal functions being performed by the defunct district council in the rural areas of the taluka have also become TMA's responsibility. The TMA consist of the Taluka Nazim, Taluka Municipal Officer (TMO), Taluka Officers, Chief Officers, other officials of the local council services and officials of the offices entrusted to the TMA[30]. According to the law (Section 15 of SLGO 2001) three provincial departments involved in development of municipal services have been devolved to the districts and their staff and functions have been entrusted to the TMAs. These three departments are (i) Public Health Engineering Department, (ii) Housing and Physical Planning Department, and (iii) Local Government and Rural Development Department. The business of a Taluka Municipal Administration is conducted according to the Sindh Taluka Municipal Administration Rules of Business 2002.

112. **Overall Planning for a district:** For overall planning in a district, the Zila Mushavirat Committee (ZMC) has a very important role and its[31] functions are: (a) to crystallize vision for integrated development of the district; (b) to prioritise and co-ordinate inter-taluka development plans; (c) to resolve intra-district disputes; (d) to muster resources for crisis management; and (e) to set direction for realizing the economic potential of the district. The Zila Nazim and Naib Zila Nazim and the Taluka Nazims of all the talukas in the district are members of the ZMC. The Zila Nazim is Chairman of the ZMC while the District Coordination Officer (DCO) acts as the Secretary. The ZMC is to meet at least once in every three months or as and when called into meeting by the Zila Nazim or on the request of any two of the members[32].

113. **Working with Communities:** The Citizen Community Board (CCB) is a new mechanism for involving the non-elected people in development, operation and maintenance of projects. Twenty five persons can come together for a common cause and form a CCB for creating a new facility, operating and maintaining a new or existing facility, monitoring some function or facility of the local government, etc. The local governments can provide upto 80% of the project cost of an approved project and the balance 20% is to be contributed by the members of the CCB. In future, this will be the main vehicle for community participation in the development projects. Twenty five percent of the development budget of a

[29] The Union Nazim represents the UC in the Zila Council as a Zila Councillor, while the Naib Union Nazim represents the UC in the Taluka Council as a Taluka Councillor, allowing for representation of elected members in both the Taluka and Zila Council as well as providing a political linkage between these two councils with mutually exclusive functional responsibility.

[30] Section 49 of SLGO 2001.

[31] Section 140 (4) of the SLGO 2001.

[32] Section 140 (1) to (3) of the SLGO 2001.

council is to be earmarked for development through CCB projects[33] and is non-lapse able.

114. **Citizens' Monitoring:** Citizens' monitoring of the functioning of the local governments is envisaged by a number of provisions in the law for transparency and citizens' voice. An exercise for obtaining citizens perception of the quality of service provision by the local governments (mainly in education, health and WSS sectors) was conducted through a CIET Social Audit 2003. In order to improve the involvement of and monitoring by the community, information about staffing and the performance of the office of a local government during the preceding month has to be displayed at a prominent place within the premises of each office for access by the citizens.

115. **Transparency and Public Awareness:** Open access and the free flow of information is a basic element of the devolution of power to the grass roots level. Information can allow citizens access to services and provide a platform for the improvement of services. Statement of monthly and annual accounts (and other necessary statements) of a local government are to be placed at a conspicuous place for public inspection. Every citizen has the right to information about any office of the local government and every office has to provide requisite information (unless it is restricted under any law for the time being in force).

2.2.1 Institutional and Financial Issues

116. **Overlap of functional jurisdiction**: Despite clear functional jurisdiction in the SLGO, mega (as well as small projects) projects of WSS are appearing in provincial PSDP[34]. These projects reflected in the provincial PSDP are supply driven, and, there is no input from taluka councils, TMAs or users concerning levels of service, budgetary and resource requirements for O&M, WTP or tariff implications.

117. In addition to the provincial mega-projects, for drinking water there is a major Federal Program. Under the "Clean Drinking Water Initiative" 445 water filtration plants will be installed in the districts, tehsils (talukas in Sindh) and town of the Country. Under the "Clean Drinking Water for All", 6,035 filtration plants varying in capacity from 500 to 2,000 gallons per hour will be installed at the Union Council level by December next year. Out of the 445 districts, tehsils (talukas in Sindh) and towns, MoUs have been received from 417, technical surveys completed at 383 sites, and, work order for 185 plants has been issued. (The daily Dawn, March 22, 2006). This program is being implemented directly by the Federal Government. The plants are being constructed by contractors and handed over to the TMAs for routine O&M using their own resources. There has been little or no consultation with or participation of the households.

118. Very small annual allocation for projects appearing in the provincial PSDP resulting in a huge throw-forward. Only 12% of the project cost of Rs.5.9 billion provincial PSDP has been allocated for expenditure in FY06[35].

[33] Section 109 (6) of the SLGO 2001.

[34] **Sukkur:** Two projects of Rs.1.2 billion for Water Supply and Sanitation (including one for urban water supply and one for sewerage/ drainage of Sukkur City; **Mirpurkhas:** Two projects for the city Rs.598 million.

[35] For the mega-projects in Sukkur and Mirpur Khas only 1% and 3% of the project cost has been allocated.

119. **Devolution of PHED and entrustment of functions to TMAs**: On the commencement of the SLGO, the functions of PHED were devolved to the district governments and functions were entrusted to the respective Taluka Municipal Administrations[36]. From FY05, the PFC Award has allocated Rs.613 million to all the TMAs in Sindh "on account of transfer of functions and to the extent of the transfer of establishment of PHED". Vide Notification No SO.II(LGD)/2/(45)/90 dated 25th January, 2006, one post of DG (PHE) and one post of director technical (PHE) at Hyderabad, while 4 posts of SE (PHE) at Hyderabad, Larkana, Mirpur Khas and Sukkur have been created and the role of DG (PHE) has been '*relocated*' to perform the following functions:

    a) execution and supervision of all provincial ADPP schemes, inter-district/ inter-taluka schemes, foreign funded projects. The execution of TMA schemes upto Rs.10 million will remain with the TMA.

    b) provide technical assistance to the TMA by PHE,LGD in designing, monitoring and execution of water and sanitation schemes. The PHED,LGD will supervise the O&M of water supply an drainage schemes of major cities maintained by TMA.

    c) TO(I&S) will work under the command of PHE,LGD for execution of PHE,LGD related schemes, other activities of TO(I&S) will remain with TMAs.

120. **Changes in Territorial Jurisdiction of Talukas:** New talukas are being carved out of the existing talukas by changing the jurisdiction of existing TMAs[37]. This is being done without taking into consideration the integrated systems of water supply, sewerage and drainage. In the case study TMAs, Sukkur city has been allocated partly to 'TMA Sukkur' and partly to 'TMA Sukkur New' though the WSS systems of Sukkur city are integrated. The SLGO provides a system of joint committees[38] to deal with issues (such as managing integrated municipal systems) which has, however, not been used by the TMAs.

[36] Section 15 of SLGO: Entrustment of certain decentralized offices to Taluka Municipal Administration.- Subject to section 14 and section 52, on commencement of this Ordinance, the administrative and financial management of the offices of Local Government and Rural Development Department, Public Health Engineering Department and Housing and Physical Planning Department which were providing services at the regional, zonal, circle, divisional, district and taluka levels shall stand entrusted to respective Taluka Municipal Administration or Town Municipal Administration, as the case may be, alongwith the employees working in such offices: Provided that the Government may direct for retention of certain components of Housing and Physical Planning Department with the District Government alongwith the officers and members of staff working therein.

[37] According to a notification, Mirpur Khas City (Deh 109) is now a part of the newly created TMA Husain Buksh Marri (instead of TMA Mirpur Khas). The city, however, continues to be managed by TMA Mirpur Khas.

[38] The Taluka Council may, with the consent of the Zila Council or adjoining Taluka Councils or Union Councils, set up joint committees of the Councils for any purpose in which such Councils may be jointly interested and may delegate to such joint committees any power which may be exercised by them, including the power to make bye-laws for their functioning. [Section 73 of SLGO]

3 SINDH WSS AND SWM POLICY

121. Formulating the Sindh drinking water and sanitation, and SWM policies followed a three-stage process:

Stage 1: Review of the sector, based on the existing documentation and policies. This was supplemented by surveys and interviews conducted in selected TMA, summarised below (see Section 5 for the situation in the selected TMA).

Stage 2: Stakeholder consultations on issues

Stage 3: Consensus on draft policies (see Annex 7 for the procedures and process)

3.1 Review of WSS and SWM Conditions in Sindh

122. There is a general shortage of water in the region. Potable[39] ground water is only available in 28% of Sindh's land mass. Potable ground water in urban areas is invariably contaminated with salt, sewage and industrial effluence. The situation is particularly severe in rural areas where only 10% of the population has access to potable water. Rural water supply schemes are only available to 21.76% of the population. However, most of these are not properly maintained.

123. A large proportion of homes, especially in rural areas, do not have adequate access to drinking water. Thus, only 20% of rural homes get piped water (in and outside their homes) as compared to 71% in urban areas (See Table 3-1).

Table 3-1: Access to drinking water (% households)

	Pakistan		Sindh				
	2001-02 PIHS	2005 PSLM	1995-1996 PIHS	1996-1997 PIHS	1998-99 PIHS	2001-02 PIHS	2005 PSLM
URBAN							
Tap in house	53	60	71	72	58	59	71
Tap outside* house	5		6	6	6	8	
Hand Pump	14	13	10		17	14	13
Motor Pump	22	22	3		9	11	10
Hand Pump/ Motor Pump				12			
Well/Dug Well	2	2	4	5	2	1	2
River/Canal/ Stream	0				0	0	
Other	3	3	5	5	9	8	5
TOTAL	100	100	100	100	100	100	100
RURAL							
Tap in house	8	23	9	8	6	3	20
Tap outside house	2		1	2	1	1	

[39] Potable generally refers to water that is used for drinking but there is usually no technical evaluation to verify its quality. The terms "potable" and "drinking" are used interchangeably.

	Pakistan		Sindh				
	2001-02 PIHS	2005 PSLM	1995-1996 PIHS	1996-1997 PIHS	1998-99 PIHS	2001-02 PIHS	2005 PSLM
Hand Pump	56	39	54		50	66	58
Motor Pump	14	14	4		4	4	3
Hand Pump/ Motor Pump				55			
Well/Dug Well	10	9	12	16	13	14	8
River/Canal/ Stream	9			17	23	10	
Other	1	16	20	2	3	1	12
TOTAL	100	100	100	100	100	100	100
OVERALL							
Tap in house	22	39	39	40	29	26	45
Tap outside house	3		4	4	3	4	
Hand Pump	44	27	33		35	44	36
Motor Pump	17	18	4		6	7	6
Hand Pump/ Motor Pump				33			
Well/Dug Well	7	6	8	11	8	9	5
River/Canal/ Stream	6			9	13	6	
Other	1	10	13	4	5	4	8
TOTAL	100	100	100	100	100	100	100

Source: Pakistan Integrated Household Survey (1998/99-2001/02) and PSLM 2004-05
Categories: "Dug well" includes well open and well closed both inside and outside the house; "River/Canal/Stream" includes canal, river, spring, stream, pond; and "Other" includes public standpipe (supplied by tanker), water seller and other.
*In 2004-5 PSLM the categories of "tap water in house" and "tap water outside house" have been merged.

124. As discussed earlier, water pollution results in the spread of water-borne diseases especially among children. According to a survey carried out in Karachi in 1997, only 16% of water samples were fit for drinking[40]. The situation is far worst in other areas and, according to another study, 100% of water samples collected in Thatta, Badin and Tharparkar districts were contaminated.[41]

125. According to a national social audit conducted in 2004, 61.2% and 14.5% respectively of urban and rural households sampled had access to government water supply. 22.7% of households in the Sindh sample were satisfied with the government water supply schemes. Respondents were more likely to be satisfied if they were women; and, members of less vulnerable households. Respondents from rural areas, nationally, were more likely to be dissatisfied with government water supply facilities.

[40] UNICEF, 1998, Children and Women in Pakistan, A Situation Analysis. Cited in Sindh State of Environment and Development, IUCN, 2004.p. xxiii
[41] Ibid.

However, in Sindh, unlike the rest of Pakistan, urban dwellers were also less likely to be satisfied with government water supply.[42]

126. Rural homes also do not have adequate access to proper sanitation facilities (Table 3-2). While 88% of urban households have toilets in the home only 17% of rural households have this facility. Overall, 27% of rural homes do not have latrines as compared to only 5% in urban areas.

Table 3-2: Sanitation Facilities

	Pakistan		Sindh				
	2001-02 PIHS	2004-5 PSLM	1995-96 PIHS	1996-97 PIHS	1998-99 PIHS	2001-02 PIHS	2004-5 PSLM
URBAN							
Household Flush	89	86	82	90	92	91	88
Non- Flush	5	7	12	8	5	7	7
Communal Latrine			3				
No Toilet	5	6	3	2	2	3	5
TOTAL	100	100	100	100	100	100	100
RURAL							
Household Flush	26	30	11	23	14	17	17
Non- Flush	15	30	36	41	28	34	56
Communal Latrine			11				
No Toilet	59	40	42	36	58	49	27
TOTAL	100	100	100	100	100	100	100
OVERALL							
Household Flush	45	54	45	56	49	48	51
Non- Flush	12	20	24	25	18	23	32
Communal Latrine			7				
No Toilet	43	26	24	19	33	30	16
TOTAL	100	100	100	100	100	100	100

Source: Pakistan Integrated Household Survey (1998/99-2001/02) and PSLM 2004-05

127. 85% of rural households do not have access to drainage facilities. In comparison 90% of urban homes are connected to drainage systems (See Table 3-3).

Table 3-3: Drainage facilities

	Pakistan		Sindh				
	2001-02 PIHS	2004-05 PSLM	1995-96 PIHS	1996-97 PIHS	1998-99 PIHS	2001-02 PIHS	2004-05 PSLM
URBAN							
Underground	45		60	66	65	69	

[42] CIET: Social audit of governance and delivery service Pakistan 2004-5. Islamabad September 2005. pp. 64-65

	Pakistan		Sindh				
	2001-02 PIHS	2004-05 PSLM	1995-96 PIHS	1996-97 PIHS	1998-99 PIHS	2001-02 PIHS	2004-05 PSLM
Drains							
Open Drains	40		33	27	22	19	
Covered Drains	4				6	2	
Soak Pit			4				
No System	10		3	8	7	10	
Total	100		100	100	100	100	
RURAL							
Underground Drains	1		2	2	1	2	
Open Drains	32		23	22	12	12	
Covered Drains	1				0	0	
Soak Pit			29				
No System	66		46	77	87	85	
Total	100		100	100	100	100	
OVERALL							
Underground Drains	14		30	33	30	30	
Open Drains	32		28	24	16	15	
Covered Drains	2				3	1	
Soak Pit			17				
No System	49		26	43	51	54	
Total	100		100	100	100	100	

Source: Pakistan Integrated Household Survey (1998/99-2001/02) and PSLM 2004-05

128. According to a national social audit conducted in 2004, 16% of households sampled in Sindh were satisfied with government sewage and sanitation services. It was also found the respondents were more likely to be satisfied if they were women; members of less vulnerable households; and, urban residents.[43]

129. According to the 2001-02 PIHS, 43% and 75% of urban and rural households respectively do not have access to garbage disposal facilities. 43% and 19% of urban and rural households respectively, use private garbage disposal service. Only 14% and 6% of urban and rural households respectively are serviced by the municipality.

130. The 2004 social audit found that 34% of communities sampled had access to a government garbage disposal service. Only 10.7% of households were satisfied with the services provided. It was also found that urban and better-off households were more likely to be satisfied with these facilities, probably because they have better access compared to poorer and often rural households.[44]

131. Young children in rural areas are particularly susceptible to disease due to absence of adequate sanitation and solid waste disposal facilities. It has been suggested that the incidence of diarrhoea can be decreased by encouraging households which do not have latrines in the house and

[43] CIET 2005 op.cit. pp. 62-63
[44] Ibid. 60-61

instead use field latrines to invest money on building a latrine. It is estimated that 1 latrine costs as much as treating 10 episodes of diarrhoea in Sindh. This practice could prevent 85 cases of acute diarrhoea per 1000 children per year.[45]

132. While proper garbage disposal (as opposed to dumping garbage in community spaces) reduces cases of diarrhoea (20 less cases per 1000 children per year) this practice has greater effect on reducing chronic growth failure among young children. It is estimated that proper disposal of garbage could prevent 50 cases of stunting per 1000 children.[46]

3.2 Issues in WSS and SWM

3.2.1 Water

133. The quantity of water and the duration of the supply to the consumers are inadequate (except in certain areas) and households need to supplement this with water from other sources (even where water from other sources is unusable for drinking and washing):

- sufficient storage facility is not available to meet the supply requirements during periods of canal closure; existing overhead tanks are inadequate (causing pressure reduction, energy wastage);
- water does not reach the entire network (for instance in the northern area of Mirpurkhas city); lack of control valves adds to difficulties in uniform/equitable distribution of water;
- to meet water shortages, women have to fetch water over long distances.

134. The quality of water is poor (odour, colour, biological condition):

- in most cases where supply is from a surface water source, “settled” water without filtration and disinfection, is supplied (except in some cases such as Sukkur city, where water treatment is carried out); even where treatment facilities exist, these are not in use (such as clarifier and filter at Mirpurkhas);
- in many cases, city/town water supplies are drawn from the irrigation canals at a point downstream of where largely untreated wastewater from the city/town is being discharged. In addition, the Pinijari, Akram Wah, New Phulleli and Kalri Begar Feeder canals (and their branches downstream) off taking from the Kotri Barrage carry domestic and industrial effluent particularly from industry in Kotri and Hyderabad. This affects domestic water supply in five districts (as well as in Karachi via the Kalri Begar Feeder)

135. The coverage of safe drinking water supply in rural areas is low (even where there are rural water supply schemes, the water available is inadequate in quantity and quality); many rural water supply schemes are inoperative – in many cases because of the issues related to the Village Development Associations (VDA) which are required to operate the community-managed rural water supply schemes:

- many VDA functionaries are unable to discharge their duties, either due to lack of understanding of the concept and process or inability to motivate households to contribute their share to operate the WSS services;

[45] CIET op. cit.
[46] Ibid.

- the role and responsibility of the community is not fully understood and/or appreciated;
- the share of charges for WSS services demanded by the VDA from households are not proportionate to water consumption by the household or their level of affordability;
- there is a perception amongst households of a lack of transparency with regard to expenditures incurred; some households complain that they only receive payment demand but no water;
- there is no technical advice or support available to the VDA in the operation and periodical maintenance of the WSS schemes; suction and delivery pumps, piping, pump houses, operator's quarters, boundary walls and gates are in poor state of repair (many pump houses are used as private stores or occupied by families).

136. In areas where groundwater can be easily accessed by households themselves and is of a reasonable quality, there is little demand for municipal supplies especially if it has to be paid for.

137. Arsenic contamination has been reported at some places (for instance at Khairpur).

138. The physical condition of the water supply system in most urban areas is poor and there is no regular maintenance or upkeep:

- poor condition of water works (for instance at Mirpurkhas), water clarifiers and filters are not working, pumping machinery is non-operational (for instance Jamesabad water works);
- poor condition of network causes leakages and wastages of water, and because of intermittent supply wherever the pipes are exposed or where they pass through open drains, polluted water is sucked-in and the water supply is polluted;
- similarly, house connections from water distribution mains (comprising of galvanized iron pipes) are in poor condition, many have leakages and pass through drains full of sewerage causing both wastage of water and entry of pollution in the network.

139. There is no system of monitoring of quality of water (at source or water supplied for consumption) and there is a lack of water testing facilities.

3.2.2 Drainage and Sewerage

140. In most cases, open drains provide both surface drainage and carry sewerage, with human excreta directly discharged into the drains. The open drains get blocked due to a combination of inadequate gradient, solid waste (particularly polythene bags), street sweepings, large content of solids in the grey water and the general state of disrepair and lack of maintenance. Sewage held up in the drains, overflows and ponding is frequent.

141. In urban areas where sewerage has been laid out, poor operation and maintenance practices (for old and deteriorated main sewers such as in Sukkur and Shikarpur) aggravate the conditions.

142. The drainage disposal stations are not properly operated (effluent is held up), have capacity of limitations, the civil and mechanical works are in a poor state, and in may cases the stations are poorly located – they are pumping effluent into canals upstream of the intake for water pumped out of the canal for supply to the population.

143. Oxidation ponds, where they exist, are usually in a poor condition. There is generally an absence of wastewater treatment facilities.

3.2.3 Solid Waste Collection and Disposal

144. There are no municipal solid waste collection and disposal systems in the rural areas.

145. There are no municipal systems for household level collection of solid waste, except on an informal level where municipal sanitation staff may provide their services against nominal payment.

146. The quality of street cleaning is poor: lack of litter bins, shortage of sanitation staff, type of cleaning equipment in use (broom, hand carts, donkey carts) and cleaning practices, resulting in street littered with refuse, and choking drains.

147. Refuse in communal storage structures get scattered around these structures due to wind and scavenging. These storages are health hazards (breeding larvae, rodents, etc.) and generate foul odour.

148. The widespread use of polythene bags that cannot be adequately disposed off due to the generally poor sanitation conditions, litter the rural and urban areas (and clog the drains).

3.2.4 Water and Sanitation Tariff

149. The water tariff in urban areas was fixed many years ago (prior to soaring electricity costs and salary increases) and is presently inadequate to meet even the salary costs. In most cases billing at the current tariff covers less than 50% of the cost of service delivery and (with few exceptions) does not cover the salary costs.

150. The poor quality of services provided has reduced the willingness-to-pay on the part of the consumers.

151. In some cases the rate of recovery of billed water tariff is low.

152. There are usually no direct charges for sewerage and solid waste collection.

153. There is, historically, no concept of calculating (i) total cost of service provision, (ii) unit cost of various services (water, solid waste) and (iii) cost recovery. The expenditure information in many cases is not arranged in a manner which would facilitate costing (and in many instances even the prescribed formats are not attached to the budgets).

3.2.5 Institutional Aspects

3.2.5.1 Creation and Delineation of New Municipalities

154. New TMAs have recently been created without consideration for the integrated water supply, sewerage and drainage systems and the need for coordinated management of urban areas as envisaged in the SLGO:

- Sukkur urban area has been divided into “Sukkur’ and ‘Sukkur New’ whereas the WSS systems of the city are integrated.
- Mirpurkhas (Mirpurkhas City – Deh 109) has now been made part of the newly created Hussain Buksh Marri TMA, but continues to be managed by TMA Mirpurkhas.

3.2.5.2 Devolution and Centralization: Dual and Overlapping Responsibilities

155. SLGO 2001 provided for devolution of Public Health Engineering Department (PHED) and accordingly the Provincial Finance Commission (PFC) Award FY 05 allocated Rs.613 million to TMAs "on account of transfer of functions and to the extent of the transfer of establishment of PHED". However recently PHED has been redesignated functions (Notification No. SO.11(LGD)/2/(45)/90 dated 24th January 2006) and new posts created (Director General, Superintendent Engineers at Hyderabad, Larkana, Mirpurkhas and Sukkur along with complete establishment) to execute and supervise all provincial ADP schemes, inter-district/inter taluka schemes, foreign funded projects, and schemes above Rs.10 million. The TO (I&S) of the TMA have been placed "under the command of the PHE" for this purpose.

156. In addition to large "mega" projects, small WSS schemes are also included in the provincial development program (PSDP). These supply driven schemes create differing levels of service in the area with adverse budgetary and O&M resource requirements and tariff implications.

157. The large "mega" projects are conceived as a single project but in real terms are implemented as "mini" or "micro" schemes due to the financial allocations and pace of execution:

- two "mega" projects, one for water supply and the other for sanitation/ drainage, costing Rs.1.2 billion are underway in Sukkur while the annual allocation in PSDP is 1% of the project cost;
- two "mega" projects costing Rs.598 million are underway in Mirpurkhas while the annual allocation in the PSDP is 3% of the project cost;
- overall, the PSDP allocations are 12% of the project cost of the Rs.5.9 billion PSDP, resulting in large throw forward.

158. The district governments are directly supporting water supply schemes through the VDA and constructing drainage schemes, although this falls within the functional mandate of the TMA.

159. The federal government has initiated a program to install water filtration units in every union administration. The O & M responsibility (staff, direct costs) has not been clarified.

3.2.5.3 Participation of Citizens and Communities

160. SLGO 2001 provides various mechanisms for working with communities, transparency, participation and "bottom-up-planning" which are not fully operational in the TMAs. The opportunity for citizens to voice their views is through lobbying elected representatives but this is highly restricted in the absence of access to information and operational transparency. One such mechanism, that of the Citizen Community Boards (CCB) to which 25% of the development budget of all local governments is to be allocated and the amount to be utilized for schemes co-funded and implemented by the CCBs, is not yet functional and many TMAs are not showing any allocations for CCBs in their budgets as required under the SLGO and budget rules.

161. There is lack of cooperation between the government agencies and the citizens. At the municipal level this is reflected in the low rate of recovery of even the low water tariffs, the use of household level pumps to draw in

more water from the public water supplies, and the general attitude of people towards the municipality.

3.2.5.4 Staff

162. There is a shortage of front-end service providers in the TMA. For instance, of the budgeted posts in the case of sanitary workers, 52% in Johi, 40% in Sukkur, 32% in Shikarpur, 20% in Umerkot and 17% in Larkana are vacant. TMAs report that they cannot recruit staff due to recruitment ban (and other administrative constraints).

163. The service provides and technical and administrative staff skills at all levels need to be upgraded.

3.2.5.5 Planning

164. Direct citizen participation and voice in planning (as stated above) is further constrained by the absence of basic information and data:

- topographic maps are not available for the urban areas;
- there is no record, inventory/data-base of WSS schemes, for instance, and in many cases records of municipal properties have not been updated; maintaining a comprehensive database and information system is an obligation under the SLGO [Section 54 (K)]. The absence of information, and access to information by citizens, results in a number of WSS (and other) schemes being approved for the same locality by the same local government under various initiatives as well as lack of coordination and linkages between various schemes.

165. Planning for new capital works is given preference over maintenance of sunken investments.

166. There are no yardsticks for budgetary allocations for operation, repair and maintenance expenditure (even broad 'rule of thumb' type such as unit cost of service as a percentage of salary expenditure); there is no relationship of O & M costs with the standard of service delivery. In FY06, three TMAs have provided less than Rs.0.5 million while Sukkur has provided Rs.5.2 million for O & M expenditure for water supply. For electricity, the budget at Umerkot is Rs.2 million while at Sukkur (with more than five times the pumping requirement) the provision is of Rs.1 million.

167. There is no link of budgetary provision with outputs, outcomes, performance or performance targets as required under the rules (Budget Rule 99) which prescribe a number of formats (BDO 8 and 9) for preparing service delivery performance targets and reporting on their status during the year. A number of prescribed formats relating to policies, activities, targets etc. that can assist in performance budgeting are not included in the budget documents (such as BSF 1 on policies and activities; BSF 2 on service delivery targets, and BSF 3 on status of service delivery facilities).

3.2.5.6 Fiscal Resources

168. The overall fiscal resources available to the TMAs are limited. The PFC Award FY 05 allocated 20% more funds to TMAs to meet the statutory salary increases but soaring electricity costs and the low own source revenues of the TMAs impose severe budgetary constraints: for instance, salaries account for 61% - 89% of the FY 04 (revised) budgets in TMA

Sukkur, Mirpurkhas, Larkana, Umerkot, Shikarpur and Johi; the FY 06 budget for TMA Sukkur shows a further increase of 30% in its salary budget.

3.2.5.7 Financial Management

169. Financial management in TMAs suffers primarily from non-compliance with prescribed rules (although system improvements to streamline procedures may contribute together with training of staff). For example, separate public accounts as required under the rules [Budget Rule 10, 51(1)(v)] are not prepared; charged expenditures (expenditure of council; interest payments; decree or awards against TMA) are not shown separately [SLGO Section (11)(b)]; outstanding liabilities and loans are, in many cases, not shown [Format BDO-5]; and justification and explanations of the receipts and expenditures (BDR-5 and BDC-8) are seldom provided.

3.3 The National Policy Context

170. Over the preceding years, there has been an active process of formulating National Policies for Drinking Water and Sanitation. This has been done through an intensive and extensive process of consultation and the involvement of all stakeholders at all levels from National through Provincial and District. Attention has been paid to ensure that global best practices and standards of health and service delivery have been incorporated.

171. Unfortunately, the process was put on hold by the earthquake of last November, just as the culminating national consultation was about to take place to ratify the results and contributions of the provincial and other consultations. Therefore, no national policies have been formally agreed to or enacted.

172. For the purposes of drawing up recommendations for the Draft Policy for Sindh, the discussion document prepared for the final consultation sessions has been used as representing a fairly accurate view of opinion and aspiration.

3.3.1 Policy Guidelines

173. The national policy documents provide policy guidelines that the provincial policies would be expected to follow. The fundamental principle in formulating the policies is that health and access to water are fundamental human rights and should be accessible to all; the other principles on which the proposed policies should be based include:

i) The need to ensure that they meet legislative requirements, in that they are in conformity with national policies, (National Sanitation Policy, Katchi Abadis, EPA, etc.) ensure adherence to NEQS and Pakistan Drinking Water Quality Standards, and provincial policies (SLGO, etc.);

ii) The need to require that they are practical and feasible, and that they encourage participation and buy-in from all stake holders, while ensuring that the needs of poor and vulnerable sections of society, especially women and children, are adequately addressed;

iii) The need to ensure that they facilitate local control through the facilitation of the provision of acceptable, affordable and sustainable SWM, sanitation and drinking water services, in accordance with

SLGO 2001 and the mandate of the TMA, rather than merely enabling or upgrading the capacity and capability of local government and statutory undertakings to provide and supply such services;

iv) The need to ensure that the services provided are sustainable, and that while the minimum level of provision may be free, users should pay progressively for increased levels of convenience and for increasing levels of consumption; and

v) The component-sharing model should be adopted for all TMA schemes, whereby different aspects and components are handled by different organisations and entities, allowing for the costs to be more easily shared, and made more transparent, and therefore make cost recoveries easier.

3.3.2 Policy Formulation Process

174. The Sindh Domestic[47] Water Supply and Sanitation[48] Policy and the Sindh Solid Waste Management[49] Policy are intended to support and guide the Sindh City District Government and Taluka Municipal Administrations (TMA) to frame their own domestic water supply and sanitation strategies, plans and programmes and is the result of stakeholder consultations held at the Taluka and provincial levels.

175. The Sindh Policy has been prepared after extensive consultations, detailed technical assessment in selected urban and rural areas and a process of consensus building The objective of the process was to ensure participation of stakeholder groups both in (i) identification of issues, and (ii) together with the technical, fiscal and financial assessment carried out by the TA Team, build a consensus on policy response to the identified issues. (See Annex 10 of interim report for further details of the process)

176. The first stage of the process involved three principal activities: (1) Consultation meetings with stakeholders in 41 Taluka Municipal Administrations (TMAs); (2) Issues assessment in 6 TMAs; and (3) Meetings at the provincial government level. The outputs of these consultations were analysed in the background of the detailed technical, fiscal, financial and WSS tariff assessments in the 6 selected TMAs. The issues highlighted in the Consultation process, together with reports from the technical and financial assessment conducted by the TA Team, formed the basis for preparing the first draft of the Policy which was included in the Interim Report.

[47] Domestic Water refers to the provision of water to households, offices and commercial establishments primarily for the use of and by people in and for their everyday activities. Also referred to as "municipal" water supply, it excludes the supply of water used as inputs for manufacturing or production (such as large-scale, commercial, agricultural and industrial) processes. "Drinking Water", which forms an important component of domestic water supply, refers to water, treated or untreated, which is intended for human use and consumption and considered to be free of harmful chemicals and disease-causing bacteria, cysts, viruses, or other microorganisms.

[48] Sanitation is defined by the World Bank as 'Interventions to reduce people's exposure to diseases by providing a clean environment in which to live; with measures to break the cycle of disease. This usually includes disposing of or hygienic management of human and animal excreta, refuse and wastewater, the control of disease vectors and the provision of washing facilities for personal and domestic hygiene. Sanitation involves both behaviors and facilities which work together to form a hygienic environment.' http://www.worldbank.org/html/fpd/water/topics/hsp/hsp_definitions.html and is used here to include open drains, covered drains and underground sewerage systems used to collect and dispose of human wastes.

[49] According to the United Nations, "Solid waste management refers to the supervised handling of waste material from generation at the source through the recovery processes to disposal." Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997

177. The second stage of the process involved consensus building on the first draft of the Policy and was carried out after the submission of the Interim Report. This included: (1) Circulation of the summary issues statement and first draft of the Policy included in the interim report to a stakeholder group invited to a Consensus Building Meeting held on April 20, 2006. (2) Presentation of the issues assessment carried out in Sindh, the framework of the draft national policies, and the first draft of the Sindh Water Supply and Sanitation Policy. Discussions were held by the group, which included high-level Provincial Government officials, invited representatives from selected local governments who could make commitments on behalf of their organizations, and civic and civil society groups, on the draft of the Policy. (3) Publication of the Draft Policies in national press, with an invitation to the public to send in their comments.(See Figure below).

178. The feedback from the meeting of April 20, 2006 on the first draft of the Policy and comments from the public provided the basis for the review and revision and the revised draft contained in this document.

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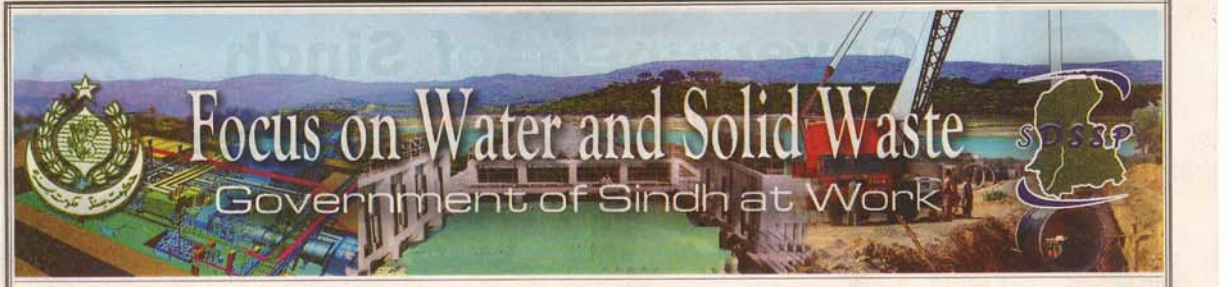

Domestic water supply policy for Sindh

PREAMBLE: The Sindh Domestic Water Supply Policy is intended to support and guide the Sindh City District Government and Taluka Municipal Administrations (TMA) to frame their own domestic water strategies, plans and programmes and is the result of stakeholder consultations held at the Taluka and provincial levels.

The Government of Pakistan has recently finalised, after stakeholder consultations held at the provincial level and in Azad Jammu and Kashmir and the Northern Areas, the draft National Drinking Water Policy to guide and support the provincial and district governments in framing their own drinking water strategies, plans and programmes. The draft Policy for Sindh, while reflecting the ground realities in Sindh, has been drawn up within the broad framework of the draft National Policy.

The Sindh Policy has been prepared after extensive consultations, detailed technical assessment in selected urban and rural areas and a process of consensus building. The objective of the process was to ensure participation of stakeholder groups both in (i) identification of issues, and (ii) together with the technical, fiscal and financial assessment carried out by the TA Team, build a consensus on policy response to the identified issues. (See Annex 10 of interim report for further details of the process)

The first stage of the process involved three principal activities: (1) Consultation meetings with stakeholders in 41 Taluka Municipal Administrations (TMAs); (2) Issues assessment in 6 TMAs; and (3) Meetings at the provincial government level. The outputs of these consultations were analysed in the background of the detailed technical, fiscal, financial and WSS tariff assessments in the 6 selected TMAs. The issues highlighted in the Consultation process, together with reports from the technical and financial assessment conducted by the TA Team, formed the basis for preparing the first draft of the Policy which was included in the Interim Report.

The second stage of the process involved consensus building on the first draft of the Policy and was carried out soon after the submission of the Interim Report. This included: (1) Circulation of the summary issues statement and first draft of the Policy included in the interim report to a stakeholder group invited at a Consensus Building Meeting held on April 20, 2006. (2) Presentation of the issues assessment carried out in Sindh, the framework of the draft national policy, and the first draft of the Sindh Domestic Water Supply Policy. Discussions were held by the group, which included representatives from selected local governments who could make commitments on behalf of their organizations, and civic and civil society groups, on the thrust of the Policy.

The feedback from the meeting of April 20, 2006 on the first draft of the Policy provided the basis for the review and revision and the revised draft contained in this document.

CONTEXT: The water realities relied on demographic change, coverage, social issues, the resource dimension, NGO and private sector involvement, capacity and capability of planning agencies and local government departments, are given below and has formed the basis for the development of the principles of the Sindh Domestic Water Supply Policy.

"Sindh's population according to the 1998 Census is 30.44 million. The annual population growth rate is 2.80 per cent which means that the population will double in the next twenty-five years. Urban growth is 3.5 per cent and 48.8 per cent of Sindhis live in urban areas. This trend is likely to continue.

"There is a scarcity of drinking water and coverage is poor. According to one survey , sixty seven percent of households has access to water inside their houses i.e., 26% have taps, 6% have motorized pumps and 35% have hand pumps. In rural areas 57% of the households has access to water inside their houses i.e. 3% have taps, 3% have motorized pumps and 51% have hand-pumps. In urban areas 80% of the households has access to water inside their houses i.e. 59% have taps, 9% have motorized pumps and 12% have hand-pumps. Between 1996 and 2002, there has been a decrease in the percentage of houses with access to water inside their house through tap water from 39% to 26%. In urban areas the tap water decreased from 71% to 59%. However there has been an increase in hand-pumps usage from 26% to 35%.

"Overall 50% of the households are paying for tap water. In rural areas 58% and in urban areas 49% are paying for tap water. However, there is virtually no data regarding water quality.

"Most cities have invested in piped water systems. The old systems have collapsed due to a lack of maintenance and poor design.

"The water is supplied intermittently. As the water lines are laid adjacent to the sewers/ drains the wastewater is sucked into the water lines. Often water lines have been tapped informally using loose joints and connections, again leading to contamination by sewage.

"The main source of water for many settlements in the irrigation canal and during canal closures or supply shortages, there is no water available in the canal. The canals are also used as the outflow for untreated sewage. Thus the dumping of sewage by new settlement/ communities/ the waste of others disconnects who undertake little or no treatment before supplying it to the households.

"Household Surveys show that the majority of the population do not have a clear understanding of the relationship between unsafe water and health. As a result, water-borne diseases impoverish them.

"Government spending for the water and drinking water sector has been poor (0.08 per cent of the GDP for the year 2002-03, and 0.09 and 0.10 per cent for the years 2003-04 and 2004-05 respectively). These allocations are insufficient to meet the Millennium Development Goals and other targets for the water and sanitation sector and are utilized for the water sector rather than drinking water.

"Vertical programmes (such as the Khushal Pakistan Programme) are organised and implemented in ways that adversely affect the autonomy of the Taluka Municipal Administration (TMA) in preparing the development budget and also undermine local government accountability and operational efficiency.

"There is considerable evidence to show that in the absence of government and/or NGO support and investments, communities organise to build their drinking water systems on self-help. If this process is supported then the huge investments/ resource constraints in the sector would be better utilised and would help to overcome resource constraints.

"There are a number of Pakistani NGO and government agency programmes and projects that have successfully supported communities in financing and managing the construction of their neighborhood drinking water infrastructure through self-help. Government/NGO/CBO partnerships have emerged as a result where local government has complimented this work by providing bulk water.

"In most urban areas and in all rural areas drinking water is not priced and as such O&M cost for infrastructure have to be subsidised from other sources.

"Land-use and topographic Maps and development plans of existing settlements and the infrastructure that they contain do not exist for the urban and/or rural areas of Sindh. Institutional capacity and capability for such documentation is almost non-existent. In the absence of such documentation, realistic and cost effective planning cannot take place.

"There is also inadequate technical capacity and capability in government agencies to plan and implement and an absence of management information systems.

"Engineering standards followed in Sindh (water systems) are over expensive to build, operate and maintain. Standards developed by NGO and innovative government programmes have overcome these constraints and are being increasingly applied as solutions.

"So far there has been an absence of a drinking water policy and an absence of a clear definition of drinking water itself. In addition, roles of the different government agencies responsible for planning and implementation are not clearly defined. There are also a large number of actors involved in drinking water provision and a large number of parallel drinking water related investments and programmes between which there is no coordination and many of which do not come under the purview of local government institutions. Local government and development agencies also lack managerial, administrative and monitoring capacity due to which a lot of ad-hoc decisions and programmes take place.

OBJECTIVES: The primary objective of the Sindh Domestic Water Supply Policy is to improve the quality of life of the people of Sindh. To achieve this, the policy has the following sub objectives:

"To ensure access to safe drinking water, in the adequate quantity and quality and hygiene practices to compliment the primary objectives.

"To develop guidelines for the evolution of an effective institutional and financial framework to implement the primary objectives.

"To link drinking water programmes with environmental, hygiene promotion and city and regional planning policies and programmes.

POLICY PRINCIPLES: *The following key policy principles will be pursued:*

"To recognise that access to safe drinking water is the basic human right of every citizen and that it is the responsibility of the state to ensure its provision to all citizens.

"The right to water for drinking takes precedence over rights for water for all other uses such as environment, agriculture, industry etc.

"To recognize the role of the broad range of providers in the sector and provide a supportive policy framework that encourages alternate options through private provision, public-private partnerships and the role of NGOs and community organizations.

"To facilitate the role of the state in a manner which allows balance between its functions as a service provider and the authority it must exercise as a regulator.

"To ensure that the existing inequities in the provision of safe drinking water are removed and the needs of the more vulnerable and poor are effectively addressed through adequate financial allocations and provisions of suitable technological options.

"To recognise the key role that women play in the drinking water sector and ensure their participation in decision-making for the sector at all levels.

"To recognise the provision of safe water should be undertaken through a responsibility centred, demand-driven approach in which the community norms here are given a key role.

MINIMUM ACCEPTABLE DRINKING/DOMESTIC WATER OPTIONS: *The definition of minimum acceptable drinking water in the context of this policy is given below.*

"In urban areas and/or rural settlements communal water points will be established within a radius of 0.5 km where safe drinking water will be made available. Water should be provided 2 litres per person per day for the settlement. The water quality will be as per the WHO Guidelines.

"The definition of minimum acceptable domestic water in the context of this policy is given below.

"In urban areas and/or rural settlements water will be provided inside the house, through piped system, to meet the minimum requirement of 50 litres per person per day.

"In rural settlements water will be provided through communal points to meet the minimum requirement of 25 litres per person per day.

TARGETS: While each city district government and TMA will pursue its own targets, the overall aim of the Sindh Provincial Government is to facilitate the attainment of the targets specified in the Medium Term Framework and the Millennium Development Goals for the country as a whole. The specific targets entail the following:

"To provide safe drinking water to 93% of the population by 2015 thereby raising the current coverage by almost 18% (from 67% at present to 93% in 2015) for the existing population and ensuring that the additional population is also provided access.

"To provide at least one hand pump or spot source for every 250 persons.

"To establish water treatment plants in all urban areas by the year 2015

PUBLIC OPINION

Pursuing the resolve of the Government of Sindh for eradicating poverty, improving living conditions and providing basic facilities in water supply, sanitation and solid waste management sectors, the Local Government Department, Government of Sindh, with the assistance of Asian Development Bank, has undertaken the Local Governance Development Programme (LGDP) Water Supply Policy and 2) Solid Waste & Sanitation Policy through international consultants Halcrow Pakistan (Pvt.) Limited. The policies have been framed in consultation with all the stakeholders. Through publication in newspapers and to achieve the objectives of transparency and public participation, the public opinion / suggestions are invited to further improve these policies before their approval and implementation

Dr. Ishrutul Ibad Khan,
Governor of Sindh

Dr. Arbab Ghulam Rahim,
Chief Minister of Sindh

M.A. Jalil
Adviser to Chief Minister on Finance

Wasim Akhtar
Adviser to Chief Minister on local govt

"There will be a regular review and updating of the legislative framework after every five years or when required by a committee constituted specially for the purpose of reviewing the implementation of its guidelines, their efficacy and continued relevance to the changing situation in the country.

PROPTICATION OF WATER SOURCES

"Regular monitoring of water sources to ensure the protection of water sources fields.

"Preserve and protect surface (rivers, lakes, wetlands) and groundwater resources which offer sustainable sources of supply for local communities in both urban and rural areas.

"Encourage and support rainfall harvesting schemes (including 'tanka', Veer dams) for augmenting municipal water supply.

INSTITUTIONAL STRATEGY

"To focus on the role of the Government as both a service provider and regulator to ensure that water quality standards are properly articulated, maintained and enforced.

"The Sindh Provincial and Local Governments will develop medium term plans for the drinking water sector in keeping with the Medium-Term Development Framework and the Millennium Development Goals in conjunction with relevant municipal authorities to guide and steer the future developments in the sector.

"The TMAs will be encouraged to make use of the SLGO (DRI) provision that allows for a variety of "contracting in" and "contracting out" arrangements for most effective service provision through the civil society and private sector organizations using performance based contracts. These arrangements can potentially be used for design and implementation, water testing, operation and maintenance, collection of water charges, awareness building, etc.

"The TMAs will be encouraged to adopt a service provider orientation to its clientele. It will develop an approach which integrates community engagement, demand assessment and service provision and marketing in order to effectively address the professional credibility and meet the needs of the people in the most suitable way.

"Capacity Building programmes will be designed to strengthen institutions which are lacking in capacity such as the Town and Taluka Municipal Administrations, the Sindh Environmental Protection Agency, the Local Government and Rural Development Departments, etc.

"Planning, design, implementation and operations of water systems still ensures a decision making role of the intended beneficiaries, who should be treated as partners rather than passive recipients of development;

"To ensure that community organizations the planning, implementation technological choices and supply specifications are determined through close participation with the users, especially in rural areas where the participation of women is critical to ensure effective use and sustainability of water supply systems.

"High performing municipalities will be given special encouragement by instituting a system of performance grants and rewards for the institutions of the individuals.

TECHNICAL STRATEGY

"Promote effective rehabilitation and efficiency improvements in existing water supply systems, through justifiable investments, significant reductions in non-revenue water, increased water metering and other initiatives.

"Technical assistance will be provided to the provincial and sites governments for the preparation of appropriate technical guidelines which can be subsequently disseminated to all TMAs and other water sector agencies.

"Standard operating procedures (SOPs) will be developed for planning, design, implementation and operations and maintenance for the various categories of water supply schemes. This will ensure adherence to technical standards and eliminate the huge concerns with regards to poor and inadequate water supply networks.

"Appropriate and cost-effective technology will be used to ensure that the local government resources are used optimally and that the systems are easy to design and build and easy to maintain by the local communities and/or the concerned local governments.

"Special care should be taken to use materials and parts of good quality in the construction of water supply facilities. Special attention will be made to ensure that pipes with standard specifications will be used and rusted pipes will be replaced.

"Wherever possible, preference should be given to rehabilitate existing schemes (functioning or not) over the construction of new schemes, unless there are special reasons to justify otherwise.

"The design and layout of water supply pipes, storage tanks etc should ensure that there is no contamination by sewerage systems, for example by maintaining a minimum distance between the two systems.

"Low cost technological options should be developed and promoted to provide affordable water treatment options, in both urban and rural areas.

OPERATION AND MAINTENANCE STRATEGY

"The responsibility for the operations and maintenance of all drinking water schemes will be with the Taluka Municipal Administrations except in the case of large urban areas, where a specialised Water and Sanitation Agency may be established.

"However, the community should be given responsibility for monitoring and surveillance of the schemes especially in the rural areas and small settlements. Where appropriate, the responsibilities for the operations and maintenance of small schemes may be devolved to the intended beneficiaries. Adequate training will be responsible for routine maintenance and operations. However, in the case of a major breakdown of the scheme, the TMA will be responsible for undertaking repairs.

"Women will be especially consulted when determining the operations and management arrangements for schemes.

"Capacity building programmes for community organisations will be implemented (in collaboration with NGOs where appropriate) for improving the local level capacity for operation and maintenance of schemes.

DRINKING WATER QUALITY STANDARDS

"The Pakistan Drinking Water Quality Standards will come into immediate force in both urban and rural areas and the agencies responsible for the provision of water supply will ensure that the quality of water supplied through government financed schemes does not fall below the standards at any given time.

"Appropriate action will be undertaken to penalise any vendor or supplier found to be providing water quality lower than the standard prescribed in accordance with the existing legislation.

WATER QUALITY MONITORING AND SURVEILLANCE

"The responsibility for monitoring and surveillance of water quality for water at the source will rest primarily with the Sindh Environmental Protection Agency. The Government of Sindh will establish a monitoring and surveillance framework and system guidelines to ensure that drinking water quality conforms with required standards.

"The specialised agencies responsible for drinking water supply like the TMA's and the Taluka Municipal Administrations will be responsible for ensuring that the water quality adheres to the prescribed standards.

"Any private vendor of water, including bottled, will be responsible for ensuring that the water supplied by the drinking purposes adheres to the approved water quality standards.

"Random testing and surveillance of water quality will be undertaken of water from different sources including government schemes in urban areas, wells, hand pumps in rural areas, bottled water, private vendors, etc to determine the quality of water from different sources.

"Water-testing laboratories will be established at the District level.

"Community activities will be involved in water surveillance and monitoring and will be trained in the use of water testing kits and will be provided kits for each scheme.

GENDER STRATEGY

"Special efforts will be made by all providers agencies particularly the TMAs in rural areas to ensure that both men and women are consulted in scheme identification, implementation and operation and maintenance.

"Special focus will be placed on gender training programs for all tiers of local government staff, TMAs, Local Government Staff and EPA so that they are able to respond in a sensitive manner to the gender differentiated needs in the drinking water sector.

"Special efforts will be made to recruit and induct women in TMAs, EPA and other relevant agencies to ensure that the needs of women clients are addressed.

"To ensure the representation of female councillors in all review and decision making forums regarding drinking water supply in the district, Taluka and tiers.

COMMUNICATION AND DISSEMINATION STRATEGY

"The Environment Protection Agency will be responsible for disseminating information on drinking water quality standards through articles in the press, leaflets, newsletters and dissemination of information to schools, through NGOs, civil society organizations, Community Citizens Boards and community organizations, etc.

"The approved Domestic Water Supply Policy will be widely disseminated to municipal institutions, civil society, community organizations and users. In order to undertake this effectively, there will be a great need for putting in place a coordinating and steering mechanism with the participation of key stakeholders.

"Regular policy dialogue will be facilitated between all tiers of government and civil society to address key issues and challenges, awareness building, experience sharing and dissemination of good practices.

"A proper system of dissemination of the information on the water quality of all sources will be developed by the prevailing agency. The provincial government and EPA will be responsible for coordinating and developing a system for information dissemination.

"Each water source and water facility from which people are drawing water for drinking purposes will be marked to indicate whether its water quality conforms to the physical, chemical and bacteriological standards prescribed for drinking.

"A system of colour coding will be devised and indicating clearly through a colour code if it is fit for human or animal consumption or not. The green code will indicate water which is fit for drinking and the red code will indicate its unfitness for human consumption.

"Civil society organisations and community associations will participate in information dissemination and raising awareness about water sector issues, water quality and water issues.

"Best Practices regarding successful initiatives in the drinking water sector will be widely disseminated and shared and will be used to enhance the performance in the sector.

FINANCIAL STRATEGY

"The government will follow an approach of full cost recovery in the sector as a whole but will consider a differentiated approach which will include full cost recovery, partial cost recovery, subsidization and cross-subsidization to achieve financial sustainability in the sector. The tariff regime should ensure appropriate subsidies to poorer communities.

"The TMAs will ensure that drinking water schemes will be given the highest priority in the allocation of funds to the Citizen Community Boards at the local level.

"The TMAs will introduce a system for operations and maintenance on full-cost recovery basis to ensure the water supply system is in sustainable way. However the cost for major breakdowns will be paid by the prevailing public sector authority. The current tariff for both residential and commercial users will be revised to ensure that the operational costs of the municipal entities are fully met.

"The providers will be encouraged to promote metering of water consumption to discourage the indiscriminate use of water.

"The implementation of professional system for billing and collection will be encouraged through a options such as through strengthening the TMAs, outsourcing to the private sector, community-based system of collection, etc.

"Systems of performance incentives will be encouraged to reward those institutions and individuals who have been able to meet performance milestones and achieve the specified targets.

"The capacity of service providers in the area of financial management, budgeting, audit and accounting, revenue collection will be strengthened.

MONITORING AND EVALUATION STRATEGY

"The Local Government Department will be responsible for monitoring the coverage of drinking water supply.

"The TMAs will initiate the establishment of internal as well as external systems to monitor and evaluate progress. They will follow professional protocols for annual work planning, Identify key performance indicators and conduct effective monitoring and evaluation functions on a regular basis.

"The coverage and specific targets and achievements of TMAs will be displayed on the Taluka boards outside their offices to inform the public of proposed plans and achievements. In addition, in ensuring that the water supplied for drinking purposes adheres to the approved water quality standards.

"Random testing and surveillance of water quality will be undertaken of water from different sources including government schemes in urban areas, wells, hand pumps in rural areas, bottled water, private vendors, etc to determine the quality of water from different sources.

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"The coverage and specific targets and achievements of TMAs will be displayed on the Taluka boards outside their offices to inform the public of proposed plans and achievements. In addition, in ensuring that the water supplied for drinking purposes adheres to the approved water quality standards.

"Where these investments are sanctioned they will be widely disseminated and plans will be made to up-scale and replicate them at the national level.

The policy also outlines roles and responsibilities of stakeholders — government institutions, NGOs and CBOs, community and individuals — as also mechanisms for implementation and monitoring.

PREAMBLE: The Sindh Sanitation Policy is intended to support and guide the Sindh City District Government and Taluka Municipal Administrations (TMA) to frame their own sanitation strategies, plans and programmes and is the result of stakeholder consultations held at the Taluka and provincial levels.

The Government of Pakistan has recently finalised, after stakeholder consultations held at the provincial level and in Azad Jammu and Kashmir and the Northern Areas, the draft National Sanitation Policy to guide and support the provincial and district governments in framing their own sanitation strategies, plans and programmes. The draft Policy for Sindh, while reflecting the ground realities in Sindh, has been drawn up within the broad framework of the draft National Policy.

The Sindh Policy has been prepared after extensive consultations, detailed technical assessment in selected urban and rural areas and a process of consensus building The objective of the process was to ensure participation of stakeholder groups both in (i) identification of issues, and (ii) together with the technical, fiscal and financial assessment carried out by the TA Team, build a consensus on policy response to the identified issues. (See Annex 10 of interim report for further details of the process)

The first stage of the process involved three principal activities: (1) Consultation meetings with stakeholders in 41 Taluka Municipal Administrations (TMAs); (2) Issues assessment in 6 TMAs; and (3) Meetings at the provincial government level. The outputs of these consultations were analysed in the background of the detailed technical, fiscal, financial and WSS tariff assessments in the 6 selected TMAs. The issues highlighted in the Consultation process, together with reports from the technical and financial assessment conducted by the TA Team, formed the basis for preparing the first draft of the Policy which was included in the Interim Report.

The second stage of the process involved consensus building on the first draft of the Policy and was carried out soon after the submission of the Interim Report. This included: (1) Circulation of the summary issues statement and first draft of the Policy included in the interim report to a stakeholder group invited to a Consensus Building Meeting held on April 20, 2006. (2) Presentation of the issues assessment carried out in Sindh, the framework of the draft national policy, and the first draft of the Sindh Sanitation Policy. Discussions were held by the group, which included representatives from selected local government officials, invited representatives from selected local governments who could make commitments on behalf of their organizations, and civic and civil society groups, on the thrust of the Policy.

The feedback from the meeting of April 20, 2006 on the first draft of the Policy provided the basis for the review and revision and the revised draft contained in this document.

SANITATION CONTEXT: The sanitation realities related to demographic change, coverage, social issues, the resource dimension, NGO and private sector involvement, capacity and capability of planning agencies and local government departments, are given below and has formed the basis for the development of the provisions of the Sindh Sanitation Policy.

"Sindh's population according to the 1998 Census is 30.44 million. The annual population growth rate is 2.80 per cent which means that the population will double in the next twenty-five years. Urban growth is 3.5 per cent and 48.8 per cent of Sindhis live in urban areas. This trend is likely to continue.

"Sanitation coverage is poor. According to one surveys, thirty per cent of Sindh's population has access to sanitation facilities, 05 per cent in the urban areas and only 2 per cent in the rural areas. Between 1996 and 2002, there has been no increase in the percentage of houses with toilets in urban areas. In the case of rural areas there has been a declines from 64 per cent in 1996 to 51 per cent in 2002.

"In the urban areas in Sindh, underground drains serve only 69 per cent of households and in the rural areas 93 per cent of households have no system at all.

"Most cities have invested in underground sewerage system. The old systems have collapsed due to a lack of maintenance and poor design and drains still receive direct untreated sewage into the storm water drains and water bodies. As a result, there is sewage-contaminated stagnant water in streets and lanes, and the heavily contaminated natural water bodies has made their water and fish unfit for both food and is a major environmental health hazard, since the water in the canals is used untreated by settlements downstream for drinking and for agricultural purposes. In addition, over 50 per cent of Sindh's urban population lives in kutchi abadis and/or informal settlements and their sanitation plans have not been integrated into the larger city sanitation plans. Treatment plants for the cities do not exist and where they do, they are inappropriately located and hence receive little or no sewage.

"The vast majority of small towns do not have an underground sewerage system. Most settlements have open drains installed by the Public Health Engineering Department (PHED) which are often: and easily blocked, and the stagnant water becomes a health hazard and a danger to the breeding mosquitoes.

"Solid waste management systems exist only in the large cities and in a few intermediate ones. In those urban areas served, as little as 50 per cent of the garbage generated by the major cities is lifted and taken to informal dumping sites since formal sites have not been adequately developed. It is estimated that only 5 per cent households in Sindh have access to a municipal garbage collection system. A system of incinerations does exist in Karachi but it is not environmentally friendly and caters to only a small fraction of the generated hospital waste in these cities.

SOLID WASTE MANAGEMENT:

"TMAs are now responsible for solid waste management, but their ability to deliver services to an acceptable quality across their areas of jurisdiction is limited by lack of resources, organisational capacity and information. There is also a lack of strategic planning with in the administrations.

"The solid waste management problems in urban areas are compounded by the behaviour of waste generators. In many areas, householders and shopkeepers throw their waste directly onto streets. Door-to-door collection systems are not prevalent. This is likely to be because of a lack of awareness of the link between public health and solid waste management, and because of a lack of alternatives, such as convenient and legally placed sanitary community bins.

"Prevailing waste management practices present a number of health and safety issues for the public and workers. Hand loading and unloading of vehicles is time consuming. Waste is often scattered on streets or left rotting in piles, and it is the most common cause of blocked drains. Hospital and other hazardous wastes are rarely separated from other waste, and there are few provisions for treatment or controlled disposal.

"The public sector has not been widely involved in solid waste management activities to date. The informal sector is active in collection and recycling activities, but its contribution remains unacknowledged and undervalued.

"National Rules have been developed for healthcare waste, and a recent Ordinance bans the manufacture and use of plastic bags under 30 microns thickness. Awareness of rules and Ordinances is not widespread, and systems of implementation and enforcement need to be further developed.

"Household Surveys show that the majority of the population of Sindh do not have a clear understanding of the relationship between unsafe excreta disposal and diarrhoea. They also do not know the costs and techniques of installing sanitary latrines. As a result, sanitation related diseases impoverish them.

"There is no shrewd total absence of public toilets in cities, towns and transport terminals and transit areas in Sindh. Functioning toilets do not exist in nearly two-thirds of schools in the Province. In addition, waste is not always available in the toilets, students and teachers do not know how to use latrines, and staff for maintaining them is not always available since maintenance of toilets is considered to be 'job of the "lower" castes. Women and girls are the worst sufferers as a result of lack of such sanitation facilities.

"Government spending for the water and sanitation sector has been poor (0.08 per cent of the GDP for the year 2002-03, and 0.09 and 0.10 per cent for the years 2003-04 and 2004-05 respectively). These allocations are insufficient to meet the Millennium Development Goals and other targets for the sector and most of them are utilised for the water sector rather than sanitation.

"Vertical programmes (such as the Khushal Pakistan Programme) are organised and implemented in ways that adversely affect the autonomy of the Taluka Municipal Administration (TMA) in preparing the development budget and also undermine local government accountability and operational efficiency.

"There is considerable evidence to show that in the absence of government and/or NGO support and investments, communities organise to build their sanitation systems on self-help and dispose them into the natural storm water drains. If this process is supported then the huge investments/ communities make into this effort would be better utilised and would help to overcome resource constraints.

"There are a number of Pakistani NGO and government agency programmes and projects that have successfully supported communities in financing and managing the construction of their neighbourhood sanitation infrastructure through self-help. Government/NGO/CBO partnerships have emerged as a result where local government has complimented this work by providing trunk sewers and disposals.

"In most urban areas and in all rural areas, sanitation is not priced and as such, O&M cost for sanitation have to be subsidised from other sources.

"Land-use and topographic maps and development plans of existing settlements and the infrastructure that they contain do not exist for the urban and/or rural areas of Sindh. Institutional capacity and capability for such documentation is almost non-existent. In the absence of such documentation, realistic and cost effective planning cannot take place.

"There is also inadequate technical capacity and capability in government agencies to plan and implement and an absence of management information systems.

"Engineering standards followed in Sindh (water systems) are over expensive to build, operate and maintain. Standards developed by NGO and innovative government programmes have overcome these constraints and are being increasingly applied as solutions.

"So far there has been an absence of a sanitation policy and an absence of a clear definition of sanitation itself. In addition, roles of the different government agencies responsible for planning and implementation are not clearly defined. There are also a large number of actors involved in sanitation provision and a large number of parallel sanitation related investments and programmes between which there is no coordination and many of which do not come under the purview of local government institutions. Local government and development agencies also lack managerial, administrative and monitoring capacity due to which a lot of ad-hoc decisions and programmes take place.

3.4 Domestic Water and Sanitation Policy for Sindh

3.4.1 Context

179. The water supply and sanitation realities related to demographic change, coverage, social issues, the resource dimension, NGO and private sector involvement, capacity and capability of planning agencies and local government departments, given below, have formed the basis for the development of the provisions of the Sindh Water Supply and Sanitation Policy.

3.4.1.1 General

180. Sindh's population according to the 1998 Census is 30.44 million. The annual population growth rate is 2.80 per cent which means that the population will double in the next twenty-five years. Urban growth is 3.5 per cent and 48.8 per cent of Sindhis live in urban areas[50]. This trend is likely to continue.

3.4.1.2 Water Supply

181. There is a scarcity of drinking water and water supply coverage is poor. According to one survey, in 2004-05, 87% of households have access to water inside their houses, (up from 81% in 2001-02)[51] i.e., 45% have taps (up from 30%), 6% have motorized pumps and 36% have hand pumps. In rural areas 81% of the households has access to water inside their houses i.e. 20% have taps (up from 4%), 3% have motorized pumps and 58% have hand-pumps, In urban areas 94% of the households has access to water inside their houses i.e. 71% have taps, 10% have motorized pumps and 13% have hand pumps. However there is virtually no data regarding water quality.

182. Most cities have invested in piped water systems. The old systems have collapsed due to a lack of maintenance and poor design.

183. The water is supplied intermittently. As the water lines are laid adjacent to the sewers/ drains the wastewater is sucked into the water lines. Often water lines have been tapped informally using poor joints and connections, again leading to contamination by sewage.

184. The main source of water for many settlements is the irrigation canal and during canal closures or supply shortages, there is no water available in the canal. The canals are also used as the outflow for untreated sewage. Thus the dumping of sewage by one settlement contaminates the water of others downstream who undertake little or no treatment before supplying it to the households.

185. Household Surveys show that the majority of the population do not have a clear understanding of the relationship between unsafe water and health. As a result, water-borne diseases impoverish them.

186. Government spending for the water and drinking water sector has been poor (0.08 per cent of the GDP for the year 2002-03, and 0.09 and 0.10 per cent for the years 2003-04 and 2004-05 respectively). These

[50] Urban Areas are defined by the Census of Pakistan as "all localities which were either metropolitan corporation, municipal corporation, municipal committee, town committee or cantonment". In this document the term urban areas and cities are used interchangeably. The term "settlements" is used to extend the definition to include smaller agglomerations in "rural" areas.
[51] Pakistan Social and Living Standard Measurement Survey (2004-05), Statistics Division, Federal Bureau of Statistics, Government of Pakistan

allocations are insufficient to meet the Millennium Development Goals and other targets for the sector and most of them are utilised for the water sector rather than drinking water.

187. Vertical programmes (such as the Khushal Pakistan Programme) are organised and implemented in ways that adversely effect the autonomy of the Taluka Municipal Administration (TMA) in preparing the development budget and also undermine local government accountability and operational efficiency.

188. There is considerable evidence to show that in the absence of government and/or NGO support and investments, communities organise to build their drinking water systems on self-help. If this process is supported then the huge investments communities make into this effort would be better utilised and would help to overcome resource constraints.

189. There are a number of Pakistani NGO and government agency programmes and projects that have successfully supported communities in financing and managing the construction of their neighbourhood drinking water infrastructure through self-help. Government-NGO/CBO partnerships have emerged as a result where local government has complimented this work by providing bulk water.

190. In most urban areas and in all rural areas the costs of drinking water are not properly priced and therefore O&M cost for drinking water have to be subsidised from other sources.

191. Land-use and topographic maps and development plans of existing settlements, and the infrastructure that they contain, do not exist for the urban and/or rural areas of Sindh. Institutional capacity and capability for such documentation is almost non-existent. In the absence of such documentation, realistic and cost effective planning cannot take place.

192. There is also inadequate technical capacity and capability in government agencies to plan and implement and an absence of management information systems.

193. Engineering standards followed in Sindh create systems that are expensive to build, operate and maintain. Standards developed by NGO and innovative government programmes have overcome these constraints and are being increasingly applied as solutions.

194. So far there has been an absence of a drinking water policy and an absence of a clear definition of drinking water itself. In addition, roles of the different government agencies responsible for planning and implementation are not clearly defined. There are also a large number of actors involved in drinking water provision and a large number of parallel drinking water related investments and programmes between which there is no coordination and many of which do not come under the preview of local government institutions. Local government and development agencies also lack managerial, administrative and monitoring capacity due to which a lot of ad-hoc decisions and programmes take place.

3.4.1.3 Sanitation

195. Sanitation coverage is poor. According to one survey[52], 16% of Sindh's population has no access to toilet facilities, 5% in urban areas and 27% in

[52] Op cit

rural areas and 32% overall and 56% in rural and 7% in urban have non flush toilets.

196. In the urban areas in Sindh, underground drains serve only 69 per cent of households and in the rural areas 85 per cent of households have no system at all.[53]

197. Most cities have invested in underground sewerage systems. The old systems have collapsed due to a lack of maintenance and poor design and almost all systems dispose untreated sewage into the storm water drains and water bodies. As a result, there is sewage-contaminated stagnant water in streets and lanes, and the heavily contaminated natural water bodies has made their water and fish life unsafe for food and is a major environmental health hazard, since the water in the canals is used untreated by settlements downstream for drinking and for agricultural purposes. In addition, over 50 per cent of Sindh's urban population lives in *katchi abadis* and/or informal settlements and their sanitation plans have not been integrated into the larger city sanitation plans. Treatment plants for the cities do not exist and where they do, they are inappropriately located and hence receive little or no sewage.

198. The vast majority of small towns do not have an underground sewerage system. Most neighbourhoods have open drains installed by the Public Health Engineering Department (PHED) which are often and easily blocked, and the stagnant water becomes a health hazard and a danger to the housing stock.

199. Household Surveys show that the majority of the population of Sindh do not have a clear understanding of the relationship between unsafe excreta disposal and diarrhoea. They also do not know the costs and techniques of installing sanitary latrines. As a result, sanitation related diseases impoverish them.

200. There is an almost total absence of public toilets in cities, towns and transport terminals and transit areas in Sindh. Functioning toilets do not exist in nearly two-thirds of schools in the Province. In addition, water is not always available in the toilets, students and teachers do not know how to use latrines, and staff for maintaining them is not always available since maintenance of toilets is considered to be job of the "lower" castes. Women and girls are the worst sufferers as a result of lack of such sanitation facilities.

201. There is considerable evidence to show that in the absence of government and/or NGO support and investments, communities organise to build their sanitation systems on self-help and dispose their effluent into the natural storm water drains. If this process is supported then the huge investments communities make into this effort would be better utilised and would help to overcome resource constraints.

202. There are a number of Pakistani NGO and government agency programmes and projects that have successfully supported communities in financing and managing the construction of their neighbourhood sanitation infrastructure through self-help. Government-NGO/CBO partnerships have emerged as a result where local government has complimented this work by providing trunk sewers and disposals.

[53] *Pakistan Integrated Household Survey (1998/99-2001/02)*

3.4.2 Objectives

203. The primary objective of the Sindh Water Supply and Sanitation Policy is to improve the quality of life of the people of Sindh. To achieve this, the policy has the following sub objectives:

i) To ensure access to safe drinking water, and the promotion of health and hygiene practices to compliment the primary objectives.

ii) To ensure an open-defecation-free environment; the safe handling and disposal of liquid; and the promotion of health and hygiene practices to compliment the primary objectives.

iii) To develop guidelines for the evolution of an effective institutional and financial framework to implement the primary objectives.

iv) To link water supply and sanitation programmes with environment, housing, sanitation and city and regional planning policies and programmes.

3.4.3 Policy Principles

204. The following key policy principles will be pursued:

i) To recognize that access to safe drinking water is the basic human right of every citizen and that it is the responsibility of the state to ensure its provision to all citizens.

ii) The right to water for drinking takes precedence over rights for water for all other uses such as environment, agriculture, industry etc.

iii) Health is another fundamental human right and health targets cannot be achieved without sanitation. Therefore, this policy considers sanitation to be a fundamental human right.

iv) To recognize the role of the broad range of providers in the sector and provide a supportive policy framework that encourages alternate options through private provision, public-private partnerships, the role of NGOs and community organizations.

v) To fashion the role of the state in a manner which distinguishes between its functions as a service provider and the authority it must exercise as a regulator.

vi) To ensure that the existing inequities in the provision of safe drinking water are removed and the needs of the more vulnerable and poor are effectively addressed through adequate financial allocations and provisions of suitable technological options.

vii) There will be an equitable distribution of resources between the richer and poorer sections of human settlements. However, preference will be given to those areas where the environmental and social impact of investments shall be the maximum.

viii) To recognize the key role that women play in the drinking water sector and ensure their participation in decision-making for the sector at all levels.

ix) The needs of women and children are to be given priority in all policy, planning and implementation processes.

x) To recognize the provision of safe water should be undertaken through a community-centred, demand-driven approach in which the community members are given a key role.

205. Development has to be sustainable. To achieve this, it is necessary to:

    i) build on what exists, mobilise local resources, minimize foreign loans and develop programmes that are implementable within available resources and enhanced capacities of institutions and communities;

    ii) understand, accept and support the role that communities, NGOs and the formal and informal sector are playing in sanitation provision;

    iii) accept the component-sharing model for all government programmes and projects so as to ensure financial sustainability and community and private sector involvement in development and subsequent of O&M; and

    iv) develop and use technologies that are low cost, easy and cost-effective to maintain.

206. The provision of adequate, appropriately and hygienically designed toilets in public spaces and public use buildings will be guaranteed.

207. PC-1s for projects and programmes will only be prepared after the conceptual technical details and Bills of Quantities have been developed and a stakeholder consultation has been held. The feedback from the stakeholder consultation will be reflected in the modified designs and estimates.

208. Recovery of O&M costs will be generated at the local level through a combination of affordable taxes (on a sliding scale) and by assigning O&M responsibilities to community organisations.

209. Water and Sanitation programmes and projects will be coordinated with settlement planning, housing, environment, health and education policy guidelines, programmes and projects.

3.4.4 Minimum Acceptable Options

210. The minimum acceptable option for the provision of **domestic water** is that, water will be provided inside the house, through piped system, to meet the minimum requirement of 50 litres per person per day. In rural settlements water may be provided through communal points to meet the minimum requirement of 25 litres per person per day

211. Where domestic water supply is not of acceptable quality, a provision of at least 4 litres per person per day of drinking water should be provided, such that no household is more than 0.5 km from the point of supply

212. The minimum acceptable **sewerage and drainage** provision is given below.

    i) In settlements of high densities: Flush latrines and/or pour flush latrines in homes (or privately shared) connected to an underground sewerage system terminating in a sewage treatment facility.

    ii) In low-density settlements: Ventilated pit privies/pour flush latrines connected to a septic tank linked to a waste water disposal and/or collection system.

    iii) Sewage treatment facilities will be as per EPA standards and guidelines for areas which are located in or near waste land or agricultural regions where the effluent can be used for agricultural purposes.

iv) In arid regions, where rain is infrequent, storm water can be combined with sewerage system provided the additional flow can bypass the treatment plants.

3.4.5 Targets

213. While each city district government and TMA will pursue its own targets, the overall aim of the Sindh Provincial Government is to facilitate the attainment of the targets specified in the Medium Term Framework and the Millennium Development Goals for the country as a whole. The specific targets entail the following:

i) To provide safe drinking water to 93% of the population by 2015 thereby raising the current coverage by almost 6% (from 87% at present to 93% in 2015) for the existing population and ensuring that the additional population is also provided access.

ii) The extension of sanitation facilities from the present coverage of 51 per cent population (88% urban and 17% rural) to 70 per cent of the total population by 2015 along with the development of waste water treatment units, recycling provisions and conservancy measures in the urban centres up to district level.

iii) To provide at least one hand pump or spot source for every 250 persons. In sparsely populated areas the location will have to ensure that it is not more than 0.5kms from the residents.

iv) To establish water treatment plants in all urban areas by the year 2015

v) To ensure that water quality standards are approved and a system of surveillance, testing, monitoring and disseminating information regarding water quality is initiated by 2007.

vi) To ensure that villages having up to 100 households, or 1,000 persons, or more are served with sanitation and drainage schemes by 2015.

vii) To ensure that each TMA has a Strategic Development Plan in place by 2007 to meet the above targets, and the financial and institutional framework for its implementation.

3.5 Solid Waste Management Policy for Sindh

3.5.1 Context

214. The SWM-related ground realities related to demographic change, coverage, social issues, the resource dimension, NGO and private sector involvement, capacity and capability of planning agencies and local government departments, are given below and has formed the basis for the development of the provisions of the Sindh Sanitation Policy.

215. Sindh's population according to the 1998 Census is 30.44 million. The annual population growth rate is 2.80 per cent which means that the population will double in the next twenty-five years. Urban growth is 3.5 per cent and 48.8 per cent of Sindhis live in urban areas54. This trend is likely to continue.

[54] Urban Areas are defined by the Census of Pakistan as "all localities which were either metropolitan corporation, municipal corporation, municipal committee, town committee or cantonment". In this document the term urban areas and cities are used interchangeably. The term "settlements" is used to extend the definition to include smaller agglomerations in "rural" areas.

216. Solid waste management systems exist only in the large cities and a few intermediate ones. In those urban areas served, as little as 50 per cent of the garbage generated by the major cities is lifted and taken to informal dumping sites since formal sites have not been adequately developed. It is estimated that only 5 per cent households in Sindh have access to a municipal garbage collection system. A system of incineration does exist in Karachi but it is not environmentally-friendly and caters to only a small fraction of the generated hospital waste in these cities.

217. TMAs are now responsible for solid waste management, but their ability to deliver services to an acceptable quality across their areas of jurisdiction is limited by lack of resources, organizational capacity and information. There is also a lack of strategic planning within the administrations.

218. The solid waste management problems in urban areas are compounded by the behaviour of waste generators. In many areas, householders and shopkeepers throw their waste directly onto streets. Door-to-door collection systems are not prevalent. This is likely to be because of a lack of awareness of the link between public health and solid waste management, and because of a lack of alternatives, such as conveniently placed sanitary community bins.

219. Prevailing waste management activities present a number of health and safety issues for the public and workers. Hand loading and unloading of vehicles is commonplace. Waste is often scattered on streets or left rotting in piles, and is the most common cause of blocked drains. Hospital and other hazardous wastes are rarely separated from other waste, and there are few provisions for treatment or controlled disposal.

220. The public sector has not been widely involved in solid waste management activities to date. The informal sector is active in collection and recycling activities, but its contribution remains unacknowledged and undervalued.

221. National Rules have been developed for healthcare waste, and a recent Ordinance bans the manufacture and use of plastic bags under 30 microns thickness. Awareness of rules and ordinances is not widespread, and systems of implementation and enforcement need to be further developed.

222. Government spending for the water and sanitation sector has been poor (0.08 per cent of the GDP for the year 2002-03, and 0.09 and 0.10 per cent for the years 2003-04 and 2004-05 respectively). These allocations are insufficient to meet the Millennium Development Goals and other targets for the sector and most of them are utilised for the water sector rather than sanitation or SWM.

223. Vertical programmes (such as the Khushal Pakistan Programme) are organised and implemented in ways that adversely effect the autonomy of the Taluka Municipal Administration (TMA) in preparing the development budget and also undermine local government accountability and operational efficiency.

224. In most urban areas and in all rural areas, SWM is not priced and as such, O&M cost for SWM have to be subsidised from other sources.

225. Land-use and topographic maps and development plans of existing settlements and the infrastructure that they contain do not exist for the urban and/or rural areas of Sindh. Institutional capacity and capability for

such documentation is almost non-existent. There is also inadequate technical capacity and capability in government agencies to plan and implement and an absence of management information systems. In the absence of such documentation, realistic and cost effective planning cannot take place.

226. So far there has been an absence of a SWM policy and an absence of a clear definition of SWM itself. In addition, roles of the different government agencies responsible for planning and implementation are not clearly defined. There are also a large number of actors involved in SWM and a large number of parallel SWM-related investments and programmes between which there is no coordination and many of which do not come under the preview of local government institutions. Local government and development agencies also lack managerial, administrative and monitoring capacity due to which a lot of ad-hoc decisions and programmes take place.

227. There is a powerful formal and informal sector involved in the development of human settlements in Sindh. SWM provision is not a priority with these developers.

3.5.2 Objectives

228. The primary objective of the SWM policy is to improve the quality of life of the people of Sindh and the physical environment. To achieve this, the policy has the following sub objectives:

i) To ensure a clean, healthy and pollution free environment in all settlements.

ii) To ensure the safe handling and disposal of solid waste and the promotion of health and hygiene practices to compliment the primary objectives.

iii) To develop guidelines for the evolution of an effective institutional and financial framework to implement the primary objectives.

iv) To link SWM programmes with environment, housing, water and sanitation and city and regional planning policies and programmes.

3.5.3 Policy Principles

229. The principles of the SWM policy are given below:

i) Health is fundamental human right and health targets cannot be achieved without environmental sanitation. This policy considers SWM an essential element in achieving health targets.

ii) To recognize that a clean and healthy living environment is the right of every one and that it is the responsibility of the state to ensure that it is available to all citizens.

iii) To recognize the role of the broad range of providers in the sector and provide a supportive policy framework that encourages alternate options through private provision, public-private partnerships, the role of NGOs and community organizations.

iv) To fashion the role of the state in a manner which distinguishes between its functions as a service provider and the authority it must exercise as a regulator.

v) There will be an equitable distribution of resources between the richer and poorer sections of human settlements. However,

preference will be given to those areas where the environmental and social impact of investments shall be the maximum.

vi) To recognize the key role that women play in the SWM sector and ensure their participation in decision-making for the sector at all levels.

vii) The needs of women and children are to be given priority in all policy, planning and implementation processes.

viii) To recognize the provision of SWM should be undertaken through a community-centred, demand-driven approach in which the community members are given a key role.

230. Development has to be sustainable. To achieve this, it is necessary to:

i) - build on what exists, mobilise local resources, minimize foreign loans and develop programmes that are implementable within available resources and enhanced capacities of institutions and communities;

ii) - understand, accept and support the role that communities, NGOs and the formal and informal sector are playing in SWM;

iii) - accept the component-sharing model for all government programmes and projects so as to ensure financial sustainability and community and private sector involvement in development and subsequent of O&M;

iv) - develop and use technologies that are low cost, easy and cost-effective to maintain;

231. PC-1s for projects and programmes will only be prepared after the conceptual technical details and Bills of Quantities have been developed and a stakeholder consultation has been held. The feedback from the stakeholder consultation will be reflected in the modified designs and estimates.

232. Recovery of O&M costs will be generated at the local level through a combination of affordable taxes (on a sliding scale) and by assigning O&M responsibilities to community organisations.

233. SWM programmes and projects will be coordinated with settlement planning, housing, environment, health and education policy guidelines, programmes and projects.

3.5.4 Minimum Acceptable Options

234. The minimum acceptable options in the context of this policy are given below.

i) Best possible use of existing staff and equipment, including re-planned beats and shifts where necessary, and improved staff attendance.
ii) Establish functioning public complaints system.
iii) Enforce SWM legislation and bylaws, e.g. the ban on manufacture and use of plastic bags < 50 mu.
iv) Increase public awareness to encourage sanitary storage of waste, waste minimisation, source segregation and composting where appropriate.
v) Sweep streets and main roads in urban areas everyday with appropriate tools and wheelbarrows/handcarts for sweepers
vi) All waste generated to be conveyed to transfer points either by

generators or door-to-door collectors.

vii) Daily removal of all waste from primary-secondary transfer points, and cleaning where necessary.

viii) Encourage, support and implement recycling and composting activities and link with existing informal- and private-sector sector activities.

ix) Shops, restaurants, healthcare centres etc. to contribute towards waste management costs.

x) Where possible, zero direct human contact with waste from primary collection to disposal, and covering of waste during transportation.

xi) Final disposal of waste at least 500m from housing to a contained area chosen and designed according to geological conditions, water table, wind etc.

xii) Zero open-burning of waste.

xiii) Separate collection, treatment and disposal of healthcare and other hazardous wastes.

4 SINDH PROVINCIAL STRATEGIES

235. The Provincial Strategies outline the various legislative, administrative, financial and technical measures that need to be instituted and implemented over the next few years, in order to move towards the goals of the Sindh Provincial policies for water, sanitation and solid waste management.

236. The Provincial Strategies are also intended to support and guide the Sindh City District Government and Taluka Municipal Administrations (TMA) to frame their own domestic water supply and sanitation strategies, plans and programmes and are the result of stakeholder consultations held at the Taluka and provincial levels.

4.1 Process

237. The Sindh Strategies have been prepared after extensive consultations, detailed technical assessment in selected urban and rural areas and a process of consensus building The objective of the process was to ensure participation of stakeholder groups both in (i) identification of issues, and (ii) together with the technical, fiscal and financial assessment carried out by the TA Team, build a consensus on strategic response to the identified issues within the framework of the Provincial Policies.

238. The first stage of the process involved three principal activities: (1) Consultation meetings with stakeholders in 41 Taluka Municipal Administrations (TMAs); (2) Issues assessment in 6 TMAs; and (3) Meetings at the provincial government level. The outputs of these consultations were analysed in the background of the detailed technical, fiscal, financial and WSS tariff assessments in the 6 selected TMAs. The issues highlighted in the Consultation process, together with reports from the technical and financial assessment conducted by the TA Team, formed the basis for preparing the first draft of the Strategy which was included in the Interim Report.

239. The second stage of the process involved consensus building on the first draft of the Strategy and was carried out after the submission of the Interim Report. This included: (1) Circulation of the summary issues statement and first draft of the Strategy included in the interim report to a stakeholder group invited to a Consensus Building Meeting held on April 20, 2006. (2) Presentation of the issues assessment carried out in Sindh, the framework of the draft national policies, and the first draft of the Sindh Water Supply and Sanitation and SWM Policies. Discussions were held by the group, which included high-level Provincial Government officials, invited representatives from selected local governments who could make commitments on behalf of their organizations, and civic and civil society groups, on the draft of the strategies.

240. This final draft of the Strategies draws on the above discussions and consultations. Since the detailing and implementation of the strategies through Annual Action Plans and various other measures will be undertaken by the same organisations and institutions at the Taluka, District and even Provincial levels, for both water and sanitation and solid waste management, the Provincial strategies have been presented by strategic area rather than by sub-sector, except the technical aspects and actual provision and delivery of services.

4.2 Objectives

241. The objectives of the provincial strategies are to deploy available resources in the most effective way to ensure that it is possible to achieve the longer-term targets of the provincial policies. It allows for a framework within which the annual investment and action plans can make a cumulative and consistent impact, as well as allowing for greater transparency and accountability.

242. The overall objective of the strategies is to provide guidelines to improve health, reduce incidence of disease while conforming to environmental regulatory standards for disposal of solid and liquid waste. At the same time, the Strategies should ensure that all programs are addressed holistically, linking environment, housing, water and sanitation, city and settlement plans, as well as providing linkages to provincial and national initiatives. The Strategies also provide guidelines that will enable the TMA achieve an effective institutional, legal and financial framework for ensuring WATSAN coverage

243. The Strategies should allow the TMA to move towards a greater degree of sustainability in the provision and delivery of urban services by working towards a full-cost recovery of services provided. In keeping with National and Provincial policies, the users, and especially women, should be fully engaged in the decision-making process, and the private sector should be encouraged to participate in the provision and delivery of services.

4.3 Key Policy Instruments and Strategies

244. A variety of policy instruments and strategies will be used to achieve the objectives of the Domestic Water Supply and Sanitation Policy and the SWM Policy. The key strategic thrusts of the policy will be as follows:

4.3.1 Targeting Strategy

245. All municipalities will adopt a demand led approach in providing access to safe water, sanitation and SWM to ensure that scarce resources are properly utilized and ownership and sustainability of schemes is ensured over the long-term.

246. Priority for water supply, sanitation and SWM will be accorded to un-served, under-served areas, and disadvantaged areas.

247. Priority for water supply will be given to brackish water zones, coastal zones and those areas where there is shortage of sweet water in the underground aquifers. Those areas will be especially targeted where women have to walk more than 0.5 kilometres to acquire access to safe drinking water.

4.3.2 Gender Strategy

248. Ensure the representation of female councillors in all review and decision making forums regarding drinking water supply, sanitation and SWM at the district, Taluka and tiers.

249. All provider-agencies, particularly the TMAs in rural areas, will make special efforts to ensure that both men and women are consulted in scheme identification, implementation and operation and maintenance.

250. Place special focus on gender training programs for all tiers of local government staff, TMAs, Local Government Staff and EPA so that they are able to respond in a sensitive manner to the gender differentiated needs in the drinking water sector.

251. Make special efforts to recruit and induct women in TMAs, EPA and other relevant agencies to ensure that the needs of women clients are addressed.

4.3.3 Legislative Strategy

252. Respect and follow the constitutional roles and responsibilities for the water and sanitation sector, and institutional roles and responsibilities will be consistent with the provisions of the Local Government Ordinance 2001 and the devolution framework, in ensuring access to safe drinking water, sanitation and SWM.

253. Frame a broad policy framework at the provincial level which encourages and supports city district and Taluka governments to design and implement policies which are in-keeping with the existing capacities and strengths of institutions.

254. Develop a framework that allows the participation of the private sector, and encourages public-private partnerships, and the role of NGOs in the sector.

255. Develop a realistic framework for community participation in the sector and ensure that their inclusion helps to build more effective scheme identification, implementation, operations and maintenance systems.

256. Regularly review and update the legislative framework after every five years or when required, by a committee constituted specially for the purpose of reviewing the implementation of its guidelines, their efficacy and continued relevance to the changing situation in the country.

257. Enact appropriate legislation to ensure compliance with the Pakistan Drinking Water Quality Standards and to affix appropriate penalties for any institution or individual not adhering to the standards.

4.3.4 Institutional Strategy

258. Focus on the role of the Government, as both a service provider and regulator, to ensure that water quality, sanitation and SWM standards are properly articulated, maintained and enforced.

259. The Sindh Provincial and Local Governments will be responsible for establishing policy guidelines and legislation for the domestic water, sanitation and SWM sector at the provincial level and be responsible for special initiatives and allocation of special funds to ensure overage in underserved and disadvantaged areas.

260. Sindh Provincial and Local Governments will develop medium term strategic plans for the domestic water, sanitation and SWM sector in keeping with the Medium-Term Development Framework and the Millennium Development Goals in conjunction with relevant municipal authorities to guide and steer the future developments in the sector.

261. The TMAs will be encouraged to make use of the SLGO (2001) provision that allows for a variety of “contracting in” and “contracting out” arrangements for more effective service provision through the civil society and private sector organizations using performance-based contracts. These arrangements can, potentially, be used for design and implementation, testing, operation and maintenance, collection of charges, awareness building, etc.

262. The TMAs will be encouraged to adopt a service-provider orientation to its clientele. It will develop an approach which integrates community

engagement, demand assessment and service provision and marketing in order to effectively enhance its professional credibility and meet the needs of the people within its jurisdiction.

263. Capacity Building programmes will be designed to strengthen institutions which are lacking in capacity such as the Town and Taluka Municipal Administrations, the Sindh Environmental Protection Agency, the Local Government and Rural Development Departments, etc.

264. The planning, design, implementation and operations of water, sanitation and SWM systems will ensure a decision-making role of the intended beneficiaries, who should be treated as partners rather than passive recipients of development;

265. Ensure that the planning, implementation technological choices and supply specifications are determined through close participation with the users and community organizations, especially in rural areas where the participation of women is critical to ensure effective use and sustainability of water supply and sanitation systems.

266. High-performing municipalities will be given special acknowledgement by instituting a system of performance grants and rewards for the institutions and the individuals.

4.3.5 Technical Strategy

267. Promote effective rehabilitation and efficiency improvements in existing water supply, sanitation and SWM systems, through justifiable investments, significant reductions in non-revenue water, increased water-metering, reduction in solid waste generation and recycling, user-charges and other initiatives.

268. Technical assistance will be provided to the provincial and area governments for the preparation of appropriate technical guidelines which can be subsequently disseminated to all TMAs and other water and sanitation sector agencies.

269. Standard operating procedures (SOPs) will be developed for planning, design, implementation and operations and maintenance for the various categories of water supply, sanitation and SWM schemes. This will ensure adherence to technical standards and eliminate the huge concerns with regards to poor and inadequate water supply and sanitation networks and inadequate SWM practices.

270. Appropriate and cost-effective technology will be used to ensure that the local government resources are used optimally and that the systems are easy to design and build and easy to maintain by the local communities and/or the concerned local governments.

271. Special care should be taken to use materials and parts of good quality in constructing drinking water, sanitation and SWM schemes. Lifetime, rather than only initial-cost comparisons should be made when considering alternative systems or tenders. Special attention will be made to ensure that pipes and equipment with standard specification will be used.

272. Wherever possible, preference should be given to rehabilitate existing schemes (functioning or not) over the construction of new schemes, unless there are special reasons to justify otherwise.

273. The design and layout of water supply pipes, storage tanks etc should ensure that there is no contamination by sewerage systems, for example by maintaining a minimum distance between the two systems.

274. Low cost technological options should be developed and promoted to provide affordable water, sewage treatment and SWM options, in both urban and rural areas.

4.3.6 Operation and Maintenance Strategy

275. The responsibility for the operations and maintenance of all drinking water, sanitation and SWM schemes will be with the Taluka Municipal Administrations except in the case of large urban areas, where a specialised Water and Sanitation Agency may be established.

276. However, the community should be given responsibility for monitoring and surveillance of the schemes, especially in the rural areas and small settlements. Where appropriate, the responsibility for the operations and maintenance of small schemes may be devolved to the intended beneficiaries. These communities will be responsible for routine maintenance and operations. However, in case of a major breakdown of the scheme, the TMA will be responsible for scheme rehabilitation.

277. Women will be especially consulted when determining the operations and management arrangements for schemes.

278. Capacity building programs for community organizations will be implemented (in collaboration with NGOs where appropriate) for improving the local level capacity for operation and maintenance of schemes.

4.3.7 Cross-Sectoral Issues

279. Water and sanitation issues are closely related to larger environment, housing, city and regional planning, health and education, gender, drainage and industrial effluent and solid waste disposal policies, regulations, programmes and projects. A process of coordination at the provincial, district and TMA level will be established between these different sectors.

4.3.8 Government's Vertical Programmes

280. Funding from government's vertical programmes and from IFIs and bilateral agencies will be a part of a larger investment plan prepared by the provincial government and managed by the city district government and the TMAs

4.3.9 Adoption of the Component-Sharing Model

281. The component-sharing model will be adopted for all TMA schemes, whereby different aspects and components are handled by different organisations and entities. The model has been successfully deployed in cities across the Province and there is considerable experience and expertise available. There a number of ways that component-sharing could be done, for example,

    i) Water supply: local government could be responsible for the provision of bulk water supply (appropriately treated water from canals or underground sources) to private or community contractors who would be responsible for its distribution to households.

    ii) Sanitation: households could be helped in financing and building

their latrines, while communities and/or developers, housing societies etc. take on the responsibility for lane and collector sewers and local government builds trunk sewers and disposal systems.. Sewage and waste water treatment facilities will be provided by the developers for large schemes where connections to local government developed disposal is not available.

iii) Solid waste management: communities and/or developers, housing societies etc. are responsible for adopting operation and management of door-to-door collection, and improving public awareness of solid waste issues and improving the solid waste management practice up to community bins/transfer points. Secondary collection, transportation and disposal will be handled by TMAs.

282. Incentives to communities and households will be provided to take up the component sharing model alternative, such as local government paving lanes where communities have built their sanitation systems.

4.3.10 Public-Private Partnerships

283. Currently, the private sector is engaged in the sector primarily to fill the gaps left in the public systems. Rather than seeing these as “temporary” arrangements tolerated by the public sector, these should be supported and formally incorporated into the system. The private sector will be encouraged to participate in the supply and delivery of water and collection and disposal of sewage, either as part of the component-sharing model, or through any variety of contracting arrangements.

284. The private sector-community-NGO linkages in solid waste management in Sindh are well established. City governments and TMAs will identify these good practices, assign roles and responsibilities through consultations and invest in promoting them. Support to the private sector can range from technical and managerial capacity-building to loans and financial packages. A formal partnership can help improve the quality and the quantity of the service by taking advantage of each other strengths and capabilities. Informal sector, community-led groups or small enterprises will be engaged where possible to undertake primary collection, reliable secondary collection and sanitary transfer points (e.g. community bins) will be provided by the TMAs. Where feasible and economical, the private sector will be engaged for secondary collection. Provision of disposal facilities will remain the responsibility of TMAs.

285. Formal sector real estate development is creating townships and housing estates all over Sindh. Bye-laws will be developed by the provincial government and implemented by the TMAs for developing water supply, sewerage systems and sewage treatment facilities for different sizes of developer-promoted schemes. Communities in informally developed housing areas will be provided incentives and disposal points by the TMAs if they build an underground sewerage system.

4.3.11 Urban Sanitation

286. City governments and TMAs will develop their capability and capacity to document existing settlements and for identifying the existing sanitation and drainage related infrastructure and its condition. On the basis of this documentation, a programme for the rehabilitation of damaged infrastructure (as opposed to its rejection and/or duplication) will be developed and implemented.

287. An overall sanitation plan will be developed for all urban settlements by city governments and the TMAs (or WASAs which have not been devolved) in coordination with all other agencies involved in sanitation. The plan will focus mainly on the details of the trunk sewers and disposals and secondary collection and disposal of solid waste. All other sanitation related agencies (cantonments boards, railways, etc) will develop their plans in accordance with the overall plan.

288. Wherever existing sewerage systems dispose untreated sewage in storm water drains or irrigation canals it should be treated before discharging, and may be used for agricultural purposes or converted into lakes and ponds as part of recreational areas, in accordance with EPA guidelines.

289. Gravity flow systems will be used for sewage schemes (unless not feasible) so as to avoid pumping and O&M costs. Where these systems cannot be self-cleansing, a one chamber septic tank will be built between the toilet and the lane sewer so as to avoid solids from entering the system and clogging it.

4.3.12 Public Toilets

290. Public toilets will be adequately provided (keeping in view the different requirements of men, women and children) and maintained as a priority for all public-use open spaces (such as markets, parks, playgrounds) and public-use buildings. The toilet requirements and specifications will be built into the bye laws of all urban areas and TMAs. Where feasible, the construction, maintenance and operation of these toilets can be sublet to the private sector on a BOT basis.

4.3.13 Rural Sanitation

291. The component sharing model (latrines and lane sewers built by the community with technical advice from NGOs/TMAs and trunk sewers and disposals built by local government) for rural sanitation which is being applied in the villages in southern Punjab will be adopted for all villages of 1,000 and above population.

292. A programme for motivation and technical advice will be initiated in TMAs for the construction of latrines and safe disposal of waste water. The use of waste water for agricultural purposes will be encouraged and designs for its collection and use in accordance with EPA guidelines will be provided to households and communities.

293. The motivation programme for latrines will also educate people on the health problems associated with handling of animal dung and the health hazards of keeping animals within homes. Alternatives to the present conditions will be developed in association with the governments livestock departments.

4.3.14 Consultations

294. City district government and TMAs will hold public consultations at the conceptual design of the development plan, schemes and projects. Modifications in the designs will be carried out to accommodate the concerns of the stakeholders. The PC-1 will be prepared only after such a process has been carried out. Taluka Council Monitoring Committees will oversee the programme/project/scheme. Accounts of the projects shall be made available to the public and made available to the media as stipulated by the SLGO (2001).

4.3.15 Communication and Dissemination Strategy

295. The Environment Protection Agency will be responsible for disseminating information on drinking water, wastewater and solid waste disposal standards, through articles in the press, leaflets, newsletters and dissemination of information to schools, through NGOs, civil society organizations, Community Citizens Boards and community organizations, etc.

296. The approved Domestic Water Supply and Sanitation Policy and SWM Policy will be widely disseminated to municipal institutions, civil society, community organizations and users. In order to undertake this effectively, consideration may be given to putting in place a coordinating and steering mechanism with the participation of key stakeholders.

297. Regular policy dialogue will be facilitated between all tiers of government and key stakeholders on key issues and challenges, awareness building, experience sharing and dissemination of good practices.

298. A proper system of dissemination of the information of the water quality of all sources will be developed by the providing agency. The provincial government and EPA will be responsible for coordinating and developing a system of information dissemination.

299. Each water source and water facility from which people are drawing water for drinking purposes will be marked to indicate whether its water quality conforms to the physical, chemical and bacteriological standards prescribed for drinking.

300. A system of colour-coding will be devised, indicating clearly through a colour code if the water is fit for human or animal consumption or not. The green code will indicate water which is fit for drinking and the red code will indicate its unfitness for human consumption.

301. Civil society organizations and community activists will participate in information dissemination and raising awareness about water and sanitation sector issues, water testing and quality issues.

302. Best Practices regarding successful initiatives in the water and sanitation sector will be widely disseminated and shared and will be used to enhance the performance in the sector.

4.3.16 Awareness and Education

303. Provincial and local government programmes will be developed to advise and collaborate with the media, especially TV and radio channels, to promote sanitation and SWM related messages in their entertainment programmes and to develop special programmes related to sanitation and SWM and its relationship between civic responsibility, health and education.

304. Awareness raising and education programmes will be developed focusing on safe drinking water, usage of toilet, solid waste management, intended to improve public understanding of the links between safe hygienic practices and public health. All educational institutions (schools and colleges), and teachers training institutions and local government department and agencies will be involved in the process. Healthcare centres will also be targeted with messages relating specifically to Healthcare waste.

4.3.17 Financial Strategy

305. The TMAs will consider a differentiated approach which will include full cost recovery, partial cost recovery, subsidization and cross-subsidization to achieve financial sustainability in the sector. The tariff system should ensure appropriate subsidies to poorer communities.

306. The TMAs will ensure that drinking water schemes will be given the highest priority in the allocation of funds to the Citizen Community Boards at the local level.

307. The TMAs will introduce a system for operations and maintenance on full-cost recovery to maintain the water supply system in a sustainable way. However the cost for major breakdown will be paid by the providing public sector authority. The current tariff for both residential and commercial users will be revised to ensure that the operational costs of the municipal entities are fully met.

308. The providers will be encouraged to promote metering of water consumption to discourage the indiscriminate use of water. This may be done by individual, collective or bulk metering as appropriate.

309. The implementation of professional systems for billing and collection will be encouraged through options such as strengthening the TMAs, outsourcing to the private sector, community-based system of collection, etc.

310. Systems of performance grants will be encouraged to reward those institutions and individuals who have been able to meet performance milestones and achieve the specified targets.

311. The capacity of service providers in the area of financial management, budgeting, audit and accounting, revenue collections will be strengthened.

4.3.18 Monitoring and Evaluation Strategy

312. The Local Government Department will be responsible for monitoring the coverage of water supply and sanitation.

313. The TMAs will initiate the establishment of internal as well as external systems for monitoring and evaluations. They will follow professional protocols for annual work planning, identify key progress indicators and conduct effective monitoring and evaluation functions on a regular basis.

314. The coverage and specific targets and achievements of TMAs will be displayed on bulletin boards outside their offices to inform the public of proposed plans and achievements. In addition, the TMAs will encourage forums in which citizens and community members can participate to provide regular feedback on TMA performance.

315. The Government of Sindh will conduct third party surveys with provincial and district level resolution to assess the coverage to safe water and sanitation, conduct water quality surveys and assess the extent to which treatment and disposal facilities have been provided and are being operated.

4.3.19 Protection of Water Sources

316. Regularly monitor water sources to ensure their protection.

317. Preserve and protect surface (rivers, lakes, wetlands) and groundwater resources which offer sustainable sources of supply for local communities in both urban and rural areas.

318. Encourage and support rainfall harvesting schemes (including the use of 'tanka' and weir dams) for augmenting municipal water supply.

4.3.20 Water Quality Monitoring and Surveillance

319. The responsibility for monitoring and surveillance of water quality for water at the source and transportation will rest primarily with the Sindh Environmental Protection Agency. The Government of Sindh will establish a monitoring and surveillance framework and system guidelines to ensure that drinking water quality conforms with required standards.

320. The specialised agencies responsible for drinking water supply like the WASA's and the Taluka Municipal Administrations will be responsible for ensuring that the water quality adheres to the prescribed standards.

321. Any private vendor of water, including bottled, will be responsible for ensuring that the water supplied for drinking purposes adheres to the approved water quality standards.

322. Random testing and surveillance of water quality will be undertaken of water from different sources including government schemes in urban areas, wells, hand pumps in rural areas, bottled water, private vendors, etc to determine the quality of water from different sources.

323. Water-testing laboratories will be established at the District level by the government where private sector facilities are not available.

324. Community activists will be involved in water surveillance and monitoring and will be trained in the use of water testing kits and will be provided kits for each scheme.

4.3.21 Effluent Quality Monitoring

325. TMAs will be responsible for coordination with the provincial Environmental Protection Agencies to assist them in the monitoring of the effluents of the municipalities in accordance with the NEQS System.

4.3.22 Capacity Building

326. TMAs will be encouraged to identify the training needs of their professional, technical, administrative staff and elected representatives to better fulfil their mandate.

327. Projects and programmes considered as good practices will be converted into training centres for government officials, TMA staff, community activists, representatives and technicians; and elected representatives. Training will be provided to groups in which all stakeholders are present together.

328. At the union council (UC) level, a team of community technicians will be trained in surveying, mapping, estimating and supervision of construction work so as to provide technical support to the UC. Salaries for this technical team will be provided through an endowment meant exclusively for this purpose. The technical team will also be responsible for training community members in the skills the technical team possesses.

329. The capacity of all levels of government will be developed to ensure public consultations and self-monitoring and documentation of their work.

330. Professional academic and research institutions will be involved in the capacity building process and as a result build their own capacities through interaction with grass root realities.

4.3.23 Research Strategy

331. Special efforts will be undertaken to pilot test new approaches and innovative ideas and arrangements in the water and sanitation sector, especially those which help to improve access, efficiency, effectiveness and sustainability.

332. Where these experiments are successful they will be widely disseminated and plans will be made to up scale and replicate them at the national level.

4.4 Roles and Responsibilities of Stakeholders

4.4.1 Government Institutions

4.4.1.1 Roles and Responsibilities under SLGO 2001

333. All provincial, district, Taluka and UC level legislative bodies and government departments and agencies will fulfil their roles strictly in keeping with the provisions of the Sindh Local Government Ordinance 2001.

334. The Government of Sindh, in coordination with the district governments, will remove all anomalies, lack of regulations and procedures, conflict of interests between government institutions, to make it possible for different tiers of government and agencies to fulfil their assigned roles.

335. The Government of Sindh will take steps to increase the capacity and capability of all water and sanitation related agencies and departments in accordance with the measures spelt out in this document.

4.4.1.2 Additional Roles

336. Provincial, district, Taluka (town) and UC elected representatives and administration will identify NGOs and CBOs and private sector (formal and informal) good practices and convert them into training centres for their staff with the help of NGOs, CBOs and/or private sector/entrepreneurs and replicate these practices in other locations within their jurisdiction through the formation of stakeholder partnerships.

337. A system of feedback, consultation and coordination will be established at the provincial, district and TMA level between all agencies (such as Environment Protection Agency, Health, Education, and Urban and Regional Planning Departments and institutions) dealing with water, sanitation and SWM issues.

338. The process for the establishment of a management information system will be initiated at the provincial, district and TMA level, in order to enable the planning and development of water supply, sanitation and SWM. The information and data from all monitoring and research agencies will be consolidated, and made freely available to the public through a policy of data sharing (through IT technology) within and amongst all water supply and sanitation related organisations.

339. Each city government and TMA will prepare a comprehensive mapping and Taluka database which will be linked to the proposed management information system. On the basis of this the TMA will prepare spatial and medium term plans which will guide and steer the future development in the sector and on the basis of which appropriate water supply and sanitation investment plans can be prepared at the federal, provincial, Taluka and UC level.

340. The TMA will provide technical support to NGOs and CBOs working on water supply, sanitation and SWM related issues on the self-help component sharing model or other community initiatives.

4.4.2 NGOs and CBOs

341. NGOs and CBOs will be encouraged to assist communities in mobilising for water, sanitation and SWM related programmes and projects and will assist the district city government/TMAs/UCs in the planning, funding and development of community-based water infrastructure and for the safe disposal of liquid and solid wastes.

342. NGOs and CBOs will be encouraged to help in the formation of Citizen Community Boards (CCBs) and to guide them in formulating water and sanitation projects.

4.4.3 Community Responsibilities

343. Through the process of mobilisation of communities envisaged in this policy and through public consultation and media programmes, communities will be encouraged to maintain a safe and pleasant physical environment in their settlement, participate in the provision of drinking water, sanitation and SWM infrastructure and its management and manage the disposal of solid waste at the neighbourhood level.

4.4.4 Individual Households

344. Through the process of mobilisation and media programmes, individual households will be encouraged to cooperate with the union administration and with their neighbours to form community organisations that can promote water and sanitation related programmes and projects.

4.5 Mechanisms for Implementation and Monitoring

4.5.1 Implementation Strategy

345. The policy will be implemented by the Government of Sindh, local governments, and government agencies in accordance with the guidelines, principles and measures spelt out in this document.

346. Communities, NGOs and the private sector will be supported and their involvement encouraged in accordance with the provisions of the Domestic Water Supply and Sanitation Policy and SWM Policy.

347. Existing water and sanitation related policies and their regulations and procedures should be reviewed and, where necessary, modified so as to fulfil the requirements of the Sindh Water Supply and Sanitation Policy and SWM Policy.

348. A policy and regulatory framework for coordination between the various sectors involved in water and sanitation related issues will be put in place at the provincial, district and TMA level.

349. The component-sharing model for the provision of sanitation will be adopted and the procedures and regulations for its implementation will be developed.

350. A programme for the upgrading of informal settlements will be instituted on lines similar to that of the katchi abadi improvement and upgrading programmes.

351. A legislation regarding the construction of toilets along with their specifications shall be developed by the provincial government and implemented by the city governments and TMAs.

352. Local government will raise funds for the O&M of sanitation systems and/or hand over O&M responsibilities to communities and the private sector so as to make O&M sustainable.

353. The Higher Education Commission will be requested to make it compulsory to link professional education in medicine, engineering, architecture, planning and social work to grass root realities.

354. The Sindh government will support the National government in its efforts to honour its international agreements and obligations which include the Millennium Development Goals, the recommendations of the World Summit on Sustainable Development and the UN Istanbul Declaration.

4.5.2 Monitoring

355. Monitoring of programmes and projects in the TMA will be done by the Taluka Monitoring Committees. They will also provide the necessary feedback, as required, to the provincial level on the implementation of the policy.

356. The Sindh Government will monitor the implementation of the policy and programmes within the province and provide necessary feedback and liaise with federal government on the wider issues related to drinking water, sanitation and SWM.

5 PROMOTING PRIVATE SECTOR PARTICIPATION

357. Over the last two decades, there has been an upsurge in private sector participation, including the cities in developing countries. This has been driven primarily by the need to attract investment into the sector. However, despite the shortage of funds and the very poor and low levels of provision, cities in Sindh, other than Karachi to a limited extent, have not shown any particular inclination to join this trend.

358. Although local authorities have long had the nominal responsibility for the provision of water supply, sanitation and solid waste management services, the provision of water supply and sanitation services has, for the most part been provided through one-off projects, funded and implemented as part of larger donor-driven provincial or national programmes. After completion, the projects have been handed over to local authorities or agencies to manage and maintain. Though users have been required to pay for the service, the charge is rarely based on consumption, and any allowance for the maintenance, upkeep and extension of the system is, at best, incidental.

359. When such a dysfunctional system operates in a context that lacks transparency and accountability, and the top-down bureaucratic environment leaves little room for manoeuvre at the local level, it is not surprising that local authorities are able to excuse shortfalls and shortcomings in service levels and provision by citing a lack of resources and blaming it all on the level of government above.

360. Therefore, when, as is increasingly the case, demand increases through an increase in population and in per capita consumption, this is met by “stretching” the system. Once any built-in capacity has been utilised, the demand is met by rationing amounts or reducing service levels, often to unacceptable levels, as has been indicated in Section 2. The shortfall in service levels is compensated-for by resorting to coping strategies by households. These differ by income and by location. Those with the means and the access, maximise their service levels through formal channels, while others adopt more informal methods to access the system. Most, if not all households, make their own private arrangements – whether for sweeping and clearing household refuse by paying for the services of a sweeper; buying water from a water vendor or a tanker; or by paying conservancy workers to unblock and cart away wastes discharged into open drains or cess pools or septic tanks.

361. Even where these services are provided to a number of households (or even all the households in a particular street, neighbourhood or part of a city) by the same individual or establishment, they are treated as atomised, individual transactions and not collated to take advantage of economies of scale. To an extent this has been because of the way the demand for these services arises – from individual households on an as-needed basis – but also because these are seen as “temporary”, augmenting or filling-in the gap till public services are provided, extended or upgraded. On the other hand, the mandate of local authorities did not make any provision for including or incorporating any contributions by the private sector. Indeed, local authorities were prohibited from accepting contributions to the goods or service it was mandated to deliver, from either the private sector or from households, whether in cash or in kind.

362. The Sindh Local Government Ordinance 2001, which seeks to bring a greater level of transparency and accountability and to increase the levels

of responsibility and involvement in local affairs, and especially the supply, provision and management of services and infrastructure, has taken a clear and radically different approach to the private sector. Thus Section 52 of the SLGO 2001 lays down that:

"(1) The functions and powers of the Taluka Municipal Administration shall be to- (a) ….(h) provide, manage, operate, maintain and improve the municipal infrastructure and services, including -

(i) water supply and control and development of water sources, other than systems maintained by the Union and Village Councils;
(ii) sewerage, sewage and sewage treatment and disposal;
(iii) storm water drainage;
(iv) sanitation and solid waste collection and sanitary disposal of solid, liquid, industrial and hospital wastes;

(2) The Taluka Municipal Administration may-

(a) assign or contract out, on such terms and conditions as are approved by the Taluka Council and after inviting public objections, any of its functions to any public-private, public or private organization:"

363. Given the opportunity offered by SLGO 2001, why has there been virtually no privatisation of water supply and sanitation services or solid waste management in any of the TMA? As suggested above, to a large extent this may be because while the legislation makes it possible, there is as yet little incentive, or for that matter, penalty for the TMA to actively seek to privatise or to look for partnerships with the private sector.

364. At the same time, the lack of an organised private sector operating in the water supply and sanitation or solid waste management sector has meant that there is little or no demand from the private sector itself. There is a need, therefore, to look at how such a demand could be generated.

365. In Pakistan, as elsewhere, the private sector in general is alert, aware and active, and therefore quick to spot opportunities for entering a market, taking advantage of any available loophole or niche that can be capitalised upon to meet a demand. The rapid proliferation of bottled drinking water companies across the country are a very good case in point. A large, and expanding, market has been created, almost from scratch over a very short period that has penetrated deep both geographically and socio-economically.

366. However, the nature and characteristics of the creation and expansion of the bottled water market has some very important lessons regarding the nature and characteristics of the private sector that help explain the lack of initiative and response with regard to the water and sanitation and solid waste management sector.

367. The roots of the current situation lie in the development model advocated and fostered by the Howard Group of Economists that advised Pakistan in the 1950s as it sought to transform itself from a largely agricultural economy to one that was industrialised. Rather than laying the foundations for a broad-based model of development, a quick-fix was sought by focusing on the leading business houses and looking for trickle-down. In this model, the focus was on import substitution, rather than indigenous development. The result was the development of a private sector dominated by a few families, and a powerful bureaucracy based on the exercise of licensing and import controls and protection.

368. With the limited support or development of technological and professional capacity, the small-scale private sector was limited to the service sector, or the manufacture of cheaper imitations, primarily by avoiding risks and not incurring any research and development costs. While some of this has changed in the last decade or two, the general underlying trend has remained.

5.1 The Operational Environment

369. The business and commercial environment in which the private sector has to operate can be characterised by:

i) Lack of information (technical and feasibility)
ii) The relatively low level of awareness of alternatives to the status quo is deliberately maintained by the prevailing culture that discourages inquisitiveness and innovation. Therefore, it is difficult for new entrants to a field or those wanting to expand into new areas, to know what possibilities exist and therefore how to exploit their potential.
iii) Lack of (market) research
iv) In the absence of any real research culture, it is very difficult to establish meaningful demand for services and therefore the signals that would otherwise prompt businesses to extend or enter their sphere of operations are missing.
v) Lack of finance (ial support)
vi) Access to capital is dependent more upon having the right connexions than on having the right business plan. Venture capital is particularly scarce, and most businesses have to rely on borrowing from their own family and friends. This is especially true for small business ventures.
vii) Lack of certainty (future)
viii) In a context where most decisions are taken to protect and promote self-interest and there is a lack of transparency, it is more than usually difficult to predict what the future conditions may be, and therefore, what the demand for any good or service will be is a matter of guesswork, and carries a high level of risk.
ix) Lack of protection (for pioneers)
x) There is very little that a small business can do to protect itself against any unforeseen event in the absence of a developed insurance market. The absence of a fair legal system affords very little protection for the developer of a new product or process against copyright infringements.
xi) Risk aversion
xii) In such conditions, it is natural for most investors, whether individual or institutional, to be reluctant to take on risks, and most prefer to invest or speculate in property and real estate.
xiii) Short term-ism
xiv) The corollary to being risk-averse is to reduce exposure by looking for investments where the return is both guaranteed and over the short-term. Therefore, proposals to make investments that are not likely to how a return in the short term are unlikely to find any backers.

370. Ironically, there has been considerable support and assistance provided to the development of the NGO sector as an alternative to the public sector. However, since this has been largely donor-led, it has focused on the social sector, primarily health, education, and rural development, targeting poverty, the environment and gender issues. There has not been as much attention or support provided for the development and expansion of the private sector as such, other than the recent provision of micro-finance facilities and the development of small scale manufacturing. Much of that has been on the development and delivery of products and services marginal to the economy, and perhaps none related to the water and sanitation and solid waste management sector.

5.2 Improving the Operational Environment

371. An integral part of any strategy to promote private sector participation has to be aimed at improving the general conditions for private sector participation, only then can there be successful private sector participation in any meaningful way in the water and sanitation and solid waste management sector. However, this does not mean that nothing can be done in the mean time. Any intervention that helps has to be welcomed and supported. Using the same characteristics as above, suggestions can be made that would help modify the operational environment for the private sector:

1. Provide information (technical and feasibility)
2. Provide (market) research
3. Provide easier access to finance
4. Reduce uncertainty (future)
5. Provide protection (for pioneers)
6. Reduce the risks in risk-taking
7. Encourage Long-term-ism

5.3 Options for Private Sector Participation

372. There are many different options for the participation of the private sector. These can be classified as follows[55]:

- *Service contracts* - are the simplest form of PSP, involving short-term contracts to provide limited services, such as reading meters, repairing leaks, and mailing statements for payment. These contracts entail carrying out specific duties and do not require any overall private sector responsibility for system operation. Small service contracts have existed in many cities for a number of years, but in recent years there has been a shift towards more comprehensive types of service contract.
- *Management contracts* - require somewhat greater private sector responsibility with the private company assuming day-to-day responsibility for system operation and maintenance. However, management contracts do not usually require any private investment, the private company does not assume commercial risk, and does not have any direct legal relationship with the consumer. The national or local government must maintain financial responsibility for the system and the capacity to plan and finance system expansion. The contractor does not get paid unless fees are collected from the

[55] The Regulation of Private Sector Participation in Urban Water and Sanitation: Realising Social and Environmental Objectives in Developing Countries Nick Johnstone, Libby Wood and Robert Hearne, IIED, 1999

consumers, and has an incentive to improve system management under the stipulations of the contract.

- *Leases* - allow a private operator to rent facilities from the public authority for a stipulated period of time. The public authority retains ownership and responsibility for system finance and expansion, but the private contractor is responsible for financing working capital and accepts some commercial risk in the day-to-day operation of the system. The private contractor is not responsible for any capital costs, and rental fees are often based upon the costs of debt service for capital costs. The contractor has a direct incentive to maximise fee collection since its returns equal revenue generated less operating costs and rental fees. Occasionally the relationship is reversed, with the private firm building a facility and leasing it back to a public provider.
- *BOOT contracts* - are mechanisms that allow a private contractor to *B*uild, *O*wn, *O*perate, and *T*ransfer a specific capital investment such as a wastewater or water treatment plant. Usually, the investment is quite substantial and the contract period is long enough to allow for the recuperation of capital expenditure. Generally the public authority must guarantee a certain demand, such as a volume to be treated. The contractor accepts a risk if this demand is not met. There are numerous variants on this option, such as BOTs, “reverse BOOTs” and others.
- *Concessions* - are long-term contracts which require the private company to invest in the system. The concessionaire has overall responsibility for the system, including operations, maintenance, investment and expansion. The concessionaire receives payment directly from the consumer and accepts the risk that costs do not exceed revenues. The contract period is usually long enough to allow the contractor to recover investment costs. Penalties may be imposed upon the contractor if specific targets or standards are not met.
- *Divestiture* - may be partial, allowing for shared government and private responsibility for service provision, through a separate corporate entity. Generally, a corporate agreement will stipulate private and public responsibilities, including representation on the board of directors and division of profits.
- Private finance may be facilitated by the establishment of a separate credit rating with support from the public authority. Less frequently, the provider may be fully private, with the government only serving a regulatory role.
- In general, concessions are the most popular form of PSP in terms of both number and size of investment.

5.4 Areas for Private Sector Participation

373. As the above discussion suggests, the private sector can, of course, take over all or any part of the management and operations of water supply, sanitation or solid waste management from the public sector. However, under the present conditions and set-up in Sindh, some areas are more feasible than others. Though there is little experience from within the sector itself, there are examples where Local Governments have brought in the private sector to manage services, usually on the basis of a concession or service or management contract. Most notable has been the use of awarding concessions to the private sector to act as “contractors” to collect road or bridge tolls.

374. In the light of the foregoing discussion, it is suggested that private sector participation should be based upon expanding or building-up on current practice. This suggests that initially, the private sector be encouraged to take over those operations within the overall system that can be easily segregated as stand-alone subsystems. This provides a more manageable process, and one that can therefore be more easily monitored. Secondly, it is suggested that priority should be given to privatising those parts of the overall system where there is already some private-sector involvement and therefore experience. Finally, those subsystems should be privatised that are the more amenable to private sector operations, or those that are, the more problematic for the public sector. These suggestions are in line with the Sindh Policy recommendations for the adoption of component-sharing in the sector.

375. The Table 5-1 below summarises the situation regarding water supply, Sanitation and Solid Waste Management in Sindh, based on the discussions and investigations undertaken for this study with a view to highlighting recommendations for Private Sector participation.

Table 5-1: Situation regarding Water Supply, Sanitation and Solid Waste Management in Sindh

	TMA	Neighbourhood	House
WATER			
Component	Bulk water treatment and supply	Local storage and Distribution	Household supply
Typical provision	Water from canals, stored in sedimentation ponds	Distributed with little or no treatment to (older) parts of the city, or collected from ponds	Intermittent piped supply where it exists; augmented by tinkered delivery
Public sector problems	Insufficient storage capacity to meet demand	Inadequate treatment facilities (lack of resources); seepage	Leakage and other losses; inability to bill and collect user charges
Private sector potential	Construction and Management contracts for sedimentation ponds	Construction and management of water filtration and ground-level and above ground tanks;	Local distribution; billing and collection of user charges
Current private sector involvement	Construction contracts	Construction contracts	Tankered delivery against payment
Recommendation	TMA to refurbish/extend bulk water storage, add/operate filtration plants; formalise arrangements with irrigation authorities for water intake	TMA to sell (metered) bulk filtered water to private contractors based on local concessions; monitor performance	Private contractors to supply households against TMA-agreed rates – via tankers or piped system; Awareness-raising of household water purification and storage options
SANITATION			
Component	Treatment and Disposal	Local collection	Household discharge
Typical provision	Untreated wastes dumped into canals or	Holding tanks and pumps	Often into open drains; or sewerage system if

	TMA	Neighbourhood	House
	agricultural fields		exists
Public sector problems	Poor management leads to inefficient operations	Poor maintenance leads to blocked pipes, non-operational pumps	Lack of awareness leads to poor enforcement and compliance
Private sector potential	Construction and management of sewage treatment and disposal plants	Construction and management of group septic tanks	Installation of on-site systems; connection of toilets to lane sewerage systems
Current private sector involvement	Limited purchase of untreated wastes for agriculture	none	Unblocking of drains upon payment
Recommendation	Introduction of improved technology for sewage treatment; contract-out management to private sector	Introduction of group/area septic tanks – piped or transported to treatment plants	Awareness-raining of households regarding health and sanitation links; Introduction of lane-based sewerage systems
SOLID WASTE			
Component	Disposal	Local collection	Household collection
Typical provision	Open disposal	Neighbourhood collection in demarcated sites; removed to disposal sites	Dumping of household wastes into streets or local dump-spots
Public sector problems	Poorly managed land-fill sites	Poorly managed transport fleet	Poor household behaviour increases collection costs
Private sector potential	Establishment and management of land-fill sites	Contract for waste collection and transfers	Contract for door-to-door collections
Current private sector involvement	None	none	Individual contracts with households
Recommendation	TMA to be informed of good practice	TMA to investigate options for privatising waste collection and transmission contracts	Awareness raising of households regarding waste generation, handling

5.5 A Programme for Promoting Private Sector Participation

376. From the Table above, it is clear that rather than suggesting the privatisation of the sector, or of services within the sector, it is being suggested that specific aspects be targeted that seem to be the more fruitful and most likely to find takers. At the same time, given the current state of the sector, it will be necessary to undertake some research and analysis regarding what can be done and how to do it. Probably the best way to proceed is learning by doing, starting with a few Pilot TMAs where private sector participation can be invited and encouraged. The feedback from the pilot can then be used to facilitate the entry and development of other private sector organisations in the rest of the TMAs. To do this, the following programme and set of activities is proposed:

i) Identification and selection of an NGO or private sector organisation to organise and manage the Private Sector Participation Promotion Programme;
ii) Preparation of a preliminary programme based on field investigations and discussions with pilot TMAs;
iii) Identification and selection of private sector organisations to participate in the programme;
iv) Provision of the required training and capacity building – both in general management and in specific sector-related tasks and operations;
v) Facilitate the access to funds and finances to enable the organisation to acquire the necessary equipment;
vi) Facilitate the organisation to enter into appropriate contractual arrangements with the TMA;
vii) Monitor the operations of the organisation, providing the necessary encouragement, facilitation and support for successful implementation of its contractual obligations;
viii) Use the feedback to draw up recommendations for the promotion of further private sector participation in the water supply, sanitation and solid waste management in Sindh.

6 PUBLIC AWARENESS RAISING

377. The success of water supply, sanitation and solid waste management policies and strategies can be considerably enhanced through public awareness-raising. To be successful, the policies have to be developed through participatory processes so that the concerns and aspirations of citizens can be addressed. To that end, a series of consultations have been held across Sindh with TMA professionals and political leaders as well as households and community groups. The Draft Policies have been circulated and also put on the web site to elicit further response before a final version is produced.

378. Making the public aware of what the TMA is doing to implement the policies and to engage them in the process of developing strategies and annual action plans is even more important since it is the people who will have to pay for the installation and operation of these services. At the same time, if the public are made more aware of the services and their operation and management, they can help reduce costs by their own actions and behaviour.

6.1 Messages

379. There are two sets of messages that need to be developed and the public made aware of. The first is to do with the relationship between Health and Sanitation, and Waste Management and the Environment. The second is to do with the TMA's roles and functions, and the cost implications of different types and level of services. From observations and responses to the surveys, it is clear that much of the behaviour of individuals and households is to do with this lack of awareness.

380. Therefore, amongst the messages that any awareness-raising programme will need to get across, includes those relating to:

i) Health and Sanitation – the fundamental link between health and sanitation appears not to have been established for many households. The discharge of human wastes directly into open drains is a common and widespread practice. Often, blockages in the drains lead to flooding that causes large pools of heavily contaminated water to form on the roads and around housing. People, and especially children, appear to be unconcerned that by wading through this, they are running severe health risks.

ii) Many households seem to have adopted the more "modern" water closet despite the fact that they are not connected to a sewerage network. As a result the more hygienic traditional on-site systems have been replaced by less effective systems.

iii) Environment and Waste – concerns seem to be limited to the space within the house, and there is indiscriminate dumping of household wastes onto the street immediately in front. Often this is blown or dragged back into the house during the course of the day. Similarly, even where an attempt is made to transport household waste to a designated dump site, it is carelessly deposited, often missing the receptacle or enclosure completely.

iv) The increasing and widespread use of plastic bags is creating a new hazard. Ironically, the primary re-use of "shoppers" is to use them to transport household wastes. Though many Local Authorities have banned the use of plastic shoppers, the ban remains ineffective

against the continued demand for them from shopkeepers by households.

v) TMA role and functions – many of which have been modified by the SLGO 2001 are still not fully understood by the public. This applies especially to knowing what their, and the TMA's, rights and duties are. Therefore, there is ineffective monitoring and a lack of accountability.

vi) Funding of services – is an area that is presumed to be the responsibility of central or perhaps provincial government, instead of the local authority, and by extension, of the households. Therefore there are often demands made for services without a willingness to pay for them. The general presumption is that funding is both available and forthcoming from provincial or central government, and therefore should be used to pay for them. There is a need to explain and gradually disabuse the public of their assumptions regarding the source of funds.

vii) Types and levels of service – and the way that varying them will impact on costs and therefore charges has neither been elaborated nor explained to the public. As a result, it has not been possible to work with households to reduce consumption levels, or to take a participatory approach to service provision, nor to get an acceptance of lower levels of convenience in return for a wider availability of services.

viii) Costs of service – in the main, governments have shied away from charging users anything like the real costs of provision. The attitude seems to have been that since the charges are such a small proportion of costs, it is irrelevant whether they are collected or not. Such thinking has led to a downward spiral, leaving local authorities with decreasing resources with which to meet increasing demand. On the other hand, there is an acceptance of and dependency upon subsidised services, especially by the better off households.

6.2 Mediums

381. Much of the above discussion has been incorporated into the proposed water and sanitation and the solid waste management policies and the TMA strategies and action plans. However, to be effective, these messages will have to be got across to the public through a variety of mediums, and not just through the educational systems to school children, though that is a vital and effective channel. The message will also have to be carried by the media, and especially the TV and cinema – both as direct and indirect messages incorporated into the storey lines and the characters. Greater use will also have to made of the mosque as one of the more effective and influential mediums in the community. The Friday sermon is already widely used for the dissemination of a variety of political and religious messages, and should be extended to cover social, health, community and environmental issues through deliberate and targeted intervention by the imams.

6.3 Programme

382. The development and implementation of an awareness-raising programme is a specialist task and needs to be undertaken as a matter of some urgency to support the TMA in the provision and management of water supply, sanitation and solid waste management services in line with the proposed provincial policies.

383. The discussion above has been intended to identify the need and to explore some of the areas and means for the development of such an awareness raising programme. However, the development of the programme will have to include more detailed and specific investigation, elaboration and confirmation of these in making its proposals.

7 CAPACITY BUILDING OF TMAs FOR STRATEGIC PLANNING

7.1 Overview

384. A programme of capacity-building of TMAs was developed and implemented to enable the development of strategic plans in line with the proposed Sindh Provincial policy and strategies for water supply, sanitation and solid waste management. Six TMAs were selected to carry out a pilot programme that was then used for all TMAs in Sindh. The selected TMA were typical of the range of TMA in terms of size, situation and conditions of water availability etc, and are shown in the map below.

Selected TMAs:

Mirpur Khas, Umerkot
Johi, Larkana,
Shikarpur, Sukkur

385. Each of the selected TMA was visited by the consultants at least twice, and consultations and discussions held with the TMA staff, including, wherever possible, the Nazim and the TMO; most of time was spent with the TO (I&S), who are directly responsible for the sector. In addition, discussions were held with other officials and operators of water supply and sanitation facilities, including private contractors and vendors; surveys, and formal and informal discussions were also held with shop-keepers and community groups, including focus group surveys of women in residential areas in both urban and rural communities.

386. The information from these surveys and discussions, supplemented by participant observation and field notes was used to document the water supply and sanitation and solid waste management situation in the selected TMAs, and is summarised below (and presented in Annex 1 to 6).

387. Guidelines for Strategic Planning (see below) were produced and field-tested with the six selected TMAs to produce Strategic Plans. These were used to conduct a series of hands-on interactive training workshops in Hyderabad and Sukkur, to which all TMAs were invited.

7.2 Water Supply Situation in Selected TMAs in Sindh

7.2.1 Overview

388. The water supply system of the 6 Taluka areas under study is dire. Municipal schemes exist in four out of the six major towns in the area and supply water, unfit for human consumption, for a small part of the day

only, to a small part of the population through aging and corroded distribution systems. Consequently, alternative private arrangements are common. In the two remaining towns, supply is mainly through shallow wells and boreholes. Municipal and private arrangements are also supplemented by private and unregulated water vendors.

389. Census information indicates that the overall population in the 6 Taluka study areas is 2,024,000 of which 27% are reported to have a potable[56] water supply. Figures do not differentiate between households that have a piped water system or those that make their own private arrangements. With the exception of one small scheme, municipally administered piped water supply does not exist in Larkana and Shikarpur talukas, all the water being obtained through individual private arrangements.

7.2.2 Water Sources

390. Irrigation canals are the main source of municipal water for urban conurbations in the taluka areas under study though water is occasionally drawn from the River Indus, for example in Sukkur, and from boreholes, for example in Johi. Water quality in any detailed sense is unknown, as sampling is rarely carried out. In Larkana, where monitoring had once been carried out, the TMA could not locate the results. Notwithstanding, the quality of water in the canals appears exceedingly poor and unhygienic. Aesthetically the canal water is highly turbid and coloured. It also contains large amounts of particulate matter (solids). Chemically, its quality is also dubious and possibly contains metals such as iron and arsenic.

Untreated water taken from Canal

Water pumped from the ground

391. Ground water in the region is generally brackish though it was reported that there are numerous pockets of non brackish water dotted around the areas. Brackish water is unsuitable as drinking water though it can be, and is, used for other domestic purposes. The quantity of the non brackish water, used for drinking purposes, is unknown because testing is hardly ever carried out. Being shallow it is however very susceptible to contamination from surface water, latrines and leaking sewers and whether non brackish water is in fact drainage water is unknown. Both Shikarpur and Larnaka TMA's report a reasonable amount of non-brackish water for supply hence the absence of a municipal piped system in those towns. In Johi, the non brackish water overlies more brackish water which limits use as a water supply.

[56] Although the census uses the word "Potable" there is no assessment as to whether it is of drinking-water quality.

7.2.3 Water Treatment

392. Water abstracted from a canal is firstly stored in lagoons or small reservoirs. Authorities and engineers euphemistically refer to these as settlement tanks but their prime purpose is to store water when the main canals close for four weeks each year for cleaning and maintenance. In most cases, the current storage capacity is insufficient to satisfy demand leading to water shortages during the period[57]. Schemes to add storage capacity are currently on-going in many places, for example in Mirpur Khas, but storage capacity is still insufficient in the study areas.

Raw Water Storage Tank

Water Treatment Plant

393. The settlement of solids in the storage tanks acts as a rudimentary treatment but otherwise water treatment is generally absent in all the six taluka areas under study. The exception is Sukkur city which has two water treatment plants serving 71% of the urban population. Treatment here comprises the standard treatment format of clarification, filtration and disinfection though it is suspected that this is only partially effective due to lack of chemicals. Treatment is however better than in any other taluka studied under this project but sadly the water intakes and treatment plants are in need of major repair and improvements to fulfil the water requirements of the city. In this context, plans have been prepared to secure further monies from provincial government. A small water treatment plant is also present in Mirpur Khas which is unused and in disrepair. If refurbished it could supply approximately 50% of the water demand of the town though it would still require the municipality to fund its operation and maintenance.

7.2.4 Water Distribution

394. Water is generally pumped untreated into the distribution system for supply. In the larger urban conurbations, elevated tanks provide buffer storage and (in theory) establish a constant hydraulic head (pressure) throughout the system. Service provision is however very poor. Most outlying urban areas are not served by distribution mains and those who are either receive water for only a few hours per day, at best, or commonly receive no water at all due to low pressure. The condition of the mains is a factor here often being old, corroded and choked with sediment (from the canal water). In addition, leakage is reportedly very high (though there are no recorded estimates of how much) and illegal

[57] The estimated storage requirement to supply a connected urban population in the 6 taluka study areas of approx 450,000 for 30 days based on 100 l/hd/d (22 galls/d) amounts to approx 1.35 million m3 (300 million galls). Approximately the same storage volume would need to be constructed in the future in association with the expansion of the municipal distribution systems to all urban populations if the practice continues.

connections generate an unsustainable demand. Realistically, the amount of water used through domestic use (legal or illegal), leakage and, significantly, wastage vastly outstrips the capability of municipal water supply systems in every instance studied.

Canal Closure
It is of concern that this unilateral practice of canal closure by the Provincial Irrigation Department places an extreme (and possibly an unnecessary) burden on the country's limited finances in requiring monies to be diverted into storage schemes when they could be better used to improve the supply infrastructure and water quality itself. The provision of isolating gates at strategic points within the canal network coupled with the construction of connecting channels would not only lead to the provision of a demand lead system of water supply (as opposed to current supply lead system) but would allow better management of the system and the integration of drinking water supply with agricultural irrigation needs. A further problem exists in people's perception that millions of rupees are being spent on water supply schemes each year when in fact they are not; the money is being spent on water storage schemes. Such schemes have no intrinsic value in the furtherance of public health and are wasteful of money. Fundamentally the canal system is being managed to irrigation requirements and is neglectful of drinking water needs. A top level management strategy realignment within the National Irrigation Department who are responsible for the management of the canal system strategy, is required to bring drinking water needs into consideration in the management of the system[1].

7.2.5 Contamination in Distribution System

House connection through sewage

House connection through open drains

395. A further disconcerting feature of the water supply systems is that water quality deteriorates whilst in distribution due to the ingress of sewage or contaminated water into the system. Consequently, should any of the towns and cities be supplied with potable water it could not be distributed without a comprehensive refurbishment (not to say replacement) of the entire distribution system if water were to remain potable at the point of consumption. Primarily the problem results from ingress of contaminated water through loss of mains pressure during service interruptions. Ingress occurs through breakages and badly sealed joints. Often water mains pass through areas of contaminated water from leaky sewers and overflowing drains a particular example of this being seen in house connections which frequently pass through open drains before entering household premises.

7.2.6 Private Sector Participation

396. Due to the vast and inherent problems with municipal supplies, households are forced to make their own private arrangements for water

supply. In those urban areas where there is no municipal supply, groundwater becomes the primary source of supply which is abstracted from individual private wells or boreholes by means of hand pumps or by small electromechanical pumps. Where the supply is inadequate or intermittent, these shallow wells or boreholes often supplement the municipal supply. Private systems also act as back up supplies during power cuts. In rural areas the water supply is almost exclusively through shallow wells or boreholes either located within or close to each household boundary, or as a more communal facility. As a third and final tier, water vending is present in some areas, with charges of around Rs 1 per litre of water. The water is obtained from various sources including municipal sources and is delivered in 20 litre containers by donkey cart. In rural areas where water is scarce households have to travel up to 1 kilometre for there domestic supplies.

Private sector water vending

Private ground water pump

7.3 Sewerage & Drainage Situation in Selected TMAs in Sindh

7.3.1 Overview

397. The system of sanitary drainage throughout the Taluka areas is extremely poor and predominately ineffective in its requirement to collect, treat and safely dispose of human waste and surface water. Coverage of the system of piped underground sewers is very low and those sewer systems that exist are generally old and badly maintained. Sewage treatment is absent in all of the talukas studied with the raw sewage being discharged directly into irrigation canals or surrounding fields.

7.3.2 Wastewater Collection System

398. The collection systems in urban areas consist of underground sewers mainly served by a system of drainage channels. Drainage channels are characteristically small open drains that run along the outside of properties, either side of the road, in an attempt to remove drainage and sewerage water from households and business premises. In the main, the channels run along level ground and simply do not have the capacity to convey all but the smallest flow away from the immediate area consequently channels are generally full and often overflow. The channels can be lined or unlined. Those that are unlined are dug simply into the earth. In urban area most of these channels feed into the underground sewer system comprising either underground reinforced concrete pipes of varying diameters or underground culverts of concrete or brick construction. In the rural areas small individual channel networks run directly onto surrounding land.

399. Census information suggests the overall percentage of households with latrine facilities in the various talukas is approximately 45%. Individually, the figures range between 44% and 47%. How reliable these figures are is unknown. There are no figures indicating the number of households served exclusively by piped underground connections which is the more sanitary practice (rather than water flowing into outside open drains), but the figures are thought to be very low.

Poor drain maintenance

Blocked drain

7.3.3 O&M of Wastewater Collection System

400. Though detailed inspections were not carried out, the condition of the underground sewer system is thought it be poor. The systems are reported by authorities as being old, in some cases, for example in Shikarpur, reportedly constructed in the 1930's. The condition of drainage channels is very poor with sides having collapsed in some instances and covers missing or broken. The latter is a significant safety hazard and there have been reports e.g., Mirpur Khas where fatal accidents have occurred for example, children falling into the drains.

401. Due to the deterioration and the population increase since construction, much of the sewer systems throughout the talukas are hydraulically too small to cope with flows. In addition, plastic bags and other general household wastes choke the channels and sewers which make matters worse. Consequently, the accumulation of raw sewage from overflowing drainage channels and sewer manholes is a common sight in most Taluka towns and cities. Though the breakdown of pumping stations within the system and power cuts also contribute to the problem.

Rain water disposal Using tanker

402. The drainage system is also used for the removal of surface water from the streets though no formal road drainage system exists in any of the urban areas. Where necessary surface water is removed by sucking it into

tankers and discharging it into the nearest drain, as seen in the visit to Mirpur Khas.

7.3.4 O&M of Disposal Stations

403. The state of the pumping plant is equally poor, with much of the pumping plant components old and decrepit. Belt and pulley pump systems, seemingly over 50 years old, are prevalent and some are only kept going by the skill and ingenuity of the plant operators. Otherwise, the situation of sewage accumulation would be considerably worse. Mostly, however, the pumps are no longer operating and the sewage accumulates in the low-lying areas and sometimes, for example as in Umerkot, extend over vast areas.

Non-functioning disposal station

Poorly maintained disposal equipment

7.3.5 Wastewater Treatment

404. There is no effective treatment of sewage in any of the Taluka towns and cities studied. In most cases, the formal sewage treatment stations are old and redundant. Even if used they would be too small for current requirements. Oxidation ponds have been constructed in some areas but these are, without exception, either too small or filled with sludge from lack of maintenance. Consequently, they are not used and most have become overgrown.

Untreated Sewage Discharged into Canal

Non-functioning Oxidation Ponds

7.3.6 Effluent Disposal

405. Final disposal is often to irrigation canals, as is the case in Sukkur and Shikarpur, or to land, as in Mirpur Khas, Umerkot, Larkana and Johi. However, due to the disrepair of pumping plant (intermediate and final) sewage also accumulates in low-lying areas from overflowing sewerage systems. Often such accumulations meander between houses as seen for example in Mirpur Khas. The condition is appallingly unhygienic and

reflects badly on the authorities who, to date, seem to be unable to remove and safely dispose of wastes due to underinvestment in essential infrastructure.

7.4 Solid Waste Situation in Selected TMAs in Sindh

7.4.1 Overview

406. This review of solid waste management (SWM) practices in Sindh has revealed serious shortcomings in the quality and coverage of SWM practices by TMAs. Key problems include:

- collection rates as low as 48% of city waste resulting in dirty streets, blocked drains and risk to public health;
- ad hoc disposal methods, usually on open ground on the outskirts of the urban areas;
- lack of specific treatment and disposal options for healthcare and other hazardous waste streams;
- low level of understanding within the TMAs of options to address the problems, and resultant lack of strategic and long-term planning;
- low level of public awareness and engagement in the issues; and,
- limited understanding of the operations of the informal sector and no public sector involvement/ support

407. In addition, the review has revealed that there are few data relating to solid waste in Sindh, and little non-governmental organisation (NGO) or community group engagement with the issues.

408. Solid waste management is an obligatory function of TMAs, but due to lack of resources, knowledge and awareness, the subject remains relatively neglected. This results in increasing risk of environmental damage, risk to public health, and as populations and urban areas expand, compounded problems.

409. Key solid waste management data from each of the TMAs are summarised in the Table 7-1 below.

Table 7-1: Summary of SWM data from 6 TMAs

	Mirpur Khas	Umerkot	Johi	Larkana	Shikarpur	Sukkur
Urban Population (2006)	231,276	55,615	29,296	389,996	164,727	240,776[58]
Collection vehicles						
Tractor trolleys	6	4	2	8	5	7
Dumper trucks	-	-	-	2	-	5
Container-carriers	-	-	-	-	-	1
Mechanical loaders	2	-	-	2	1	1
Donkey carts	9	1	-	20	10	11
Hand carts	70	21	10	40	24	150
Primary-secondary transfer	Open heaps	Open heaps	Open heaps	Open heaps	Open heaps	Open heaps
Disposal methods	Open	Open	Open	Open	Open	Open

[58] Note: there is a lack of clarity on the jurisdiction, and therefore urban population, of Sukkur. This figure is based on 11 Union Councils.

	Mirpur Khas	Umerkot	Johi	Larkana	Shikarpur	Sukkur
	dumping	dumping	dumping	dumping	dumping	dumping
Hospital wastes	Collected with municipal wastes	Burnt at site	Negligible (on site in disposal)	Open dumping	Collected with municipal wastes	Collected with municipal wastes
Dead animals	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes
Annual expenditure (Rs)	16,686,000	9,224,700	3,185,000	3,070,000	13,517,000	29,732,000
Collection cost/ton (Rs)	952	1487	550	766	823	1037
Cost/inhabitant/year (Rs)	72	166	51	79	82	123
Collection efficiency (%)	48	80	73	62.5	65	72
Staff / 1000 population	1.5	2.59	1.06	0.97	0.92	1.79
Contracts awarded to private sector	-	-	1	1	-	-

7.4.2 Waste Generation and Composition

410. Few studies have been undertaken in the province to determine waste generation rates and this has also not been studied in this review. A recent set of studies undertaken by Nippon Koei (2006) in collaboration with TMAs suggest that household waste generation rates vary between 0.12 to 0.4 Kg/capita/day in the five towns studied. Low and high-income households were found to generate similar quantities of waste, which contrasts with waste generation patterns in many similar cities across South Asia. It is possible that the study suffered from some methodological problems. The World Bank (1997) suggests a range of 0.3 to 0.55 for medium cities in low-income countries.

411. Based on the lifting capacity of municipal vehicles, collection efficiency, and experiences in other parts of the country, the following Table 7-2 presents estimated generation figures for the TMAs visited.

Table 7-2: Waste Generation Rates

Type of areas	Population range (Th)	Average generation rate (Kg / capita / day)
Urban	25-100 100-300 300-500 500-700 700-900	0.35-0.4 0.4-0.44 0.44-0.47 0.47-0.4 0.49-0.51
Rural	1-5 5-10	0.15-0.2 0.2-0.25

412. The present waste generation rate in urban areas of Sindh is estimated to be 1,059,000 tons pa.

413. Nippon Koei (2005) found that the physical composition of domestic solid waste in most of the study cities consisted mainly of organic waste. The World Bank (1997) also indicates that Pakistan's solid wastes have a very high organic content, and are low in combustible materials. In Sindh, no other studies have been conducted for determining the waste composition.

414. Experiences elsewhere in Pakistan indicate that waste composition, after it has been picked through by waste pickers, is as follows:

- Putrescibles - 50 – 60 %
- Polyethylene bags - 8 - 12 %
- Other plastics - 8 – 12 %
- Debris - 20 – 25 %
- Metals glass - 0.5 – 1 %

7.4.3 Primary Collection and Street Sweeping

415. Primary collection is the removal of waste from the point of generation to intermediate disposal points (transfer points), from where it is collected by municipal authorities for disposal. In the six TMAs most waste generators, including households, shops and hospitals, store solid wastes on their premises in non-standardized containers such as plastic bags or

buckets. In most cases these are reportedly emptied either straight onto the street, or into a transfer point.

416. There is no provision for house to house collection of waste, except in a few residential areas where private arrangements exist, at rates varying from Rs 40-60 /month/household.

417. As most waste is thrown on the streets, street sweepers are implicitly responsible for transporting the bulk of the city's waste to community bins (i.e. transfer points). This stretches the workforce, and as a result all roads and streets are not being swept on daily basis. There are no standards for size of beat, so some sweepers have large areas to cover, and others very small. Many roads are swept early in the morning, but subsequently become soiled again as waste is thrown into the streets.

418. Sweepers are normally provided with short handled brooms and single wheeled hand carts (wheel barrows) but are not given pans for lifting the wastes. The continuous bending can cause fatigue and backache and reduce their output. In some TMAs long handled brooms are being used by the sweepers, although many established workers refuse to use these.

419. The wheel barrows have to be upturned to unload the waste onto the ground at transfer points. This creates unsanitary conditions.

7.4.4 Recycling and Composting

420. In urban areas across Pakistan, many[59] rag pickers (also known as scavengers or waste pickers) earn their livelihood by picking recyclables (e.g. paper, glass, metal etc.) from the street side heaps, dust bins and waste disposal sites. Rag pickers start picking waste in the early hours. Some (known as *kabaris)* go from house to house to buy recyclable and reusable materials. Others will transport waste from householders to the transfer points for a fee. A detailed study of rag pickers was not undertaken in the course of this sector review, though some were consulted.

Solid Waste Dumped on the Street in Search for Useful Material

[59] Exact figures are not known for the towns studied. In Karachi, the informal sector provides employment for more than 55,000 families and has an annual turnover of Rs 1.2 billion (US$ 20m) (URC 2001).

421. It is estimated[60] that these rag pickers extract 5% to 10% of the total waste produced in large urban areas and pass it on to the recycling industries through various intermediaries. Rag pickers thus reduce the burden of local bodies by several million rupees a year in collection, transport and disposal costs, as well as resultant saving of landfill space. Their activities also help in conserving national resources. Despite this, their role remains unacknowledged by society or the authorities.

422. Waste pickers' access to waste could be reduced by changes in solid waste management practices which would in turn threaten their livelihoods. It is important to consider ways of including them in the delivery of improved services, for example by employing them as sweepers or door-to-door collectors.

7.4.5 Composting

423. No composting of organic waste was observed or described in any of the TMAs. Composting could prove to be a useful processing option for organic solid waste from some of the TMAs.

7.4.6 Transfer Points

424. Transfer points provide the interface between primary and secondary collection. In Sindh they are referred to as *filth depots, community bins or 'katchra khundi'.* Waste is deposited in these by sweepers, door-to-door collectors (where they exist), and waste generators. In the towns studied, two main types of transfer points existed:

- open 'filth depots' in smaller cities; or ,
- metal bins (demountable containers which can be hauled onto trucks, also known as 'buckets' or 'skips') in larger towns.

425. Filth depots were by far the most prominent throughout the towns studied. They were usually just open dumping areas, sometimes with concrete slab floors and walls. Some are officially designated areas, while many are just informal dumps. Problems of waste spillage and incomplete removal were prevalent.

426. In the towns studied, the community bins were often placed far from homes. This can act as a disincentive to disposing of waste in the bins, and encourage dumping of waste on streets. Experience in South Asia indicates that householders are prepared to walk a maximum of 50-100 metres to deposit their waste in community bins.

427. Even in places where metal bins have been provided as in Sukkur, it has been observed that these are often unsuitably designed, inadequate in size and placed too far apart.

428. The system of filth depots often requires the double handling of waste by workers particularly where front loaders are not readily available (such as in Umerkot and Johi).

[60] ibid

Hand-Loading Waste into Tractor-Trolley From On-Street Filth Depot

7.4.7 Secondary Collection (transportation of waste to disposal)

429. Secondary collection is the removal of waste from transfer points for transportation to disposal. In most of the TMAs transfer points are emptied either by hand, or using front loaders which deposit waste into tractor trolleys. Where they exist, metal bins are lifted hydraulically onto lorries.

Manual Loading of Waste from Filth Depot

430. Manual loading and unloading of the vehicles makes the entire operation unhygienic and unnecessarily time-consuming. Often the truck or tractor trolleys are not fully loaded by the work force, resulting in further loss of collection efficiency / productivity of manpower and equipment.

431. The tractor trolleys and trucks in all towns take the wastes directly to disposal: there are no transfer stages during secondary transportation.

432. Maintenance of transport fleets is a challenge for many municipalities. For example, in Mirpur Khas, eight tractor trolleys are owned, but according to the TMA usually two vehicles are off the road awaiting repair at any one time. This compounds their shortage of equipment.

7.4.8 Disposal

433. None of the towns studied had a sanitary landfill facility, and waste was invariably dumped openly on the outskirts of towns, sometimes in low-lying areas, such as those created by the brick industry. Waste is also dumped along roadsides.

434. All types of waste are disposed of together, including healthcare and industrial waste where present. The wastes deposited in this manner are neither spread nor compacted and covered with inert material. Highly unhygienic conditions thus prevail at and around these dumps.

7.4.9 Provisions for Special Wastes

A. Dead animals

435. There is no separate arrangement for disposal of dead animals. They are collected and disposed of along with other municipal solid wastes.

B. Industrial wastes

436. Few industries are located within urban areas in the TMAs. Industries like rice mills, flour mills and sugar mills are generally situated at some distance from urban centres and are responsible for management of their own waste.

437. Various waste management mechanisms exist, such as rice husk from mills being utilized as fuel for brick kilns who also use the resultant ash for brickmaking. Therefore, this industry effectively produces no waste. This cannot necessarily be said of all industries.

C. Slaughterhouse wastes

438. Slaughterhouses have been built in larger towns. Generally, the wastes are thrown indiscriminately and collected by tractor trolleys once per week for disposal along with other municipal wastes.

D. Hospital wastes

439. In the TMAs hospital waste received no special treatment, except occasional burning within compounds. It is generally collected and disposed of along with municipal waste. In some instances, prior to disposal, used syringes are cut to prevent recycling.

440. Discussions in Mirpur Khas indicated that there was a low level of appreciation of the public health hazards associated with careless treatment of healthcare wastes, as well as of options for treating it.

Syringe and Hypodermic Needle Discarded on Roadside

E. Sludge and Grit

441. Due to significant volumes of solid waste being thrown into the open drains and manholes of the sewerage system, blockages are very common. TMA sanitary workers are deployed for extracting sludge and grit from the system. After drying in piles, it is also picked up by hand carts and tractor trolleys for disposal along with municipal waste.

F. Demolition and Construction Waste

442. Such waste usually has a value, but is often left on the street in front of construction for demolition sites awaiting removal, which can cause traffic problems. There are no organised systems for its quick removal at present.

G. Rural SWM

443. No solid waste management activities were reported throughout rural areas in each of the TMAs consulted. Indeed SWM in rural areas remains a low priority for TMAs for a number of reasons, including:

- low generation rates in rural areas;
- the largely organic nature of the waste generated;
- the grave waste problems in urban areas for which there are already insufficient resources to manage; and,
- the difficulty of providing waste management services to low-income and low-density rural areas.

444. There may be scope for awareness raising campaigns in rural areas to help communities address the main problems they face, such as disposal of plastic bags.

7.4.10 Private Sector Participation

445. Private sector participation is not widespread in the TMAs, although contracts have reportedly been awarded for door-to-door collection in Johi and Larkana. Little detail exists on these.

7.4.11 Performance Analysis

446. The following parameters are used to indicate the performance of SWM practices in the TMAs:

i) Collection efficiency i.e. the ratio between the amount of the waste collected and the amount of the waste generated / day.

ii) Cost of collection / ton of waste.

iii) Cost of waste collection / inhabitant / year.

iv) Staff employed / 1000 population.

447. Calculations have been made using the data collected from TMA staff. The accuracy of these data cannot be guaranteed, and some figures disagree with those found in the official budgets. The Table 7-3 below summarises the performance analysis data which is included in full in Annex 1 to 6 for each TMA.

Table 7-3: Performance analysis data

Collection efficiency (%)	Cost / ton (Rs)	Cost / inhabitant / year (Rs)	Staff / 1000 population (ratio)
48 - 80	Rs 550 - 1487	Rs 51 – 166	0.92 – 2.59

7.4.12 Public Awareness and Community Engagement

448. Solid waste management issues appear to be a low priority for much of civil society in Sindh, reflected by the lack of initiatives, and the poor solid waste management practices undertaken at present (most notably dumping on streets and empty plots). However, this needs to be viewed within the context of what alternatives exist: many may be dumping their waste on the street or in empty plots because there is no nearby disposal site.

449. No willingness to pay survey has been undertaken so far in this project, and there is conflicting evidence as to whether or not citizens would be prepared to pay for improved solid waste management services. The Nippon Koie (2006) findings suggest that communities are willing to pay for services, though further detail (for example, what they are prepared to pay, and which income groups) is not known.

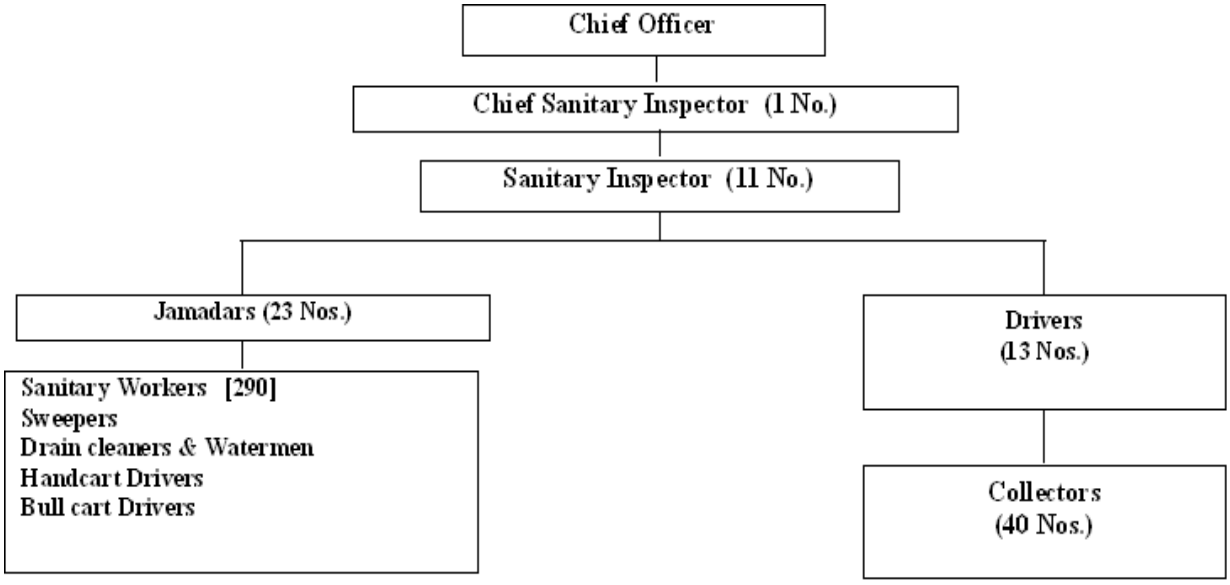
450. As noted earlier, very few civil society organisations appear to be engaging with solid waste management issues in the province.

7.4.13 Organisation and Capacity

451. Further to the Sindh Local Government Ordinance, TMAs now have full responsibility for managing solid wastes. Despite SWM consuming a significant chunk of TMAs' budgets, it seems to consistently be given low priority, particularly against water and sanitation. Its management is left in the hands of junior level supervisors who often have little vision, training, knowledge, or decision-making power. Similarly, often unqualified and untrained persons are appointed as supervisors (*jamadars*). The

maintenance of SWM vehicles gets low priority and generally old vehicles are allocated for this job. The following chart summarises the organisational structure of one of the selected TMA.

7.4.14 Typical Organisation Chart (Larkana)



452. There is a perception within TMAs that there is shortage of staff, and that recruitment could solve many of the SWM problems. This is largely because there has been a freeze on recruitment for around 30 years, so despite growing populations and urban areas, staff numbers have fallen. Nippon Koei (2006) findings indicate that TMAs do not lack personnel, so much as *skilled* personnel.

7.4.15 Revenue

453. Data from TMAs indicate that up to 20% of municipal budgets are spent on SWM.

454. Sources of revenue for TMAs include tariffs from water and sewerage, property tax and income from properties. No specific conservancy fee was found to be charged for SWM services. TMAs achieve relatively low revenue collection success. Property taxes are collected at district level, reportedly around 85% of which reaches TMAs. Because of this, there is a low incentive on the part of district to pursue property taxes.

7.4.16 Planning

455. Little or no strategic planning appears to have been undertaken for solid waste management within the TMAs consulted. In addition, the environmental and public health implications of solid waste management practices at present do not appear to be well understood.

7.4.17 Legislation

456. Various legislation exists relating to solid waste management. These include:

- Ordinance to prohibit manufacture, sale and use of black plastic polythene bags including polythene bags below 30 microns in thickness in the Sindh Province. March 2006.

- Guidelines for Hospital Waste Management. EPA, Sindh. June 2004.
- Hospital Waste Management Rules 2005. Gazette of Pakistan. 2005.
- (Draft) Guidelines for Solid Waste Management. Pakistan EPA. June 2005.

457. There appears to be a lack of awareness of these documents, as well as means by which to enforce their implementation.

7.4.18 TMA Aspirations

458. As stated earlier, the level of engagement with SWM, as well as the level of knowledge and vision for its improvement, is low within the TMAs.

459. In Mirpur Khas, senior staff were asked to describe their ideas of solutions for the SWM problems in the city. They consistently indicated they required:

- more staff;
- more equipment (particularly trucks and front loaders); and,
- technical solutions to disposal and waste processing, including technologies they have heard about operating in other cities, such as 'recycling technologies in Lahore' but about which they knew little.

460. In reality, many of the solutions that are affordable and viable are going to involve changes in process, community engagement, staff efficiency and so on. Trying to convince TMA staff that this is the best route to take in the long run could be difficult because of the perceived need for expansion and physical assets.

7.5 Survey of Gender Perspective on Water and Sanitation

461. Women are primarily responsible for WSS and SWM aspects within the household and in order to identify key issues and formulate appropriate policy responses regarding these services it is essential to solicit women's views and opinions.

462. A survey on women's perspective was therefore designed and conducted in six localities in each of the six case study TMAs. It was composed of three components: (i) locality profiles, (ii) key informant interviews, and (iii) focus group discussions. (See Annex 8 for a detailed report)

463. The results of the survey indicate that:

i) Most areas surveyed do not have adequate access to WSS and SWM services.

ii) An absence of satisfactory drinking water, sanitation and solid waste management services creates immense difficulties for women as it increases their already heavy work load.

iii) Lack of adequate government water supply schemes invariably means that women have to perform the task of fetching water from external sources. The task becomes even more arduous when they have to walk long distances in extreme heat.

iv) Children, especially girls, are also responsible for fetching water. This has an adverse effect on their education as girls often drop-out of school due to increased household chores.

v) Poor quality water makes ordinary household tasks such as cleaning and washing difficult and more time consuming.

vi) Absence or poor quality of WSS and SWM services is further problematic as it leads to a high incidence of disease (due to unhygienic conditions) which in turn requires that women provide nursing care for sick family members.

vii) Lack of or poor quality government WSS and SWM services also creates financial problems as households incur extra costs including those of purchasing water (to meet household needs), and medicines (required due to high incidence of waterborne and infectious diseases).

viii) Most respondents in urban areas are willing to pay for improved services while rural respondents are reluctant to do so.

7.6 Capacity Building Workshops

464. The Director Monitoring & Evaluation Cell, Local Government Department, assisted the consultants in organizing the two days training workshops on Strategic Planning for water supply and sanitation for all TMAs, excluding districts of Karachi and Hyderabad. Taluka Municipal Officer, Taluka Officer Infrastructure & Services and Taluka Officer Planning were invited in the workshop. A summary of the workshop participants is given in the Table 7-4.

Table 7-4: Participation in Capacity Building Workshops

Date/ Venue	Number of TMAs Invited	Number of TMAs Participated	Number of Persons Attended the Workshop
April 17-18, 2006 - Hyderabad	28	22	41
May 2-3, 2006 - Sukkur	23	11	17
May 4-5, 2006 - Sukkur	21	14	21
May 8-9, 2006 - Hyderabad	27	16	26
Total	**99**	**63**	**105**

465. The training material for the workshops was developed and copies were provided to the participants for discussions during the workshop, and for use in their future work. The training material included information and commentary on i) issues in the water and sanitation sectors, ii) draft policies on water and sanitation, iii) examples of global good practices, iv) forms for strategic planning and guidelines to fill in, and v) one worked example. Participatory approach was followed during the presentations, and discussions were held with the participants on their specific issues and concerns.

7.6.1 Evaluation

466. Despite the fact that many of the participants had to travel considerable distances, attendance was high, and participation was enthusiastic. Most participants felt that they had benefited from the workshops, especially by getting a better picture of what the TMA's roles and responsibilities were in regard to the delivery of services. The strategic planning guidelines were appreciated by the participants who felt able to use them. These were also expected to compliment their Annual Action Plans. Most of the interest focused on the financial aspects, and in particular on their ability to set and enforce tariffs and charges. There was also considerable interest exhibited on the sources of information and statistical data, and base maps. The concept of the "planning wall map" to show existing and proposed service provision and other projects was also found useful.

467. However, it was also clear that the workshops were only one part of the training and capacity-building required. To be effective, the rest of the TMA had to be involved and there needed to be more understanding and interaction between the technical staff and the administrative and financial staff and with the elected representatives. This is particularly the case since the proposed strategies are meant to be developed through participatory processes. Without some joint training, it was felt that the technical staff would not be able to fully utilise the strategic planning concepts. Their efforts are also likely to be undermined by the action of PHED and even national organisations providing projects and programmes without due consultation and coordination with TMA staff.

7.6.2 Guidelines for Strategic Plans

468. The guidelines produced for the TMA, and which formed the basic document for the training workshops are reproduced below. In each of the 6 selected TMAs, these guidelines were also used to produce Strategic Plans, and these were used in the training workshops as "worked examples" that the consultants and the staff from the selected TMA used to provide hands-on guidance.

7.6.2.1 Strategy Planning

469. A Strategic Plan is a tool to help translate the TMA Vision into action. It relates to a Programme of activities that will be undertaken over the medium term – say 5 to 10 years – while Action Plans detail the Projects to be implemented by each Annual Development Plan. A Strategic Plan is a broad-brush statement of choices, made through appropriate consultation and consensus, of the available alternatives based on their

- technical feasibility – which determines whether the proposals are feasible,
- social acceptability – which ascertains that the people will be willing to use the services and facilities, and therefore be willing to pay for them,
- economic viability – which ensures that all the costs have been taken into account and that there provisions to meet them; and
- environmental sustainability – which assures that the proposals will not cause any irreversible or irreparable damage to those living in or around the area, or indeed the world at large.

470. Usually, there may be more than one way that meets these criteria, therefore, the actual choices selected should reflect the policies of the Taluka. These will be based on the one hand the Sindh Provincial policies, the resources available, and of course, the preferences and

priorities of the Nazim for the Taluka as indicated by the TMA Vision. The selected choices will also have to be presented to the Council for their concurrence and for consultation to the community. Therefore, they will need to be spelt out in terms of their

- Placing – that is, the specific locations in the Taluka where the various activities and their outputs will be located. This should be done on a map of the Taluka, and where appropriate also on maps of the settlements;
- Phasing – that is, when and in which year of the Strategic plan each of the activities will be undertaken. This should be done on a Gantt chart that shows the timing of the implementation of each activity in terms of start and end dates and duration;
- Financing – of investments and actions through external, internal sources, user charges. The sources and amounts will be shown, and naturally be included in the TMA Budget.

471. Though many of the options need specific expertise and experience, and therefore are likely to be developed by the professional and technical staff of the TMA, the process of choosing amongst them and making and taking strategic choices regarding their selection and inclusion and incorporation in the Strategic Plan needs to be a process that is:

- Inclusive – involving communities, their representatives and professionals
- Transparent – based on declared values and objectives
- Consultative – using an iterative process of refining choices

7.6.2.2 Strategy Planning process

472. The suggested strategic planning process consists of the following four steps:

1. **Brief description** of the situation regarding water supply, sewerage and solid waste (WSS) situation in the Taluka.

   TO I&S and TMA staff should do this, using the information they have. The information collected for the Annual Sector Plan (see *Guidelines* on Sectoral Planning for Taluka/Town Municipal Administrations (TMA) produced by the Programme Support Unit of the Sindh Devolved Social Services Programme, Finance Department, Government of Sindh, December 2005) provides everything that is necessary for this purpose, except for a Map of the Taluka. Ideally, this should show the various administrative boundaries and the location of existing schemes. Initially, such a map with accurate information may not be available, and therefore it will have to be developed. However, it is not necessary that it should be completed before proceeding to the next step, and can be completed over time, as information becomes available.

2. **Problems and issues** identification of WSS

   TO I&S should take the lead in collecting and collating the information from all the stakeholders, as part of an ongoing process of information collection and analysis by the TMA rather than undertaking detailed surveys specifically for this purpose. The information should be assembled and presented in the form of a Table and made publicly available as part of the "**planning wall**". This will allow everyone in the Taluka to know that the TMA is aware of their problems (and if they are not included, they can

bring them to the attention of the TO I&S), and they will be dealt with in due course. This will help both participation and transparency.

Nazim and elected representatives – should represent the views of the constituents they represent. Between them, they should have a good view of the overall situation, and the Nazim should encourage the identification and elaboration of issues and problems for inclusion onto the planning wall.

TO I&S and TMA staff – should take the lead in identifying the problems that they see as professionals as part of their work in the TMA. The TO I&S should help develop and maintain the Planning Wall along with the TO P where there is one.

Provincial policies and standards – should be consulted and where these are not being met or complied with, should be included as issues or points that need action.

Community and households – should be encouraged to voice their views and have them included on the Planning wall. The views and opinions of community and households on sectoral issues should also be sought as part of any data-collection or survey exercise being undertaken in the TMA, where this can be done without too much inconvenience or cost.

Private sector and other stakeholders – should also be encouraged to give their views on sectoral issues for inclusion on the Planning Wall.

3. **Prioritisation** of issues

By Nazim, elected representatives – help to demonstrate the priorities that the Nazim and the other representatives attach to the different issues, and should be done as a part of the regular (annual) planning process and indicated on the Planning Wall. These priorities should naturally reflect the **TMA Vision** and the development agenda set by the Nazim.

4. **Development of feasible responses**

These are effectively the priority issues, with indications of how they could be resolved. **TO I&S** working with the other officials of the TMA will take the initial steps to develop a technically feasible list. For this, guidance may be sought from a variety of sources, including the Provincial PHED.

Nazim and the **Taluka Council** should be presented with **t**hese alternatives so that they can choose between alternatives, knowing roughly what they would entail in terms of costs (financial as well as political, social and environmental).

7.6.2.3 The Strategic Plan

473. The selected sets of actions should be presented with a description or indication of:

Proposal – what needs to be done? This will be in the form of activities, or projects;
Placing – where will it be done? These should be shown on relevant maps;

Phasing – when will it be done? This should be shown on a Gantt chart or schedule;

Financing – how will it be paid for? This should be shown and reflected in the TMA Budget.

474. Together, this will constitute the Strategic Plan to guide the Annual Action Plans. The feedback from the implementation of the Annual Plans and their impact on the Taluka should be monitored carefully – by the TMA staff as well as by the community – and should be used to help modify and fine-tune the Strategic Plan in future years

475. See Annex 10 for blank forms for use in developing a Strategic Plan. The 6 Case Studies in Annex 1 to 6 used these forms to develop their Strategic Plans and these are available as "worked examples"

8 TARIFFS AND TARIFF SETTING

8.1 Introduction

476. This section is a "tool for the future", should TMAs decide on radical reform of tariffs at some point. It focuses on water and sanitation charges, as formalised tariff setting of the sort described here is seldom practiced in the field of solid waste management.

477. This section looks first at the wage and non-wage costs of service-provision in the selected TMAs and goes on to evaluate their current tariff structure, practice and experience, as well as their accounting practices and their consequences. Based on this, and relevant global experience, some proposals for tariff reform are suggested, using different criteria, goals and objectives. The relevance and advantages of different basis for setting tariffs is discussed, and finally, a step-by-step procedure for tariff setting and tariff structure is described.

8.2 Summary of Experience from the Selected TMAs

8.2.1 Tariffs

A) Introduction

- The term "tariffs" is taken to refer to prices charged by TMAs for water, sanitation and solid waste disposal. It therefore excludes prices charged by water vendors, the owners of private wells, privately hired street sweepers and non-governmental or informal service providers.

B) Best practice tariffs

478. The ideal tariff structure serves the following goals, by:

i) being predictable (that is, there is a clear process for setting and changing tariffs and that increases are phased in gradually) (ADB goal A – good governance)

ii) ensuring that cost recovery goals are met, i.e. that it complies with an agreed definition of financial viability (which may fall short of covering all costs in the short to medium term) (ADB goal B – financial sustainability)

iii) ensuring that the utility has incentives to extend coverage, improve service levels and improve its productive efficiency

iv) sending appropriate price signals to consumers to ensure that people only purchase water services if the value to them exceeds the cost of supplying the service. This is called economic (or "allocative") efficiency (ADB goal D – economic efficiency)

v) ensuring that charges reflect the costs users impose on the utility, i.e. they do not discriminate on the basis of users' activities (ADB goal E – fair pricing)

479. Tariffs must also be socially acceptable (ADB goal C – distributive justice). That is, everyone should be able to afford enough water to meet their basic needs. Increases should also not cause real hardship or widespread dissatisfaction. Finally, social acceptability means, as far as possible, linking tariff increases to improved levels of service.

480. A secondary goal is that of simplicity: tariffs should be both easy and cost-effective to administer and easy for consumers to understand. (Captured in ADB's goal A – good governance).

481. The above is presented with water supply in mind, but the same principles apply to sanitation and solid waste disposal, with the additional requirement that those generating the waste should meet the costs of dealing with the adverse environmental consequences of its disposal, i.e. the polluter pays principle.

482. Many developed and transition countries have water and wastewater tariffs that comply fairly closely with best practice. Customers pay for a measured supply subject to a volumetric tariff that does not discriminate according to the activity of the customer. Those facing hardship receive welfare payments (rather than cross-subsidies from other users or a "lifeline" tariff block). Income exceeds the utility's expenses – modest financial goals are met. Affordable, regulated sums are paid for new connections – the system of deposits is generally absent (as nearly all customers are sufficiently creditworthy). Predictability is achieved by a clear review process, often accompanied by automatic indexation.

483. Septic tank and cesspool clearing is usually undertaken by contractors who have to be licensed but whose charges are left to the market to decide.

484. Disposal of municipal solid waste from households is in most countries included in charges for general municipal services, perhaps as a percentage of a property tax value but often not as an explicit charge at all. A few countries (e.g. Ireland) charge households by volume, and even fewer charge by weight. Most commercial waste generators are charged by volume.

C) How do the TMAs' tariffs compare with best practice?

485. Tariffs, confined to urban areas, are very low indeed and there are no explicit charges at all for solid waste disposal in any of the six TMAs selected for study.

486. There being no customer metering, water is charged for in one of three possible ways:

    i) as a fixed charge that is the same for all consumers

    ii) as a fixed charge that depends on the activity of the consumer

    iii) according to service pipe diameter (sometimes referred to as "ferrule based charging")

487. There is no clear distinction between sewerage and drainage. Where charged for, it is a fixed charge per property.

488. Septic tank or cess pool cleaning is often a private sector activity, though some TMAs do raise a charge, either according to tank size or by a fixed charge.

489. The residential charge ranges between Rs.180 to Rs.540 per year for water.

490. The charge for a water connection to a nearby distribution pipe is generally around Rs.100. In exchange for this, a householder gets a short service pipe to their boundary. The practice of demanding deposits appears to have ceased.

491. None of the TMAs has a financial target for any of its services, although TMA budget rules allow service delivery performance targets to be set and monitored (see Table 8-1). The only financial discipline is that a

deficit budget may not be approved[61]. Even this is a weak discipline, however, as actual expenditure does sometimes exceed income, the deficit being made good either by a provincial transfer in shape of special grant or by not paying the electricity bills or pensions (TMAs cannot borrow under the SLGO).

Table 8-1: TMA charges judged against best practice criteria

Best practice	TMAs
Predictability	Yes: charges have remained at the same level for many years No: sight has been lost of any original goals the charges were supposed to serve
Agreed financial goal	None
Incentives to extend coverage	Very little as charges well below average let alone marginal cost of service provision.
Appropriate price signals	None as marginal price is zero
Social acceptability	Charges are admittedly very low and in that sense "acceptable" but are not linked to willingness or ability to pay
No discrimination on the basis of user's activity	Water charges discriminate: typically a commercial user pays three times the residential charge
Simplicity	Charges are simple

492. TMAs' tariffs fail best practice criteria on most counts, though it could be said that they are predictable (in a limited sense), socially acceptable and simple.

8.2.2 Wage and Non-wage costs

493. Establishment (i.e. wage and salary) costs account for over half of current expenditure. In FY06 budgets it accounts for 64 percent at Mirpur Khas, 83 percent at Sukkur, 61 percent at Johi, 60 percent at Umerkot, 64 percent at Shikarpur and 54 percent at Larkana. As salary costs have the highest claim on a TMA's funds and actual revenue is usually well short of that budgeted, the outturn position is usually even worse than these percentages suggest. In FY04, for example, the range at outturn was 61 to 89 percent (*vs* 60 to 83 percent at budget).

494. Budgetary allocations for non-salary current expenditure lack a clear rationale. In FY06, for O&M expenditure for water supply, three TMAs have provided less than Rs.0.5 million while Sukkur has provided Rs.5.2 million. For electricity, the budget at Umerkot is Rs.2 million while at Sukkur (with more than five times the pumping requirement) the provision is of only Rs.1 million.

8.2.2.1 Accounting Practices and their Consequences

495. Electricity bills are seldom paid. As the TMAs do not use accruals accounting, unpaid bills are not accounted for. This makes it impossible to calculate the costs of service provision with any confidence. For example,

[61] Section 112(5) of the Sindh Local Government Ordinance (SLGO) 2001.

Larkana has budgeted electricity at Rs.25.2 million for FY06, in line with the FY05 budget of Rs.16.1 million. However, the budget provision for FY05, was reduced to Nil in the revised budget estimates[62] which means that the TMA planned not to pay any electricity bills. The actual expenditure for FY04 shows that only Rs.3.8 million were paid for electricity (covering water supply, sewerage/drainage and street lighting).

496. The TMAs use cash (not accruals) accounting and single entry bookkeeping. The TMA budget rules, 2003 prescribe a number of formats for providing information that is very useful for financial management (and in future may be used for modified cash basis of accounting). These formats include form BDO-5, which shows the position of TMA liabilities. This form, however, has not been completed and attached to the FY06 budget documents by three of the case study TMAs. Only Shikarpur shows some electricity liabilities. The remaining two TMAs show no electricity liabilities, even though one of them, Larkana, does not plan to pay any electricity charges in FY05 (see previous para).

497. The prices charged (if any) for WSS and SWM services lack any clear rationale. Accounting practices are such that the costs of services cannot be calculated with any degree of confidence and so even the basis for setting prices is absent.

498. Cash collections of user charges are very poor, as is the quality of customer records. The TMA budget rules, 2003, prescribe a form (BDR-4) for both recording arrears and setting monthly recovery targets. If used properly, this form would be a useful financial management tool. The form has been completed in respect of FY06 WSS arrears by five of the case study TMAs. All show equal expected recovery in each of the twelve months (in defiance of logic and experience). Larkana expects to collect only Rs.4,700 against arrears of Rs.1.7 million while Sukkur, optimistically given its past record, expects recovery of Rs.38 million against WSS arrears of Rs.41 million[63]. Umerkot is slightly more realistic and expects to collect Rs.0.5 million against arrears of Rs.2 million.

8.2.2.2 Results from the Selected TMA

499. The following charts illustrate the same points using data from the budgets of the six Case Study TMAs. Although the data available from the budgets is erratic and cost of service provision cannot be easily worked out, it can be seen that:

i) In Water Supply, wages account for a fairly large percentage of costs; in Larkana and Shikarpur there is no municipal water supply but the staff is still in place. (Figure 8-1); there is a marked variation in expenditure per connection per annum which ranges from Rs.490 to Rs.2,900 per annum (for the same ferrule size i.e.1/4" and almost the same hours of supply); the inadequate provision for electricity by Sukkur is apparent (Figure 8-2); the component-wise cost and billing has been shown in Figure 8-3; billing does not cover even 50% of the total costs; except for one TMA, billing does not cover even the wage costs, only 50% of the water charges billed are being collected (Figure 8-4);

[62] The revised budget estimates are prepared in March of each year and are based on eight months of actual expenditure of the year and four months projected expenditure till the year end.
[63] Last year only Rs.3.2 million could be recovered against these arrears.

ii) In the cases of sanitation and solid waste management wages account for the bulk of total costs; collections do not cover even 20% of the wages. Very minor collections are reported for sanitation, and there are almost no charges for solid waste management (Figure 6-5); there are major inter-TMA variations in cost per inhabitant for Sewerage/ drainage (Figure 8-6); and, per ton solid waste collection (Figure 8-7).

iii) The budgetary position of the Case Study TMAs has been discussed in Annex 9 of this report; and, the institutional and financial issues of service provision (WSS and SWM) have been detailed there.

Figure 8-1: Water Supply Cost Components in Percentage

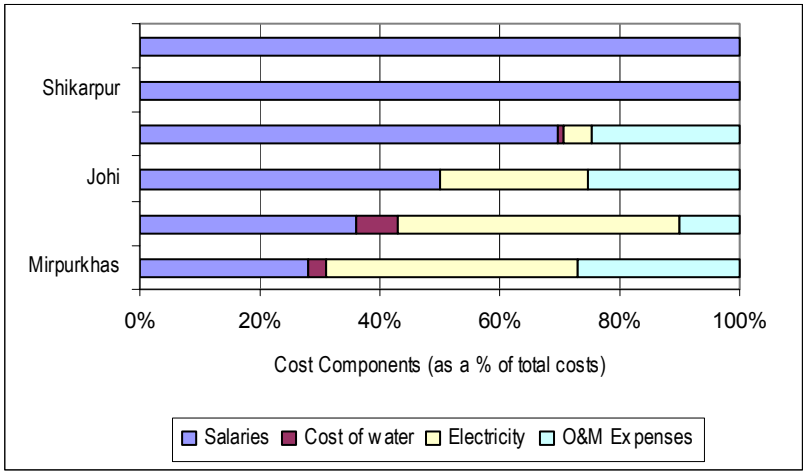


Figure 8-2: Water Supply – Cost Components per connection per annum

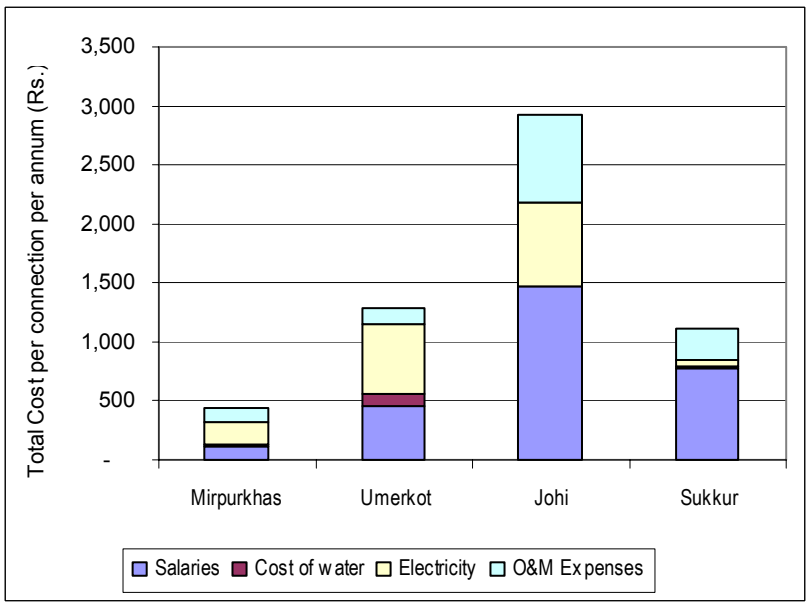


Figure 8-3: Water Supply – Cost Components and Billings

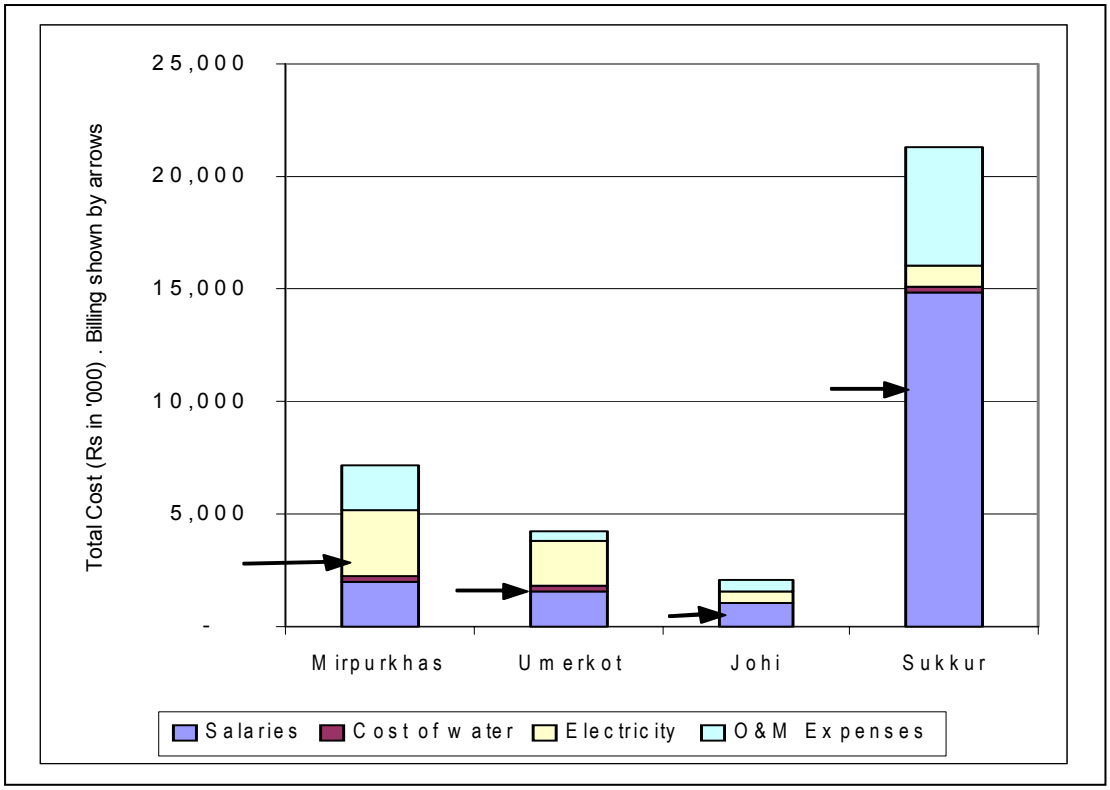


Figure 8-4: Case Study TMAs: Financial characteristics of water

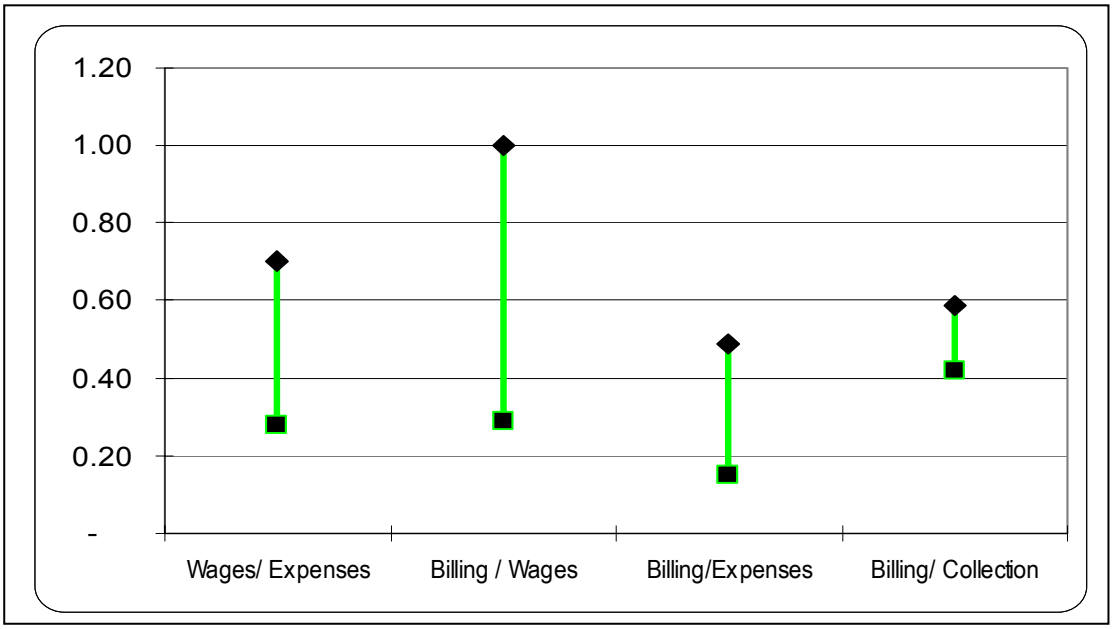


Figure 8-5: Financial characteristics of Sewerage/Drainage and SWM

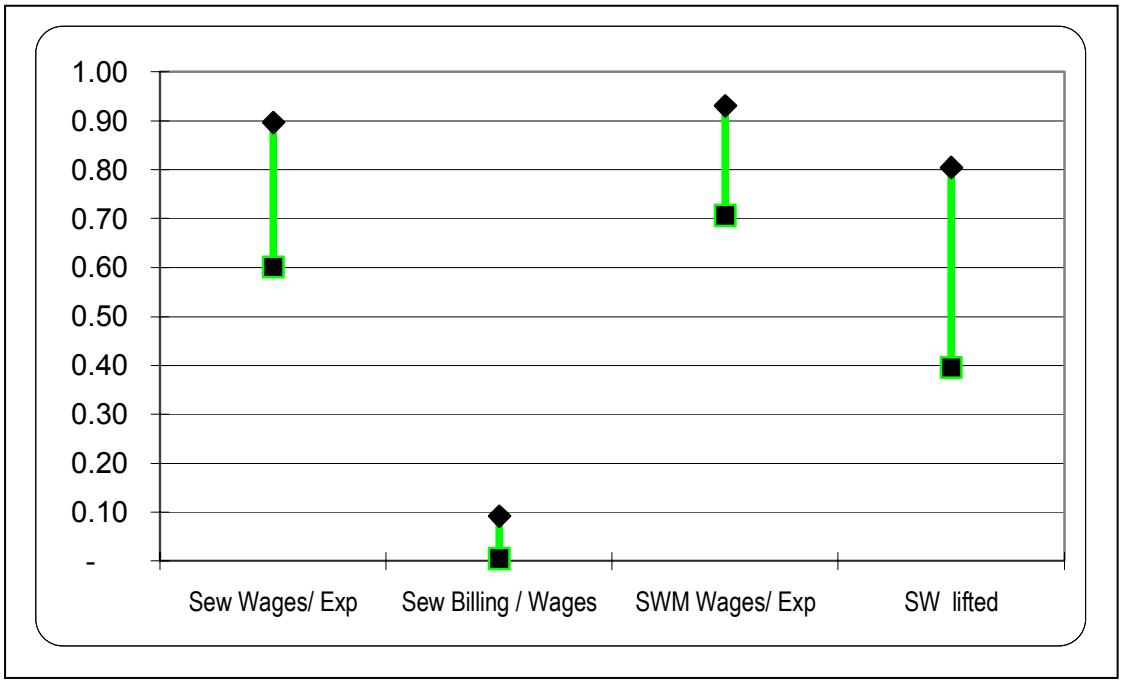


Figure 8-6: Annual Sewerage/ Drainage cost per inhabitant

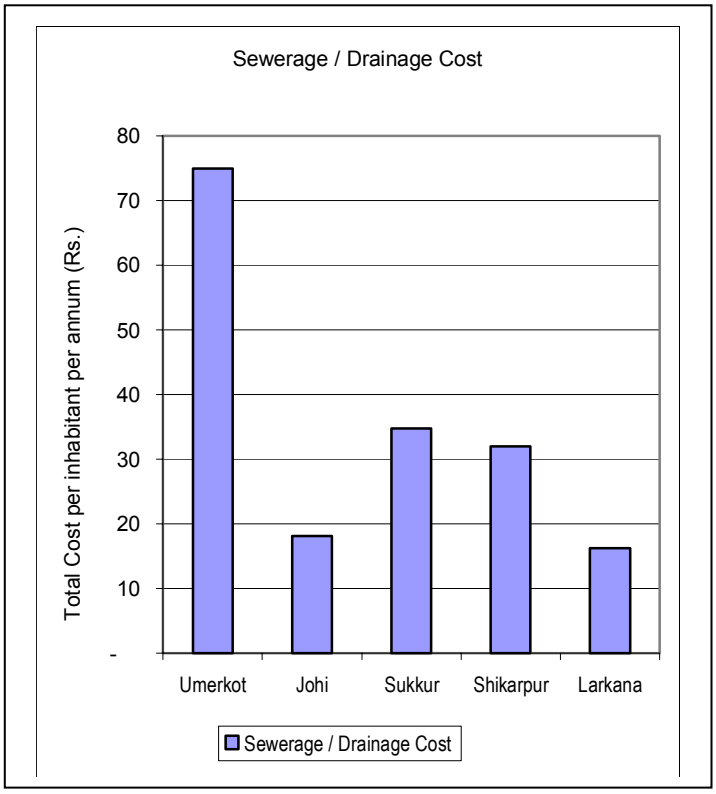
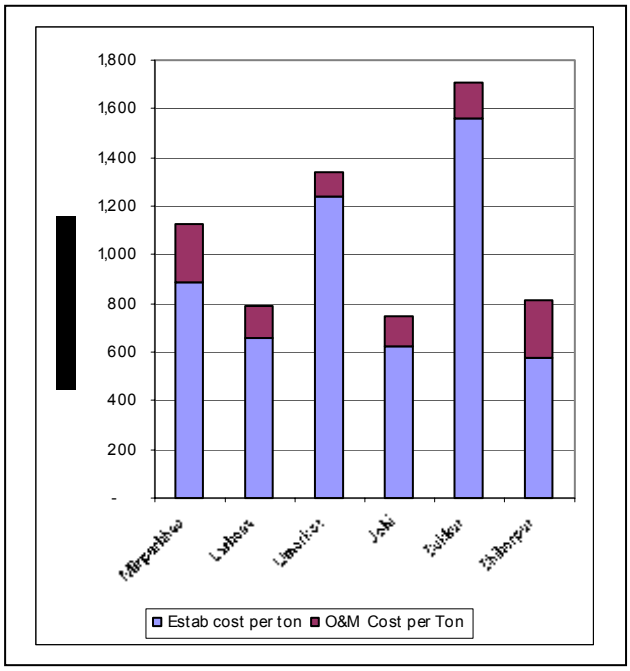


Figure 8-7: SWM cost per ton lifted



8.2.3 Tariff Reform

8.2.3.1 Introduction

500. A formal and more ambitious approach to tariff setting has been described above. This section describes a practical approach to reforming TMAs' current tariffs.

501. The proposals for water tariffs are centred around the proposed strategy. The latter comprises a programme under which, following supply improvements, responsibility for maintenance and retail charging (for a specific area) would be handed over to water contractors[64], while TMAs charge these water contractors for bulk supplies.

8.2.3.2 What to charge for: payment vehicles

502. User charges are more appropriate for private goods (food, a visit to the cinema, a mobile phone call) than they are for public goods (clean air, pleasant surroundings). People are generally willing to pay for the former but much less willing to pay for the latter, which they expect to be provided by government.

503. User charges are certainly appropriate for water – a private good. The appropriate payment vehicle is therefore a direct user charge, levied on the water contractors by the TMA and then by the water contractors on the individual households. User charges are also appropriate for emptying septic tanks or cesspits, where the benefits are also largely, though not entirely, private. It is less clearly the case for sanitation, where the

[64] Water Contractors will be from the private sector, for profit (or not-for profit if some NGO/ CCB is interested). They will be provided bulk supply for a specific area and will be responsible for routine repairs/ maintenance of the system and for billing and collection. Of course, monitoring committees of the elected members of the union councils and tehsil council will continue to be responsible for monitoring of this service provision by the water contractors.

benefits accrue to the community and, similarly, for the disposal of municipal solid waste. In fact the history of charging for these services reflects this: many countries still charge for sewerage and solid waste disposal as part of general municipal taxes.

504. The appropriate payment vehicle for sanitation and solid waste is by an increase in property tax.

8.2.3.3 Recognition of functional income and expenses

505. A starting point for user charges is the cost of the service, even if not all its costs are recovered. This means that income and expenses must be properly recognised for these two functions – water supply and septic tank emptying – in the accounts.

8.2.3.4 Metering

a) Customer metering

506. The pros and cons of customer metering (i.e. metering at the individual household) are given below in Table 8-2. The scorecard comes out in favour of meters, but metering customers is far from a self evidently sound policy in all situations. Aside from issues of acceptability, meters suffer from two profound difficulties:

- they do not work if supply is intermittent – as it is in all the TMAs visited
- they are expensive – at roughly Rs.300 – Rs.600 (US$5-10) per year for the supply, installation, repair and reading of a cheap external meter, they cost more than today's average TMA residential water bill. If water supply is costly meters can be a cost effective way of reducing demand, but this is unlikely to be the case in Sindh at present.

507. Although customer metering should remain a long term goal, to be adopted once the pre-conditions are met, it is not recommended that the water contractors adopt customer metering at this stage.

Table 8-2: Pros and cons of customer metering

Criterion	Metering	No metering	Comment
Financial viability	●	-	Long run gain: metering will reduce long run costs of increasing supplies and lead to a small drop in sewage treatment costs. In short term there are uncertainties over the likely size of bills and the costs of metering.
Economic efficiency	● ● ●	-	Only metering will enable appropriate price signals to be sent to consumers.
Equity	●	-	In the absence of a developed welfare system and cost effective means of identifying low income or vulnerable households, metered tariffs offer (imperfect) mechanisms for improving access.
Simplicity	-	● ●	An unmeasured tariff is generally much simpler and offers certainty over the size of the bill, but no scope to reduce it.
Environmental externalities	● ●	-	Lower abstraction reduces aquifer depletion

b) Bulk metering

508. Bulk supplies to the water contractors could and should be metered provided a 24h supply is provided. The cost of metering will be tiny relative to bill size and there is no other equitable way of charging. The water contractor will have an incentive to manage its distribution system efficiently and minimise leakage and theft.

8.2.3.5 The Starting Point

509. In Sindh, levels of service are poor and levels of dissatisfaction with service provision are correspondingly high. For example, the 2004-5 social audit[65] found that only 22.7 and 16.1 percent of households were satisfied with government water supplies and sanitation respectively. At 10.7 percent, satisfaction with waste disposal services was even lower.

8.2.3.6 Financial Objectives

510. A premise for this part of the study is that TMAs should adopt clear financial goals for its water function and that the long-term goal is full cost recovery. Near-term goals are likely to fall well short of full cost recovery, but if no goals at all are set then there can be no financial accountability and the prospects for extending services to the poor.

511. There is a hierarchy of financial goals – see Table 8-3. While there are "higher" goals than OM&D recovery, (see Table 8-8) they have little relevance to the situation in Sindh.

Table 8-3: Hierarchy of financial goals – water supply

Goal	Commentary
I. Recover operating expenses including reactive maintenance (but not capital charges) from billings ("O&M recovery")	This is the least challenging goal, and even if met would – unless all bills were promptly rendered as cash – still leave the water function with negative operating cash flows. "Reactive maintenance" does not mean replacement of pipes or pumps (which would usually be capitalised). It means replacing small items – washers, valves etc – or greasing a pump etc.
II. Recover operating expenses as above but from cash *receipts* rather than *billings* ("Operating cash flow" criterion)	As receipts are generally much lower than billings, meeting this goal is likely to be much more demanding than (I). It should provide an incentive to recover arrears as well as current billings.
III. Recover operating expenses including capital (i.e. depreciation) charges from billings ("OM&D recovery")	A common goal, but impractical in Sindh as depreciation charges are neither calculated nor recorded.

512. For TMAs to recover from the water contractors all their expenses excluding capital charges – (II) above – is the appropriate near term goal. Sensible shorter term goals could be:

- recovery of bulk water charges (i.e. bulk to TMAs, not bulk to the water contractors) and direct labour costs only (as labour costs are

[65] Social Audit of Governance and Delivery of Public Services, Pakistan 2004-5, CIET and DTCE, Islamabad, Sep 2005

well documented) ("direct" labour costs exclude the costs of administration, billing etc);

- recovery of labour costs plus the materials and spare parts used for maintenance;
- recovery of labour costs plus materials and spares plus power (power is left to last as it is very poorly recognised in TMA financial statements);
- recovery of all expenses excluding capital charges.

8.2.3.7 Social Objectives

513. Under the proposed strategy it will be for the water contractors to devise a system of charging for water that is feasible and meets its social and other objectives.

514. To meet acceptability criteria it is important that sanitation and solid waste charges imposed by TMAs are lower than those imposed by the water contractors for water, but, subject to this limit, should aim to recover direct labour costs (unlikely to be possible in the case of solid waste, which typically employs very large numbers of people). Where possible, septic tank emptying should be undertaken by the private sector and in the meantime TMAs should make their charges the same as those charged privately.

515. The basis for imposing charges would be:

- in the case of water, all households with a piped water supply
- in the case of drainage/sewerage and solid waste management, all properties

516. In principle, charges should not be increased without an improvement in levels of service – or, given the very poor quality of information concerning baseline conditions, an improvement in inputs (e.g. pumping hours, disinfection).

517. The terms of reference ask for suitable levels of cross subsidy between customers. In the absence of metering (which would have made a "lifeline block" solution – however imperfect – possible), cross subsidy is only possible if the poor can be cost effectively and efficiently tagged. At present it is clear that TMAs are not in a position to do this – their databases of registered connections are too inadequate – and certainly the water contractors will be in no such position. For the future, though, it may be possible to use the selling prices of immovable property that are used for stamp duty (DC Rates). Lists of these prices are compiled and revised every one or two years at district level. Each price represents a small area average and a typical TMA would have several such price bands.

518. There should however be a ceiling for the level of domestic water charges recovered by the TMA through its bulk charge to the water contractors – tentatively suggested at Rs.12/m^3 (US$0.20/$m^3$) as measured at the bulk meter – equivalent to Rs.120/month (which is 4 percent of a single wage earner household with an income of Rs3,000/month) for a household drawing 10m^3/month. The cost of delivering water to a low standard – excluding capital charges – should not exceed this. If the cost base is higher than this, then it suggests that the TMA should improve its efficiency rather than increase its charges.

8.2.3.8 Approaches to fulfilling social objectives

519. The cost of a water supply service does not vary enormously between countries. It is not necessarily lower because households have less money to spend on it. An annual supply cost that represents 2-4 percent of individual incomes in a medium/low income country (such as Jordan) would represent 7-14 percent of individual income in Pakistan. Hence the search for ways of meeting social objectives – access to supplies and an adequate service at a low price for the poor. The possible approaches to this comprise:

- a subvention system similar to that currently in place in Pakistan (effectively a system of untargeted revenue and capital grants)
- "tagging" households by some income, wealth or expenditure measure who then either:
  - pay a lower tariff or connection charge and government pays a top up subsidy directly to the utility;
  - receive a cross subsidy from other water users; or
  - pay the full cost for water services but are eligible for a payment (or voucher) from government which either implicitly or explicitly meets some or all of the water service costs
- acceptance that low income households cannot be tagged effectively and we adopt a price or "within tariff" solution, such as a lifeline block (i.e. a first block of consumption charged at a low rate) or other form of cross subsidy arrangement
- offer a lower price for a lower standard of service
- in the case of connection charges, offer an installment plan, an option whereby charges are recouped from monthly charges or offer a low price that is in effect subsidised by all consumers

520. Table 8-4 summarises the options and their advantages and disadvantages.

Table 8-4: Access for the poor – options

Option	Examples	Pros and cons
A. Capital and/or revenue subvention from government	Many: Pakistan, India, Sri Lanka (capital), Guyana (previously)	Administratively simple, but: ▪ completely untargeted; ▪ little incentive for the utility to improve its efficiency or services Could be improved by making subsidy contingent on providing, and continuing to provide, a specified service
B Services to tagged low income etc households trigger a government subsidy or there are subsidies from other consumers	Attempted in Guyana.	Feasible if a simple measure such as rateable value is closely correlated with income. Geographical area may be a successful discriminator in extreme cases. Cross subsidies from other users may fail if other users are expected to pay more than long run costs
C Pay full cost then get	Chile, UK	Does not distort price signal, unlike other

Option	Examples	Pros and cons
transfer payment from government		methods, but needs a well developed benefits system. Cost of benefits system could not be justified for water bills alone.
D Cannot identify deserving households, therefore within tariff solution	Many developing and some developed countries have lifeline blocks. In S Africa, for example, no household pays for the first $6m^3$ a month, irrespective of income or level of service. Cross subsidies are common in developing countries but are no longer common elsewhere.	A lifeline block is easy to implement (and is favoured by ADB's technical note no 9) provided the supply is metered, but: ▪ everyone enjoys the subsidised block, which potentially undermines ability to meet financial goals ▪ it results in higher charges per m^3 if several families share a single metered supply ▪ it is administratively complex to adjust billings for non standard billing intervals (for example, if the standard period is a month but readings take place at intervals slightly longer or slightly shorter than a month) ▪ it distorts the price signal ▪ it is difficult to specify the block structure in the absence of sound evidence of the likely demand pattern Cross subsidies from other users may fail if other users (particularly large commercial users) are expected to pay more than long run costs.
E Reduced charge for a reduced level of service	Low pressure consumers in eThekwini (Durban), S Africa, are limited to $6m^3$/mon, for which they pay nothing. Full pressure consumers pay a standing charge in addition to a volumetric tariff if they use $>6m^3$.	Superficially appealing but: ▪ costs of lower standard supply not usually very different from that of high standard ▪ relevant standard(s), e.g. pressure or continuity of supply, often not easy to meet ▪ difficulty of enforcing market segments, i.e. those with a low standard supply will take additional supplies from those enjoying a higher standard
F Subsidies specific to connection charges	Installment payment plans are common in many places. Aguas Argentinas, the former Buenos Aires concessionaire, was forced to offer "free" connections and recover the cost through other charges.	Utilities have a legitimate concern to supply only the minimally creditworthy, but the full costs of connection are often a major hurdle for the poor.

8.2.3.9 Proposed Bulk Water Tariff Methodology

521. Table 8-5 summarises the methodology described in preceding sections.

Table 8-5: Water tariff methodology

Step	
A.1	Decide on target level of expense recovery from the water contractors which roughly equates to a cap of Rs.120/month for a residential consumer
A.2	The water contractors to set tariffs for commercial users with ¼" service pipes at the same level as domestic users
A.3	For commercial users with service pipes > ¼", set the tariff at the lower of the existing multiple x the ¼" tariff and an assessed monthly volume x Rs12/m^3.
A.4	Decide on tolerable annual increase in tariffs – 25 percent nominal per annum is suggested during the first few years and 10% subsequently.

8.2.3.10 Implementation Schedule

522. The schedule for implementation is implicit in the methodology shown above. Practical implementation is demonstrated by an example in Table 8-6, based on data from Mirpur Khas.

Table 8-6: Town baseline information

Item	Unit	Amount
Connections, tariffs, income and cash collections		
Residential ¼ connections	Number	15,085
Commercial ¼ connections	Number	378
Commercial ½ connections	Number	37
Commercial ¾ connections and special	Number	10
Monthly residential tariff	Rs/mon	15
Monthly commercial ¼ tariff	Rs/mon	43
Monthly commercial ½ tariff	Rs/mon	86
Monthly commercial ¾ tariff	Rs/mon	130
Approx annual billings	Rs/year	2,956,000
Approx annual collection	Rs/year	1,400,000
Operating expenses		
Bulk water costs (priority 1)	Rs/year	200,000
Direct labour costs (priority 1)	Rs/year	2,000,000
Spares and materials (priority 2)	Rs/year	1,200,000
Administrative expenses (priority 3)	Rs/year	300,000

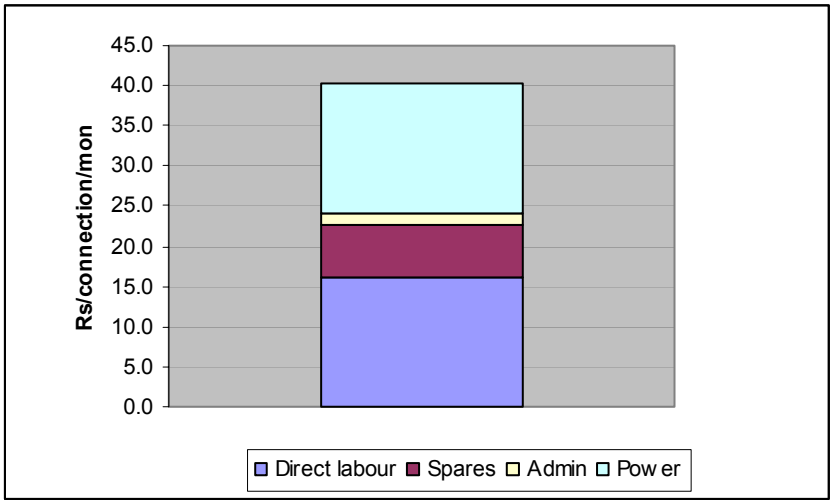
Item	Unit	Amount
Power (priority 4)	Rs/year	3,000,000
Total	Rs/year	6,300,000

Source: Mirpur Khas budgets

523. Cash receipts are a tiny 47 percent of billings and recover just Rs8 per connection per month. As can be seen from Figure 6-9 this amounts to about:

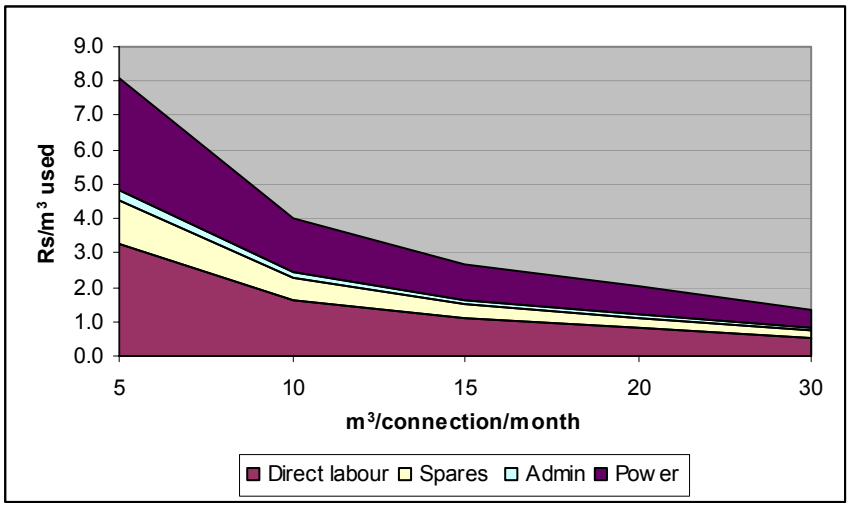
- half the direct labour cost of Rs16 per connection per month
- a third of all expenses excluding power
- a fifth of all expenses including power

Figure 8-8: Operating expense breakdown



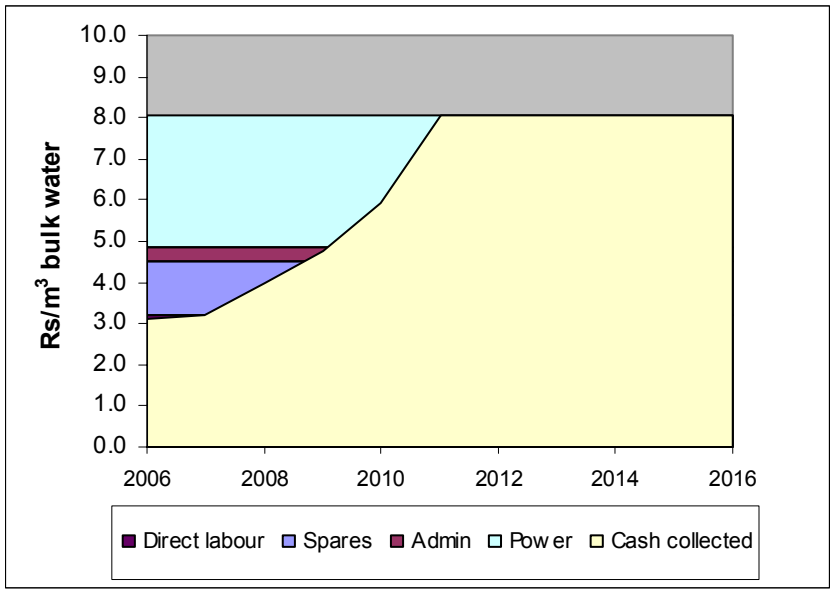
524. While cost recovery is dreadful – there is no other word for it – the actual costs do not appear unreasonably high. Figure 8-8 shows costs per cubic metre for various plausible monthly consumption rates. For a consumption of 5m^3/connection/month they amount to about Rs.8/m^3 (US$0.13/m^3).

Figure 8-9: Operating expenses per m^3



525. Figure 8-10 shows the impact of a series of annual bulk tariff increases, each of 25 percent, stopping at the point where they equal all operating expenses (excluding capital charges), based on 5m^3/connection/month delivered at the bulk measurement point. Note that figure 6-10 makes no allowances for inflation or real growth in wages or the costs of any other inputs; implicitly it assumes that the water contractors pay all charges raised by the TMA. In this instance recovery of all the TMA's direct operating expenses is possible without applying a cap, and amounts to Rs.40/month. This should be easily affordable as it represents around 1½ percent of the minimum wage, although in practice there would be some water contractor's costs to add to this.

Figure 8-10: Increasing tariffs and cost recovery



8.2.3.11 Volumes – the missing link

526. The bulk tariff of Rs.8/m3 derived above assumes a monthly household consumption of 5m3. Unfortunately, there is little information regarding what households consume, or would consume if the supply were reliable. While experience will of course give an answer to this, an initial estimate will be needed to set an initial volumetric tariff.

527. The best approach to this would be to install meters at the points of putting water into supply (boreholes, pumps on canals etc). This will be better than the "hours pumped x pump capacity" approach and is fairly cheap to implement. Moving from an estimate of water into supply to an estimate of water supplied in bulk means estimating leakage, but this is more likely to yield useful results than attempting to measure current household consumption from an intermittent supply.

8.2.3.12 Charges for Sanitation and Solid Waste Management

528. There are about 29,000 households in Mirpur Khas City. The charge implications per household of recovering sanitation and solid waste costs are as follows:

529. For 29,000 household, the total sanitation and solid waste management cost of Mirpur Khas is Rs.19.6 million per annum which comes to Rs.678 per annum per household or Rs.57 per month per household.

8.2.4 Tariff goals

8.2.4.1 Introduction

530. In practice, tariff reform starts with its history and moves in slow steps towards a structure that goes some way to meeting the goals outlined in "best practice tariffs", though, starting with a clean sheet. Table 8-7 summarises tariff goals, which are discussed in more detail below.

Table 8-7: Tariff setting goals and definitions

	Goals				
	Economic	**Financial**	**Distributive**	**Predictability**	**Fair pricing**
Goal definition	"Efficiency", i.e. people buy the service to the extent that the value to them just equals the amount they pay	Income (or cash collected) meets some agreed proportion of costs.	Prices do not impose an intolerable burden on the poor	Clear process for setting and changing tariffs; increases are phased in gradually; tariffs are simple and readily understood	Prices reflect the costs imposed on the service provider
Premise	1. Consumer demand is known 2. Willingness to pay estimates available 3. Payment by unit volume or weight is possible, i.e. mains are pressurised all the time 4. Resource is sufficiently scarce that the costs of introducing (3) are justified.	1. Costs and revenues of service are known – this means that accruals accounting must be used – or atleast the requisite forms for showing liabilities and receivables must be completed 2. Service provision is financially autonomous	1. It is possible to "tag" the poor both efficiently and cost effectively	Institutional location and authority for price setting is clear	If customers are not metered, some proxy for consumption is needed. Service pipe diameters, plot areas, taxation bands etc are all used, but all are weakly correlated with costs per m^3 imposed on the utility.
Practical definition	Price = marginal cost Present value (PV) of increased costs ÷PV of increased volumes delivered	Hierarchy of goals, from: i) recovery of operating expenses (excluding capital charges[a]) from income (or from cash collects) to: (ii) earn a positive real return on net	Prices should not exceed willingness to pay by low income groups Connection charges should be the minimum consistent with covering the application costs (not the construction costs).	Goal definition serves	Goal definition serves

	Goals				
	Economic	**Financial**	**Distributive**	**Predictability**	**Fair pricing**
		revalued assets equal to the cost of capital	If the poor are identified, a direct subsidy can be paid to the utility.		

8.2.4.2 Economic Goals

a) Setting an efficient price

531. The first step is to estimate a price that satisfies the economic criterion in table 6.1, namely that people should buy extra amounts of a service only up to the point where the value of the next (marginal) unit costs more than its incremental value to them. This "efficient" solution is only achieved if the service is priced at its marginal cost.

532. Short run marginal costs assume useful capacity is fixed, while the long run marginal cost is the cost per unit of additional output when capacity may be changed. The two costs are the same if a system has the optimum configuration and investments are not "lumpy". In the real world of water, sanitation and solid waste, neither of these is true.

533. There are many competing definitions of marginal cost, each giving a different result and price signal. A practical definition that could in theory be applied in Pakistan is to separate capacity and operating costs and to make:

534. Marginal cost = incremental capacity cost + marginal operating costs (of pumping, treatment etc)

> where the long run average incremental cost (LRAIC) of capacity is defined as:
> LRAIC = PV of investment costs ÷ PV of incremental demand met
> (PV = present value, that is, the sum of future costs each of which is discounted by an appropriate discount rate)[66]. In addition to the marginal costs of increased capacity and of operations, there are costs of connection and of managing a new account to be recovered. Of course, anticipating the interests of social acceptability, especially that of access, will compel the recovery of some or all consumer and connection costs from the volumetric charge.

535. Although marginal cost pricing would normally be expressed as a cost per unit of service (m^3 delivered, kg collected etc), it is entirely consistent with marginal cost pricing that there is a fixed element that reflects the incremental cost of delivering the service to one more customer. These are the customer related costs of:

- supplying, repairing, reading etc the device used to measure the service (usually a water meter)
- maintaining a customer's account and billing for the service
- Such costs are not necessarily trivial, as indicated in Section 3, they could amount to Rs300-600 per connection per year.

[66] Alternatively, instead of the PV of investment costs, express investment costs as an equivalent annual cost

b) Premise for economic efficiency

536. Marginal cost pricing cannot be implemented unless:

- It is possible to measure and charge according to the amount consumed – which in turn means, in the case of water and sanitation, that supply is continuous (customer meters will not work otherwise)
- demand is known

537. A further assumption behind marginal cost pricing is that the service is in scarce supply. This is not always the case. In some countries, demand is falling and the service is in over-supply. In such cases it may be tempting to base charges on average costs, but it is more efficient in such cases to set a tariff whose variable element reflects short run costs and a fixed charge.

c) Potential conflict with other goals

538. Often, there is a conflict with meeting financial goals. This usually arises because economic pricing looks to the future while financial pricing has to recover costs that arise from past investment decisions, i.e. economic prices are too low to recover costs. If this happens, again the best course of action is to change the fixed element in the tariff.

8.2.4.3 Financial Goals

a) Setting the price

539. At its strongest, "financial sustainability" means that the service provider is not only in a position to meet all financial obligations as they fall due, it also means:

- paying a return to investors that is commensurate with the risks they face
- maintaining the real value of financial capital in the business

540. Very few utilities anywhere meet these criteria. The privatised utilities in England and Wales belong to this select group, but few others do so. A more realistic hierarchy is shown below in Table 8-8. Although cost recovery goals are often couched in terms of income (i.e. billings), it is weak cash flows that are the enemy of many utilities in developing countries. Hence goal II in the table emphasizes cash collections rather than income. The ratio that expresses performance against goal II is sometimes referred to in the literature as the "working ratio" (operating expenses÷cash collections) – a recent World Bank paper[67] suggests a target ratio for developing country water utilities of 0.68 (i.e. cash collections are 1.47 x operating expenses). (The "operating ratio" is a more widely used benchmark, but strictly refers to operating expenses÷sales, i.e. it is an accruals rather than cash based target).

Table 8-8: Hierarchy of financial goals

Goal	Commentary	Subsidy requirement
I. Recover operating expenses including reactive maintenance (but not capital charges) from	This is the least challenging goal, and even if met would – unless all water bills were promptly collected – still leave the water function with negative	Extensive: ▪ revenue subsidy to the point where operating cash flows

[67] Tynan, N and Kingdom, B "A Water Scorecard: Setting Performance Targets for Water Utilities", Public Policy for the Private Sector, World Bank, note 242, April 2002.

Goal	Commentary	Subsidy requirement
billings ("O&M recovery")	operating cash flows. "Reactive maintenance" does not mean replacement of pipes or pumps (which would usually be capitalised). It means replacing small items – washers, valves etc – or greasing a pump etc.	are adequate ▪ all capital expenditure ▪ all capital maintenance
II. Recover operating expenses as above but from cash *receipts* rather than *billings* ("Operating cash flow" criterion)	As receipts are generally much lower than billings, meeting this goal is likely to be much more demanding than (I). It should provide an incentive to recover arrears as well as current billings.	Revenue subsidies no longer needed but subsidy requirements remain for: ▪ all capital expenditure ▪ all capital maintenance
III. Recover operating expenses including capital (i.e. depreciation) charges from billings ("OM&D recovery")	A common goal, but impractical in Sindh as depreciation charges are neither calculated nor recorded.	Limited to: ▪ interest charges (if any) arising from capital expenditure ▪ some capital maintenance (depending on adequacy of depreciation charges) ▪ probably most capital expenditure

541. Short of full cost recovery, meeting any of these goals implies subsidy, as set out in the table. Subsidies are consistent with financial sustainability provided the subsidy is explicit and secure, and preferably reducing according to an agreed timetable.

b) Premise for financial sustainability

542. The absolutely essential requirement is that the expenses and revenues associated with providing the service are known. This in turn means that atleast the budgeting formats prescribed under the TMA Budget Rules for recording liabilities and receivables are strictly adhered to[68].

c) Potential conflicts with other goals

543. The potential for conflict with economic goals has already been discussed. The other potential areas for conflict are:

- predictability in the sense that meeting financial goals can imply large increases in prices.
- distributive goals if a large proportion of the customers are unable to afford a service priced to meet a financial goal.

8.2.4.4 Distributive Goals

544. To paraphrase ERD technical note no 10, "user charges are probably amongst the least effective and appropriate ways [to promote distributive justice]". The usual criteria adopted in the water and sanitation sector are that (i) charges should reflect willingness to pay and (ii) bills should not exceed five (or a similar) percentage of household income. If followed when devising tariffs, both tend to yield very low prices, usually a tiny proportion of what people actually pay to vendors (typically around Rs5

[68] Instead of the present "cash accounting", the Federal, provincial and district governments are moving towards "modified cash accounting" under the New Accounting Model, introduced under the "Project for Improvement of Financial Reporting and Accounting - PIFRA") of the World Bank.

per 20 litre container) or the opportunity costs they face when fetching and carrying water from a remote source.

545. The suggestions for improving the distributive justice of tariffs are:

- if the poor can be efficiently and cost-effectively "tagged":
  - set connection charges to the costs of managing the application process
  - charge a reduced tariff to the poor that meets their willingness to pay but, if feasible, arrange a transfer that covers the difference between the subsidised and unsubsidised charge, on production of evidence that the customer has in fact paid the reduced bill
- if tagging is not possible, reduce connection charges to all

546. The principal area of potential conflict is between a "within tariff" solution (lifeline blocks etc) and meeting financial goals.

8.2.4.5 Predictability

547. Predictability means having a clear and rational process for tariff setting and a phased approach to tariff changes.

548. Such a process should set out:

- the targets to be met
- how prices meet them
- how large changes are to be implemented over time
- who determines prices and how often
- consultative arrangements with users
- how poor consumers are to be protected
- the information used to set prices

549. The only scope for conflict is between a phased approach to price changes and meeting financial goals.

8.2.4.6 Fair Pricing

550. "Fair pricing" has no formal definition. A workable one is that prices should reflect the costs that a particular (and of course readily identifiable) user group imposes on the service provider. In the water and sanitation sector this tends to come down to the following question: should commercial customers be charged more than residential customers? Sometimes, fair pricing includes the idea of "normal profit" (indeed this principle is central to many regulatory arrangements in developed countries), but this will be a redundant concern in Sindh for the foreseeable future.

551. If the above cost based definition is adopted, there is normally no good reason to charge non-residential users higher prices per unit of output. If anything, commercial users impose lower unit costs on the supplier (billing costs per unit are lower and demand is less variable), but of course this would not normally be a socially acceptable policy. If there is no metering, however, it can make sense to use some proxy for the total cost imposed. All readily proxies – service pipe diameter, property tax band, plot area – are crude and quite likely to arouse opposition from those who lose if the current system is changed.

552. The practical course of action that fits with the proposed policy is either:

- retain the existing system of charging by service pipe diameter; or

- investigate use of selling prices of immovable properties (DC Rate fixed for collection of stamp duty and Tax on Transfer of Property).

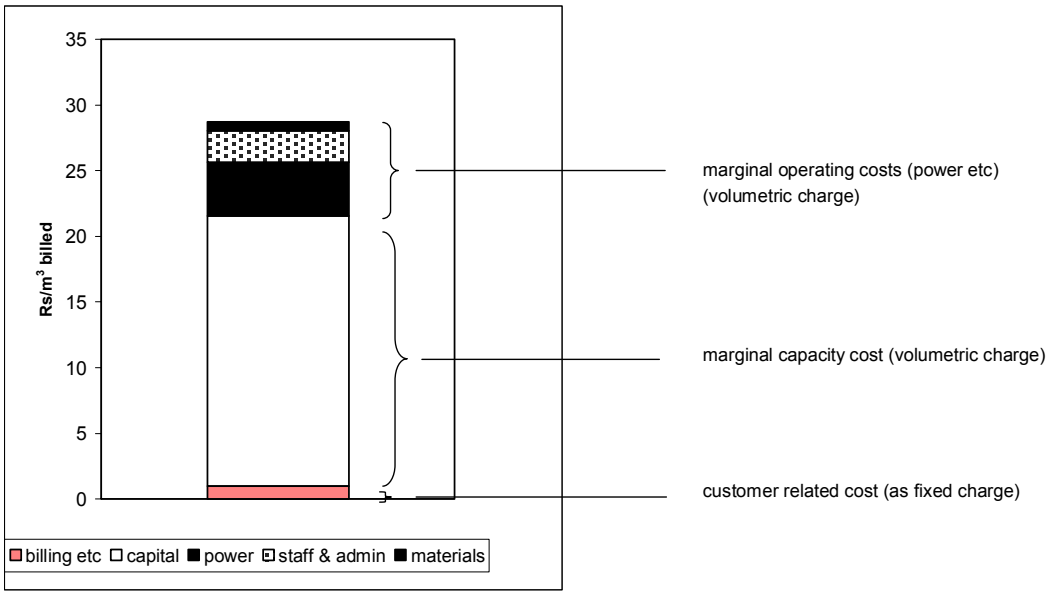
8.2.4.7 Steps in Tariff Setting and Tariff Structure

553. Figure 8-11 shows a generic tariff structure, based on a metered supply. It has three elements:

- a small customer related charge that should be charged as a fixed amount per month
- two charges that should be reflected in a single volumetric charge:
  - a capacity charge based on an incremental capital costs
  - a marginal operating cost

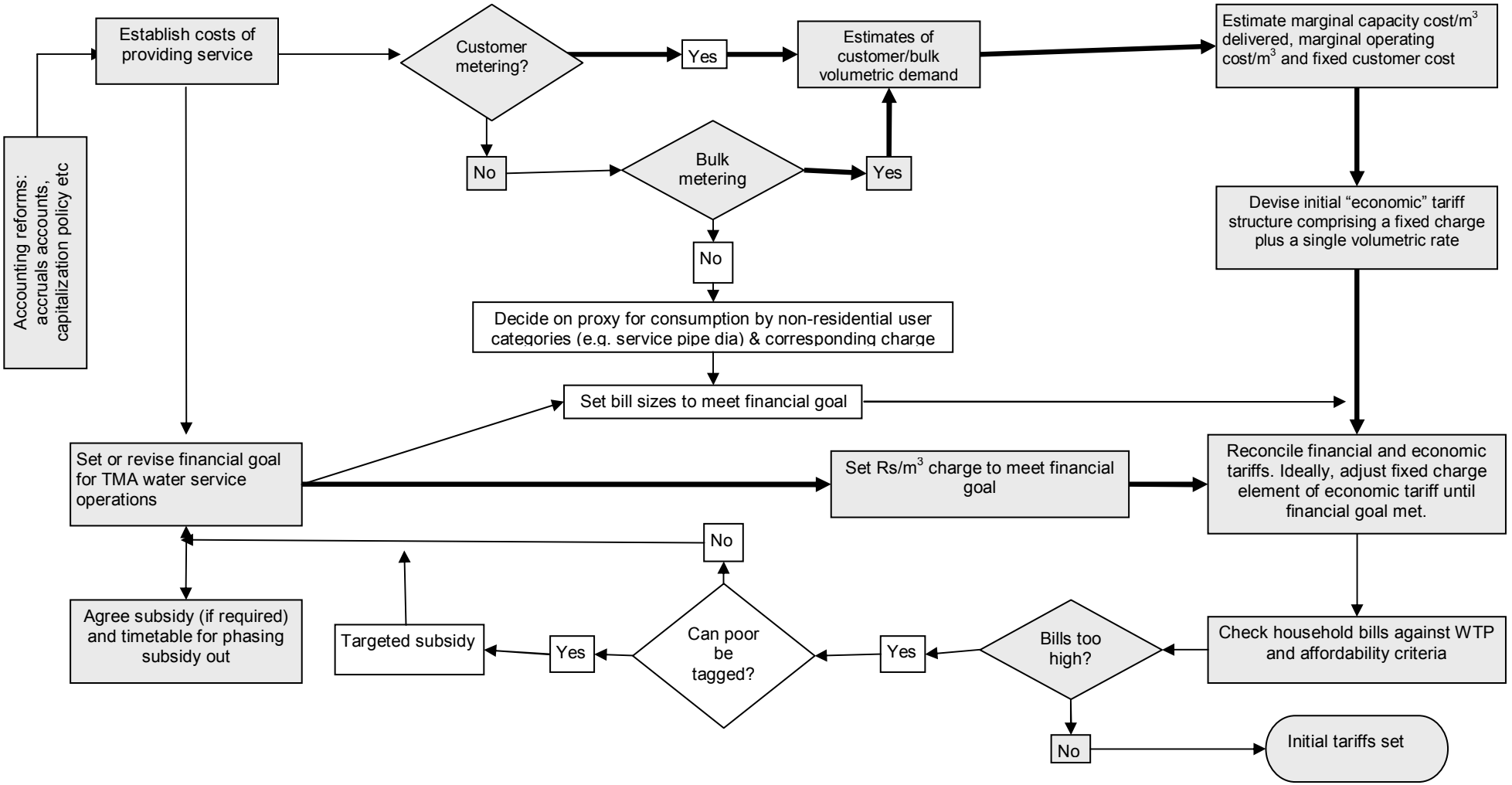
554. The structure deliberately opts for a single volumetric rate rather than a rising block tariff.

Figure 8-11: Tariff structure



555. Figure 8-12 is a flowchart for tariff design. The steps that are relevant to the Sindh TMAs are shaded. If the chart appears complex, this is because of the need to accommodate both metered and unmeasured supplies.

Figure 8-12: Tariff Design Flowchart



Annexure - 1

MIRPUR KHAS

MIRPUR KHAS TALUKA

Strategic Plan For Water Supply and Sanitation 2006-2012

Table of Contents

1 BACKGROUND 1
1.1 Overview of Mirpur Khas Taluka 1
2 WATER SUPPLY 2
2.1 Urban areas 2
2.2 Rural areas 2
3 SEWERAGE AND DRAINAGE 3
3.1 Urban areas 3
3.2 Rural area 3
4 SOLID WASTE MANAGEMENT 4
4.1 Urban Areas 4
5 PRIORITIES 5
6 ISSUES 6
6.1 Water Supply 6
6.2 Sewerage and Drainage 7
6.3 Solid Waste Management 9
7 STRATEGIC PLAN 11
7.1 Water supply 11
7.2 Sewerage and drainage 12
7.3 Solid waste management 15

Supporting information and Appendices

Mirpur Khas Taluka – Strategic Plan for Water Supply and Sanitation – 2006-2012

1 BACKGROUND

1.1 Overview of Mirpur Khas Taluka

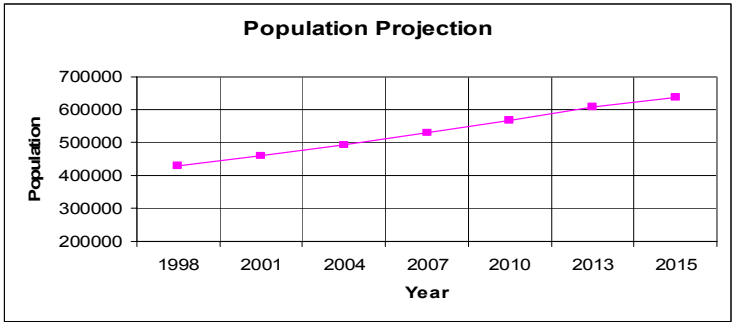
1. Mirpur Khas Taluka lies in the lower Indus plain and according to the 1998 census had a total population of 428,275, of which:

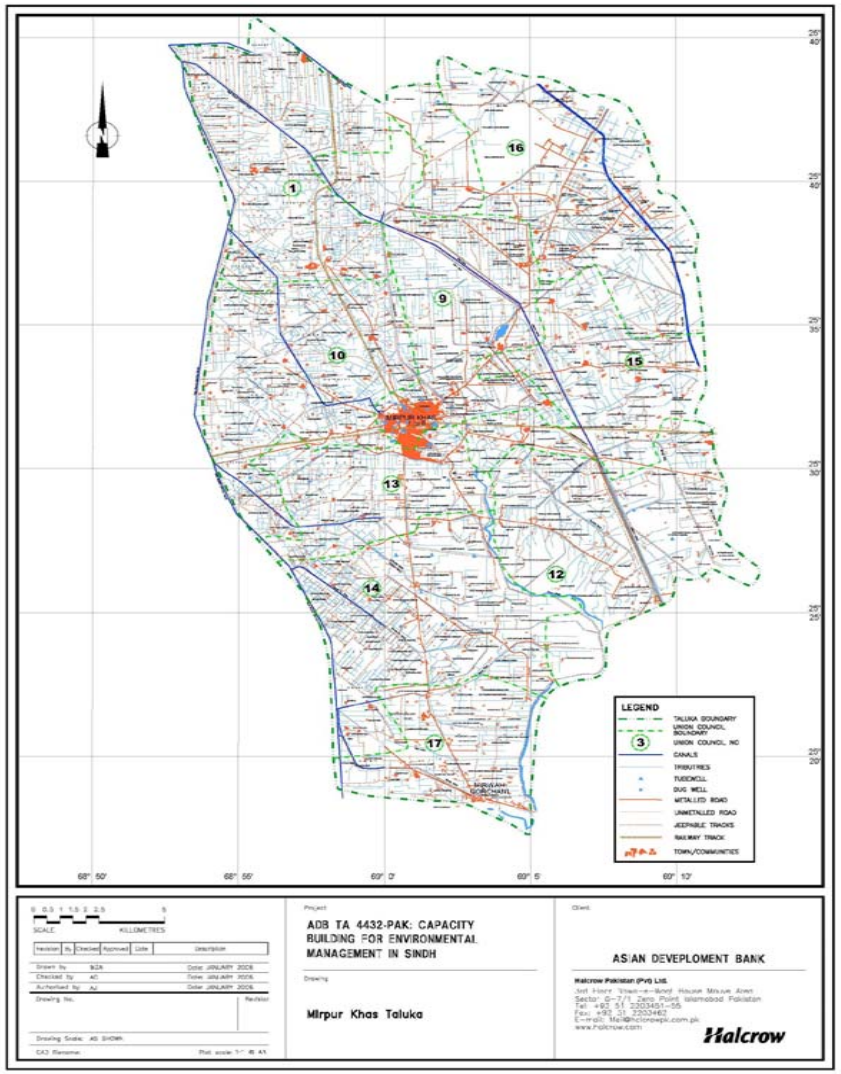
   - 199,820 (46.7%) were in urban areas; and
   - 228,455 (53.3%) were in rural areas.

2. The urban population was divided in Mirpur Khas with population of 189,671 and Mirwah with population of 10,149. At present there are 12 union councils in Mirpur Khas Taluka.

3. The area is characterized by an arid and hot climate and large fluctuations in temperature. The maximum temperature of the area is about 48 degree centigrade and the minimum temperature is about 6 degree centigrade. Average annual rainfall is about 200 mm (8 inches) with the major part during the monsoon season.

4. The graph below indicates estimated current and projected population based on the 1981-1998 growth rate of 2.37% per annum,





2 WATER SUPPLY

2.1 Urban areas

At present there are about 29,000 households in Mirpur Khas city (estimated through projection of 1998 census figure) and numbers of registered connections are about 15,000. There are many house connections which are not registered or more than one household is getting benefit of one connection. Actually the coverage of municipal water supply is more than 75% of the households. Similarly in Mirwah town, coverage of water supply is more than 75% of total households.

Ground water in the taluka is generally brackish and at shallow depth of about 10 feet. There are some pockets of sweet water with limited quantity of water. Therefore, the main source of water is canals. In Mirpur Khas they are Jarwar Minor, West Jamrao Canal, and Mirpur Minor. These are closed for about four to six weeks annually for maintenance. Water is stored in ponds to meet the requirement during canal closure period. In these storage tanks, sediments settle down and this settled water is supplied to the city.
Private Arrangement of Water in the cities includes hand pumps and motor pumps. In some pockets of the cities, sweet water is available at shallow depths. People draw water from 20 to 50 feet of depth.
The District Government has initiated water supply and drainage schemes for Mirpur Khas city with an estimated cost of rupees 399 million and 199 million respectively. The project implementation is slow due to the slow release of funds.

2.2 Rural areas

Irrigation channels are the main source of water in rural areas of the taluka. In most of the cases, people collect water directly from the water channels for their domestic use. People dig irregular ponds to store water for the use in canal closure period. Animals also drink water from the same ponds. The water is unhygienic and the TMA is unable to carry out any quality tests.

The coverage of TMA water supply is small and it may be less than 25%. In the existing rural water schemes water from canal is fed to the storage ponds, which serve in the canal closure period. The water is pumped from these water storage tanks or drawn through hand pumps installed on the side of these ponds. These water supply schemes were constructed by Public Health Engineering Department (PHED). To meet the O&M expenses, for the first four years the provincial government provides 2/3rd of O&M cost, paid quarterly in sixteen instalments. After completion of this period, the community owns the scheme and bears total O&M cost. At present, there is no technical advice or support available to the VDA in the operation and periodical maintenance of the WSS schemes. According to record available with TMA, 13 water schemes were constructed by the PHED, out of which 9 are operational.

3 SEWERAGE AND DRAINAGE

3.1 Urban areas

The Sanitary Drainage System in urban areas consists of open drains at lane level which lead to trunk sewers and pumping stations. In Mirpur Khas there are three main sewage disposal stations. All sewage is being disposed of un-treated in nearby depressions and seepage drains, although one disposal station has treatment plant, which is silted up and not in working condition.
In most cases, open drains provide both rain water drainage and carry sewage, with human excreta directly discharged into the drains.
The open drains get blocked due to a combination of inadequate gradients and solid waste (particularly polythene bags). Sewage held up in the drains, overflows and pondage is frequent.

In urban areas where sewerage has been laid out, poor operation and maintenance practices aggravate the conditions.
The drainage disposal stations are not properly operated (sewage is held up), have capacity limitations, the civil and mechanical works are in a poor state.

3.2 Rural area

In rural areas, open drains are provided for sewage flow which is then used or disposed of through pumping in the nearby areas.

In most cases, open drains provide both surface drainage and carry sewage and human excreta directly discharged into the drains.
The open drains get blocked due to a combination of inadequate gradient, solid waste (particularly polythene bags). Sewage is held up in the drains, overflows and pondage is frequent. The pumping stations are also in poor condition and sewage held up there which is also a cause of overflowing drains.

4 SOLID WASTE MANAGEMENT

4.1 Urban Areas

The TMA uses hand carts and donkey carts for primary collection and tractor-trolleys and front end loaders for secondary collection of the waste which is finally disposed off in form of open dumps inside the city and on the out skirts. No formal sanitary land filling is done.

The overall collection efficiency of the TMA is about 50% of the total generation and so quite a portion of waste remains uncollected in the city which is a source of environmental pollution. Major reasons for the situation are non provision of community bins and indiscriminate throwing of waste on the streets, manually loaded vehicles and disposal in form of open dumps. Healthcare wastes are also mixed with the municipal waste. Women are responsible for managing waste at the household level but they are not adequately educated to deal with the problem in a sanitary manner.Rural area

The problems in rural areas are much less severe compared with in the city. Waste generation rates are low, and there is a high organic content, making waste suitable for natural decomposition, or controlled composting.

Plastic bags are a growing problem in rural areas of the Mirpur Khas TMA, and there is lack of information on how to deal with this form of waste.

5 PRIORITIES

The Mirpur Khas Taluka Strategy Plan is based on the following priorities:

1. *The need to involve the community in working with the TMA to reduce waste and increase efficiency through greater awareness and concern for the environment in general and of the Taluka in particular; This will be done through public awareness campaigns and a programme of concerted area-by-area campaigns;*
2. *The need to adopt more participatory and transparent processes of working by the TMA. This will be done through the use of the "planning wall" and other devices for making the public more aware of the TMA's programmes and priorities;*
3. *To involve the private sector and the community in working with the TMA in the delivery of WSS services as part of the component-sharing approach;*
4. *The need to rehabilitate and refurbish existing systems and schemes;*
5. *The need to improve the capacity and efficiency of existing and installed schemes and systems;*
6. *The need to take greater control over the resources and services of the Taluka. This will be done through building up an updated database and management information systems*
7. *Then, to improve and extend WSS services delivery to the new and expanding parts of the Taluka;*
8. *Once the TMA service delivery has improved, the priority will be to collect an increased portion of increased tariff and user charges*

6 ISSUES

6.1 Water Supply

	House	Lane/ Neighbourhood	Settlement
Mirpur Khas	Piped water still not available in some houses	Water pipes not laid in some areas of city	Water supply network inadequate, and in poor condition
	Timings and quantity of municipal water supply is not reliable	Underground pipes are leaking and in poor condition causing contamination of water. Some are passing through the drain.	Canal water storage tanks have inadequate capacity to meet demand during canal closure period. The existing capacity has been further reduced due to silting.
	Municipal water quality is not safe for drinking because it is without disinfection.	Water distribution can not be properly managed due to shortage of control valves in the system	Though existing treatment facilities exist for a part of the city they are not operational due to lack of maintenance, therefore at present all water supplied is untreated
	Lack of awareness about link between water quality and health		Water pumping stations are in poor condition
	Many connections are not registered with TMA		The amount of water being supplied is not measured
	Wastage and poor water management in the house. House plumbing is generally in bad condition causing loss of water		The quality of water supplied do not meet the drinking water standards such as WHO guidelines
	Households reluctant to pay for water services		Both water tariff and collection efficiency are low.
			Revenue does not cover the O&M cost
			Topographic and infrastructure plans and information on existing system is not available
UCs			
Mirwah	As Above	As Above	As Above
Rest of Taluka	Safe drinking water is not available in most houses		Most of the rural areas are not served with municipal water supply.

	House	Lane/ Neighbourhood	Settlement
	Lack of awareness between water quality and health		Canal water is the only available source of water. Some canals are non-perennial, and remain closed four to six months in a year. Perennial canals also close for 30 to 40 days in a year for maintenance purpose. Available water storage does not meet the requirements during canal closure period
			Canal water is suspected to be contaminated by upstream pollution including dumping of raw sewage.
			Data for planning and for proper operation and maintenance is not available.
			There are few water supply schemes which are completely in-operational or not inadequately.
Financial	Budgeting is made difficult because of lack of information on contributions and commitments from district and provincial levels. Tariff structure is set too low and has no relation to expenses. Incentives for tariff recovery are low.		
Environment	Poor quality of water is a health hazard particularly for children. Intestinal disorders are endemic.		
Women	Women, particularly in rural areas, are responsible for water provision to the household. They are forced to fetch water over long distances, making it a tiring and wasteful task severely impacting on their ability to undertake other household tasks. The poor quality of water not only causes family health problems, but also makes other water-related tasks such as clothes washing and cleaning more difficult and time-consuming.		
UC1			
UC2			
UC3			
Institutional	TMA responsibilities are not clear because of the overlapping created by the re-designation of PHED. For example TO(I&S) has been placed under the command of the PHED. The PHED will supervise the O&M of water supply and drainage schemes of major cities. O&M responsibility for the vertical projects such as water Filtration Plants has been put on the TMA. A mega project is being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001.		

6.2 Sewerage and Drainage

	House	Lane	Settlement

	House	Lane	Settlement
Mirpur	Toilet facility is not available in some of the houses	Most open drains are usually blocked with refuse	Untreated disposal into fields
	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	All open drains carry human excreta	Inadequate Trunk Sewer network coverage
	Lack of awareness about link between sanitation and health	Underground pipes exist in some parts of the city but most are in poor condition	Sewage Treatment Plants are not functioning therefore there is no treatment of sewage
			Pump Stations in poor condition. Sewage gets held up there.
Mirwah	As Above	As Above	As Above
Rest of Taluka	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	No facility in most of the area	Most of the area is un-served.
	Lack of awareness about link between sanitation and health	All open drains carry human excreta	Existing Sewerage Schemes in rural areas are not functioning or functioning inadequately
			Untreated disposal into fields
UC1			
UC2			
UC3			
Institutional	A mega project is being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001. Maps and Data of existing system is not available.		
Financial	Budgeting is made difficult because of lack of information from district and provincial levels.		
Environment	Open drains with faeces discharged directly from household toilets are a common sight. Drains blocked by polythene bags and leaking pipes cause ponding. This is particularly hazardous in lanes and residential areas where children play in and around untreated sewage. The discharge of untreated sewage for use in agriculture is harmful to both agricultural workers and consumers of the produce.		
Women	The lack of toilets in some houses, is particularly onerous for women who are forced to curtail their activities and functions.		
Public Toilets	Absence of public toilets in urban areas, especially for women, severely limits activities and leads to open urinating		

6.3 Solid Waste Management

	House	Lane	Settlement
Mirpur Khas (and Mirwah)	Waste is mixed, thus reducing potential for composting and reducing value of recyclables	Incomplete sweeping of lanes due to large amounts of waste is thrown on the streets, low -attendance of sweepers and low-productivity	Only 50% of waste generated from the city is collected by TMA
	Waste thrown on streets, thus increasing sweeping work and choking sewers and drains	Sweepers use inefficient tools and poorly designed handcarts, thus reducing efficiency and exposing workers to occupational diseases	Ad hoc disposal facilities threatening public health and the environment
	No door-to-door collection system, encouraging indiscriminate dumping on streets	Poorly maintained and designed transfer points resulting waste scattering on street sides	Waste pickers operating at dump sites, posing a threat to themselves
		Scavengers working on the streets can scatter waste, and susceptible to health problems	Inadequate manually loaded vehicles for secondary collection
		Polythene bags spread around make the city look filthy, and caused choking of sewers and drains	Health risks from present final waste disposal practices (e.g. groundwater pollution, air pollution, disease vectors)
		Health risks from rotting piles of waste on streets/at transfer points	Health risks from lack of separate Healthcare waste management
		Health risks from blocked drains and sewers	
		Manual handling of waste when loading and unloading is dangerous and inefficient	
Rural areas			Plastic waste is a problem throughout rural areas and hinders composting of waste
Community participation	Lack of community engagement in solid waste management activities	Very few community organisations are established at present to facilitate community-led door-to-door collection	
Institutional		No NGOs working in the field of solid waste management	Lack of technical knowledge within TMA on solid waste management options
Finance	Required contributions from		Lack of funds hinders investment and planning in solid waste

	House	Lane	Settlement
	householders provided with door-to-door collection services		management
Environment		Degradation of city environment as a result of indiscriminate dumping on streets	Environmental pollution from uncontrolled disposal of waste
Women	Women lack education on problems caused by improper management of solid waste		No public awareness messages targeted at women
Private sector	Potential for informal-sector/small enterprises to undertake door-to-door collection services not being tapped.	Contracting out solid waste management to the private sector proved uneconomical in two union councils	Contracting out solid waste management at the city level not tried
Hospitals	Improper handling of healthcare waste can expose hospital staff, sanitary workers and citizens to health risks. In particular, the practice of recycling syringes, and handling and resale of infected equipment is hazardous.		
Schools	Due to storage of solid waste in open heaps, school children and staff are exposed to health risks.		
Commercial	Demolition and construction waste is presently mixed with other municipal wastes, and remains on the streets in commercial areas awaiting collection. It is a source of health risks as well as traffic hazard. Shopkeepers throwing waste onto the streets further aggravate the problems.		
Public awareness	Lack of public awareness about health impacts of poor solid waste management practices		Lack of awareness about Healthcare waste amongst professionals and public

7 STRATEGIC PLAN

7.1 Water supply

PROPOSALS	PLACING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
House Level								
All households should have individual house connections and charged according to usage	Mirpur Khas							Households
Public awareness campaign for the connection between water quality and health.								SDSSP
Raw Water Storage								
Carry out de-silting of existing raw water storage tanks to rehabilitate capacity	Mirpur Khas							SDSSP
Construct new raw water storage tanks to meet current and expected demand	Mirpur Khas							Mega Project
Water Treatment								
Rehabilitate existing water treatment plant	Mirpur Khas							SDSSP
Construct additional water treatment plant	Mirpur Khas							Mega Project
Water Distribution								
Repair and replace pipes and house connections in poor condition and provide additional control valves.	Mirpur Khas							SDSSP
Extend piped network to provide coverage in all areas of the town.	Mirpur Khas							SDSSP
Rehabilitate pump stations								TMA
Build (over-head) storage tanks	Mirpur Khas							SDSSP
Planning								
Proper topographic survey, inventory of all civil and mechanical works. Compilation of information and preparation of the maps on some computer software with marking/ connecting the relative information.	Mirpur Khas							SDSSP
Draw up and introduce a programme of regular maintenance of water supply system including network, treatment plant, pumping stations and storage tanks.								SDSSP
Cost Recovery								
Investigate and introduce a programme to increase Water Tariff and Revenue Collection.	Mirpur Khas							TMA

PROPOSALS	PLACING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Computerized billing system and proper updating of consumers record by field survey.	Mirpur Khas							SDSSP
Install meters at all sources to measure the amount of water to be supplied.								SDSSP
Consider component-sharing through involvement of community and/or private sector, for example Private/community contractors to purchase bulk water from TMA –and distribute to households through Community/group metered supply	Mirpur Khas							TMA
As Above for Mirpur Khas	Mirwah							SDSSP
Rehabilitation Of Existing Rural Schemes	**Other UCs**							
Rehabilitation of existing water supply schemes after consultation with the community for the demand and O&M responsibility	Other UCs							SDSSP
New Rural Schemes								
Arrange land acquisition and construct water storage tanks	Other UCs							SDSSP
Arrange land acquisition and construct water treatment plants consisting of slow sand filter	Other UCs							SDSSP
Planning								
Continuous liaison and coordination with irrigation department on regular supply of water to operate existing water supply schemes.	Other UCs							TMA
Collect data of each settlement regarding the ground water condition, distance of the nearest water source etc. and plan for water supply schemes.	Other UCs							SDSSP

7.2 Sewerage and drainage

PROPOSALS	PLACING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Lane Level Drains And Sewers								
Targeted action to unblock drains – area by area; accompanied by public awareness campaign	Mirpur Khas							TMA

PROPOSALS	PLACING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Cover the open drains or replace with underground pipe	Mirpur Khas							SDSSP
Extend underground pipe network on a lane by lane basis	Mirpur Khas							Mega Project
Trunk Sewers And Pump Stations								
Gradually repair and replace underground trunk sewers and pump stations.	Mirpur Khas							SDSSP
Provide Additional Trunk Sewers and Pump Stations	Mirpur Khas							Mega Project
Treatment								
Repair existing sewage treatment plants	Mirpur Khas							SDSSP
Provide additional treatment plants	Mirpur Khas							Mega Project
Cost Recovery								
Sell treated sewage effluent as fertiliser	Mirpur Khas							-
Planning								
Prepare Map and Data of existing system	Mirpur Khas							SDSSP
---------- As Above ----------	Mirwah							
House Level								
Public awareness campaign to install toilets in low density areas, encourage installation of individual Ventilated Improved Pit (VIP) Latrine	Other UCs							SDSSP
Lane Level								
Targeted action to unblock drains – area by area; public awareness campaign.	Other UCs							TMA
Cover the open drains or replace with underground pipe.	Other UCs							SDSSP
Trunk Sewer And Pumping Station								
Repair existing Trunk Sewers and Pump Stations.	Other UCs							SDSSP
Provide Additional Trunk Sewers and Pump Stations.	Other UCs							SDSSP
Sewage Treatment Plant								
Repair existing sewage treatment plants.	Other UCs							TMA

PROPOSALS	PLACING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Provide additional sewage treatment plants.	Other UCs							SDSSP
Rehabilitation								
Rehabilitation of existing drainage schemes after consultation with the community for the demand and O&M responsibility.	Other UCs							SDSSP
Planning								
Plan new drainage/ sewerage schemes after consultation with community.	Other UCs							SDSSP
Public Latrines								
Provide public latrines at important places	Mirpur Khas, Mirwah							SDSSP

7.3 Solid waste management

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Onsite Storage and Processing								
Introduce 2-bin system for wet and dry waste in household								Households
Initiate home composting in barrels where space allows and appropriate								Households/ TMA/ NGO
Street Waste Management								
Provide litter bins on main streets for pedestrians' use								TMA/NGO/CBO
Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas								TMA
Hand over sweeping to private-sector (with staff and equipment)								TMA/ Private Sector
Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors								TMA
Enforce provision of containers/ bags on public vehicles, vendors' carts								TMA
Primary Collection/ Private Sector/ CBO								
Enforce waste producers' responsibility for transporting waste to transfer points (i.e. community bins)								TMA/CBO
Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area								TMA/NGO
Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers								TMA/CBO/Private Sector
Communal Storage								
Purchase demountable containers ($5m^3$) as communal storage facility								TMA/SDSSP
Secondary Collection/ Private Sector								
Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots								TMA

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Purchase hydraulic tractor container carrier system for use with demountable containers to replace the present manually loaded tractor trolleys								TMA/ SDSSP
Contract out secondary transportation to private-sector								TMA
Reuse and Recycling/ Organizing Scavengers								
Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors								TMA/CBO
Treatment and Final Disposal								
Improve and rehabilitate present disposal practices in line with basic public health and environmental standards (levelling and providing soil cover)								TMA
Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant								TMA/SDSSP
Central compost plant								TMA/ Private Sector
Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available								TMA/ CBO/Private Sector
Special Waste Management								
Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste								TMA/ District Health Department
Awareness campaigns in hospitals								TMA/ District Health Department
Undertake viability study for installation of locally manufactured incinerator								TMA/SDSSP
Assess generation of hazardous waste within TMA, and devise strategy for its safe treatment and disposal								TMA
Enforce provisions for demolition and construction waste disposal								TMA/Private Sector
Awareness Raising								
Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment								TMA/NGO

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Public awareness raising campaign for rural areas, providing information on composting and basic disposal								TMA/NGO
Hold a series of cleanup campaigns								TMA/NGO/CBO
Introduce public complaints system by establishing a complaint cell								TMA
Legislation								
Ban open burning of waste on streets and at final disposal points								TMA
Introduce anti-littering laws								TMA
SWM Fee								
Introduce fee systems for commercial producers of waste								TMA
Introduce fee system for door to door collection								TMA

SUPPORTING INFORMATION

1 GENERAL

1. Mirpur Khas District lies in the Lower Indus Plain. It is bounded on the north by Sanghar district, on the west by Hyderabad district, on the south by Badin and Tharparker districts and on the east by Umerkot and Sanghar districts. The branches of Nara Canal irrigate the district. It comprises of three talukas named as Digri, Kot Ghulam Muhammad and Mirpur Khas. According to census report of 1998, population distribution of the district is as follows.

Administration Unit	Population	Urban Proportion
Mirpur Khas District	905,935	33.1
Digri Taluka	298,652	27.7
Kot Ghulam Muhammad Taluka	179,008	9.8
Mirpur Khas Taluka	428,275	46.7

2. Mirpur Khas Taluka has urban population as 199,820 and rural population as 228,455. its urban population is divided in two cities; Mirpur Khas with population of 23,672 and Mirwah with population of 1,385. Rural population of Mirpur Khas Taluka is spread in about 123 dehs. Out of these dehs only one deh has a population more than 5,000. About 28 dehs have 2,500 to 5,000 populations, 65 dehs have 1,000 to 2,500 populations, 24 dehs have 500 to 1000 population and 5 dehs have population less than 500. At present there are 12 union councils in Mirpur Khas taluka. The details are provided in Table B1-1 and B1-2.

3. The area is characterized by arid and hot climate and large fluctuations in temperature. The maximum temperature of the area is about 48 degree centigrade during summers and the minimum temperature during winter is about 6 degree centigrade. Average annual rainfall is about 200 mm (8 inches) with the major part during the monsoon season. Ground water in the taluka is generally saline, except in a few isolated pockets where sweet water can be found at shallow depth of about 8 feet or so.

4. There are 14 katchi abadies in the Taluka. Out of these, 6 are under the TMA and 8 are still with Sindh Katchi Abadis Authority. A list of katchi abadis is attached at Attachment 2.

5. There are few industries in the Taluka and include cotton ginning, textile, floor mills, sugar mill and machinery manufacturing. These industries have their own sources of water (canal or ground water). The wastewater from these industries is discharged into nearby land or seepage drains.

1.1 On-going Projects

1. Urban Areas: The District Government has initiated water supply and drainage schemes for Mirpur Khas city with an estimated cost of rupees 399 million and 199 million respectively. The layout plans are attached at Figure A1-1 and A1-2. The project implementation is slow.
2. Rural Area: The District Government has provided funds for 54 rural water supply schemes with an estimated cost of Rupees 45.847 million; one water supply scheme from member provincial assembly (MPA) with an estimated cost of rupees 0.22 million; and 8 water supply schemes with an estimated cost of rupees 3.1 million from TMA funds.
3. There appears to be a lack of clarity in responsibilities of Taluka, District and that of Public Health Engineering Department's concerned personnel. Presently, PHED staff is working with TMA but at the same time, they are hoping for the complete revival of the department, which they consider a better option.
4. After the census of 1998, changes have been made in the Taluka and Union boundaries therefore the population figures have also changed, but due to the fact that all relevant information is available on the previous boundaries, therefore for technical analysis, previous configuration of the Taluka is used. This was the best option to carry out the technical study.
5. Situation of Water Supply and Sanitation in two cities of the Taluka as described in the census report is summarized in Table A1-1

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Table A1-1: Water and Latrine Facility in Urban Areas

City	Population 1998	Average House hold size	Total Houses	Houses with Potable Water Facility	Houses with Latrine Facility
Mirpur Khas	189,671	8	23,672	19,675 (83%)	13,615
Mirwah	10,149	7.3	1,385	1,183 (84%)	866

6. For rural areas, the Census Report describes the statistic of population and houses having potable water supply. The statistics in the report are up to village level. Table-1.2 provides the summery of this information up to Supervisory Tapedar Circle (STC) and Tapedar circle (TC).

Table A1.2: Potable Water Facility In Rural Areas

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	%
Total Rural Taluka Mirpur Khas	228,455	41,541	5,752	13.85
Jhuluri Stc	43,752	8,000	828	10.35
Balaro Tc	5,746	1,047	55	5.25
Bitokot Tc	7,550	1,453	111	7.64
Jhuluri Tc	8,465	1,577	31	1.97
Munjri Tc	10,366	1,881	107	5.69
Wisro Tc	11,625	2,042	524	25.66
Kathiry Stc	48,685	9,432	1,521	16.13
Balochabad Tc	11,981	2,126	410	19.29
Chitory Tc	10,937	2,073	235	11.34
Jhurbi Tc	6,462	1,211	160	13.21
Kathiry Tc	10,266	2,121	536	25.27
Khirah Tc	9,039	1,901	180	9.47
Khan Stc	32,250	6,019	573	9.52
Khan Tc	5,768	1,094	202	18.46
Miro Mari Tc	5,178	989	104	10.52
Muhammad Hassan Mari Tc	5,542	1,085	35	3.23
Patoyoon Tc	6,314	1,041	206	19.79
Sakho Tc	9,448	1,810	26	1.44
Mirpur Khas Stc	45,453	7,677	1,224	15.94
Azim Shah Tc	11,751	2,003	163	8.14
Bhitaro Tc	6,821	1,076	15	1.39

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	%
Khudri Tc	6,105	1,034	322	31.14
Mirpur Khas Tc	10,418	1,668	594	35.61
Mirpur Old Tc	10,358	1,896	130	6.86
Mirwah Stc	58,315	10,413	1,606	15.42
Doulat Pur Tc	8,972	1,523	194	12.74
Kak Tc	10,675	1,953	242	12.39
Khunbhri Tc	10,500	1,905	300	15.75
Mirwah Tc	9,369	1,767	45	2.55
Mubarik Tc	18,799	3,265	825	25.27

* STC= Supervisor Tapedar Circle

TC= Tapedar Circle

2 WATER SUPPLY SYSTEM

2.1 Urban Area

Municipal Water Supply Mirpur Khas

7. Ground water in the city is generally brackish and at shallow depth of about 10 feet. There are some pockets of sweet water within the city with limited quantity of water. The main source of water is from canals namely Jarwar minor, Jamrao canal, and Mirpur minor. These canals are closed for about four weeks. The canal water is stored in the ponds for sedimentation and stored during the canal closure. This settled water is stored in clear water tanks, from where it is supplied to the city. This is not a sufficient water treatment; water should be filtered and disinfected properly before distribution. Water Ponds also serve the purpose of storage during canal closure period. Some clarifiers with arrangement of alum dozing and rapid gravity filters are there but are not in use and consequently only settled water is provided to the citizens. During visit, it is noted that TMA has not required information of the Water Works that means drawings showing all sizes, machinery list with present status and past history of its date of installment and repair. Similarly comprehensive map of the water network and list of all assets in shape of land, structures, pipes and machinery relating to water system is not available with TMA. Presently system of regular monitoring of water quality do not exists. There is complaint register in the office, but no proper system of handling the complaints. Appropriate record of complaints not only provides confidence to the consumer but also helps in planning of future developments. In water supply and sanitation sector of TMA, many posts are vacant.

8. According to the census report and information provided by TMA officials, most of the houses of Mirpur Khas City have water connection from the municipal water supply system, however due to shortage of water and inadequate distribution system, at some places people have to use handpumps for example in Reyochand Garden, Iqbal Road and Lalchand areas. Details of existing three main water works in Mirpur Khas city are as follows.

S.No	Name of Water Works	Ground Storage Capacity	Daily discharge as per design
1	Sattelite Town Source: Jarwari Minor	30.00 MG (30% is silted and 20.00 MG available	3.50 MGD (Actual 3.50 MGD)
2	Jamrao West	10.90 MG (30% is silted and 7.90 MG available)	3.10 MGD (Actual 2.0 MGD)
3	At Mirpur Minor	10.00 MG	1.00 MGD (Actual 0.80 MGD)

9. There are three Over Head Tanks of capacity 200,000 gals each at Satellite Town. Two OHTs of 200,000 gals capacity each are at Riwacha Garden and at Khamsa Abad, one OHT is of 500,000 gals and one of capacity 200,000 gals. According to TMA officials, water supply time is approximately 8 hours in a day. Northern Area of the city is suffering shortage of water because water does not reach here properly.

10. Banks of Existing Ground Water Tanks at Jamrao West are being raised by four feet with brick lining on the raised four feet. Two additional Ground Water Tanks with capacity of 10 MG each are also under construction with lining on tank sides. Three turbine pumps having delivery pipe size of 10 inch each are installed here. At present settled water is being supplied, but filter beds and chlorination arrangement is included in the plan. Water reach from Jamrao West Water Works to Thamasabad Pumping Station, where two reservoirs of capacity 200,000 and 500,000 gals are provided. There are three turbines of 100 HP are installed here to supply water in the distribution system. At time of visit of the consultant's team, only one turbine was there and two were shifted temporarily to Mirpur Minor Water Works. Overhead Tank is needed here for which space is available in the Water Works. At Mirpur Minor Water Works, there are two Ground Water Tanks and same two turbines are working which have been taken from Thamasabad Pumping Station.

11. Mirwah city has the similar situation. There is one Water Works, where only settling facility is available. The same tanks serve the purpose of storage during canal closure period. Water is directly pumped to the city through pipe network. One overhead tank is under construction.

12. From table A1-1, it is concluded that TMA serves water to about 83% of houses of the cities. In Mirpur Khas, according to TMA, there are 15,510 water connections in the city, detail of which is as follows:

Water connection ¼ in dia, commercial	=	378
Water connection ½ in dia, commercial	=	37
Water connection ¾ in dia, commercial	=	5
Water connection special, commercial	=	5
Total commercial connections	=	425
Water connection ¼ in dia, domestic	=	15,085
Total Commercial and domestic connections	=	15,510

13. During shortage of water less pressure is available and water do not reach in some areas of the city and people purchase water from water venders who sell water through donkey carts and mashaks (leather bag of about 7 gals). One drum of 45 gals costs Rs.40 to 50.

14. Following is the TMA's water tariff in the cities.

Connection Size	Domestic	Commercial
Dia ¼ in	Rs. 180 /year	Rs. 516 /year
Dia ½ in	Rs. 360 /year	Rs.1,032 /year
Dia ¾ in	Rs. 780 /year	Rs.1,560 /year

15. According to the TMA officials, if the quality and quantity of water improved then people are ready to pay more. Present collection of bills hardly covers the operation cost.

16. Private water source included hand pumps and few motor pumps in the two cities. In some pocket of the cities, sweet water is available at shallow

17. Following information was provided by TMA staff regarding water supply in Mirpur Khas city:

Private Arrangement of Water

depths. People draw water from depth of 20 to 50 feet.

Billing and Collection

Water Supply-		
Current Billing	=	Rs. 2,900,000
Arrears	=	Rs. 4,000,000
Total of Current Billing & Arrears	=	Rs. 6,900,000

2.2 Rural Areas

Municipal Water

18. In rural areas, the coverage of TMA water supply is about 16% as derived from the information given previously in Table A1-2. Water is stored in ponds and people get settled water through pumping or public hand pump. These schemes were constructed by Public Health Engineering Department prior to SLGO 2001. According to the present policy, 2/3rd of O&M cost is provided by the provincial government and 1/3rd cost by the local community for four years. Provincial government pays its part quarterly in sixteen instalments. Four

years after completion, the community owns that scheme and bear total O&M cost. Most of the schemes are running successfully, but some of the schemes were closed after their transfer to local community. There are different reasons for the closure of those schemes. According to many people, it is due to the incompetence of the Village Development Association (VDA). Often this happens due to lack of interest of its head, who live in the city and seldom visit the village. Second opinion is that people are so poor that they can not

afford the O&M cost of the scheme. It was observed that TMA do not have complete list with necessary technical data and present status of all schemes, which is required for proper monitoring of existing schemes and for future planning. At present no comprehensive Master Plan is there which covers whole TMA specially the rural areas. Regular water quality monitoring system is also needed for rural areas.

19. Water Supply Scheme at Sultan Kak Bungalow, located along the link road is one example which is functioning. Water Source is Jarwari Minor, from where water come to two Ground Water Tanks. In Pump Room, two electric pumps and one diesel pump is provided and water is supplied through a 6 inch dia AC pumping main to the village. According to VDA personals, VDA have taken over this scheme and running it for three months. Approximate number of houses in the village is 450 and house connections are 215. Water charges are Rs.30 per month and only 70 to 80 households pay these charges therefore VDA is in difficulty to operate and maintain this scheme. Presently, water is not reaching to all consumers. Valves in the water distribution system are not functioning so water can not be regulated to supply water to all consumers. Additional pipeline is required to connect the remaining houses of the village. Additional Ground Water Tanks because during closure period present storage is insufficient to meet the requirement.

20. Water Supply Scheme at Jhuluri, located on Ring Road is an example of those, which are not functioning. The scheme was constructed at about 1985. It consists of two Ground Water Tanks, Operator Quarter, Sump and a Pump Room, where two pumps are installed. This scheme is very bad example of lack of coordination of different departments. The Water Works is near to Mithrao Canal, but its water source is planned from a water course, from where water did not reach the Water Works and scheme is not functioning since its completion. Water channel from water course has to cross a seepage channel from where it is disconnected and even difficult to locate its path. Nobody knows the exact reason, but it seems that water is not sanctioned for the scheme and matter was not coordinated with irrigation department. Structures of Pump House and Operator's Quarter are also damaged. Boundary wall is also damaged. Pipes are now croded and are not useable. There are approximately 1000 houses in the village. There are pockets of sweet water and about half of the village draws sweet water through their own motor pumps or hand pumps. These people have no much interest in the water supply scheme. Some people of the village have a fear that in densely populated area, sweet water will become saline with the time.

Private Arrangement of Water

21. Generally water source in rural areas is water course. People dig irregular ponds where they store water to use during canal closure period. They take water directly from ponds, where hygienic conditions are not sufficient. Animals also drink water from the same ponds. TMA does not

have any quality tests on these private water systems.

3 SEWERAGE SYSTEM

3.1 Urban Areas

22. Presently, The Sanitary Drainage System in urban area consists of Sewers and Open Drains. There are three main sewage disposal stations in Mirpur Khas city. Sewage is used for irrigation or disposed of in nearby depressions/ seepage channels. Sewage from Northern Zone Disposal Works passes though Oxidation Ponds before its reuse/disposal. Jaman Shah Disposal Station located near Umerkot Road. Sewage is approaching to the collecting tanks through open channels. Sewage coming through sewer pipe is lifted to open channel just outside the disposal station. Oxidation Ponds are now filled with sludge. Sewerage System needs improvements of sewer network and at disposal stations. Improvement of existing waste water treatment plants (WWTPs) and new WWTPs are also needed for improvement of health, environment and treated sewage will be more useful for irrigation. Improvement of sewerage system is included in an on-going Mega Project.

3.2 Rural Areas

23. In rural areas, open drains are provided for sewage flow which is then re-used or disposed of in the nearby areas. Proper sewage system (pipes or covered drains) is required in all rural areas.

24. Sewage Disposal Station at Sultan Kak Bungalow is a typical example of such disposal stations. It has a screening chamber, collecting tank, pump room and operator quarter with boundary wall enclosing these structures. Two electric pumps of 10 HP, 140 gpm, 90ft head are installed, out of one is working and other is not at working condition. A diesel pump of 16 HP is also there but it is not working.\ One brick lined oxidation pond and a pump room to pump treated water are located outside the boundary. The oxidation pond and treated water pump station are not working. Raw sewage is being used for irrigation and unused sewage goes to a nearby seepage channel. All structures are in bad condition. Persons living in the disposal station do not look the concerned staff and their animals have also occupied most of the space.

25. Sewage Disposal Station at Jhuluri is another example of the rural sewage schemes in the taluka. Human excreta are being discharged in open drains. These drains are not flowing properly. They are chocked due to entrance of solid waste. Some drains of narrow width of about one foot are about twelve feet deep and very dangerous. One accident has already occurred here and a girl died. At many places the drains are also damaged. The open drains have also created environmental pollution in the streets. The sewage disposal station is although functioning but it is not properly operated and maintained. The occupants of this disposal also look unauthorized persons.

3.3 Legislation

26. There is Pakistan Environmental Protection Act 1997, which governs the pollution of water bodies, waste water disposal standards, but there is no practical enforcement of the act in the taluka. Any other Law, regulation, standard or guideline do not exist at national, provincial, district or local levels regarding drinking water supply, sewerage or drainage. For drinking water, WHO guidelines are generally referred in practice by the provincial departments but these are not being implemented in letter and spirit.

3.4 Private Sector Participation

27. There is no private sector participation in the fields of potable /drinking water, sewerage or drainage in the taluka.

3.5 Main Issues and Constraints

i) Responsibilities of Taluka, District and Public Health Engineering Department are not clear.
ii) TMA has not sufficient data and drawings of the water supply and sewerage systems in the Taluka.
iii) TMA has not a complete list and drawings of its assets in shape of water and sewerage components. These include land, structures, pipes, machinery etc.
iv) TMA do not have complete list of rural water and sewerage schemes with their present status.
v) There is no comprehensive Master Plan of TMA regarding water and sanitation especially for rural areas.
vi) There is no system for water quality monitoring.
vii) Sufficient water storage facility is not available to meet the requirements during canal closure period.
viii) Water does not reach the entire network like northern areas of the city.
ix) In rural areas, to meet the requirements of the house, women have to fetch water over long distances.
x) Existing water works and disposal stations need improvements in the urban and rural areas.
xi) Existing Water Clarifiers and Filters of Mirpur Khas city are not working which indicates poor operation and maintenance. Untreated water is supplied.
xii) There are many posts vacant in Water and Sanitation Sectors.
xiii) Shortage of man power and equipment.
xiv) Village development associations (VDAs) are not discharging their duties properly.
xv) Oxidation ponds where they exist are in poor condition and being bye-passed.
xvi)

4 SOLID WASTE MANAGEMENT SITUATION

4.1 General

28. The current practices of solid waste management in the city are explained in stepwise form in the following sections. Performance analysis has also been carried out at the end.

4.2 Storage and Collection

29. The storage and collection systems of solid wastes in the city are either inadequate or inappropriate. There are innumerable informal communal storage locations in the city where the waste is temporarily stored in the form of the open heaps on the sides of the streets and at number of places in the centre of the streets (in congested areas). The situation gets aggravated when the heaps of waste pour down into the open drains where choking and wastewater spillage is seen quite often.

4.2.1 Primary Collection

30. Primary collection is the shifting of wastes from points of generation, i.e., homes, shops, offices, institutions etc., to communal storage places. The sanitary workers shift the wastes from these sources and smaller street side heaps to somewhat bigger heaps/filth depots, with the help of handcarts and donkey carts.

31. House to house collection is virtually non-existent. In certain cases the sanitary workers who are assigned the job of sweeping and collection of wastes from the street sides also serve a few households informally.

4.2.2 Secondary Collection

32. The tractor trolleys then serve these bigger heaps/filth depots. In certain situations sanitary workers with the hand carts dispose off the wastes in some vacant plots or low-lying areas on the periphery of the city. The tractor trolleys shift the solid wastes to open dumping sites outside the city.

4.2.3 Vehicles and Equipment

33. Collection vehicles of different description used for the purpose are given in Table A1.1. Data from discussion with TMA staff.

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Table A1.1: Vehicles and equipment in use for solid waste collection

Type	Capacity (m^3)	No
Hand Cart (Wheel barrows)	0.1	70
Donkey Carts	0.7	9
Trolley with Tractor (1988)	5.0	4
Trolley with Tractor (2000)	5.0	2

4.3 Sludge and Grit Collection

34. Due to quite an amount of solid wastes being thrown into the open drains and manholes of the sewerage system, blockages are very common. The municipality's sanitary workers are deployed

for extracting sludge and grit from the system. After drying in open this sludge and grit is also picked up by donkey carts or tractor trolleys.

4.4 Recovery of Recyclable Wastes

35. The recyclable materials in wastes, like paper, board, plastics, metals and glass are either separated at source by the owners or by the scavengers from the street side open heaps. There are a number of shops in the town dealing with the recovered materials which channelise them to the recycling industries in other cities.

4.5 Disposal

36. Quite a portion of the wastes collected with the help of donkey carts are open dumped in the vacant plots or low lying areas within the city or on the periphery. The tractor trolleys shift the wastes to open dumps at open dumping sites in and around the city haphazardly.

4.6 Special Wastes

4.6.1 Slaughterhouse Wastes

37. One slaughterhouse has been built to cater the needs for the meat. The wastes are thrown just nearby and collected by tractor trolleys once per week to be open dumped at Gharibabad disposal site.

4.6.2 Hospital Wastes

38. There are no proper arrangements for storage, collection and disposal of the wastes. There are very few wastes baskets provided in the wards, and the wastes Hospital were found in form of open heaps on the corners. Communal storage is also in form of open heaps outside the wards, from where it is collected by municipal tractor-trolleys, and dumped alongwith municipal solid wastes in form of open dumps.

4.6.3 Dead Animals

39. There is no separate arrangement for disposal of carcasses of the dead animals. They are collected alongwith other municipal solid wastes and buried alongwith the solid wastes in open dumps.

4.6.4 Demolition and Construction Waste

40. Most of the demolition and construction wastes are reused. Only a small portion is thrown out on the street sides. The generators of such wastes are responsible to dispose them off. But the municipality has to take care of the situation with out any charges.

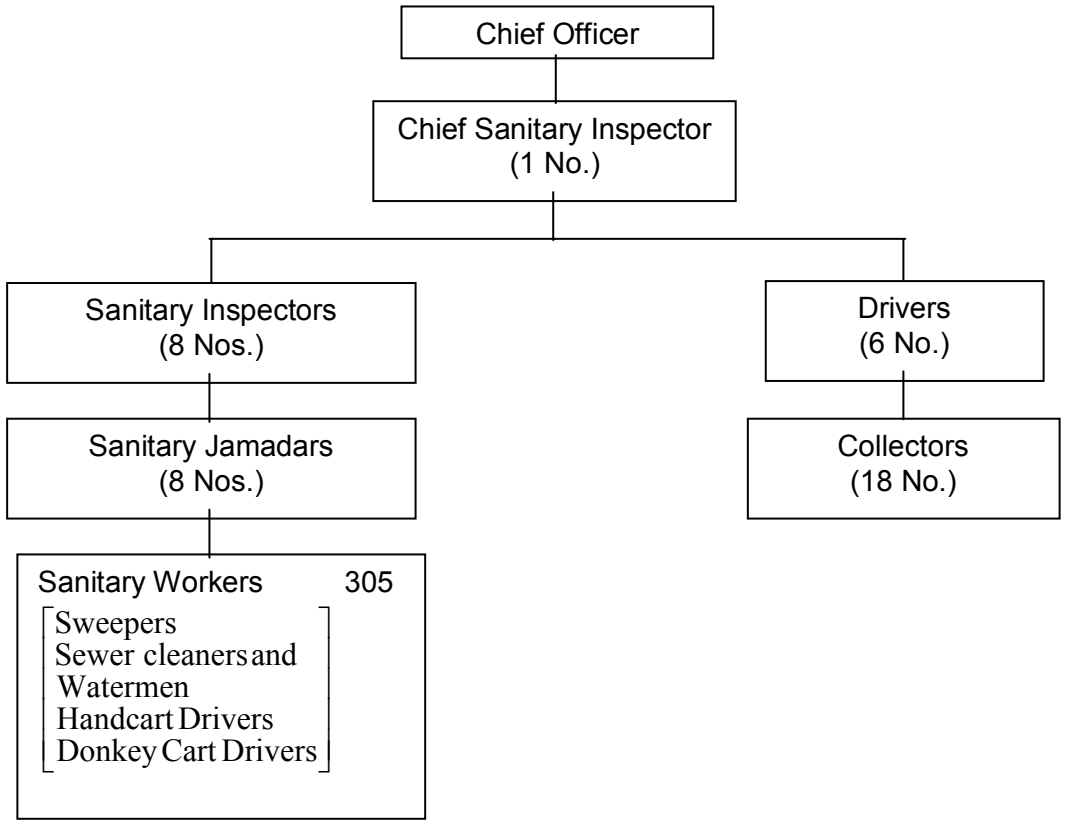
4.6.5 Industrial Wastes

41. No industry has been installed in and around the city.

4.7 Staff and Organization

42. Presently there are 6 drivers and 323 sanitary workers in total, out of which some are regular and other are on work charged basis. On daily basis they are deployed for sweeping, as drain cleaners and watermen, as collectors on tractor trolleys, as donkey cartmen and as handcart drivers. The sanitary workers are supervised by 8 jamadars who work under 2 sanitary inspectors and one Chief Sanitary Inspector. The overall organization is shown in Figure A1-3.

Figure A1-3: Present Organization Chart of Sanitation Section Mirpurkhas



4.8 Private Sector Participation

43. In Mirpur Khas, the job of street sweeping, waste collection, transportation and disposal for two union councils was contracted out in year 2004-05, but it proved more costly so this year no contract has been awarded.

4.9 Community Participation

44. No such activity has been noted in the town. Actually solid waste management issues appear to be a low priority.

4.10 Public Awareness

45. Public awareness is very necessary to get their cooperation for efficient managements of solid waste. But no such effort has been launched in the town.

4.11 Legislation (Laws, Regulation, Standards, Guidelines)

46. Various type of legislation including laws, rules, guidelines exist at National and Provincial levels dealing with solid waste management. These include:

- Ordinance to prohibit manufacture, sale and use of black plastic polythene bags including polythene bags below 30 microns in thickness in the Sindh province. March 2006.
- Guidelines for Hospital Waste Management EPA, Sindh.june 2004 Rules 2005. Gazette of Pakistan.2005.
- Hospital Waste Management Rules 2005. Gazette of Pakistan.2005.
- (Draft) Guidelines for Solid Waste Management. Pakistan EPA. June 2005.

47. But there appears to be a lack of awareness regarding these documents in the community.

4.12 Performance Analysis

48. Based on the data obtained from discussion with TMA staff, the system performance analysis can be made in terms of collection efficiency i.e. the ratio between wastes collected and wastes generated, cost of collection/ton, staff employed per 1000 population, cost per inhabitant It is done in the following sub-sections, The results are presented in Tables 1.2 and 1.3. Drawbacks noted in the present system are also given separately.

4.12.1 Collection Efficiency

49. The figures reveal the total number of vehicles deployed, average trips made by each vehicle per day and the average amount of waste carried per trip. The total waste collected on the average is 48 tons/day while the generation rate is 99.5 tons/day. This gives a collection efficiency of 48%.

Table A1.2

A. Haulage Capacity of TMA Collection Vehicles (Year 2006)

Sr. No.	Type of Vehicle	No. of Vehicles	Total Avail-able	Trips/ Vehicle/ day (No.)	Average Weight/ Trip (Tons)	Total Weight Carried (Tons)
1.	Tractor Trolley I	6	4	4	2	32
2.	Tractor Trolley II	2	2	4	2	16
					Total:	48

Total Generation/day (2006) = 231,276 × 0.43 = 99.5 tons

Collection Efficiency = 48 / 99.5 = 48 %

4.12.2 Cost per Ton Collected and per Inhabitant

50. The cost of collection per ton is Rs. 952 and per capita/year is Rs. 72 as per calculations below:

Wastes collected per day = 48 tons

Waste collected per year = 48 x 365 = 17520 tons

Total expenses incurred/year = Rs.16, 685,760 (from TMA office files)

Cost/Ton = $\frac{16,685,760}{17,520}$ = Rs. 952

Population for year 2006 = 231276

Cost/inhabitant = $\frac{16685760}{231276}$ = Rs. 72

4.12.3 Staff per 1000 Inhabitants

No. of staff = 346 (From Section 5.8)

Population = 231276

Staff/1000 inhabitants = $\frac{346}{231276} \times 1000$ = 1.5

Table A1.3: Present System Performance Indicators

Collection Efficiency	Cost per Ton	Cost per Inhabitant	Staff per 1000 Population
%	(Rs.)	(Rs.)	Ratio

48	952	72	1.5

4.13 Drawbacks/Deficiencies in the Present System

51. Drawbacks and deficiencies have been noted at all the stages of the present system i.e. communal storage, street cleansing, collection vehicles like handcarts, donkey carts and tractor trolleys, and disposal in the form of open dumping. These are delineated in the following sub-sections. With the adoption of the new system, it is envisaged that these drawbacks and deficiencies will be removed.

4.13.1 Communal Storage

52. The communal storage is done in the form of small street side heaps. Besides that masonry enclosures are also being constructed. The following shortcomings are noted in this practice.

i) Because of design defects it is difficult to collect the waste from within the dust bins and filth depots.

ii) Refuse in these structures is scattered all over the surrounding area as a consequence of scavenging activity and wind action.

iii) Rodents become active in these dumps. Similarly these become the breeding places for larvae of the flies and scores of other disease causing organisms. These are merely health hazard.

iv) These are a constant source of obnoxious odours leading to pollution of local environment.

v) Rains wash away the waste to areas in the vicinity.

vi) Masonry enclosures are uneconomical as compared with the metallic skips.

4.13.2 Street Cleansing

53. Hand tools and other equipment used during sweeping and collection are of low-standard and poor design. And because of littering habit sweepers are confronted with enormous work load. Therefore, the sweepers cannot give a satisfactory output. Major drawbacks are:

i) As a general practice sweepings are placed on the sides of the streets and roads, in open heaps making their condition shabby.

ii) Brooms have handles of shorter length on account of which sweeping efficiency is reduced.

iii) Sweepers are hardly provided with any replacements for the damaged tools and equipment.

iv) Supervision on performance of the sweepers by the supervisory staff is generally lacking.

4.13.3 Hand Carts

i) Hand carts are of poor design and low capacity.

ii) The carried wastes can only be tipped on the ground and not in a metallic container.

iii) It is cumbersome to drive these carts as they have only one wheel.

iv) Number of handcarts is totally inadequate.

4.13.4 Donkey Carts

i) Donkey carts are slow and consume more time. The quantity of the waste collected is small.

ii) It is quite costly option and works even lesser than a hand cart in some cases.

4.13.5 Tractor Trolleys

i) Present vehicles can not collect the entire quantity of the generated waste.

ii) Ti me spent/trip is over 2 hours, which is quite long and makes the system uneconomical.

iii) Inaccessible areas are left uncovered.

iv) Collection vehicles are required to collect the scattered heaps of waste, thus spending unwanted time en-route to the dumping site.

v) Manual loading and unloading of the vehicles is un-economical in terms of time and effort.

vi) Collectors come in physical contact with the waste, due to which they are liable to be affected by occupational diseases.

vii) Littering is caused by uncovered collection vehicles during transportation.

4.13.6 Open Dumping (Disposal)

i) Disease causing vectors can spread all around the dumping ground thus causing a constant health hazard for the surrounding population. Open dumping makes the area unsightly.

ii) Because of wind action components like paper and polyethylene bags are seen scattered in the adjoining areas.

iii) Groundwater pollution is an essential sequence of the practice.

4.14 Conclusions and Remarks

54. The solid waste management of Shikarpur is not satisfactory due to shortage of proper vehicles. Solid waste was seen by roads/streets sides. Unauthorized dumping of solid waste in vacant plots and depressions was noticed.

55. The Chief Officer and Sanitary Inspector were helpful and cooperative in assessment of the facilities and requirements for solid waste management.

4.15 Strength and Weaknesses of Solid Waste Management Activities

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
1	Introduce 2-bin system for wet and dry waste in household	- Improves quality and quantity of recyclable materials, and enables composting	- difficult to enforce, and requires major change in household habits. Could take many years.				100
2	Initiate home composting in barrels where space allows and appropriate	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting		2000/ barrel		
	Street Waste Management/ Private Sector						
3	Provide litter bins on main streets for pedestrians' use	- Potentially low-cost way of reducing littering, and therefore cost of labour to sweep	- Would have to be introduced along with anti-littering legislation and public awareness campaigns to be effective	60,000 (for 100 bins)	600/ bin	15,000	150/ bin
4	Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas	- Little extra cost -	- Provision of better tools, and education to sweepers required - Sweepers may react against working for longer/ harder hours				
5	Hand over sweeping to private-sector (with staff and equipment)	- TMA no longer has responsibility for this management and labour-intensive activity					500
6	Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum-door to door collectors	- improved health and safety of staff - increased productivity	Extra cost for improved tools	5,400/ cart (100hh served)	54	2,700 (100hh served)	27
7	Enforce provision of containers/ bags on public vehicles, vendors' carts, covers on sand, bricks carriers	- Stops littering of streets - Saves time of street sweeping - Clean streets	- Little extra cost				10-100/ veicle
	Primary Collection/ Private Sector/ CBO						
8	Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area	Sweepers' work will become more efficient as less waste dumped on to streets	Systems would require contributions from householders. Would they pay?				300
9	Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers	-Zero cost for TMA -Sweepers' work will become more efficient as less waste dumped on to streets	- could take many years to establish community-based organisations - Systems would require	TMA equipment leased			300

		- provides livelihoods for poor	contributions from householders. Would they pay? - Can be difficult to organise waste pickers				
	Communal Storage						
10	Purchase demountable containers ($5m^3$) as communal storage facility	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- Experience in other countries suggests that if not properly manufactured and maintained can be problematic and containers can have short useful lives due to corrosion.	60,000/ container (750hh served)	80	14,000/ container (750hh served)	19
	Secondary Collection/ Private Sector						
11	Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots	- no extra capital cost	Increased annual cost			100,000	
12	Purchase hydraulic tractor container carrier system for use with demountable containers	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- high capital cost - Success depends on public behaviour, as if waste deposited around containers, very problematic. - extra space required	600,000/ vehicle (4500 hh served)	130	444,000/ vehicle (4500 hh served)	96
13	Contract out secondary transportation to private-sector	- TMA no longer required to manage fleet of vehicles - Could lease vehicle fleet to private-sector operator - Financial savings and improvements to service	- Lack of experience of tendering and contracting out				200
	Reuse and Recycling/ Organizing Scavengers						
14	Introduce door to door collection of	- Provides better livelihood to	- Effort needed to organize				

	recyclable wastes by organizing scavengers accompanying municipal collectors	scavengers - Reduces the waste quantities to be disposed off	scavengers - May take long time to introduce				
	Treatment and Final Disposal						
15	Improve and rehabilitate present disposal practices in line with basic public health and environmental standards	- Reduced threat to environment in public health - basic but significant improvements can be made for relatively low cost	- Some investment and expertise required				
16	Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant	- Less environmentally damaging -Reduced pollution of groundwater - In line with Annual Strategic Plan guidelines from the ADB	- Vested interests of drivers who sell waste may discourage dumping at site - Cost of developing and running site	1,520,000	70	532,000	25
17	Central compost plant (30 tons waste per day)	Recycles the organic matter which is useful for agriculture	Capital cost	3,260,000	92		
18	Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting	65,000	92		
	Special Waste Management						
19	Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste	- Reduced hazards from healthcare waste - compliance with national guidelines on healthcare waste - Could possibly attract private-sector investment	- Funding from hospitals/Department of Health? - Enforcement challenging, and needs to be backed up with awareness campaigns	20,000		20,000	
20	Awareness campaigns in hospitals	-Reduced mixing of healthcare waste with municipal waste - Changes behaviour of waste generators	- Awareness raising campaigns can take time and cost money				
21	Undertake viability study for installation of locally manufactured incinerator	- Widely accepted healthcare waste management technique	- Costly to purchase, and challenging to operate and maintain				
	Awareness Raising						
22	Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment	- likely cost-effective way of tackling many problems - If successful could result in increased recycling rates from separated waste, reduced dumping on streets, reduced	- Awareness raising campaigns can take time and cost money - Expertise in awareness raising required			50,000	

		labour requirements for sweeping, improved drainage					
23	Public awareness raising campaign for rural areas, providing information on composting and basic disposal	- Could help solve problem of plastic disposal in villages	- Would need support of professionals to disseminate information			25,000	
24	Hold a series of cleanup campaigns	- Can be effective at giving visible results quickly, and thus attracting public support - Relatively low-cost option				25,000	
25	Introduce public complaints system by establishing a complaint cell	- makes public more willing to cooperate with TMA, and contribute to improved waste management services	- vital that systems of accountability are in place within the TMA so complaints can be followed up and affect change				
	Legislation						
26	Ban open burning of waste on streets and at final disposal points	- Reduced environmental pollution - popularity with local residents	- Difficulties of enforcing legislation				
27	Introduce anti-littering laws	- Potentially low-cost way of impacting urban environment, with benefits to public health, drainage and labour requirements for waste management	- Difficulties of enforcing legislation				
	SWM Fee						
28	Introduce fee systems for commercial producers of waste	- following the 'producer pays' principle, enables better services to be provided to the areas most needy – particularly shopping and industrial areas	- Possible resistance, so needs to be backed up with legislation and enforcement mechanisms				100
29	Introduce fee system for door to door collection	- Cost shared by the communities	- Difficult to realize from the communities				

Table B1-1: Urban Population Projections

TALUKA HUSSAIN BUX MARI: MIRPURKHAS TOWN - UNION WISE PROJECTED POPULATION

	POPULATION 1998	HOUSING CHARACTERISTICS							AVERAGE HOUSEHOLD SIZE	1998 POPULATION - UNION WISE								TOTAL
		TYPE OF STRUCTURE				HOUSING FACILITIES												
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	LATRINE	ELECTRICITY		UC 1	UC 2	UC3	UC4	UC5	UC6	UC7	UC8	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
*MIRPUR KHAS MC	189,671	23,672	19,791	1,993	1,888	19,575	13,615	22,503	8									
*CHARGE NO 01	52,293	6,691	6,179	292	420	5,594	3,823	6,610	7.6									
CIRCLE NO 01	7,269	1,097	813	91	193	724	352	905	6.7	7,269								7,269
CIRCLE NO 02	11,305	1,494	1,342	60	92	1,241	974	1,455	7.6		11,305							11,305
CIRCLE NO 03	12,808	1,655	1,534	63	58	1,363	1,019	1,616	7.7		12,808							12,808
CIRCLE NO 04	9,564	1,400	1,289	50	61	1,201	706	1,390	6.8	4,075								4,075
												5,510						5,510
CIRCLE NO 05	11,327	1,255	1,201	28	26	1,025	462	1,244	9	8,697								8,697
												2,630						2,630
*CHARGE NO 02	66,587	8,194	6,298	1,250	646	6,615	4,929	7,692	8.1									-
CIRCLE NO 01	16,982	1,859	1,479	295	85	1,624	1,242	1,772	9.1			16,982						16,982
CIRCLE NO 02	19,458	2,239	1,697	269	273	1,458	1,020	1,898	8.7					19,458				19,458
CIRCLE NO 03	12,589	1,600	1,154	458	188	1,686	1,054	1,760	7				12,589					12,589
CIRCLE NO 04	7,191	990	893	67	30	924	482	989	7.3	2,797								2,797
													4,394					4,394
CIRCLE NO 05	10,367	1,306	1,075	161	70	1,123	1,131	1,273	7.9				6,735					6,735
														2,693				2,693
															938			938
*CHARGE NO 03	70,791	8,587	7,314	451	822	7,266	5,163	8,201	8.2									-
CIRCLE NO 01	13,295	1,602	1,393	75	134	1,100	1,080	1,499	8.3						13,295			13,295
CIRCLE NO 02	14,140	1,717	1,616	33	68	1,604	645	1,582	8.2						9,054			9,054
																	5,086	5,086
CIRCLE NO 03	15,554	1,953	1,535	173	245	1,565	1,150	1,894	8							15,554		15,554
CIRCLE NO 04	27,802	3,315	2,770	170	375	2,877	2,288	3,126	8.4							9,017		9,017
																	18,785	18,785
Population 1998										22,838	24,113	25,122	23,718	22,151	23,287	24,571	23,871	189,671
Growth Rate (2.51%)																		
Population 2006										27,648	29,402	30,633	28,921	27,010	28,395	29,961	29,107	231,277
Population 20012										32,314	34,118	35,545	33,559	31,342	32,949	34,766	33,775	268,368

Table B1-2: Rural Population Projections

TALUKA HUSSAIN BAX MARI: UNION WISE PROJECTED POPULATION

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	POPULATION 1998	HOUSING CHARACTERISTICS						AVERAGE HOUSEHOLD SIZE	AREA IN ACRES	PROJECTED POPULATION YEAR 2006 Growth Rate 2.37%	PROJECTED POPULATION YEAR 2012 Growth Rate 2.37%	UNION COUNCIL
		TYPE OF STRUCTURE				HOUSING FACILITIES						
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	ELECTRICITY					
1	2	3	4	5	6	7	8	9	10	11	12	13
Taluka Hussain Bux Mari	83,219	14,619	2,942	4,808	6,869	2,275	8,710	5.7	100,709	100,372	115,517	
DEH 098	1,572	299	35	153	111	11	210	5.3	3116	1,896	2,182	UC 10
DEH 099	1,813	338	93	173	72	91	303	5.4	1647	2,187	2,517	UC 10
DEH 100	1,878	336	71	169	96	7	301	5.6	2119	2,265	2,607	UC 10
DEH 105	2,300	386	92	35	259	-	265	6	3448	2,774	3,193	UC 10
DEH 107	3,380	503	44	167	292	14	179	6.7	3369	4,077	4,692	UC 10
DEH 096	745	122	18	22	82	1	122	6.1	1149	899	1,034	UC 10
DEH 097	671	92	16	22	54	-	38	6.2	1139	689	793	UC 10
DEH 102	1,666	286	25	61	200	66	246	5.8	1244	2,009	2,313	UC 10
DEH 103	392	76	-	23	53	-	20	5.2	1133	473	544	UC 10
DEH 104	1,757	314	19	147	148	255	259	5.6	2560	2,119	2,439	UC 10
DEH 101	1,379	256	16	138	102	46	144	5.4	2423	1,663	1,914	UC 10
DEH 106	2,174	378	108	72	198	76	259	5.8	2885	2,622	3,018	UC 10
DEH 108	2,793	421	194	3	224	84	319	6.6	2754	3,369	3,877	UC 10
	22,420									27,042	31,123	**Total**
DEH 091	623	122	4	90	28	1	-	5.1	1633	751	865	UC 11
DEH 092	2,186	471	39	214	218	4	104	4.6	3583	2,637	3,034	UC 11
DEH 093	2,959	501	249	20	232	197	326	5.9	2486	3,569	4,107	UC 11
DEH 094	1,793	362	82	233	37	2	147	5.1	2780	2,163	2,489	UC 11
DEH 087	657	126	15	36	75	-	-	5.2	1297	792	912	UC 11
DEH 088	933	209	3	27	179	-	2	4.5	1963	1,125	1,295	UC 11
DEH 089	2,118	376	127	31	218	35	212	5.6	2120	2,555	2,940	UC 11
DEH 090	1,834	374	141	32	201	-	320	4.9	1849	2,212	2,546	UC 11
DEH 079	997	190	4	160	26	6	5	5.2	2118	1,202	1,384	UC 11
DEH 079A	248	57	2	37	18	1	57	4.4	784	299	344	UC 11
DEH 080	2,434	390	82	50	258	186	205	6.2	1818	2,936	3,379	UC 11
DEH 081	564	73	1	53	19	8	-	7.7	769	680	783	UC 11
DEH 081A	1,126	187	8	165	14	-	-	6	1599	1,358	1,563	UC 11
DEH 082A	945	144	6	111	27	5	2	6.6	2378	1,140	1,312	UC 11
DEH 071	1,003	219	4	143	72	2	139	4.6	2373	1,210	1,392	UC 11
DEH 077	553	106	-	66	40	2	27	5.2	1893	667	768	UC 11
DEH 078	2,232	413	29	54	330	6	265	5.4	2619	2,692	3,098	UC 11
DEH 123	2,728	577	16	269	292	8	277	4.7	2890	3,290	3,787	UC 11
DEH 095	974	144	41	14	89	-	-	6.8	1217	1,175	1,352	UC 11
	26,907									32,453	37,350	**Total**
DEH 118	2,528	429	114	63	252	48	282	5.9	3368	3,049	3,509	UC 15
DEH 119	3,291	691	205	326	160	86	434	4.7	2464	3,957	4,554	UC 15
DEH 120	4,493	689	305	112	272	366	665	6.2	3711	5,419	6,237	UC 15
	10,302									12,425	14,300	**Total**
DEH 121	1,946	294	55	130	109	1	181	6.6	2043	2,347	2,701	UC 9
DEH 122	986	201	-	163	38	7	87	4.9	3169	1,189	1,369	UC 9
DEH 110	4,356	640	172	48	420	65	391	6.8	1076	5,254	6,047	UC 9
DEH 113	1,717	320	29	84	207	8	308	5.4	2466	2,071	2,383	UC 9
DEH 114	1,234	260	23	37	200	3	70	4.7	2308	1,488	1,713	UC 9
DEH 117	2,566	447	75	41	331	80	313	5.7	1638	3,095	3,562	UC 9
DEH 109	4,072	613	254	156	203	388	447	6.6	2475	4,911	5,652	UC 9
DEH 111	1,001	199	28	100	71	4	177	5	1817	1,207	1,389	UC 9
DEH 112	627	108	2	69	37	4	93	5.8	1529	756	870	UC 9
DEH 115	1,333	204	3	164	37	8	97	6.5	2072	1,608	1,850	UC 9
DEH 116	2,313	366	83	50	233	87	164	6.3	1440	2,790	3,211	UC 9
DEH 125	1,439	320	10	275	35	6	258	4.5	1978	1,736	1,997	UC 9
	23,590									28,452	32,744	**Total**

Figure A1-1: Mirpur Khas – Mega Project Water Supply Scheme

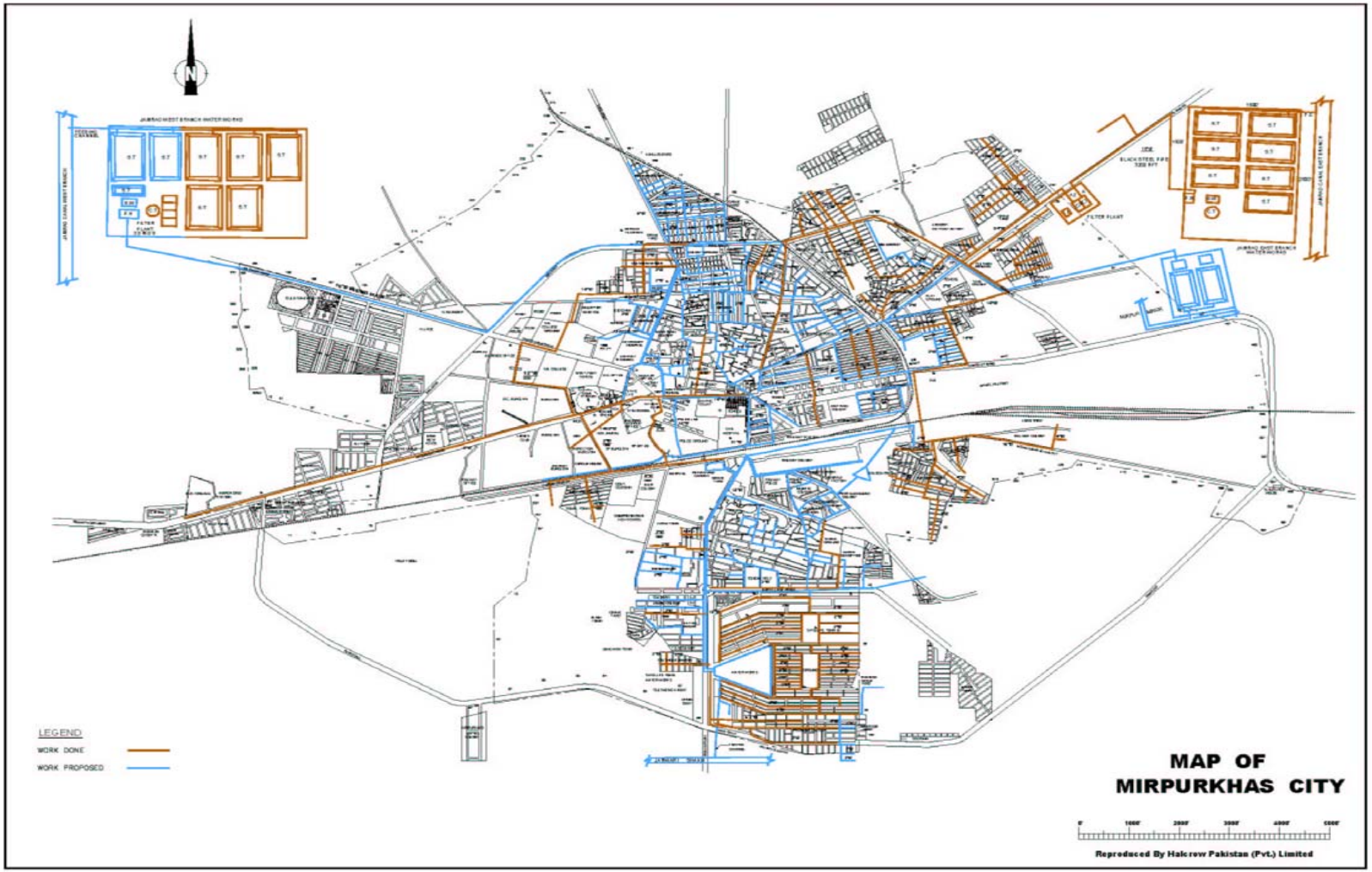
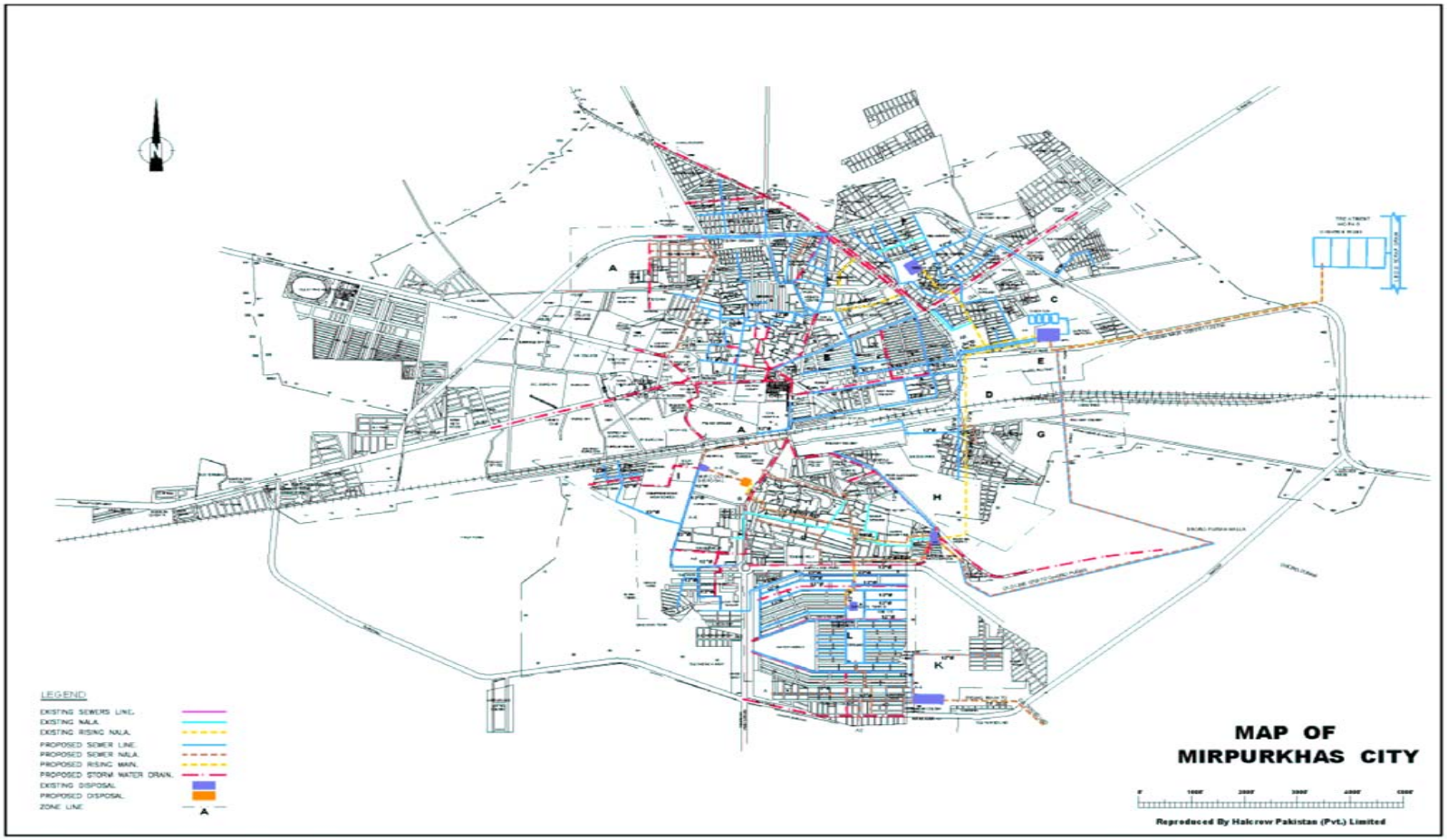


Figure A1-2 – Mirpur Khas Mega Project Sewrage/ Drainage Scheme



Annexure - 2

UMERKOT

UMERKOT TALUKA

Strategic Plan For Water Supply And Sanitation

2006-2012

Table of Contents

1	**BACKGROUND**	**1**
1.1	Overview of Umerkot Taluka	1
2	**WATER SUPPLY**	**2**
2.1	Urban areas	2
2.2	Rural areas	3
3	**SEWERAGE AND DRAINAGE**	**4**
3.1	Urban areas	4
3.2	Rural area	4
4	**SOLID WASTE MANAGEMENT**	**5**
4.1	Urban Areas	5
4.2	Rural area	5
5	**Priorities**	**6**
6	**ISSUES**	**7**
6.1	Water Supply	7
6.2	Sewerage and Drainage	8
6.3	Solid Waste Management	9
7	**STRATEGIC PLAN**	**11**
7.1	Water supply	11
7.2	Sewerage and drainage	12
7.3	Solid waste management	14

Supporting Information and Appendices

Umerkot Taluka – Strategic Plan for Water Supply and Sanitation – 2006-2012

1 BACKGROUND

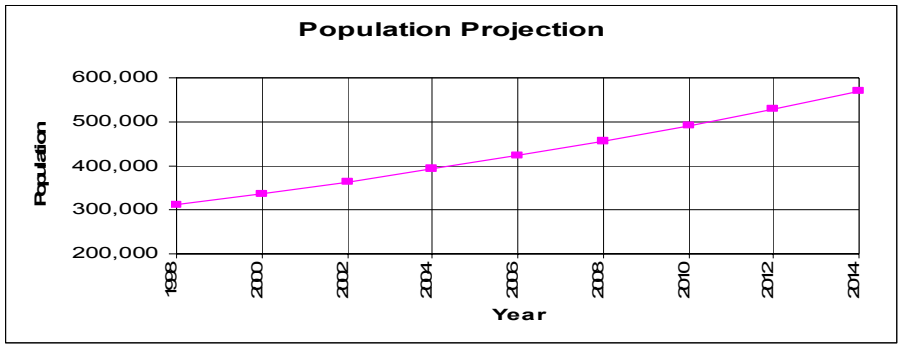
1.1 Overview of Umerkot Taluka

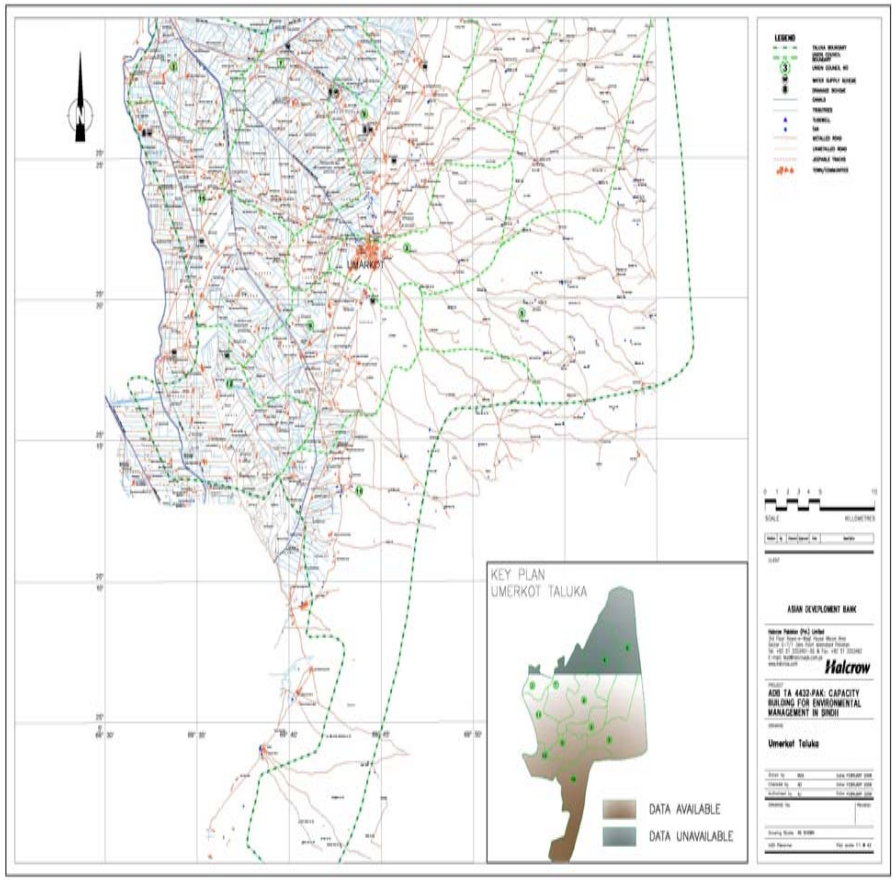
Umerkot is extreme corner of east Sindh at about 80 kms from India Pakistan border. There is no river or natural stream of water in the district. Topographically the district has two distinct portions, irrigated area in the west and north and the desert area in the east and south.

April, May and June are the hottest months. The mean maximum and minimum temperatures during this period are 28°C and 9°C respectively. Main Canals irrigate the district are Nara Canal and Mithrao Canal. The district, being situated at the tail of these canals, there remains shortage of water. Record of Chhor station provided in census report show average annual rainfall as 222 millimetres.

Umerkot Taluka had urban population as 66,247 according to the census of year 1998 and rural population as 246,506. Its urban population is divided in three towns namely, Umerkot, Dhoronaro and Chhor Old having population of 35,559, 16,707 and 13,981 respectively.

The graph below indicates estimated projected population based on the growth rate of 3.83% as provided in 1998 census report.





2 WATER SUPPLY

2.1 Urban areas

Umerkot

1. In Umerkot city, ground water is generally saline, but it is in the acceptable limit. Source of municipal water supply is Therwah Canal, from where settled water is pumped to the city. This water is supplied without filtration and chlorination. More than 50% of the city population is served with municipal water supply system through 2800 connections. Water tariff has been fixed at different rates for different uses. Domestic rate is Rs.30 per month, commercial rate is Rs.80 per month and rate for ice factories is Rs.100 per month. Roughly only 40% of registered consumers are paying water bills. TMA Umerkot is in a struggle for the improvement in the basic necessities for the citizens. Umerkot is now district headquarter and water demand has increased due to increased commercial and social activities and therefore another phase of water supply is required.
2. Therefore the government has approved extension and improvement of urban water supply scheme Umerkot at a cost of Rs. 45.387 million and is about to commence. It consists of construction of two numbers storage tanks, one number high service reservoir (HSR) of one lac gals capacity and rising main 16" dia 6500 ft. It also includes additional distribution pipes and construction of filter plant.
3. Most of the people have their own private arrangement of water as the hand pumps and small motor pumps abstracting ground water. Water vending is not practiced in the city.

Dhoronoro

4. Ground water is brackish in major part of the town. Approximately 90% of the population is served with municipal water supply. Source of water is Thar Canal which is a perennial canal. Private arrangement of water supply does not exist except few hand pumps. No water vending is practiced in the town. Most of the households have joint water connection due to low income. This is one of the reasons that water connections are less. There are 500 domestic and 200 commercial connections in the town. In Dhoronoro water tariff is different from the rest of TMA. Domestic rate is Rs.40 per month and commercial rate is Rs.300 per month.
5. Water Supply Scheme at a cost of Rs. 14.427 million for Dhoronoro town is in progress.

Chhor

6. In Chhor, Ground Water is sweet. As private arrangement of water, people are using motor pumps, hand pumps and also dug wells. Municipal water source is Chhorwah (canal). There is no water vending practiced in the town. Municipal water is provided to about 40% houses of the city. There are approximately

500 connections. Water rate is Rs.30 per month for each connection.

2.2 Rural areas

7. Ground water is brackish in most of the rural areas of Umerkot Taluka. Source of municipal water supply schemes is the nearby canal. Most of the schemes are based on non-perennial canals and not have enough storage capacity. Therefore people face much difficulty during canal closure period. No water vending is practiced in the rural area. There is also no collection of any water charges.

8. The coverage of TMA water supply is less than 25%. In the existing rural water schemes, source of water is canal, from where it is fed to the storage ponds, which serve during the canal closure period. The water is pumped from these water storage tanks or drawn through hand pumps installed on the side of these ponds. These water supply schemes were constructed by Public Health Engineering Department (PHED). To meet the O&M expenses, for the first four years the provincial government provides 2/3rd of O&M cost, paid quarterly in sixteen instalments. After completion of this period, the VDAs own the schemes and bears total O&M cost. At present, there is no technical advice or support available to the VDAs in the operation and periodical maintenance of the water supply schemes.

9. Exact record of the existing schemes with their present status is not available, but according to the available record TMA has about 26 water supply schemes and 5 drainage schemes in the rural areas of the taluka. Approximately half of the schemes are not properly working. Coordination with irrigation department and WAPDA is needed as well as repair work is required for proper functioning of the schemes. The main reason for the non-functioning is non-availability of water from the canals.

Private Arrangement of Water

10. The community also arranges domestic water on their own. Water source for private arrangement is also canals or water courses. People use some depression in natural ground or dig irregular ponds where they store water to use during the canal closure period. They take water directly from ponds, where hygienic conditions are not to the standard. Animals also drink water from the same ponds. TMA does not have any facility for the quality tests to monitor these private water arrangements.

3 SEWERAGE AND DRAINAGE

3.1 Urban areas

11. In all the urban areas of the taluka, open drains are provided for sewage flow and human excreta is directly discharged into the open drains, which has created an un-hygienic condition in the streets of the towns. Short lengths of sewers also exist near the sewage pump stations. Sewage is held up in the drains in the streets and also ponding in the vicinity of disposal stations. Present situation is a big environmental hazard. Repair and Improvement is required in the sewage disposal stations as well as in the drainage networks. Existing oxidation ponds are not serving the purpose and proper waste water Treatment Plants are required in all the towns of the taluka.

12. In Umerkot, one sewage disposal station is on Chhor Road. Sewage is ponding along the road just adjacent to the pump station. Second is Manghwar Sewage Pump Station, where the sewage after pumping is used for agriculture.

13. In Dhoronaro, open drains serve 70% of the city. After the sewage disposal station, raw sewage is in use for agriculture. The situation adjacent to the sewage pump station is very poor and sewage is ponding there. Practically, sewage first collects in the depressed areas and then it enters into the collecting chamber. Dhoronaro city has a slope for drains; therefore choking of drains is not common in those sloped areas.

14. In Chhor open drains with one main sewer of short length and a disposal station serve the town.

3.2 Rural area

15. In rural areas, open drains are provided for sewage flow which is then used or disposed of through pumping in the nearby areas.

16. In most cases, open drains provide both surface drainage and carry sewage with human excreta directly discharged into the drains.

17. The open drains get blocked due to a combination of inadequate maintenance, gradient and solid waste. Sewage is held up in the drains, overflows and pondage is frequent. The pumping stations are also in poor condition and sewage held up there which is also a cause of overflowing drains.

4 SOLID WASTE MANAGEMENT

4.1 Urban Areas

18. The TMA uses hand carts and donkey carts for primary collection of waste and stores on the street sides in form of filth depots or open heaps. Tractor-trolleys are used for secondary collection of the waste which is finally disposed off in form of open dumps inside the city and on the out skirts. No formal sanitary land filling is done.

19. The overall collection efficiency of the TMA is around 80% of the total generation which is quite adequate practically. But manual loading and unloading of vehicles and storage in form of open heaps is a source of health hazards and environmental pollution. Other major reasons for the situation are non provision of community bins, indiscriminate throwing of waste on the streets and disposal in form of open dumps. Healthcare wastes are disposed off by burning within the hospitals' compound. Women are responsible for managing waste at the household level but they are not adequately educated to deal with the problem in a sanitary manner.

4.2 Rural area

20. The problems in rural areas are much less severe compared with in the city. Waste generation rates are low, and there is a high organic content, making waste suitable for natural decomposition, or controlled composting.

21. The problems in rural areas are much less severe compared with in the city. Waste generation rates are low, and there is a high organic content, making waste suitable for natural decomposition, or controlled composting.

22. Plastic bags are a growing problem in rural areas of the TMA, and there is lack of information on how to deal with this form of waste.

5 Priorities

23. The Strategy Plan of the Taluka is based on the following priorities:

1. *the need to involve the community in working with the TMA to reduce waste and increase efficiency through greater awareness and concern for the environment in general and of the Taluka in particular; This will be done through public awareness campaigns and a programme of concerted area-by-area campaigns;*
2. *The need to adopt more participatory and transparent processes of working by the TMA. This will be done through the use of the "planning wall" and other devices for making the public more aware of the TMA's programmes and priorities;*
3. *to involve the private sector and the community in working with the TMA in the delivery of WSS services as part of the component-sharing approach; and to involve*
4. *The need to rehabilitate and refurbish existing systems and schemes;*
5. *The need to improve the capacity and efficiency of existing and installed schemes and systems;*
6. *The need to take greater control over the resources and services of the Taluka. This will be done through building up an updated database and management information systems*
7. *Then, to improve and extend WSS services delivery to the new and expanding parts of the Taluka;*
8. *Once the TMA service delivery has improved, the priority will be to collect an increased portion of increased tariff and user charges*

6 ISSUES

6.1 Water Supply

	House	Lane/ Neighbourhood	Settlement
Umerkot, Dhoronaro, Chhor	Piped water still not available in a large number of houses	Water pipe network not laid in many areas of the town	Canal water storage tanks have inadequate capacity to meet demand during canal closure period.
	Municipal water supply is not reliable and water does not reach in many areas	Underground pipes are leaking and are in poor condition causing contamination of water	The existing capacity has been reduced further due to silting.
	Lack of awareness about link between water quality and health	House connections are leaking and some have been found passing through the sewage drains.	Water supply network inadequate, and in poor condition
	Many connections are not registered with TMA	Water distribution can not be properly managed due to shortage of control valves in the system	Water pumping stations are in poor condition
	Wastage and poor water management. Plumbing faults cause loss of water within the premises.		Untreated water is being supplied.
	Households reluctant to pay for water services		The quantity of water being supplied is not measured
			The quantity of water supplied is not enough to meet the basic needs
			Both water tariff and collection efficiency are low and Revenue does not cover the O&M cost
			Topographic and infrastructure plans and information on existing system is not available
UCs			
Rest of Taluka	Safe drinking water is not available in most houses		Most of the rural areas are not served with municipal water supply.
	Lack of awareness between water quality and health		Canal water is the only available source of water. Some canals are non-perennial, and remain closed four to six months in a year. Perennial canals also close for 30 to 40 days in a year for maintenance purpose. Available water storage does not meet the requirements during canal closure period
			Canal water is suspected to be contaminated by upstream pollution including dumping of raw sewage.
			Data for planning and for proper operation and maintenance is not available.
			There are few water supply schemes which are completely in-operational or not inadequately.

	House	Lane/ Neighbourhood	Settlement
Financial	Budgeting is made difficult because of lack of information on contributions and commitments from district and provincial levels. Tariff structure is low and has no relation to expenses.		
Environment	Poor quality of water is a health hazard particularly for children. Intestinal disorder are endemic.		
Women	Women, particularly in rural areas, are responsible for fetching water for the households. They are forced to fetch water travelling long distances, making it a tiring and wasteful task and severely impacting on their ability to undertake other household jobs. The poor quality of water not only causes family health problems, but also makes other water-related tasks such as clothes washing and cleaning more difficult and time-consuming.		
UC1			
UC2			
UC3			
Institutional	TMA responsibilities are not clear because of the overlapping created by the re-designation of PHED. For example TO(I&S) has been placed under the command of the PHED. The PHED will supervise the O&M of water supply and drainage schemes of major cities. O&M responsibility for the vertical projects such as water Filtration Plants has been put on the TMA. Major projects are being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001.		

6.2 Sewerage and Drainage

	House	Lane	Settlement
Umerkot, Dhoronaro, Chhor	Toilet facility is not available in some of the houses	Most open drains are usually blocked with refuse	Untreated disposal into fields
	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	All open drains carry human excreta	Inadequate Trunk Sewer network coverage
	Lack of awareness about link between sanitation and health	Underground pipes exist in some parts of the urban area but most are in poor condition	Sewage Treatment Plants are not functioning therefore there is no treatment of sewage
			Pump Stations in poor condition. Sewage gets held up there.
Rest of Taluka	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	No facility in most of the area	Most of the area is un-served.
	Lack of awareness about link between sanitation and health	All open drains carry human excreta	Existing Sewerage Schemes in rural areas are not functioning or functioning inadequately
			Untreated disposal into fields
UC1			
UC2			
UC3			
Institutional	Major projects are being implemented by the province without TMA's involvement. The release of funds and project duration does not match, making it		

	House	Lane	Settlement
	difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001 Maps and Data of existing system is not available.		
Financial	Budgeting is made difficult because of lack of information of district and provincial level inputs.		
Environment	Open drains with faeces discharged directly from household toilets are a common sight. Drains blocked by polythene bags and leaking pipes cause ponding. This is particularly hazardous in lanes and residential areas where children play in and around untreated sewage. The discharge of untreated sewage for use in agriculture is harmful to both agricultural workers and consumers of the produce.		
Women	The lack of toilets in some houses is particularly onerous for women who are forced to curtail their activities and functions.		
Public Toilets	Absence of public toilets in urban areas, especially for women, severely limits activities and leads to open urinating		

6.3 Solid Waste Management

	House	**Lane/ Neighbourhood**	**Settlement**
Umerkot (Dhoro Naro, Chhore)	Waste is mixed, thus reducing potential for composting and reducing value of recyclables	Incomplete sweeping of lanes due to large amounts of waste is thrown on the streets, low -attendance of sweepers and low-productivity	TMAs collection fleet collects 80% of the total wastes generated, but the system is unhygienic, exposes the workers to waste and is not environment friendly
	Waste thrown on streets, thus increasing sweeping work and choking sewers and drains	Sweepers use inefficient tools and poorly designed handcarts, thus reducing efficiency and exposing workers to occupational diseases	Ad hoc disposal facilities threatening public health and the environment
		Indiscriminate dumping on streets and littering habits make the streets look filthy	
	No door-to-door collection system, encouraging indiscriminate dumping on streets	Poorly maintained and designed transfer points resulting waste scattering on street sides	Waste pickers operating at dump sites, posing a threat to themselves
	Cost/ household/ month is very high (Rs 166)	Scavengers working on the streets can scatter waste, and susceptible to health problems	Inefficient equipment for secondary collection
		Polythene bags spread around make the city look filthy, and caused choking of sewers and drains	Health risks from present final waste disposal practices (e.g. groundwater pollution, air pollution, disease vectors)
		Health risks from rotting piles of waste on streets/at transfer points	Health risks from lack of separate Healthcare waste management
		Health risks from blocked drains and sewers	Cost/ ton is very high (Rs 1487)
		Manual handling of waste when loading and unloading is dangerous and inefficient	Staff/ population ratio is 2.66, which is also high when compared with mechanical system
Rural areas			Plastic waste is a problem throughout rural areas and hinders composting of waste
Community	Lack of community engagement in	Very few community organisations are	

	House	Lane/ Neighbourhood	Settlement
participation	solid waste management activities	established at present to facilitate community-led door-to-door collection	
Institutional		No NGOs working in the field of solid waste management	Lack of technical knowledge within TMA on solid waste management options
Finance	Required contributions from householders provided with door-to-door collection services		Lack of funds hinders investment and planning in solid waste management.
Environment		Degradation of city environment as a result of indiscriminate dumping on streets	Environmental pollution from uncontrolled disposal of waste.
Women	Women lack education on problems caused by improper management of solid waste		No public awareness messages targeted at women.
Private sector	Potential for informal-sector/small enterprises to undertake door-to-door collection services not being tapped.	Contracting out solid waste management to the private sector not tried at neighbourhood level	Contracting out solid waste management at the city level not tried
Hospitals	Open burning healthcare waste can expose hospital staff, sanitary workers and citizens to health risks.		
Schools	Due to storage of solid waste in open heaps, schoolchildren and staff are exposed to health risks.		
Commercial	Demolition and construction waste is presently mixed with other municipal wastes, and remains on the streets in commercial areas awaiting collection. It is a source of health risks as well as traffic hazard. Shopkeepers throwing waste onto the streets further aggravate the problems.		
Public awareness	Lack of public awareness about health impacts of poor solid waste management practices		Lack of awareness about Healthcare waste amongst professionals and public

7 STRATEGIC PLAN

7.1 Water supply

PROPOSALS	PLACING	PHASING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
House Level									
All households should have individual house connections and charged according to usage	Umerkot, Dhoronaro and Chhor								Households
Public awareness campaign for the connection between water quality and health.									SDSSP
Raw Water Storage									
Carry out de-silting and repair of existing raw water storage tanks to rehabilitate capacity	Umerkot, Dhoronaro and Chhor								SDSSP
Construct new raw water storage tanks to meet current and expected demand	Umerkot, Dhoronaro and Chhor								Vertical Project
Water Treatment									
Construct water treatment plant	Umerkot, Dhoronaro and Chhor								Vertical Project
Water Distribution									
Repair and replace pipes and house connections in poor condition and provide control valves.	Umerkot, Dhoronaro and Chhor								SDSSP
Extend piped network to provide coverage in all areas of the town	Umerkot, Dhoronaro and Chhor								SDSSP
Rehabilitate pump stations	Umerkot, Dhoronaro and Chhor								TMA
Planning									
Proper topographic survey, inventory of all civil and mechanical works. Compilation of information and preparation of the maps on some computer software with marking/ connecting the relative information.	Umerkot, Dhoronaro and Chhor								SDSSP
Draw up and introduce a programme of regular maintenance of water supply system including network, treatment plant, pumping stations and storage tanks.	Umerkot, Dhoronaro								SDSSP

PROPOSALS	PLACING	PHASING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	
	and Chhor								
Cost Recovery									
Investigate and introduce a programme to increase Water Tariff and its Collection.	Umerkot, Dhoronaro and Chhor								TMA
Computerized billing system and proper updating of consumers record by field survey.	Umerkot, Dhoronaro and Chhor								SDSSP
Install meters at all sources to measure the amount of water to be supplied.									SDSSP
Consider component-sharing through involvement of community and/or private sector, for example Private/community contractors to purchase bulk water from TMA –and distribute to households through Community/group metered supply	Umerkot, Dhoronaro and Chhor								TMA
Rehabilitation Of Existing Rural Schemes	**Other UCs**								
Rehabilitation of existing water supply schemes after consultation with the community for the demand and O&M responsibility	Other UCs								SDSSP
New Rural Schemes									
Arrange land acquisition and construct water storage tanks	Other UCs								SDSSP
Arrange land acquisition and construct water treatment plant consisting of slow sand filter	Other UCs								SDSSP
Planning									
Continuous liaison and coordination with irrigation department on regular supply of water to operate existing water supply schemes.	Other UCs								TMA
Collect data of each settlement regarding the ground water condition, distance of the nearest water source etc. and plan for water supply schemes.	Other UCs								SDSSP

7.2 Sewerage and drainage

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	
Lane Level Drains And Sewers									
Targeted action to unblock drains – area by area; accompanied by public awareness campaign	Umerkot, Dhoronaro								TMA

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
	and Chhor								
Cover the open drains or replace with underground pipe	Umerkot, Dhoronaro and Chhor								SDSSP
Extend underground pipe network on a lane by lane basis	Umerkot, Dhoronaro and Chhor								Vertical Project
Trunk Sewers And Pump Stations									
Gradually repair and replace underground trunk sewers and pump stations.	Umerkot, Dhoronaro and Chhor								SDSSP
Provide Additional Trunk Sewers and Pump Stations	Umerkot, Dhoronaro and Chhor								Vertical Project
Treatment									
Repair existing sewage treatment plants	Umerkot, Dhoronaro and Chhor								SDSSP
Provide additional treatment plants	Umerkot, Dhoronaro and Chhor								Vertical Project
Cost Recovery									
Sell treated sewage effluent as fertiliser	Umerkot, Dhoronaro and Chhor								-
Planning									
Prepare Map and record Data of existing system	Umerkot, Dhoronaro and Chhor								SDSSP
House Level									
Public awareness campaign to install toilets in low density areas, encourage installation of individual Ventilated Improved Pit (VIP) Latrine	Other UCs								SDSSP
Lane Level									
Targeted action to unblock drains – area by area; public awareness campaign.	Other UCs								TMA
Cover the open drains or replace with underground pipe.	Other UCs								SDSSP

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
Trunk Sewer And Pumping Station									
Repair existing Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Provide Additional Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Sewage Treatment Plant									
Repair existing sewage treatment plants.	Other UCs								TMA
Provide additional sewage treatment plants.	Other UCs								SDSSP
Rehabilitation									
Rehabilitation of existing drainage schemes after consultation with the community for the demand and O&M responsibility.	Other UCs								SDSSP
Planning									
Plan new drainage/ sewerage schemes after consultation with community.	Other UCs								SDSSP
Public Latrines									
Provide public latrines at important places	Umerkot, Dhoronaro, Chhor								SDSSP

7.3 Solid waste management

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Onsite Storage and Processing								
Introduce 2-bin system for wet and dry waste in household								Households
Initiate home composting in barrels where space allows and appropriate								Households/ TMA/ NGO
Street Waste Management								
Provide litter bins on main streets for pedestrians' use								TMA/NGO/CBO
Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas								TMA

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Hand over sweeping to private-sector (with staff and equipment)								TMA/ Private Sector
Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors								TMA
Enforce provision of containers/ bags on public vehicles, vendors' carts								TMA
Primary Collection/ Private Sector/ CBO								
Enforce waste producers' responsibility for transporting waste to transfer points (i.e. community bins)								TMA/CBO
Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area								TMA/NGO
Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers								TMA/CBO/Private Sector
Communal Storage								
Purchase demountable containers ($5m^3$) as communal storage facility								TMA/SDSSP
Secondary Collection/ Private Sector								
Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots								TMA
Purchase hydraulic tractor container carrier system for use with demountable containers								TMA/ SDSSP
Contract out secondary transportation to private-sector								TMA
Reuse and Recycling/ Organizing Scavengers								
Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors								TMA/CBO
Treatment and Final Disposal								
Improve and rehabilitate present disposal practices in line with basic public health and environmental standards								TMA
Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant								TMA/SDSSP
Central compost plant (30 tons waste per day)								TMA/ Private Sector
Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available								TMA/ CBO/Private Sector
Special Waste Management								
Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste								TMA/ District Health Department
Awareness campaigns in hospitals								TMA/ District Health Department

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Undertake viability study for installation of locally manufactured incinerator				■	■	■	■	TMA/SDSSP
Assess generation of hazardous waste within TMA, and devise strategy for its safe treatment and disposal			■	■				TMA
Enforce provisions for demolition and construction waste disposal			■	■				TMA/Private Sector
Awareness Raising								
Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment		■						TMA/NGO
Public awareness raising campaign for rural areas, providing information on composting and basic disposal			■					TMA/NGO
Hold a series of cleanup campaigns		■						TMA/NGO/CBO
Introduce public complaints system by establishing a complaint cell			■	■				TMA
Legislation								
Ban open burning of waste on streets and at final disposal points		■						TMA
Introduce anti-littering laws		■						TMA
SWM Fee								
Introduce fee systems for commercial producers of waste			■					TMA
Introduce fee system for door to door collection				■				TMA

SUPPORTING INFORMATION

1 GENERAL

1. Umerkot is extreme corner of east Sind at about 80 kms from India Pakistan border. Umerkot city, the district headquarter is at a distance of 16 kilometres from Chhor railway station and about 23 kilometres from Dhoronnoro railway station. The district is rich in historical as well as cultural background.

2. There is no river or natural stream of water in the district. Topographically the district has two distinct portions, irrigated area in the west and north and the desert area in the east and south. The eastern Nara Canal is the demarcation line between the two regions. The fusion of the two is clearly marked towards south at Umerkot. One can see the sand hill spreading towards east which consists of barran tract and sand dunes covered with thorny bushes. Towards west is the alluvial plain with vast stretches of vegetation.

3. April, May and June are the hottest months. The mean maximum and minimum temperatures during this period are 28°C and 9°C respectively. Most of the rain falls in the monsoon months between June and September. The winter rains are insignificant. Record of Chhor station provided in census report show average annual rainfall as 222 millimeters. In the desert, the cultivation mostly depends upon rain. Main Canals irrigate the district are Nara Canal and Mithrao Canal. The district, being situated at the tail of these canals, there remains shortage of water.

4. Umerkot District comprises of four Talukas; according to census report of 1998, it's population distribution and urban proportion is as follows.

TALUKAS, POPULATION AND URBAN PROPORTION IN THE DISTRICT

Administration Unit	Population	Urban Proportion
Umer Kot District	663,095	16.8
Kunri Taluka	158,215	17.6
Pithoro Taluka	79,480	12.6
Samaro Taluka	112,647	6.5
Umer Kot Taluka	312,753	21.2

5. Umerkot Taluka has urban population as 66,247 and rural population as 246,506. Its urban population is divided in three cities namely, Umerkot, Dhoronoro and Chhor Old having population of 35,559, 16,707 and 13,981 respectively. The details are provided in Table B2-1 and B2-2.

6. Information about tap water and latrine facility in the urban areas as available in the census report is provided in Table A2-1.

Table A2.1: Water and Latrine Facility in Urban Areas of the Taulka

Urban Areas	Population according to census 1998	Average House hold size	Total Houses	Houses with Potable Water Facility		Houses with Latrine Facility	
				Nos.	%	Nos.	%
Umerkot	35,559	6.6	5,385	2,531	47	2,073	38
Dhoronoro	16,707	5.4	3,102	1,160	37	1,373	44
Chhor Old	13,981	4.8	2,165	452	21	611	28
Total	66,247	6.2	10,652	4,143	39	4,057	38

7. Situation of potable water facility in the houses of rural areas as given in census report is provided in Table A2-2.

Table A2-2: Potable Water facility in Rural Areas of the Taluka

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
Umer Kot Taluka	246,506	47,679	3,565	7.48
Dhoronaro Stc	75,520	14,936	1,647	11.03

Table A2-2: Potable Water facility in Rural Areas of the Taluka

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
Banhiari Tc	14,427	2,857	864	30.24
Chhore Purno Tc	6,830	1,427	220	15.42
Debo Tc	7,240	1,598	177	11.08
Dhoronaro Tc	4,398	840	75	8.93
Harh Tc	9,117	1,817	21	1.16
Hasisar Tc	8,242	1,601	131	8.18
Makhyaro Tc	6,627	1,203	117	9.73
Noonhyoon Tc	5,529	1,133	17	1.50
Soofi Tc	5,947	1,062	3	0.28
Soonhi Tc	7,163	1,398	22	1.57
Dinore Stc	91,154	17,615	970	5.51
Dinore Tc	49,602	9,693	795	8.20
Kaplore Tc	41,552	7,922	175	2.21
Umerkot Stc	79,832	15,128	948	6.27
Digoo Tc	9,335	1,619	210	12.97
Gapno Tc	6,667	1,111	117	10.53
Janhiro Tc	4,465	897	93	10.37
Kaith Tc	5,381	1,078	-	-
Karna Tc	8,522	1,825	11	0.60
Kharoro Pat Tc	5,277	959	12	1.25
Khejrari Tc	5,628	1,174	42	3.58
Khirohi Tc	7,566	1,390	127	9.14
Kunar Tc	2,364	495	-	-
Maroo Wai Tc	2,736	530	15	2.83
Sarethi Tc	7,136	1,404	149	10.61
Sonpur Tc	4,558	839	11	1.31
Umarkot Tc	4,033	720	25	3.47

Table A2-2: Potable Water facility in Rural Areas of the Taluka

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
Walidad Pali Tc	6,164	1,087	136	12.51
* STC = Supervisor Tapedar Circle				
TC = Tapedar Circle				

1.1 On-going Projects

Urban Areas:

8. Following are included under SDSS program.

   Extension and improvement of urban water supply scheme Umerkot of cost MRs. 45.387 and consists of construction of storage tanks two numbers (400X200), one number HSR of one lac gals capacity, rising main 16" dia 6500 ft. It also include additional distribution pipes.
   Construction of filter plant of cost MRs. 5.0.
   Water Supply Scheme Dhoronoro of cost MRs. 14.427 for Dhoronoro city is in progress.

Rural areas:

9. Following are included under SDSS program

   Rising Main of cost MRs. 6.436 of size 6" dia for rural water supply scheme, Noor Ahmad Arisar.
   Rural drainage scheme of cost MRs. 5.446 for Wali Mohammad Mangrio.

   Following schemes/ projects are approved by district government under ADP.
   Water Supply Scheme Bashir Rajar of cost MRs. 3.02
   Water Tanks of cost MRs 1.72
   Following Schemes are included in Khushal Pakistan Program
   Rural Water Supply Scheme Kharoro Syed, Kharoro Charan.
   Rural Water Supply Scheme Mithal Khan Lashari.

2 WATER SUPPLY SYSTEM

2.1 Urban Area

Umerkot

10. In Umerkot city, ground water is generally saline, but it is in the acceptable limit. Source of municipal

water supply is Therwah Canal, from where settled water is pumped to the city. This water is without filtration and chlorination. Private arrangement is the motor and hand pumps. Some people use the water from private arrangement for drinking purpose and municipal water for washing purpose. Water vending is not practiced in the city. The map of Umerkot town is given at Figure A2-1.

11. There are about 2800 connections in the city. Domestic water rate is Rs.30 per month, commercial rate is Rs.80 per month and rate for ice factories is Rs.100 per month. Roughly 40% of registered consumers are paying water bills. Now a days (visit time) recovery campaign is in progress. TMA is also taking the disconnecting steps in this regard. TMA Umerkot is in a struggle for the improvement in the basic necessities of the citizens. Umerkot is now district headquarter and water demand is increased and therefore another phase of water supply is required.

12. There is a ground water tank and pump station in water works at Therwah. Three pumps of size 6" X6" with 40 HP motor each are installed, out of the three one pump is standby. From Therwah Water Works, water is transmitted to another Water Works in the city through a pipe line of 16 inch dia. This is AC pipe line buried in ground and MS pipes are used where it is open. There are four ground water tanks and three pumps of 40 HP each. There is one on-going project by taluka in which three electric pumps of 40 HP each and two diesel pumps are being installed. Water from ground water tank is pumped to two Over Head Tanks and then supplied to the city. There is also direct pumping to the distribution system. Out of the two OHTs, one is old and damaged and now not in service and direct pumping is used instead of this OHT. Part of the distribution system is in satisfactory condition but some part of the system is about 40 years old and required replacement. People feel that during transmission of water through pipelines, impurities mix in the water.

Dhoronoro

13. Ground water is brackish in most of the city. Approximately 90% of the population is served with municipal water supply. Source of water is Thar Canal which is a perennial canal. Private arrangement of water does not exist. Few hand pumps are exemptions. No water vending is in the city. Most of the house holds have joint water connection due to joint family system or low income population in the locality. This is one of the reasons that water connections are less. There are 500 domestic and 200 other connections in the city. In Dhoronoro water tariff is different from the other TMA. Domestic rate is Rs.40 per month and commercial is Rs.300 per month.

14. Water Works consists of two phases, phase-I have two Settling Tanks and a pump house having two pumps of 15 HP each, phase-II have also two settling tanks along with two pumps of 40 HP each. Water is directly pumped to half of the city and through OHT for the other half of the city.

Chhor

15. In Chhor, Ground Water is sweat in the area. As private arrangement of water, people are using motor pumps, hand pumps and also wells.

Municipal water source is Chhorwah (canal). There is no water vending in the city. Municipal water is provided to about 40% houses of the city. There are approximately 500 water connections in the city. Water rate is Rs.30 per month for each connection.

16. In the water works, there is one Ground Water Tank (Settlement Tank), two pumps of size 3"X3", 10 HP each are installed. No generator or diesel pump is there. Water is pumped directly to water distribution system comprising of 6" to 3" size pipes. Overhead tank is not provided in the city. Water is supplied for two hours. Pipe line was laid in year 1988 and now in poor condition and often damaged.

17. According to the personal at water works, one ground Water Tank is not enough and bigger pumps are required for proper functioning of the water works.

2.2 Rural Areas

18. Ground water is brackish in most of the rural area of Umerkot Taluka. Source of municipal water supply schemes is the nearby canal. Most of the water schemes are on non-perennial canals and not have enough storage capacity therefore people face much difficulty during canal closure period. No water vending is practiced in the rural area. There is no collection of any water charges.

19. Exact record of the existing schemes with their present status is not available, but the TMA has provided some information which reflects that there are about 26 water supply schemes and 5 drainage schemes in the rural areas of the taluka. According to TMA record, out of the total water supply schemes, 3 are not functioning and all drainage schemes are working. The main reason of the not functioning is non-availability of water from the canals. It is told by the TMA personals and observed during visits that approximately half of the schemes are not properly working. Coordination with irrigation department and WAPDA is needed as well as repair work is required for proper functioning of the schemes.

Private Arrangement of Water

20. Water source for private arrangement is also canal or water course. People use some depression in natural ground or dig irregular ponds where they store water to use during the canal closure period. They take water directly from ponds, where hygienic conditions are not sufficient. Animals also drink water from the same ponds. TMA does not have any quality tests on these private water systems.

Deh Velhat Mohammad Eisa Mangreo

21. Water Supply scheme was constructed in 1999, (as informed by local people) for three villages with total of about 750 houses. There is a settling tank and pump house with a pump of 40 HP motor and with 3" size pumping main. Pipe is also laid in the village. This water supply scheme did not function at all. The scheme is not taken over by VDA.

Presently no one is looking after it. There is no operator or guard is seen during the site visit. There may be many possible reasons for its not functioning. Most possible reason is that water for the scheme is not sanctioned from Irrigation Department and is still pending.

Ghamori Amer Mittho Raja (Village of Sharif Sameeja)

22. This is a water supply scheme constructed three or four years ago by Local Government Department. This is situated near the main road to Umerkot and near to canal. One pump station is on bank of the canal; in the pump room one electric and one diesel pump of size 3"X4" are installed. From this pump room water is pumped to a nearby Water Works. In the water works, there are two settling water tanks and one pump house with a diesel pump of 3"X4". The scheme did not functioned at all.

Haveli Ariser

23. Haveli Ariser is about 4 kms from Chhor. Water Supply Scheme worked for about two years. Due to shortage of water in the canal, water is not available for the scheme. VDA is not formed. Separate connection (channel) is required from Chorwah (approx. 5 kms).

24. Akheraj, Noonhyon and Sadhar have also water schemes in the same condition. VDAs are not formed and water is not available for these schemes. For some schemes electric connection is bottle neck for their operation.

3 SEWERAGE AND DRAINAGE SYSTEM

3.1 Urban Area

25. In all the urban areas of the taluka, open drains are provided for sewage flow and human excreta is directly discharged into the open drains, which has created an un-hygienic condition in the streets of the towns. Short lengths of sewers also exist near the sewage pump stations. Sewage is held up in the drains in the streets and also ponding in the vicinity of disposal stations. Present situation is a big environmental hazard. The disposal stations are not being properly operated. They should be operated continuously during the day time in a way that sewage should not hold up in the drainage network. Repair and Improvement is required in the sewage disposal stations as well as in the drainage networks. Existing oxidation ponds are not serving the purpose and proper Waste Water Treatment Plants are required in all the towns.

Umerkot

26. One sewage disposal is on Chhor Road. This Disposal consists of two collecting tanks, one pump station and two oxidation ponds. Both pumps are of 20 HP each and in working condition. Sewage is ponding along the road just adjacent to the pump station.

27. Second is Manghwar Sewage Pump Station, which consists of one collecting tank and one pump

station. Capacity of pump is 10 HP and the discharge sewage is used for agriculture.

Chhor

28. In Chhor also open drains with one main sewer of short length serve sanitary drainage. There is one disposal station with two pumps of 15 HP each. Shoppers have chocked most of the drains in the city.

Dhoronaro

29. Open drains are there for sanitary drainage, with which 70% of the city is served, sewage disposal station and raw sewage is in use for agriculture. Screening Chamber, Collecting Tank and disposal are provided in the sewage disposal station. The situation adjacent to the sewage pump station is very poor and sewage is ponding there. Practically, sewage first collects in the depressed areas and then it enters into the collecting chamber. Three electric pumps of 15 HP are installed, out of which two are working and one standby. One diesel pump station of 24 HP is also provided. Boundary wall and operator quarter are damaged. Sewage pumping main is 10" up to boundary and after that it is divided in 6" and 4" pipes. Out of these pipes 6" is working and 4" is closed. Dhoronaro city has a slope for drains; therefore choking of drains is not common in those sloped areas.

3.2 Rural Areas

30. In rural areas, open drains are provided, which ultimately disposed of in to the fields. Because the water consumed is very less, therefore relative waste water is also less and so make no considerable trouble, waste water comes out of houses and dry in nearby depressions. It also spreads in some of the streets of the villages/ settlements. With a little effort, it can be managed that sewage should not collect or spread in the streets. At those places drains should be maintained and cleaned regularly.

3.3 Legislation

31. There is Pakistan Environmental Protection Act 1997, which governs the pollution of water bodies, waste water disposal standards, but there is no practical enforcement of the act in the taluka. Any other Law, regulation, standard or guideline do not exist at national, provincial, district or local levels regarding drinking water supply, sewerage or drainage. For drinking water, WHO guidelines are generally referred in practice by the provincial departments but these are not being implemented in letter and spirit.

3.4 Private Sector Participation

32. There is no private sector participation in the fields of potable /drinking water, sewerage or drainage in the taluka.

3.5 Main Issues and Constraints

i) Responsibilities of Taluka, District and Public Health Engineering Department are not clear.
ii) TMA has not sufficient data of the water supply and sewerage systems in the Taluka.
iii) TMA has not a complete list with necessary details and drawings of its assets in shape of water and sewerage components. These

include land, structures, pipes, machinery etc in urban and rural areas.

iv) There is no system for water quality monitoring.

v) There is no comprehensive Master Plan of TMA regarding water and sanitation especially for rural areas.

vi) Existing water works and sewage disposal stations need improvements.

vii) The operation of existing sewage disposal stations also needs improvements. Presently it is operating in such a way that waste water held up in the drainage network.

viii) In rural areas, although the problem of waste water is less than the urban areas, but waste water is ponding and spreading in the streets or open areas of the villages. This is very harmful for the health of the citizens, especially for children.

ix) Solid waste is being thrown in drains.

4 SOLID WASTE MANAGEMENT SITUATION

4.1 General

33. The current practices of solid waste management in the town are explained in stepwise form in the following paragraphs. Performance analysis has also been carried out at the end.

4.2 Storage and Collection

34. The storage and collection systems of solid wastes in the town are either inadequate or inappropriate. There are innumerable informal communal storage locations in the town where the waste is temporarily stored in form of the open heaps on the sides of the streets and at number of places in the centre of the streets (in congested areas). The situation gets aggravated when the heaps of waste pour down into the open drains where choking and wastewater spillage is seen quite often.

4.2.1 Primary Collection

35. Primary collection is the shifting of wastes from individual premises, i.e., homes, shops, offices, institutions etc., to communal storage places. The sanitary workers shift the wastes from smaller street side heaps to somewhat bigger heaps/filth depots, with the help of handcarts.

36. House to house collection is virtually non-existent. In certain cases the sanitary workers who are assigned the job of sweeping and collection of wastes from the street sides also serve a few households informally.

4.2.2 Secondary Collection

37. The tractor trolley then serves these bigger heaps. The tractor trolleys shift the solid wastes various open dumping sites haphazardly.

4.2.3 Vehicles and Equipment

38. For collection of solid waste collection vehicles of different description used are given in Table A2-1. Data is from discussion with TMA staff.

Table A2-1: Vehicles and Equipment

Type	Capacity (m^3)	No	Condition
Hand Carts (wheel barrows)	0.1	11	Satisfactory
Hand Carts (wheel barrows)	0.1	10	Good
Trolleys with Tractors	5.6	2	Bad
Trolleys with Tractors	4.2	2	Good
Donkey carts	0.7	1	Good

4.3 Sludge and Grit Collection

39. Due to quite an amount of solid wastes being thrown into the open drains and manholes of the sewerage system, blockages are very common. The municipality's sanitary workers are deployed for extracting sludge and grit from the system. After drying in open this sludge and grit is also picked up by donkey carts or tractor trolleys.

4.4 Recovery of Recyclables

40. The recyclable materials in wastes, like paper, board, plastics, metals and glass are either separated at source by the owners or by the scavengers from the street side open heaps. There are a number of shops in the town dealing with the recovered materials which channelise them to the recycling industries in other cities.

4.5 Disposal

41. Quite a portion of the wastes collected with the help of hand carts are open dumped in the vacant plots or low lying areas within the town or on the periphery. The tractor trolleys shift the wastes to open dumps on the periphery of the town.

4.6 Special Wastes

4.6.1 Slaughterhouse Wastes

42. One slaughterhouse has been built near sewage disposal works and is in depilated condition. A new slaughter house is under construction behind stadium. The wastes are thrown just nearby or collected by tractor trolleys once per week to be open dumped at a distance haphazardly.

4.6.2 Hospital Wastes

43. The solid waste of Tehsil Head Quarter Hospital consisting of used cotton, bandages, and syringes etc., is disposed off by burning within the hospital's compound in the pit. Before disposal the used syringes are cut by cutting machine.

4.6.3 Dead Animals

44. There is no separate arrangement for disposal of carcasses of the dead animals. They are collected alongwith other municipal solid wastes and buried alongwith the solid wastes in open dumps.

4.6.4 Demolition and Construction Waste

45. Most of the demolition and construction wastes are reused. Only a small portion is thrown out on the street sides. The generators of such wastes are responsible to dispose them off. But the municipality has to take care of the situation without any income.

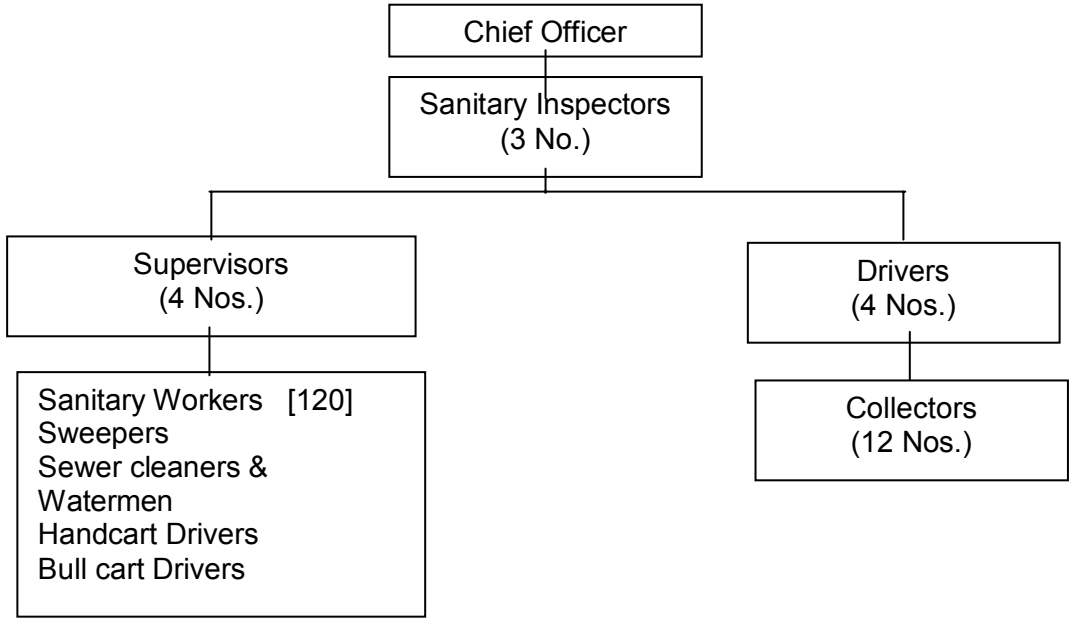
4.6.5 Industrial Wastes

46. No industry has been installed in and around the city.

4.7 Staff and Organization

47. Presently there are 4 drivers and 132 sanitary workers in total, out of which some are regular and others are on work charged basis. On daily basis they are deployed for sweeping, as drain cleaners and watermen, as collectors on tractor trolleys, and work as handcart drivers. The sanitary workers are supervised by 4 Jamadars and the jamadars work under three Sanitary Inspectors. The overall organization is shown in Figure A2-2.

Figure A2-2: Present Organization Chart of Sanitation Section Umer Kot



4.8 Private Sector Participation

48. There is no private sector participation experienced in the town/city up till now.

4.9 Community Participation

49. No such activity has been noted in the town. Actually solid waste management issues appear to be a low priority.

4.10 Public Awareness

50. Public awareness is very necessary to get their cooperation for efficient managements of solid waste. But no such effort has been launched in the town.

4.11 Legislation (Laws, Regulation, Standards, Guidelines)

51. Various type of legislation including laws, rules, guidelines exist at National and Provincial levels dealing with solid waste management. These include:

- Ordinance to prohibit manufacture, sale and use of black plastic polythene bags including polythene bags below 30

microns in thickness in the Sindh province. March 2006.

- Guidelines for Hospital Waste Management EPA, Sindh.june 2004 Rules 2005. Gazette of Pakistan.2005.
- Hospital Waste Management Rules 2005. Gazette of Pakistan.2005.
- (Draft) Guidelines for Solid Waste Management. Pakistan EPA. June 2005.

52. But there appears to be a lack of awareness regarding these documents in the community.

4.12 Performance Analysis

53. Based on the data obtained from discussion with TMA staff., the system performance can be evaluated in terms of collection efficiency i.e. the ratio between wastes collected and wastes generated, cost of collection/ton, staff employed per 1000 population, cost per inhabitant It is done in the following sub-sections, The results are presented in Tables 2.2 and 2.3. Drawbacks noted in the present system are also given separately.

4.12.1 Collection Efficiency

54. Table A2-2 shows the data (year 2006) regarding total collection per day. The figures reveal the total number of vehicles deployed, average trips made by each vehicle per day and the average amount of waste carried per trip. The total waste collected on the average is 17 tons/day while the generation rate is 21 tons/day. This gives a collection efficiency of 58%.

Table A2-2: Haulage Capacity of TMA Collection Vehicles

Sr. No.	Type of Vehicle	No. of Vehicles	Total Avail-able	Trips/ Vehicle/ day (No.)	Average Weight/ Trip (Tons)	Total Weight Carried (Tons)
1.	Tractor Trolley I	2	2	2.5	1.8	9
2.	Tractor Trolley II	2	2	2	2.0	8
					Total:	**17**

Total Generation/day = $55615 \times 0.38 = 21$ tons

Collection Efficiency = $\frac{17}{21}$ = 80 %

4.12.2 Cost per Ton Collected and per Inhabitant

Wastes collected per day = 17 tons

Waste collected per year (for year 2005) = $17 \times 365 = 6205$ tons

Total expenses incurred/year = Rs. 92,24,700 (from TMA Office Files)

Cost/Ton = $\frac{92,24,700}{6205}$ = Rs. 1487

Population for year 2006 = 55,615

Cost/inhabitant = $\frac{92,24,700}{55615}$ = Rs. 166

4.12.3 Staff Per 1000 Inhabitants

No. of staff = 148 (From Section 2.11)

Population = 55615

Staff/1000 inhabitants = $\frac{148 \times 1000}{55615}$ = 2.66

Table A2-3: Present System Performance Indicators

Collection Efficiency	Cost per Ton	Cost per Inhabitant	Staff per 1000 Population
%	(Rs.)	(Rs.)	Ratio
80 %	1487	166	2.66

4.13 Drawbacks/Deficiencies in the Present System

55. Drawbacks and deficiencies have been noted at all the stages of the present system i.e. communal storage, street cleansing, collection vehicles like handcarts and tractor trolleys, and disposal in the form of open dumping. They are delineated in the following paragraphs. With the adoption of the new system, they will be well taken care.

4.13.1 Communal Storage

56. The communal storage takes place in the form of small street side heaps. Besides that masonry enclosures are also present in a very shabby form.

i) Because of design defects it is difficult to collect the waste from within the dust bins and filth depots.

ii) Refuse in these structures is scattered all over the surrounding area as a consequence of scavenging activity and wind action.

iii) Rodents become active in these dumps. Similarly these become the breeding places for larvae of the flies and scores of other disease causing organisms. These are merely health hazard.

iv) These are a constant source of obnoxious odours leading to pollution of local environment.

v) Manual collection is a source of professional diseases, and wastage of time.

vi) Masonry enclosures are uneconomical as compared with metallic containers.

4.13.2 Street Cleansing

57. Hand tools and other equipment used during sweeping and collection are of low-standard and poor design. Therefore, the sweepers cannot give a satisfactory output. Major drawbacks are:

i) As a general practice sweepings are placed on the sides of the streets and roads, in open heaps making the condition of streets shabby.

ii) Brooms have handles of shorter length on account of which sweeping efficiency is reduced.

iii) Sweepers are hardly provided with any replacements for the damaged tools and equipment.

iv) Supervision on performance of the sweepers by the supervisory staff is generally lacking.

4.13.3 Hand Carts

i) Hand carts are of poor design and low capacity.

ii) The carried wastes can only be tipped on the ground and not in a metallic container.

iii) It is cumbersome to drive these carts as they have only one wheel.

iv) Number of handcarts is totally inadequate.

4.13.4 Tractor Trolleys

i) Ti me spent/trip is over 2 hours, which s quite long.

ii) Inaccessible areas are left uncovered.

iii) Collection vehicles are required to collect the scattered heaps of waste, thus spending unwanted time en-route to the dumping site.

iv) Manual loading and unloading of the vehicles is un-economical in terms of time and effort.

v) Collectors come in physical contact with the waste, due to which they are liable to be affected by occupational diseases.

vi) Littering is caused by uncovered collection vehicles.

vii) Only "Bilarus" tractors are acceptable as their spare parts are easily available. MF does not have the market.

4.13.5 Open Dumping

i) Disease causing vectors are spread all around the dumping ground thus causing a constant health hazard for the surrounding population. Open dumping makes the area unsightly.

ii) Because of wind action components like paper and polyethylene bags are seen scattered in the adjoining areas.

iii) Groundwater pollution is not unexpected during rainy season.

4.14 Strength and Weaknesses of Solid Waste Management Activities

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
1	Introduce 2-bin system for wet and dry waste in household	- Improves quality and quantity of recyclable materials, and enables composting	- difficult to enforce, and requires major change in household habits. Could take many years.				100
2	Initiate home composting in barrels where space allows and appropriate	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting		2000/ barrel		
	Street Waste Management/ Private Sector						
3	Provide litter bins on main streets for pedestrians' use	- Potentially low-cost way of reducing littering, and therefore cost of labour to sweep	- Would have to be introduced along with anti-littering legislation and public awareness campaigns to be effective	60,000 (for 100 bins)	600/ bin	15,000	150/ bin
4	Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas	- Little extra cost -	- Provision of better tools, and education to sweepers required - Sweepers may react against working for longer/ harder hours				
5	Hand over sweeping to private-sector (with staff and equipment)	- TMA no longer has responsibility for this management and labour-					500

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
		intensive activity					
6	Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum-door to door collectors	- improved health and safety of staff - increased productivity	Extra cost for improved tools	5,400/ cart (100hh served)	54	2,700 (100hh served)	27
7	Enforce provision of containers/ bags on public vehicles, vendors' carts, covers on sand, bricks carriers	- Stops littering of streets - Saves time of street sweeping - Clean streets	- Little extra cost				10-100/ veicle
	Primary Collection/ Private Sector/ CBO						
8	Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area	Sweepers' work will become more efficient as less waste dumped on to streets	Systems would require contributions from householders. Would they pay?				300
9	Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers	-Zero cost for TMA -Sweepers' work will become more efficient as less waste dumped on to streets - provides livelihoods for poor	- could take many years to establish community-based organisations - Systems would require contributions from householders. Would they pay? - Can be difficult to organise waste pickers	TMA equipment leased			300
	Communal Storage						
10	Purchase demountable containers ($5m^3$) as communal storage facility	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- Experience in other countries suggests that if not properly manufactured and maintained can be problematic and containers can have short useful lives due to corrosion.	60,000/ container (750hh served)	80	14,000/ container (750hh served)	19
	Secondary Collection/ Private Sector						
11	Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots	- no extra capital cost	Increased annual cost			100,000	

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
12	Purchase hydraulic tractor container carrier system for use with demountable containers	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- high capital cost - Success depends on public behaviour, as if waste deposited around containers, very problematic. - extra space required	600,000/ vehicle (4500 hh served)	130	444,000/ vehicle (4500 hh served)	96
13	Contract out secondary transportation to private-sector	- TMA no longer required to manage fleet of vehicles - Could lease vehicle fleet to private-sector operator - Financial savings and improvements to service	- Lack of experience of tendering and contracting out				200
	Reuse and Recycling/ Organizing Scavengers						
14	Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors	- Provides better livelihood to scavengers - Reduces the waste quantities to be disposed off	- Effort needed to organize scavengers - May take long time to introduce				
	Treatment and Final Disposal						
15	Improve and rehabilitate present disposal practices in line with basic public health and environmental standards	- Reduced threat to environment in public health - basic but significant improvements can be made for relatively low cost	- Some investment and expertise required				
16	Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant	- Less environmentally damaging -Reduced pollution of groundwater - In line with Annual Strategic Plan guidelines from the ADB	- Vested interests of drivers who sell waste may discourage dumping at site - Cost of developing and running site	1,520,000	70	532,000	25
17	Central compost plant (30 tons waste per day)	Recycles the organic matter which is useful for agriculture	Capital cost	3,260,000	92		
18	Initiate decentralised composting at neighbourhood level through community-	- Potential reduced volumes of solid waste for disposal	- Could take time to educate and convince people about	65,000	92		

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	based organisations, where appropriate/space available	- Environment friendly way of processing organic waste	composting				
	Special Waste Management						
19	Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste	- Reduced hazards from healthcare waste - compliance with national guidelines on healthcare waste - Could possibly attract private-sector investment	- Funding from hospitals/Department of Health? - Enforcement challenging, and needs to be backed up with awareness campaigns	20,000		20,000	
20	Awareness campaigns in hospitals	-Reduced mixing of healthcare waste with municipal waste - Changes behaviour of waste generators	- Awareness raising campaigns can take time and cost money				
21	Undertake viability study for installation of locally manufactured incinerator	- Widely accepted healthcare waste management technique	- Costly to purchase, and challenging to operate and maintain				
	Awareness Raising						
22	Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment	- likely cost-effective way of tackling many problems - If successful could result in increased recycling rates from separated waste, reduced dumping on streets, reduced labour requirements for sweeping, improved drainage	- Awareness raising campaigns can take time and cost money - Expertise in awareness raising required			50,000	
23	Public awareness raising campaign for rural areas, providing information on composting and basic disposal	- Could help solve problem of plastic disposal in villages	- Would need support of professionals to disseminate information			25,000	
24	Hold a series of cleanup campaigns	- Can be effective at giving visible results quickly, and thus attracting public support - Relatively low-cost option				25,000	
25	Introduce public complaints system by establishing a complaint cell	- makes public more willing to cooperate with TMA, and contribute to improved waste management services	- vital that systems of accountability are in place within the TMA so complaints can be followed up and affect change				
	Legislation						
26	Ban open burning of waste on streets and at final disposal points	- Reduced environmental pollution	- Difficulties of enforcing legislation				

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
		- popularity with local residents					
27	Introduce anti-littering laws	- Potentially low-cost way of impacting urban environment, with benefits to public health, drainage and labour requirements for waste management	- Difficulties of enforcing legislation				
	SWM Fee						
28	Introduce fee systems for commercial producers of waste	- following the 'producer pays' principle, enables better services to be provided to the areas most needy – particularly shopping and industrial areas	- Possible resistance, so needs to be backed up with legislation and enforcement mechanisms				100
29	Introduce fee system for door to door collection	- Cost shared by the communities	- Difficult to realize from the communities				

Table B2-1: Urban Population Projections

TALUKA UMERKOT: CHHORE TOWN, DHORONARO TOWN, UMERKOT TOWN - UNION WISE PROJECTED POPULATION

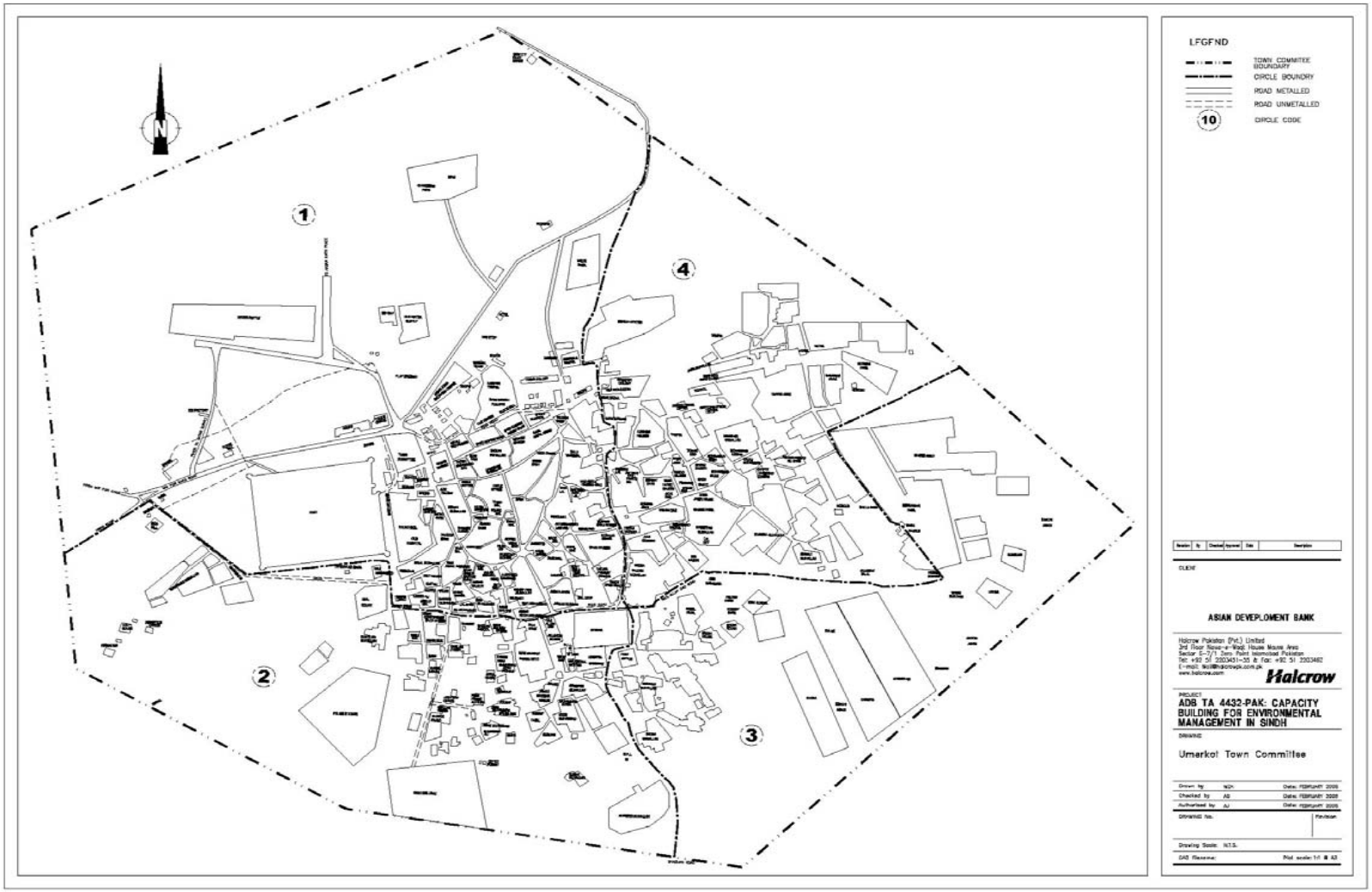
URBAN LOCALITIES	POPULATION 1998	HOUSING CHARACTERISTICS							AVERAGE HOUSEHOLD SIZE	1998 POPULATION - UNION WISE			
		TYPE OF STRUCTURE				HOUSING FACILITIES				UMERKOT URBAN AREA		DHORO NARO URBAN AREA	CHHORE URBAN AREA
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	LATRINE	ELECTRICITY		UMERKOT	GHARIABANAD	DHORO NARO	CHHORE
										GROWTH RATE			
1	2	3	4	5	6	7	8	9	10	6.75%	6.75%	3.70%	3.70%
*UMER KOT TALUKA	66,247	10,652	3,695	1,690	4,664	4,143	4,057	7,335	5.9				
*CHHORE OLD TC	13,951	2,165	369	443	1,353	462	611	1,049	4.6				
*CHARGE NO 20	13,951	2,165	369	443	1,353	462	611	1,049	4.6				
CIRCLE NO 01	5,663	1,248	92	351	806	36	292	611	4.6				5,663
CIRCLE NO 02	8,328	917	297	92	626	417	319	536	6.2				8,328
*DHORONARO TC	16,707	3,102	682	625	1,795	1,160	1,373	2,193	6.4				
*CHARGE NO 02	16,707	3,102	682	625	1,795	1,160	1,373	2,193	6.4				
CIRCLE NO 01	11,918	2,245	319	362	1,594	818	1,063	1,604	6.3			11,918	
CIRCLE NO 02	4,789	857	363	263	231	342	310	589	6.6			4,789	
*UMERKOT TC	35,569	5,385	2,827	822	1,736	2,631	2,073	4,063	6.6				
*CHARGE NO 01	35,569	5,385	2,827	822	1,736	2,631	2,073	4,063	6.6				
CIRCLE NO 01	9,402	1,229	786	147	297	700	501	1,075	7.6	9,402			
CIRCLE NO 02	9,678	1,312	697	109	309	707	678	1,013	7.3	9,678			
CIRCLE NO 03	7,666	1,396	577	294	666	417	513	667	5.6	7,666			
CIRCLE NO 04	8,823	1,448	668	305	575	707	381	1,105	5.9		8,823		
Population 1998											35,569	16,707	13,991
Population 2006											55,615	27,542	18,697
Population 20012											77,781	37,764	23,251

Table B2-2: Rural Population Projections

TALUKA UMERKOT: UNION WISE PROJECTED POPULATION

NAME OF MAUZA / DEH / VILLAGE / SETTLEMENT	POPULATION 1998	HOUSING CHARACTERISTICS								PROJECTED POPULATION YEAR 2006 Growth Rate 3.63%	PROJECTED POPULATION YEAR 2012 Growth Rate 3.63%	UNION COUNCIL
		TYPE OF STRUCTURE				HOUSING FACILITIES		AVERAGE HOUSEHOLD SIZE	AREA IN ACRES			
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	ELECTRICITY					
1	2	3	4	5	6	7	8	9	10	11	12	13
UMER KOT TALUKA	246,306	47,675	3,048	11,901	32,826	3,961	19,910	5.2	610,164	312,975	417,264	
LAKHIO THARI	2,672	470	41	10	429	54	320	5.68	22961	3,909	4,923	UC 10
KACHOLI	6,196	982	19	94	919	21	0	6.2	47871	6,268	8,083	UC 10
MARSUR THARI	7,139	867	43	31	793	108	238	6.1	53533	5,750	8,696	UC 10
PALARI THARI	206	50	3	0	47	1	1	5.1	1570	404	506	UC 10
KALORI THARI	265	51	1	0	50	1	1	5.19	4065	331	440	UC 10
GABHIS THARI	1,219	199	5	16	178	2	0	5.94	10000	1,761	2,153	UC 10
SACHIMIS THARI	806	163	2	68	93	11	110	4.98	8000	1,060	1,364	UC 10
SINDHOT THARI	2,068	354	17	84	253	20	258	5.77	12401	2,795	3,502	UC 10
CHUNDAWAH	2,470	444	14	24	406	61	311	4.85	4782	3,807	4,749	UC 10
UMARO PAT	1,704	326	9	67	250	30	144	5.53	39154	2,329	2,918	UC 10
SA DOORI PAT	71	16	2	2	12	3	4	4.44	995	90	120	UC 10
MAROO WAH	1,101	195	6	20	169	40	45	4.45	1182	947	1,186	UC 10
CHOKARO	2,033	378	11	88	279	18	251	5.4	9941	2,788	3,494	UC 10
	29,451									30,305	30,305	(Cont)
AMORE EAST	1,623	439	16	130	276	163	176	3.8	9351	2,782	2,797	UC 11
CHORO SARIN	4,947	794	29	126	642	11	210	6.71	1396	6,169	7,729	UC 11
DOORI	1,988	268	28	52	191	1	180	5.2	993	1,854	2,136	UC 11
PA NOOR	4,589	910	52	170	938	61	110	4.9	9338	6,191	7,757	UC 11
KARNA	4,049	847	41	206	601	1	261	4.79	5041	5,615	6,967	UC 11
KHIRAL	2,401	492	18	54	429	1	93	4.9	2981	3,286	4,067	UC 11
SHELLIET	2,004	473	25	65	340	2	300	4.3	4134	2,725	3,382	UC 11
BIBLO KARANA	1,176	205	9	44	152	0	20	5.4	4689	1,586	1,679	UC 11
SHAIKH KHETARI	2,045	405	30	68	307	1	70	5.6	3152	1,544	4,566	UC 11
ALLIGAD PALI	2,159	363	26	131	203	124	181	5.8	2156	2,182	3,687	UC 11
	26,032									35,233	43,424	(Cont)
BOOHAR	2,248	439	14	93	348		241	5.15	2154	3,040	3,820	UC 12
SIYAGO	3,481	643	29	474	1164	164	240	5.43	2481	4,430	5,891	UC 12
MAHFAIRO	1,906	417	32	113	175	11	410	6.3	1206	4,807	6,096	UC 12
GAPRO	3,138	686	175	308	315	96	327	6	3141	4,776	5,985	UC 12
TANGORE	3,171	727	40	93	464	27	331	6	2031	4,299	5,396	UC 12
JAJARO	968	204	6	52	8		8	4.8	1756	1,349	1,691	UC 12
DHORALO	2,557	461	55	205	586	33	286	5.5	2084	3,870	4,776	UC 12
KHIROKI	1,949	472	9	253	58	22	201	4.8	1208	2,997	3,966	UC 12
VIRASAR	1,716	313	33	168	121	53	176	5.63	1625	2,372	2,972	UC 12
KHABA	1,118	268	4	48	238	1	31	4.8	4071	1,776	2,405	UC 12
PERNEARO	1,046	236	10	10	166	1	1	4.6	2677	1,417	1,775	UC 12
	25,092									33,021	41,880	(Cont)
SAHIBAI THARI	1,685	315	31	34	253	1	54	5.4	13356	2,450	2,947	UC 4
MOHAN BAH	1,277	248	9	10	229	1	1	5.5	27965	1,725	2,161	UC 4
UMARKOT THARI	1,164	209	61	50	142	11	171	5.4	16955	1,699	2,004	UC 4
VEHRO THARI	8,585	1,714	647	585	777	93	741	5.67	6001	12,940	16,214	UC 4
UMARKOT	9,067	441	93	76	318	23	130	6	4182	3,186	4,304	UC 4
	91,364									22,100	27,730	(Cont)
DEBO	2,687	552	21	96	435	24	417	4.9	3178	3,830	4,548	UC 3
KACRI	1,709	304	4	146	61		42	4.78	10444	1,398	1,659	UC 3
MARHU	1,606	411	14	101	206	4	101	4.78	11004	2,800	3,360	UC 3
MOHD ALAM PALI	4,398	842	61	254	525	75	418	5.2	3182	5,941	7,441	UC 3
TAR SAMOO	172	66	1	14	11			2.43	99336	252	291	UC 3
	93,187									13,761	17,241	(Cont)
SANHARI	177	32		10	4			5.5	5218	256	300	UC 4
CHHORE THAR	11,861	2,361	279	376	1,805	845	1,141	5	2127	16,876	20,142	UC 4
TEERRI	2,348	461	100	63	235	19	409	6.1	3080	3,175	3,979	UC 4
	14,437									13,400	24,421	(Cont)
DINORI	3,006	639	14	78	511	53	23	5.1	48488	4,178	5,230	UC 5
GHARIRO	8,706	1,564	16	26	1,912	4	2	4.71	10347	11,762	14,727	UC 5
KAPLORE	7,186	1,432	25	43	1,463	1	1	5	53000	9,981	12,496	UC 5
LALA SAH	5,172	1,062	2	11	1,011	1	1	5.1	47901	4,414	5,525	UC 5
SHABIRI (SONARO)	4,176	805	8	23	660	16	8	4.9	21476	5,258	7,996	UC 5
	28,674									36,093	45,147	(Cont)
DODAR	10,245	1,974	24	20	1,251	1	1	5.2	50011	13,039	17,339	UC 6
HOTIANO	8,265	1,113	12	51	1,049	67	15	5.6	19000	4,481	10,054	UC 6
LALLO	7,755	1,421	22	211	1,188	210	10	6.6	40000	10,605	15,256	UC 6
	26,179									32,911	41,351	(Cont)
MANDHAL	2,437	494	31	238	201	113	100	4.8	1950	2,991	3,623	UC 7
GAMURO	2,094	439	11	261	126	1	140	5.1	1329	2,834	3,431	UC 7
MARK	4,016	842	24	641	169	17	119	4.8	6545	5,425	6,797	UC 7
BABARO	3,000	634	74	666	321	1	42	5.3	1001	4,056	5,092	UC 7
HAJIBAR	3,403	650	33	225	394	244	230	5.3	8754	4,887	5,847	UC 7
KUNDLI	4,304	847	30	361	426	101	420	5.1	4466	5,816	7,311	UC 7
SABRO	497	101	20	16	61	2	1	4.9	1400	671	843	UC 7
NOKHNYOON	4,800	971	50	306	794	11	389	4.9	9945	6,484	8,144	UC 7
GUDHO	1,100	163	7	51	93		121	4.5	1139	991	1,244	UC 7
BOOHRI	2,026	485	36	97	337	1	241	5.1	1325	3,485	4,367	UC 7
	27,638									37,333	46,776	(Cont)
AMORI CHHORE	3,448	726	31	476	276	60	414	4.7	3668	4,660	5,857	UC 8
CHHORE OLD	1,741	248	8	14	208	1	92	4.9	4454	1,836	2,060	UC 8
KHORIRO SHOAR	4,966	898	24	116	711	61	601	5.45	5958	6,892	8,169	UC 8
MAHFARO	1,473	304	17	30	257	66	201	5.3	3652	2,427	3,038	UC 8
KHALFAI THARI	4,602	963	19	47	901	11	521	4.9	14026	6,134	7,941	UC 8
KHARORO THARI	4,585	930	69	81	756	398	981	4.8	754	6,186	7,767	UC 8
KHAIRO PAT	1,213	294	34	0	260	10	300	4	6073	1,961	2,437	UC 8
THATHRAI	3,625	900	34	441	425	1	54	6.71	1000	5,167	6,474	UC 8
JUNEJA	1,317	278	6	65	208	1	61	5	2797	1,883	2,322	UC 8
	27,317									36,764	46,064	(Cont)
GIBI BAH	1,634	341	1	6	134	1	10	4.8	13000	2,201	2,765	UC 9
KATRI	1,561	287	14	112	111	1	60	5	2049	1,882	2,359	UC 9
TIBO MITHO	3,966	797	34	171	546	1	490	5	3475	5,387	6,750	UC 9
KHEJRAN	1,810	418	45	45	330	1	150	4.71	2999	2,636	3,305	UC 9
PACHRO	1,251	219	10	62	208	1	150	4.69	1965	1,730	2,170	UC 9
SABHAI PAT	2,398	473	32	99	342	38	70	5	2055	3,226	4,042	UC 9
KHELARI	2,105	510	8	217	285	117	140	5	4492	3,404	4,266	UC 9
GOTDAR	1,321	233	20	139	95	53	130	5.5	5842	1,670	2,154	UC 9
SARETHI	1,276	64	21	171	231	25	40	5	1025	4,336	1,431	UC 9
LASHARI	1,479	362	6	89	286		200	4.9	4305	2,048	3,180	UC 9
UMERPUR	2,679	453	15	224	224	11	155	5.9	4762	3,818	4,934	UC 9
	24,537									12,074	41,180	(Cont)

Figure A2-1: Umerkot Town Map



Annexure - 3

JOHI

JOHI TALUKA

Strategic Plan For Water Supply And Sanitation 2006-2012

Table of Contents

1 BACKGROUND 1
1.1 Overview of Johi Taluka 1
2 WATER SUPPLY 2
2.1 Urban areas 2
2.2 Rural areas 2
3 SEWERAGE AND DRAINAGE 3
3.1 Urban areas 3
3.2 Rural area 3
4 SOLID WASTE MANAGEMENT 4
4.1 Urban Areas 4
4.2 Rural area 4
5 PRIORITIES 5
6 ISSUES 6
6.1 Water Supply 6
6.2 Sewerage and Drainage 7
6.3 Solid Waste Management 8
7 STRATEGIC PLAN 10
7.1 Water supply 10
7.2 Sewerage and drainage 11
7.3 Solid waste management 12

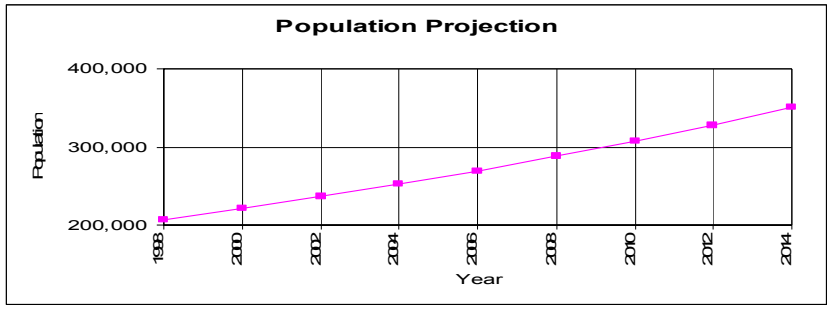
Supporting Information and Appendices

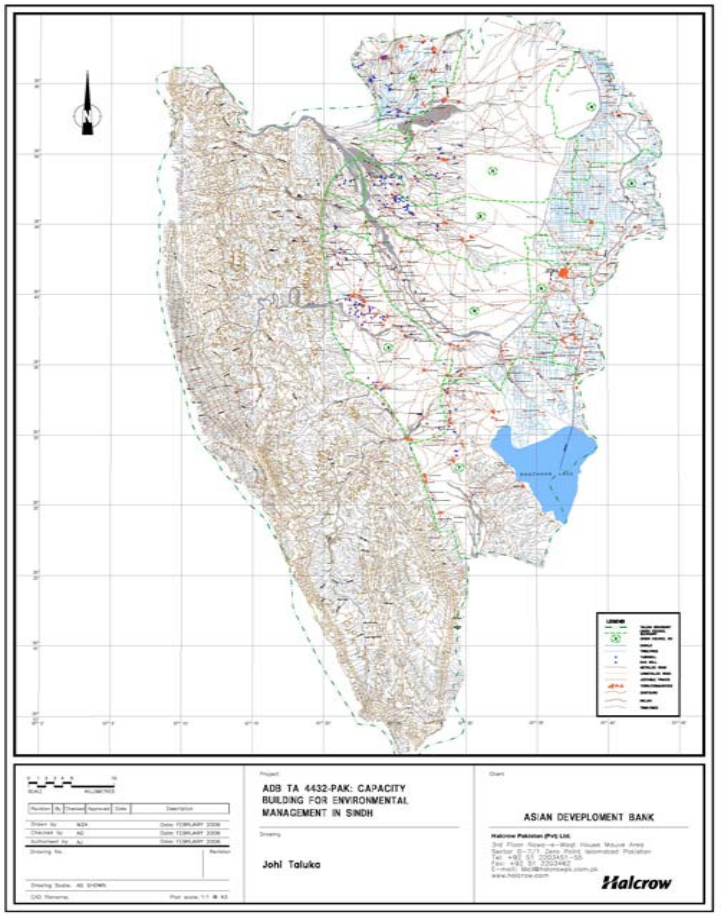
Johi Taluka – Strategic Plan for Water Supply and Sanitation – 2006-2012

1 BACKGROUND

1.1 Overview of Johi Taluka

1. Johi is one of the Taluka of Dadu District. The River Indus flows along the eastern boundary of the district. There is no other river in the district except numerous water courses which drain the hills and are known as Nais. Some of them are Gaj, Baran, Sann and Sol. The Mancher lake located in the taluka is the biggest natural lake in Asia. The other important lake is Ganero about 16 kms from Mehar.
2. The climate of the district is intensively hot in summer and cold enough in winter. The southern area has moderate climate whereas Johi, Dadu, Mehar and Khairpur Nathan Shah talukas have extreme weather conditions. The average annual rainfall in the district is about 120 millimetres.
3. Johi Taluka had total population of 207,383 according to the 1998 census report, urban population in only Johi town as 17,997 (8.7%) and rural population as 189,386 (91.7%). The graph of population projection indicates estimated projected population based on the growth rate of 3.34 as provided in 1998 census report.





2 WATER SUPPLY

2.1 Urban areas

Johi

4. There are about 700 domestic connections and 10 commercial connections from municipal water supply. Source of municipal water supply is Johi canal. Available Storage of water does not serve the purpose during canal closure period. The canal has one month closure in winter and two month closure in summer. There are two overhead tanks, out of which one is working but that is also in very poor condition. Settled water is supplied without filtration and chlorination. Rate of domestic connection is Rs.30 per month and that of commercial is Rs.50 per month.

5. Ground water is sweet in major portion of the city. Motor pumps and hand pumps are common as Private Arrangement. This ground water is not a reliable source and if considerable quantity of water is drawn, it turns to brackish; the example is the tubewells installed for water works. Water vending is not practiced in the city.

6. Water is pumped from Johi Canal with the help of 40 HP pump and 10" dia pumping main for 24 hours. Water is stored in settling tanks and supplied to the city through Over Head Tank and direct pumping.

2.2 Rural areas

7. Sweet Ground Water is available in the most parts of the area; therefore as a Private Arrangement, hand pumps are common. These are shallow and chances are there to have Arsenic in it. In some areas, like Mureed Babbar, sweet water is not available at all. Here water ponds are used to store the canal water which is used for drinking without any treatment. There are a number of water supply schemes based on canal water, but these are not working due to the lack of coordination with irrigation or electric department or lack of VDA capability.

8. Unicef has installed hand pumps at depths 200 to 300 ft depth. Arsenic is less at deep wells.

3 SEWERAGE AND DRAINAGE

3.1 Urban areas

9. At present, open drains are used to carry waste water. Human excreta are discharged into these drains which is a environmental hazard in the streets of the city. There are two sewage pump stations in the city out of which one is in working but that is also not operated continuously and as a result waste water held up in the drains. Waste water is ponding in the vicinity of the pump stations. The open drains are also chocked due to lesser gradient and at some locations solid waste spillage into them. There exists oxidation ponds but presently they are not serving the purpose. Improvement in the drainage network and sewage pumping stations is required. Proper sewage treatment plants are also required.

10. Presently waste water is bye passing the disposal station no.1 and ponding in nearby area.

3.2 Rural area

11. In most of the rural areas, drainage system does not exist. In some villages, open drains are provided in main streets, which ultimately disposed of in to the fields. Because the water consumed is very less, therefore relative waste water is also less and makes no considerable trouble.

12. If water supply in the villages of water shortage is improved, some drainage system will also be required in those villages.

13. In some areas, open drains provide both surface drainage and carry sewage, with human excreta directly discharged into the drains.

14. The open drains get blocked due to a combination of inadequate maintenance, gradient and solid waste.

4 SOLID WASTE MANAGEMENT

4.1 Urban Areas

15. The TMA has contracted out the job of solid waste collection and disposal to a private contractor along with the hand carts and a tractor trolley. The contractor uses hand carts for primary collection of waste and stores on the street sides in form of open heaps. The tractor-trolley is used for secondary collection of the waste which is finally disposed off in form of open dumps on the out skirts of the town. No formal sanitary land filling is done.

16.

17. The overall collection efficiency is around 73% of the total generation which may be considered as adequate practically. But manual loading and unloading of tractor trolley and storage in form of open heaps is a source of health hazards and environmental pollution. Other major reasons for the situation are non provision of community bins, indiscriminate throwing of waste on the streets and disposal in form of open dumps. Only out door patient service is being provided in the civil hospital Johi presently. Therefore there are no problems regarding the healthcare wastes except that disposable syringes need to be destroyed, so that they are not reused. Women are responsible for managing waste at the household level but they are not adequately educated to deal with the problem in a sanitary manner.

4.2 Rural area

18. The problems in rural areas are much less severe compared with in the city. Waste generation rates are low, and there is a high organic content, making waste suitable for natural decomposition, or controlled composting.

19. Plastic bags are a growing problem in rural areas of the TMA, and there is lack of information on how to deal with this form of waste.

5 PRIORITIES

20. The Strategy Plan of the Taluka is based on the following priorities: *The need to involve the community in working with the TMA to reduce waste and increase efficiency through greater awareness and concern for the environment in general and of the Taluka in particular; This will be done through public awareness campaigns and a programme of concerted area-by-area campaigns;*

1. *The need to adopt more participatory and transparent processes of working by the TMA. This will be done through the use of the "planning wall" and other devices for making the public more aware of the TMA's programmes and priorities;*
2. *To involve the private sector and the community in working with the TMA in the delivery of WSS services as part of the component-sharing approach;*
3. *The need to rehabilitate and refurbish existing systems and schemes;*
4. *The need to improve the capacity and efficiency of existing and installed schemes and systems;*
5. *The need to take greater control over the resources and services of the Taluka. This will be done through building up an updated database and management information systems*
6. *Then, to improve and extend WSS services delivery to the new and expanding parts of the Taluka;*
7. *Once the TMA service delivery has improved, the priority will be to collect an increased portion of increased tariff and user charges*
8.

6 ISSUES

6.1 Water Supply

	House	Lane	Settlement
Johi	Piped water still not available in many houses.	Water pipes not laid in some areas of city	Water supply network inadequate, and in poor condition
	Timings and quantity of municipal water supply is not reliable and water often not reach in many areas.	Underground pipes are leaking and are in poor condition causing contamination of water	Canal water storage tanks have inadequate capacity to meet demand in canal closure period.
	Municipal water quality does not meet the drinking water requirements.	House connections are leaking and some laid through the sewage drains.	Untreated water is supplied.
	Lack of awareness about link between water quality and health	Water distribution can not be properly managed due to shortage of control valves	Water pumping stations are in poor condition
	Many connections are not registered with TMA		The quantity of water being supplied is not measured
	Wastage and poor water management at house hold level and poor plumbing causes wastage of water.		The quantity of water supplied is not enough to meet the basic needs
	Households reluctant to pay for water services		Both water tariff and collection efficiency are low.
			Revenue does not cover the O&M cost
			Topographic and infrastructure plans and information on existing system is not available
UCs			
Rest of Taluka	Safe drinking water is not available in most of the houses.		Most of the rural areas are not served with municipal water supply.
	Lack of awareness between water quality and health.		Ground Water and Canal Water are the sources at different locations.
			Some canals are non-perennial, and remain closed four to six months in a year. Perennial canals also close for 30 to 40 days in a year for maintenance purpose. Available water storage does not meet the requirements during canal closure period
			Canal water is suspected to be contaminated by upstream pollution including dumping of raw sewage.

	House	Lane	Settlement
			Data for planning and for proper operation and maintenance is not available.
			There are few water supply schemes but they are in-operational or functioning inadequately.
Financial	Budgeting is made difficult because of lack of information on contributions and commitments from district and provincial levels. Tariff structure is low and has no relation to expenses.		
Environment	Poor quality of water is a health hazard particularly for children. Intestinal disorders are endemic.		
Women	Women, particularly in rural areas, are responsible for water provision to the household. They are forced to fetch water over long distances, making it a tiring and wasteful task severely impacting on their ability to undertake other household tasks. The poor quality of water not only causes family health problems, but also makes other water-related tasks such as clothes washing and cleaning more difficult and time-consuming.		
UC1			
UC2			
UC3			
Institutional	TMA responsibilities are not clear because of the overlapping created by the re-designation of PHED. For example TO(I&S) has been placed under the command of the PHED. The PHED will supervise the O&M of water supply and drainage schemes of major cities. O&M responsibility for the vertical projects such as water Filtration Plants has been put on the TMA. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001.		

6.2 Sewerage and Drainage

	House	Lane	Settlement
Johi	Toilet facility is still not available in some of the houses	Most open drains are usually blocked with refuse	Untreated disposal into fields
	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	All open drains carry human excreta	Inadequate Trunk Sewer network coverage
	Lack of awareness about link between sanitation and health	Underground pipes exist in some parts of the urban area but most are in poor condition	Sewage Treatment Plants are not functioning therefore there is no treatment of sewage
			Pump Stations in poor condition. Sewage held up there.
Rest of Taluka	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	No facility in most of the area	Most of the area is un-served.

	House	Lane	Settlement
	Lack of awareness about link between sanitation and health	All open drains carry human excreta	Existing Sewerage Schemes in rural areas are not functioning or functioning inadequately
			Untreated disposal into fields
UC1			
UC2			
UC3			
Institutional	Major projects are being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001 Maps and Data of existing system is not available.		
Financial	Budgeting is made difficult because of lack of information from district and provincial levels.		
Environment	Open drains with faeces discharged directly from household toilets are a common sight. Drains blocked by polythene bags and leaking pipes cause ponding. This is particularly hazardous in lanes and residential areas where children play around untreated sewage. The discharge of untreated sewage for use in agriculture is harmful to both agricultural workers and consumers of the produce.		
Women	The lack of toilets or poor facility in some houses is particularly onerous for women who are forced to curtail their activities and functions.		
Public Toilets	Absence of public toilets in urban areas, especially for women, severely limits activities and leads to open urinating		

6.3 Solid Waste Management

	House	**Lane/ Neighbourhood**	**Settlement**
Johi	Waste is mixed, thus reducing potential for composting and reducing value of recyclables	Incomplete sweeping of lanes due to large amounts of waste is thrown on the streets, low -attendance of sweepers and low-productivity	TMAs collection fleet collects 73% of the total wastes generated, but the system is unhygienic, exposes the workers to waste and is not environment friendly
	Waste thrown on streets, thus increasing sweeping work and choking sewers and drains	Sweepers use inefficient tools and poorly designed handcarts, thus reducing efficiency and exposing workers to occupational diseases	Ad hoc disposal facilities threatening public health and the environment
		Indiscriminate dumping on streets and littering habits make the streets look filthy	
	No door-to-door collection system, encouraging indiscriminate dumping on streets	Poorly maintained and designed transfer points resulting waste scattering on street sides	Waste pickers operating at dump sites, posing a threat to themselves
		Scavengers working on the streets can scatter waste, and susceptible to health problems	Inefficient equipment for secondary collection

	House	Lane/ Neighbourhood	Settlement
		Polythene bags spread around make the city look filthy, and caused choking of sewers and drains	Health risks from present final waste disposal practices (e.g. groundwater pollution, air pollution, disease I vectors)
		Health risks from rotting piles of waste on streets/at transfer points	Health risks from lack of separate Healthcare waste management
		Health risks from blocked drains and sewers	
		Manual handling of waste when loading and unloading is dangerous and inefficient	
Rural areas			Plastic waste is a problem throughout rural areas and hinders composting of waste
Community participation	Lack of community engagement in solid waste management activities	No community based organization working in solid waste management.	
Institutional		No NGOs working in the field of solid waste management.	Lack of technical knowledge within TMA on solid waste management practices
Finance	Required contributions from householders provided with door-to-door collection services		Lack of funds hinders investment and planning in solid waste management
Environment		Degradation of town environment as a result of indiscriminate dumping on streets	Environmental pollution from uncontrolled disposal of waste
Women	Women lack education on problems caused by improper management of solid waste		No public awareness messages targeted at women
Private sector	Potential for informal-sector/small enterprises to undertake door-to-door collection services not being tapped.		Solid waste management contracted out for the town needs further improvement.
Hospitals	Healthcare waste can expose hospital staff, sanitary workers and citizens to health risks, specially when indoor service is also started.		
Schools	Due to storage of solid waste in open heaps, schoolchildren and staff are exposed to health risks.		
Commercial	Demolition and construction waste is presently mixed with other municipal wastes, and remains on the streets in commercial areas awaiting collection. It is a source of health risks as well as traffic hazard. Shopkeepers throwing waste onto the streets further aggravate the problems.		
Public awareness	Lack of public awareness about health impacts of poor solid waste management practices		Lack of awareness about Healthcare waste amongst professionals and public

7 STRATEGIC PLAN

7.1 Water supply

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
House Level									
All households should have individual house connections and charged according to usage	Johi								Households
Public awareness campaign for the connection between water quality and health.	Johi								SDSSP
Raw Water Storage									
Carry out de-silting/ repair of existing raw water storage tanks									SDSSP
Construct new raw water storage tanks to meet current and expected demand									SDSSP
Water Treatment									
Construct water treatment plant									SDSSP
Water Distribution									
Repair and replace pipes and house connections in poor condition and provide additional control valves.									SDSSP
Extend piped network to provide full coverage									SDSSP
Rehabilitate pump stations									TMA
Build (over-head) storage tanks									SDSSP
Planning									
Proper topographic survey, inventory of all civil and mechanical works. Compilation of information and preparation of the maps on some computer software with marking/ connecting the relative information.									SDSSP
Draw up and introduce a programme of regular maintenance of water supply system including network, treatment plant, pumping stations and storage tanks.									SDSSP
Cost Recovery									
Investigate and introduce a programme to increase Water Tariff and Revenue Collection.									TMA
Computerized billing system and proper updating of consumers record by field survey.									SDSSP
Install meters at different main lines to measure the quantity of water to be supplied.									SDSSP
Consider component-sharing through involvement of community and/or private sector, for example Private/community contractors to purchase bulk water from TMA –and distribute to households through Community/group metered supply									TMA
Rehabilitation Of Existing Rural Schemes	**Other UCs**								
Rehabilitation of existing water supply schemes after consultation with the community for the demand and O&M responsibility	Other UCs								SDSSP
New Rural Schemes									

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	
Arrange land acquisition and construct water storage tanks	Other UCs								SDSSP
Arrange land acquisition and construct water treatment plant consisting of slow sand filter	Other UCs								SDSSP
Planning									
Continuous liaison and coordination with irrigation department on regular supply of water to operate existing water supply schemes.	Other UCs								TMA
Collect data of each settlement regarding the ground water condition, distance of the nearest water source etc. and plan for water supply schemes.	Other UCs								SDSSP

7.2 Sewerage and drainage

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	
Lane Level Drains And Sewers									
Targeted action to unblock drains – area by area; accompanied by public awareness campaign									TMA
Cover the open drains or replace with underground pipe									SDSSP
Extend underground pipe network on a lane by lane basis									SDSSP
Trunk Sewers And Pump Stations									
Gradually repair and replace underground trunk sewers and pump stations.									SDSSP
Provide Additional Trunk Sewers and Pump Stations									SDSSP
Treatment									
Repair existing sewage treatment plants									SDSSP
Provide additional treatment plants									SDSSP
Cost Recovery									
Sell treated sewage effluent as fertiliser									-
Planning									
Prepare Map and Data of existing system									SDSSP
House Level									
Public awareness campaign to install toilets in low density areas, encourage installation of individual Ventilated Improved Pit (VIP) Latrine	Other UCs								SDSSP
Lane Level									

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	
Targeted action to unblock drains – area by area; public awareness campaign.	Other UCs								TMA
Cover the open drains or replace with underground pipe.	Other UCs								SDSSP
Trunk Sewer And Pumping Station									
Repair existing Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Provide Additional Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Sewage Treatment Plant									
Repair existing sewage treatment plants.	Other UCs								TMA
Provide additional sewage treatment plants.	Other UCs								SDSSP
Rehabilitation									
Rehabilitation of existing drainage schemes after consultation with the community for the demand and O&M responsibility.	Other UCs								SDSSP
Planning									
Plan new drainage/ sewerage schemes after consultation with community.	Other UCs								SDSSP
Public Latrines									
Provide public latrines at important places	Johi								SDSSP

7.3 Solid waste management

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	
Onsite Storage and Processing								
Introduce 2-bin system for wet and dry waste in household								Households
Initiate home composting in barrels where space allows and appropriate								Households/ TMA/ NGO
Street Waste Management								
Provide litter bins on main streets for pedestrians' use								TMA/NGO/CBO
Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors								TMA
Enforce provision of containers/ bags on public vehicles, vendors' carts								TMA

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Primary Collection/ Private Sector/ CBO								
Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers								TMA/CBO/Private Sector
Communal Storage								
Purchase demountable containers ($5m^3$) as communal storage facility								TMA/SDSSP
Secondary Collection/ Private Sector								
Purchase hydraulic tractor container carrier system for use with demountable containers to replace the present manually loaded tractor trolley								TMA/ SDSSP
Treatment and Final Disposal								
Improve and rehabilitate present disposal practices in line with basic public health and environmental standards (levelling and providing soil cover)								TMA
Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant								TMA/SDSSP
Central compost plant								TMA/ Private Sector
Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available								TMA/ CBO/Private Sector
Special Waste Management								
Awareness campaigns in hospitals								TMA/ District Health Department
Enforce provisions for demolition and construction waste disposal								TMA/Private Sector
Awareness Raising								
Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment								TMA/NGO
Public awareness raising campaign for rural areas, providing information on composting and basic disposal								TMA/NGO
Hold a series of cleanup campaigns								TMA/NGO/CBO
Introduce public complaints system by establishing a complaint cell								TMA
Legislation								
Ban open burning of waste on streets and at final disposal points								TMA
Introduce anti-littering laws								TMA
SWM Fee								
Introduce fee systems for commercial producers of waste								TMA
Introduce fee system for door to door collection								TMA

SUPPORTING INFORMATION

1 GENERAL

1. Johi is a Taluka of Dadu District, which drives its name from the headquarter town Dadu. The district is bounded on the north by Larkana district, on the east by Naushehro Feroze, Nawabshah and Hyderabad districts, on the south by Thatta district, on the south-west by Malir district and Lasbela and Khuzdar districts of Balochistan province.

2. The River Indus flows along the eastern boundary of the district. There is no other river in the district except numerous water courses which drain the hills and are known as Nais. The most of them is Gaj, the other Nais are Baran, Sann and Sol. The Mancher lake is the biggest natural lake in Asia. When it is in full capacity it covers an area of 259 square kilometers at its maximum and when it shrinks, it covers an area of 52 square kilometers at its minimum. Apart from being a storage of fish, it is also a source of water irrigating about 20,000 to 25,000 acres of land. The other important lake is Ganero about 16 kilometers from Mehar.

3. The climate of the district is intensively hot in summer and cold enough in winter. The southern area which consists of taluka Kotri, Thano Bula Khan and major part of Sehwan have moderate climate whereas Johi, Dadu, Mehar and Khairpur Nathan Shah talukas have extreme weather conditions. The average annual rainfall in the district is about 120 millimeters.

4. Dadu District comprises of seven talukas; according to census report of 1998, it's population distribution and urban proportion is as follows.

TALUKAS, POPULATION AND URBAN PROPORTION IN THE DISTRICT

Administration Unit	**Population**	**Urban Proportion**
Dadu District	1,688,811	21.4
Dadu Taluka	327,972	33.4
Johi Taluka	207,383	8.7
Khairpur Nathan Shah Taluka	253,309	19.7
Kotri Taluka	307,679	22.7
Mehar Taluka	318,053	16.3
Sehwan Taluka	170,589	28.8
Thano Bula Khan Taluka	103,826	12.2

5. Johi Taluka has urban population in only Johi town as 17,997 (8.7%) and rural population as 189,386 (91.7%). The details are provided in Table B3-1 and B3-2

6. Johi town comprises of 2,972 houses, out of which 1,359 houses (46%) have facility of potable water and 780 houses (26%) have latrine facility. The map of Johi Town is provided in Figure A3-1.

Table A3.1: POTABLE WATER FACILITY IN RURAL AREAS OF THE TALUKA

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
JOHI TALUKA	189,386	36,968	1,819	4.92
CHHINI STC	33,481	6,986	61	0.87
ADDL. CHHINI TC	3,164	674	2	0.30
CHHINI TC	3,831	861	13	1.51
KHARICHH TC	2,470	444	2	0.45
PIR GAJI SHAH TC	3,096	777	2	0.26
SAKRO TC	2,617	570	2	0.35
SHAH HASSAN TC	4,133	817	7	0.86
TANDO RAHIM KHAN TC	7,615	1,448	3	0.21
TORI TC	6,555	1,395	30	2.15
HAJI KHAN STC	52,490	10,254	523	5.10
BAKHIR SHAHID TC	11,668	2,292	137	5.98
DRIGH BALA TC	12,502	2,419	9	0.37
HAJI KHAN TC	4,959	1,001	139	13.89
QUBO QALANDAR TC	5,752	1,159	15	1.29
SHADMAN TC	5,574	1,050	6	0.57
WAHI PANDHI TC	12,035	2,333	217	9.30
JOHI STC	66,794	12,642	784	6.20
ADDL. BAHAWALPUR TC	8,031	1,546	105	6.79
ADDL. CHANA TC	5,297	952	1	0.11
BAHAWALPUR TC	8,277	1,400	11	0.79
BUTHI TC	2,294	436	3	0.69

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
CHANA TC	3,423	617	11	1.78
DARAMACHI TC	8,193	1,814	43	2.37
JOHI TC	8,198	1,500	385	25.67
KURJAMAK TC	5,750	1,089	-	-
PHULJI TC	7,931	1,582	208	13.15
SARANJHRI TC	9,400	1,706	17	1.00
NAI GAJ STC	36,621	7,086	451	6.36
ADDL. THARIRI JADO SHAHID TC	3,653	590	1	0.17
HAIRO KHAN TC	10,029	1,983	52	2.62
PAT GUL MUHAMMAD TC	6,381	1,353	2	0.15
RAJODERO TC	4,730	991	1	0.10
THARIRI JADO SHAHID TC	5,638	1,031	54	5.24
TOR TC	6,190	1,138	341	29.96
* STC = Supervisor Tapedar Circle				
TC = Tapedar Circle				

1.1 On-going Projects

Following are on-going Water Supply projects

1. Rehabilitation of WS Scheme Phulji village MRs. 2.4
2. Rehabilitation of WS Scheme Pir Gaji Shah MRs. 1.0
3. Construction of Shallow Well Pir Bado Sain MRs. 0.35
4. Low Level tanks 4 nos in village Ibrahim Leghari MRs. 0.20
5. Repair of well and construction of low level tank in Rustamani Mohalla Wahi Pandhi MRs. 0.15
6. Repair of well in Wahi Pandhi MRs. 0.10

7.	Water supply and brick soling in Kamal Khan	MRs. 0.15
	Total	**MRs. 4.35**

Following are the sanitation projects

1.	Surface drains and brick soling in Johi Town	MRs. 0.945
2.	Brick soling from Phulji Village to Faiz Mohd Qambrani	MRs. 0.075
3.	Brick soling from Joh road to Qasim Jamali	MRs. 0.175
4.	Brick soling and surface drains in Bahota Mohallo ward-1 Johi	MRs. 0.200
5.	Brick soling and surface drains in Khosa Mohallo Johi	MRs. 0.175
6.	Brick soling and surface drains from Ali Akbar House to Mrs. Noor Khatoon House Johi	MRs. 0.200
7.	Brick soling in village Patt Gul Muhammad	MRs. 0.200
	Total	**MRs. 2.00**

2 WATER SUPPLY SYSTEM

2.1 Urban Area

7. There are about 700 domestic connections and 10 commercial connections from municipal water supply. Source of municipal water supply is Johi Canal. Available Storage of water do not serve the purpose during canal closure period. Settled water is supplied without filtration and chlorination. Water distribution system also requires rehabilitation and improvements. Rate of domestic connection is Rs.30 per month and that of commercial is Rs.50 per month.

8. Ground water is sweet in major portion of the city. Motor pumps and hand pumps are common as Private Arrangement. This ground water is not a reliable source and if considerable quantity of water is drawn, it turns to brackish; the example is the tubewells installed for water works. Water vending is not practiced in the city.

9. Taluka Nazim told that UNICEF took samples of about 40 hand pumps, but they have not seen the results. They have heard indirectly about presence of Arsenic.

10. Water is pumped from Johi Canal with the help of 40 HP pump and 10" dia pumping main for 24 hours. Water is stored in settling tanks and supplied to the city through Over Head Tank and direct pumping. There are two overhead tanks, out

of which one is working but that is also in very poor condition. At time of visit, canal was closed and water from tubewells was being mixed at ground Water Tank. Water of the tubewells was saline. The canal has one month closure in winter and two month closure in Summer. Upstream of canal, there is no source of contamination, except that people sometimes throw dead animals in the canal.

2.2 Rural Areas

11. Sweet Ground Water is available in the most parts of the area; therefore as a Private Arrangement, hand pumps are common. These are shallow and chances are there to have Arsenic in it. In some areas, like Mureed Babbar, sweet water is not available at all. Here water ponds are used to store the canal water which is used for drinking without any treatment. Unicef has installed hand pumps at depths 200 to 300 ft depth. Arsenic is less at deep wells.

Haji Khan Goth

12. In Water Works there is one tubewell working. Bore is working for 13 years. 15HP motor was installed, which was insufficient and burnt. Now another motor is installed in the pump room at some distance and connected with the tubewell old motor with a belt. Now it is working satisfactory. No water fee in the Goth. Hand pumps are not successful in the Goth. One was installed even at depth of 130 ft, but the water was saline. Tubewell is at depth of 200 ft. Approximately all houses are connected with the water supply scheme.

Pir Mashakh

13. Pir Mashakh Goth is extremely suffering the problem of drinking water. A scheme was constructed taking water from Atti Shakh (water coarse No.8) which is a branch from Johi Branch. This scheme was to provide water to about four villages. Water came in this water coarse for only 30 days in year in these days. Water from here is pumped to the water works, where two settling water ponds are provided. Pump room is there and water can be pumped to the villages. Water lines were provided with house connections. Present status of this scheme is that the electric line to the pump station at the water coarse is stolen. Electric poles are there but without the electric cable. Therefore it is now not working at all. Pipes in the villages, plumbing in the houses and water taps are damaged. There are hand pumps in the water works near the settling tanks. Women of the nearby villages bring water from these hand pumps. The distance to travel for this water is about 2 kms. Even then this source is not reliable for longer time. Rehabilitation of the water supply scheme is required, may be change of water source is also required. Possibility of tubewell at some distance may also be studied, if it will successful, the water supply will be easy.

Mureed Bubbar

14. One water pond is constructed and water comes to this pond through an unlined channel from Johi Branch. No arrangement is pumping water and distribution. From this pond water is taken manually, mostly by the women for the house hold use. One another Ground Water tank was constructed near Johi Branch with pumping

arrangement, but during flood, pipe line was damaged during flood. Now in summer, water do not reach the pond which is near village and people have to bring water from more distant Ground Water Tank near Johi Branch.

3 SEWERAGE AND DRAINAGE SYSTEM

3.1 Urban Area

15. At present, open drains are used to carry waste water. Human excreta is discharged into these drains which is a environmental hazard in the streets of the city. There are two sewage pump stations in the city out which one is in working but that is also not operated continuously and as a result waste water hold up in the drains. Waste water is ponding in the vicinity of the pump stations. The open drains are also chocked due to less slopes and at some locations, solid waste spillage into them. There exists oxidation ponds but presently they are not serving the purpose. Improvement in the drainage network and sewage pumping stations is required. Proper sewage treatment plants are also required.

16. Sewage Pumping Station #2 is located on road to Phulgi. It is in working condition. There is a depression, which is filled with sewage and used as oxidation pond after which it is used for irrigation.

17. Sewage Pumping Station #1 is not in working, because people do not allow to throw sewage in their fields and also there is no transformer available. Now some people wants sewage but the pumping main is on the other side therefore, waste water can not be provided to the willing people. Presently waste water is bye passing the disposal station and ponding in nearby area.

3.2 Rural Areas

18. In most of the rural areas, no drainage system is there. In some villages, open drains are provided in main streets, which ultimately disposed of in to the fields. Because the water consumed is very less, therefore relative waste water is also less and makes no considerable trouble.

19. If water supply in the villages of water shortage is improved, some simple drainage system will also be required in the villages.

3.3 Legislation

20. There is Pakistan Environmental Protection Act 1997, which governs the pollution of water bodies, waste water disposal standards, but there is no practical enforcement of the act in the taluka. Any other Law, regulation, standard or guideline do not exist at national, provincial, district or local levels regarding drinking water supply, sewerage or drainage. For drinking water, WHO guidelines are generally referred in practice by the provincial departments but these are not being implemented in letter and spirit.

3.4 Private Sector Participation

21. There is no private sector participation in the fields of potable /drinking water, sewerage or drainage in the taluka.

3.5 Main Issues and Constraints

i) Responsibilities of Taluka, District and Public Health Engineering Department are not clear.
ii) TMA has not sufficient data of the water supply and sewerage systems in the Taluka.
iii) TMA has not a complete list with necessary details and drawings of its assets in shape of water and drainage components. These include land, structures, pipes, machinery etc in urban and rural areas.
iv) There is no system for water quality monitoring.
v) There is no comprehensive Master Plan of TMA regarding water and sanitation especially for rural areas.
vi) Existing water works and disposal stations need improvements.
vii) The operation of existing disposal stations also needs improvements. It should be planned in such a way that waste water should not hold up in the drainage network.
viii) In rural areas, although the problem of waste water is less than the urban areas, but waste water is ponding and spreading in the streets or open areas of the villages.
ix) Human excreta and solid waste is being thrown in drains.

4 SOLID WASTE MANAGEMENT SITUATION

4.1 General

22. The current practices of solid waste management in the town are explained in stepwise form in the following paragraphs. Performance analysis has also been carried out at the end.

4.2 Storage and Collection

23. The storage and collection system of solid wastes in the town is either inadequate or inappropriate. The collection of waste is entrusted to a contractor for one year, who is paid Rs.98000 per month. There are innumerable informal communal storage locations in the town where the waste is temporarily stored in form of the open heaps on the sides of the streets and at number of places in the centre of the streets (in congested areas). The situation gets aggravated when the heaps of waste pour down into the open drains where choking and wastewater spillage is seen quite often.

4.2.1 Primary Collection

24. Primary collection is the shifting of wastes from individual premises, i.e., homes, shops, offices, institutions etc., to communal storage places. The sanitary workers shift the wastes from smaller street side heaps to somewhat bigger heaps/filth depots, with the help of handcarts.

25. House to house collection is virtually non-existent. In certain cases the sanitary workers who are assigned the job of sweeping and collection of wastes from the street sides also serve a few households informally.

4.2.2 Secondary Collection

26. The tractor trolley then serves these bigger heaps. The tractor trolleys shift the solid wastes to various open dumping sites haphazardly.

4.2.3 Vehicles and Equipment

27. The description of collection vehicles and equipment used in the town is given in Table A3-1. Data from discussion with TMA staff.

Table A3-1: Vehicles and Equipment

Type	Capacity (m^3)	No	Condition
Hand Carts (wheel barrows) old	0.1	10	Satisfactory
Hand Carts(wheel barrows) new	0.1	30	Good
Trolleys with Tractors	4.2	1	Average
Trolley with Tractor	4.2	1	Good

4.3 Sludge and Grit Collection

28. Due to quite an amount of solid wastes being thrown into the open drains, blockages are very common. The municipality's sanitary workers are deployed for extracting sludge and grit from the system. After drying in open this sludge and grit is also picked up by hand carts or tractor trolleys.

4.4 Recovery of Recyclables

29. The recyclable materials in wastes, like paper, board, plastics, metals and glass are either separated at source by the owners or by the scavengers from the street side open heaps. There are a number of shops in the town dealing with the recovered materials which channelise them to the recycling industries in other cities.

4.5 Disposal

30. Quite a portion of the wastes collected with the help of hand carts are open dumped in the vacant plots or low lying areas within the town or on the periphery. The tractor trolleys shift the wastes to open dumps on the periphery of the town.

4.6 Special Wastes

4.6.1 Slaughterhouse Wastes

31. There is no slaughterhouse built in the town. The animals are slaughtered within the town at the convenience of the butchers. The wastes are thrown just nearby or collected by tractor trolleys to be open dumped at a distance along with other municipal wastes.

4.6.2 Hospital Wastes

32. Only outdoor service is being provided in the civil hospital. The solid waste of Tehsil Head Quarter Hospital consisting of used cotton, bandages, and syringes etc., is disposed off within the hospital's compound in a pit. Before disposal the used syringes are cut by cutting machine.

4.6.3 Dead Animals

33. There is no separate arrangement for disposal of carcasses of the dead animals. They are collected alongwith other municipal solid wastes and buried alongwith the solid wastes in open dumps.

4.6.4 Demolition and Construction Waste

34. Most of the demolition and construction wastes are reused. Only a small portion is thrown out on the street sides. The generators of such wastes are responsible to dispose them off. But the municipality has to take care of the situation without any income.

4.6.5 Industrial Wastes

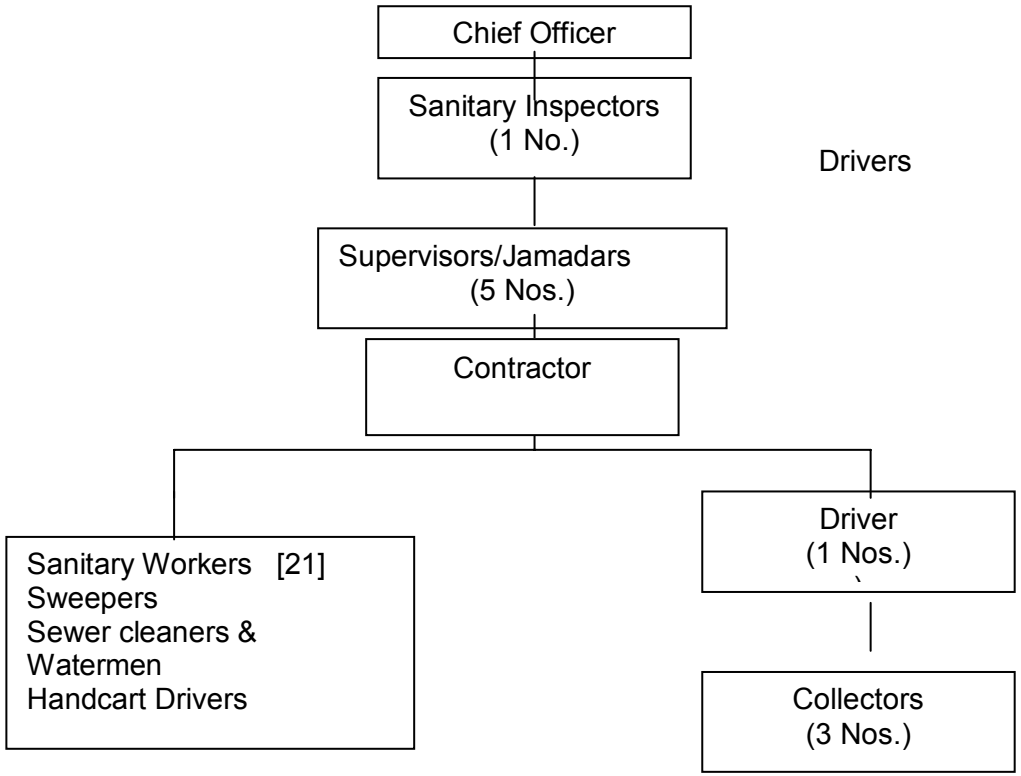
35. No industry has been installed in and around the town.

4.7 Staff and Organization

36. Presently there is one driver and 24 sanitary workers in total, which are on work charged basis and are working with the contractor. On daily basis they are deployed for sweeping, as drain cleaners and watermen, as collectors on tractor trolley, and work as handcart drivers. The sanitary workers are supervised by 5 Jamadars and the jamadars work

under one Sanitary Inspector. The overall organization is shown in Figure A3-2.

Figure A3-2: Present Organization Chart of Sanitation Section Johi



4.8 Private Sector Participation

37. In Johi town the job of solid waste management comprising of street sweeping, primary collection, secondary collection and final disposal has been entrusted to a contractor. This practice was started in the year 2004-05 and has been repeated in the year of 2005-06.

38. The conditions of contract include the leasing of a tractor trolley and hand carts to the contractor, and payment at a rate of Rs.98000/month. No staff has been given to the contractor and he has hired staff, which is working on the worked charged basis.

4.9 Community Participation

39. No such activity has been noted in the town. Actually solid waste management issues appear to be a low priority.

4.10 Public Awareness

40. Public awareness is very necessary to get their cooperation for efficient managements of solid waste. But no such effort has been launched in the town.

4.11 Legislation (Laws, Regulation, Standards, Guidelines)

41. Various type of legislation including laws, rules, guidelines exist at National and Provincial levels dealing with solid waste management. These include:

- Ordinance to prohibit manufacture, sale and use of black plastic polythene bags including polythene bags below 30 microns in thickness in the Sindh province. March 2006.
- Guidelines for Hospital Waste Management EPA, Sindh.june 2004 Rules 2005. Gazette of Pakistan.2005.
- Hospital Waste Management Rules 2005. Gazette of Pakistan.2005.
- (Draft) Guidelines for Solid Waste Management. Pakistan EPA. June 2005.

42. But there appears to be a lack of awareness regarding these documents in the community.

4.12 Performance Analysis

43. Based on the data obtained through discussion with TMA staff, the system performance can be evaluated in terms of collection efficiency i.e. the ratio between wastes collected and wastes generated, cost of collection/ton, staff employed per 1000 population, cost per inhabitant It is done in the following sub-sections, The results are presented in Tables 3.1 and 3.2. Drawbacks noted in the present system are also given separately.

4.13 Collection Efficiency

44. Table A3-2 shows the data (year 2006) regarding total collection per day. The figures reveal the total number of vehicles deployed, average trips made by each vehicle per day and the average amount of waste carried per trip. The total waste collected on the average is 7.5 tons/day while the generation rate is 10.25tons/day. This gives a collection efficiency of 73%.

Table A3-2: Haulage Capacity of TMA Collection Vehicles

Sr. No.	Type of Vehicle	No. of Vehicles	Total Avail-able	Trips/ Vehicle/ day (No.)	Average Weight/ Trip (Tons)	Total Weight Carried (Tons)
1.	Tractor Trolley	1	1	3	2.5	7.5
					Total:	**7. 5**

Total Generation/day = $29296 \times 0.35 = 10.25$ tons

Collection Efficiency = $\frac{7.5}{10.25}$ = 73 %

4.14 Cost per Ton Collected and per Inhabitant

Wastes collected per day = 7.5 tons and cost/ inhabitant/ year is Rs.

Waste collected per year (for year 2005) = $7.5 \times 365 = 2738$ tons

Total expenses incurred/year = Rs. 1,504,790

(data from TMA Office Files. NB – These are different from budget)

Cost/Ton = $\frac{1504790}{2738}$ = Rs. 550

Population for year 2006 = 29296

Cost/inhabitant = $\frac{1504790}{29296}$ = Rs. 51

4.15 Staff per 1000 Inhabitants

No. of staff = 131 (From Section 2.11)

Population = 55615

Staff/1000 inhabitants = $\frac{31 \times 1000}{29296}$ = 1.06

Table A3-3: Present System Performance Indicators

Collection Efficiency	Cost per Ton	Cost per Inhabitant	Staff per 1000 Population
%	(Rs.)	(Rs.)	Ratio
73 %	550	51	1.06

4.16 Drawbacks/Deficiencies in the Present System

45. Drawbacks and deficiencies have been noted at all the stages of the present system i.e. communal storage, street cleansing, collection vehicles like handcarts and tractor trolleys, and disposal in the form of open dumping. They are delineated in the following paragraphs. With the adoption of the new system, they will be well taken care.

4.17 Communal Storage

46. The communal storage takes place in the form of small street side heaps.

    1. A consequence of scavenging activity and wind action result in waste from these heaps being scattered all over the surrounding areas.
    2. Rodents become active in these heaps. Similarly these become the breeding places for larvae of the flies and scores of other disease-causing organisms
    3. These are a constant source of obnoxious odours leading to pollution of local environment.
    4. Manual loading of collection vehicles is a source of professional diseases, and wastage of time.

4.18 Street Cleansing

47. Hand tools and other equipment used during sweeping and collection are of low-standard and poor design. Therefore, the sweepers cannot give a satisfactory output. Major drawbacks are:

i) As a general practice sweepings are placed on the sides of the streets and roads, in open heaps making the condition of streets shabby.

ii) Brooms have handles of shorter length on account of which sweeping efficiency is reduced.

iii) Sweepers are hardly provided with any replacements for the damaged tools and equipment.

iv) Supervision on performance of the sweepers by the supervisory staff is generally lacking.

4.19 Hand Carts

i) Hand carts are of poor design (wheel barrows) and low capacity.

ii) The carried wastes can only be tipped on the ground and not in a metallic container.

iii) It is cumbersome to drive these carts as they have only one wheel.

4.20 Tractor Trolleys

i) Time spent/trip is over 2 hours, which is quite long.

ii) Inaccessible areas are left uncovered.

iii) Collection vehicles are required to collect the scattered heaps of waste, thus spending unwanted time en-route to the dumping site.

iv) Manual loading and unloading of the vehicles is un-economical in terms of time and effort.

v) Collectors come in physical contact with the waste, due to which they are liable to be affected by occupational diseases.

vi) Littering is caused by uncovered collection vehicles.

4.21 Open Dumping

i) Disease causing vectors are spread all around the dumping ground thus causing a constant health hazard for the surrounding population. Open dumping makes the area unsightly.

ii) Because of wind action components like paper and polyethylene bags are seen scattered in the adjoining areas.

iii) Groundwater pollution is not unexpected during rainy season.

4.22 Strength and Weaknesses of Solid Waste Management Activities

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
1	Introduce 2-bin system for wet and dry waste in household	- Improves quality and quantity of recyclable materials, and enables composting	- difficult to enforce, and requires major change in household habits. Could take many years.				100
2	Initiate home composting in barrels where space allows and appropriate	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting		2000/ barrel		
	Street Waste Management/ Private Sector						
3	Provide litter bins on main streets for pedestrians' use	- Potentially low-cost way of reducing littering, and therefore cost of labour to sweep	- Would have to be introduced along with anti-littering legislation and public awareness campaigns to be effective	60,000 (for 100 bins)	600/ bin	15,000	150/ bin
4	Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors	- improved health and safety of staff - increased productivity	Extra cost for improved tools	5,400/ cart (100hh served)	54	2,700 (100hh served)	27
5	Enforce provision of containers/ bags on public vehicles, vendors' carts, covers on sand, bricks carriers	- Stops littering of streets - Saves time of street sweeping - Clean streets	- Little extra cost				10-100/ veicle
	Primary Collection/ Private Sector/ CBO						
6	Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers	-Zero cost for TMA -Sweepers' work will become more efficient as less waste dumped on to streets - provides livelihoods for poor	- could take many years to establish community-based organisations - Systems would require contributions from householders. Would they pay? - Can be difficult to organise waste pickers	TMA equipment leased			300
	Communal Storage						

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
7	Purchase demountable containers (5m^3) as communal storage facility	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- Experience in other countries suggests that if not properly manufactured and maintained can be problematic and containers can have short useful lives due to corrosion.	60,000/ container (750hh served)	80	14,000/ container (750hh served)	19
	Secondary Collection/ Private Sector						
8	Purchase hydraulic tractor container carrier system for use with demountable containers	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- high capital cost - Success depends on public behaviour, as if waste deposited around containers, very problematic. - extra space required	600,000/ vehicle (4500 hh served)	130	444,000/ vehicle (4500 hh served)	96
	Treatment and Final Disposal						
9	Improve and rehabilitate present disposal practices in line with basic public health and environmental standards	- Reduced threat to environment in public health - basic but significant improvements can be made for relatively low cost	- Some investment and expertise required				
10	Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant	- Less environmentally damaging -Reduced pollution of groundwater - In line with Annual Strategic Plan guidelines from the ADB	- Vested interests of drivers who sell waste may discourage dumping at site - Cost of developing and running site	1,520,000	70	532,000	25
11	Central compost plant (30 tons waste per day)	Recycles the organic matter which is useful for agriculture	Capital cost	3,260,000	92		
12	Initiate decentralised composting at	- Potential reduced volumes of solid waste for disposal	- Could take time to educate and convince people about	65,000	92		

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	neighbourhood level through community-based organisations, where appropriate/space available	- Environment friendly way of processing organic waste	composting				
	Special Waste Management						
13	Awareness campaigns in hospitals	-Reduced mixing of healthcare waste with municipal waste - Changes behaviour of waste generators	- Awareness raising campaigns can take time and cost money				
14	Enforce provisions for demolition and construction waste disposal as responsibility of the producer	- clearer highways/ streets	- Getting this funded may be difficult, but construction companies should contribute				
	Awareness Raising						
15	Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment	- likely cost-effective way of tackling many problems - If successful could result in increased recycling rates from separated waste, reduced dumping on streets, reduced labour requirements for sweeping, improved drainage	- Awareness raising campaigns can take time and cost money - Expertise in awareness raising required			50,000	
16	Public awareness raising campaign for rural areas, providing information on composting and basic disposal	- Could help solve problem of plastic disposal in villages	- Would need support of professionals to disseminate information			25,000	
17	Hold a series of cleanup campaigns	- Can be effective at giving visible results quickly, and thus attracting public support - Relatively low-cost option				25,000	
18	Introduce public complaints system by establishing a complaint cell	- makes public more willing to cooperate with TMA, and contribute to improved waste management services	- vital that systems of accountability are in place within the TMA so complaints can be followed up and affect change				
	Legislation						

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
19	Ban open burning of waste on streets and at final disposal points	- Reduced environmental pollution - popularity with local residents	- Difficulties of enforcing legislation				
20	Introduce anti-littering laws	- Potentially low-cost way of impacting urban environment, with benefits to public health, drainage and labour requirements for waste management	- Difficulties of enforcing legislation				
	SWM Fee						
21	Introduce fee systems for commercial producers of waste	- following the 'producer pays' principle, enables better services to be provided to the areas most needy – particularly shopping and industrial areas	- Possible resistance, so needs to be backed up with legislation and enforcement mechanisms				100
22	Introduce fee system for door to door collection	- Cost shared by the communities	- Difficult to realize from the communities				

Table B3-1: Urban Population Projections

TALUKA JOHI JOHI TOWN - UNION WISE PROJECTED POPULATION

	POPULATION 1998	HOUSING CHARACTERISTICS							AVERAGE HOUSEHOLD SIZE	PROJECTED POPULATION YEAR 2006 GROWTH RATE 6.28%	PROJECTED POPULATION YEAR 2012 GROWTH RATE 6.28%
		TYPE OF STRUCTURE				HOUSING FACILITIES					
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	LATRINE	ELECTRICITY			
1	2	16	17	18	19	20	21	22	23	11	12
*JOHI TC	17,997	2,972	863	637	1,472	1,369	780	2,139	6	29,296	42,220
*CHARGE NO 18	17,997	2,972	863	637	1,472	1,369	780	2,139	6	29,296	42,220
CIRCLE NO 01	12,433	1,991	406	522	1,063	799	374	1,196	6.2	20,239	29,167
CIRCLE NO 02	5,564	981	457	115	409	560	406	943	5.7	9,057	13,063

Table B3-2: Rural Population Projections

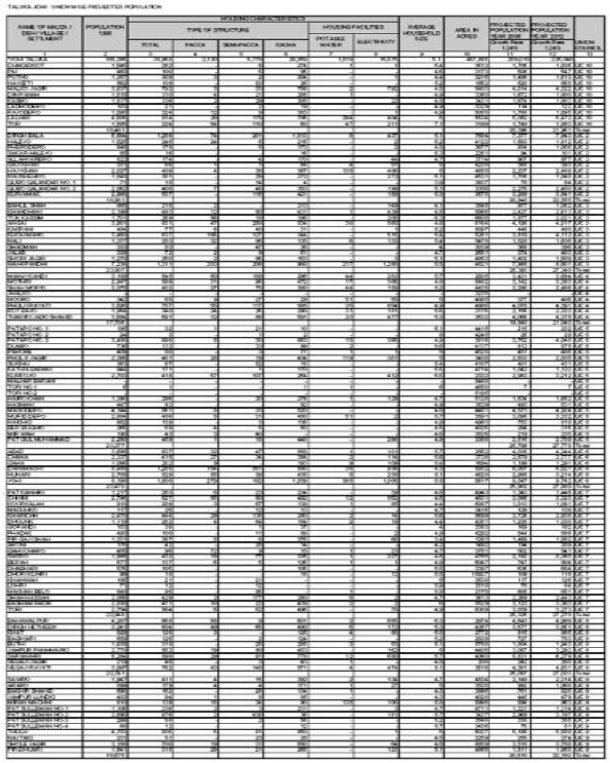
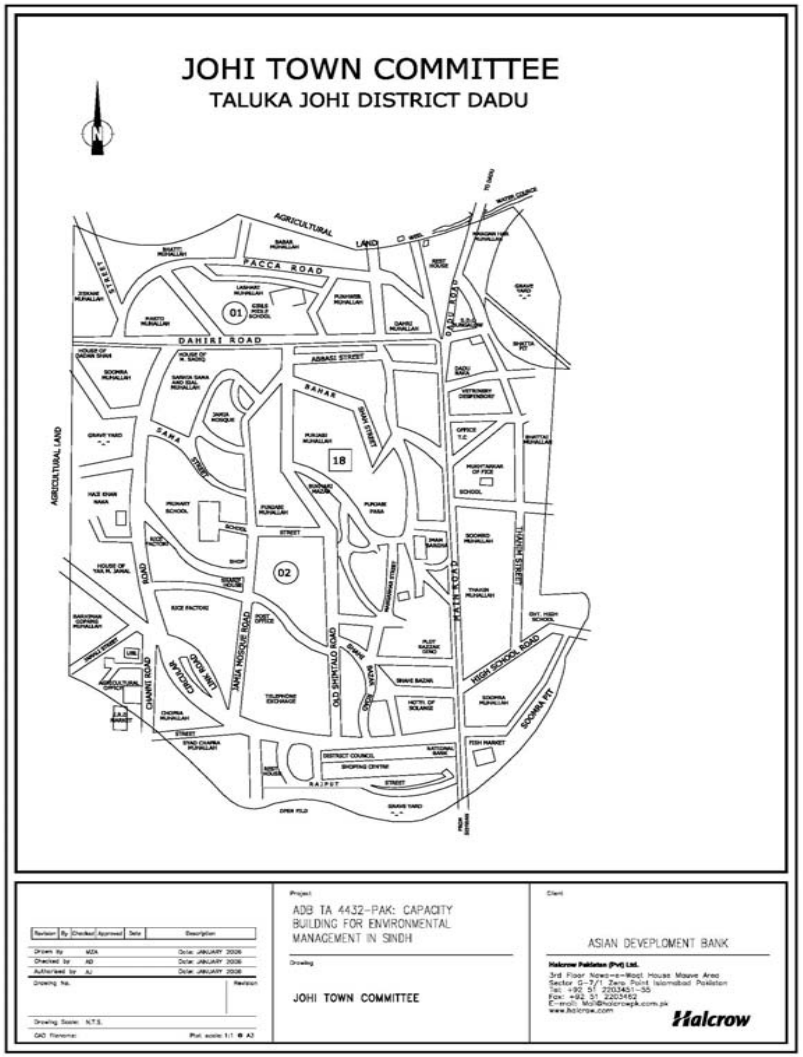


Figure A3-1: Johi Town Map



Annexure - 4

LARKANA

LARKANA TALUKA

Strategic Plan For Water Supply and Sanitation 2006-2012

Table of Contents

1 BACKGROUND 1
1.1 Overview of Larkana Taluka 1
2 WATER SUPPLY 2
2.1 Urban areas 2
2.2 Rural areas 2
3 SEWERAGE AND DRAINAGE 3
3.1 Urban areas 3
4 SOLID WASTE MANAGEMENT 4
4.1 Urban Areas 4
4.2 Rural area 4
5 PRIORITIES 5
6 ISSUES 6
6.1 Water Supply 6
6.2 Sewerage and Drainage 7
6.3 Solid Waste Management 8
7 STRATEGIC PLAN 10
7.1 Water supply 10
7.2 Sewerage and drainage 10
7.3 Solid waste management 12

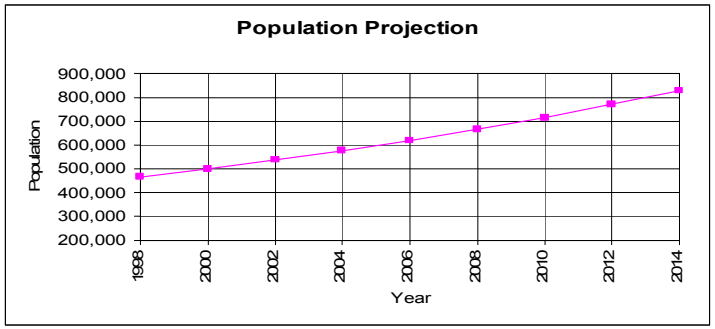
Supporting Information and Appendices

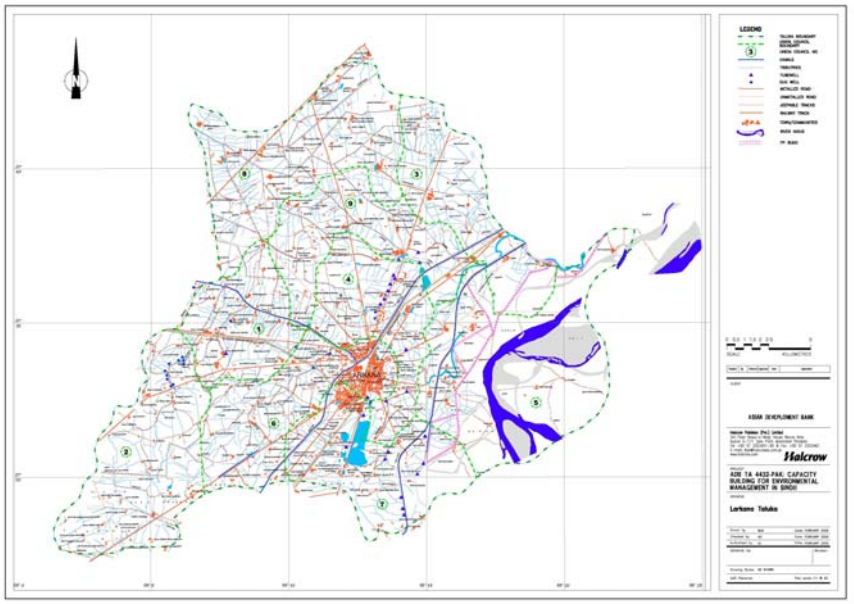
Larkana Taluka – Strategic Plan for Water Supply and Sanitation – 2006-2012

1 BACKGROUND

1.1 Overview of Larkana Taluka

1. The district has extreme climate in summer which is hot and moderate in winter. The mean maximum and minimum temperature in summer season is approximately 43 deg C and 33 deg C while that of winter season 21 deg C & 11 deg C respectively. The average annual rainfall is about 100 to 125 millimetres per year. Dust storms are common and hot winds blow continuously for about 40 days around the middle of May every year.
2. Larkana Taluka had total population of 466,424 according to the 1998 census with urban population only in Larkana city as 270,283 (57.95%) and rural population as 196,141 (42.05%).
3. The graph of population projection indicates estimated projected population based on the growth rate of 3.64% as provided in the 1998 census report.





2 WATER SUPPLY

2.1 Urban areas

Larkana

4. Ground Water is sweet in the city. Private Arrangement of water exists throughout the city and motor pumps & hand pumps are used by individual households. Municipal water supply does not exist in the city and there is only one tubewell in public sector for Public Health Colony and Zulfiqar Bagh. There is no water vending in the city.

2.2 Rural areas

5. In rural areas of Larkana, sweet water is available in most of the areas but there are many villages where water is brackish. Villages where sweet water is available hand pumps and motor pumps are common. Tubewells are also installed in some villages. There are chances of Arsenic in shallow ground water but deep ground water is fit for drinking. There are villages where sweet water is available at some distance in the nearby vicinity; in these villages tubewells have to be installed at distance and pumping main will be required to bring the water to the village. For the villages in brackish zone, surface water is the only option.

6. There are a number of water supply schemes based on canal water, but these are not working due to the lack of coordination with irrigation or electric department or lack of VDA capability. Unicef has installed hand pumps at depths 200 to 300 ft depth.

Private Arrangement of Water

7. Hand pumps and small motor pumps are in use where sweet water is available and in brackish areas source of water is canal or water course. People use some depression in natural ground or dig irregular ponds where they store water to use during the canal closure period. They take water directly from the ponds during canal closure.

3 SEWERAGE AND DRAINAGE

3.1 Urban areas

8. In Larkana city, open drains are used to carry waste water at lane level. Human excreta are discharged into these drains which is an environmental hazard in the streets of the city. At main streets sewers are provided that carry waste water up to sewage pump station. These main sewers are now old and in poor condition. Similarly in sewage pumping stations, pipes and machinery require repair and replacement. Oxidation ponds are provided at some locations but these are not working as well as insufficient.

9. Most important deficiency is discharge of sewage in the canals. Much planning and effort will be required to stop this practice. Sewage from Main Disposal Station is disposed of in Scarp Drain after passing through oxidation ponds, which are in poor condition. Other disposal stations are discharging sewage in Rice Canal or Dadu canal. Oxidation ponds are bye passing. All these sewage pump stations and Waste Water Treatment Plants need much improvement. There is an on-going project of 300 million rupees for the improvement of main sewers and sewage pump stations.

.Rural area

10. In rural areas of Larkana, open drains are provided and waste water flows generally directly into fields and other open areas. In most of the villages, drains are overflowing and waste water hold up in them and overflowing in the streets. Human excreta are directly discharged into the open drains which are great environment hazard. The open drains get blocked due to a combination of inadequate maintenance, gradient and solid waste. Sewage disposal stations are not properly functioning due to lack of interest of the VDA of the villages, lack of proper electricity connection or in need of repair.

4 SOLID WASTE MANAGEMENT

4.1 Urban Areas

11. The TMA uses hand carts and donkey carts for primary collection and tractor-trolleys and front end loaders for secondary collection of the waste which is finally disposed off in form of open dumps inside the city and on the out skirts. No formal sanitary land filling is done. The major dumping sites are along Noudero road, Airport road and Phol road.

12. The overall collection efficiency of the TMA is about 62.5% of the total generation and so quite a portion of waste remains uncollected in the city which is a source of environmental pollution. Major reasons for the situation are non provision of community bins and indiscriminate throwing of waste on the streets, manually loaded vehicles and disposal in form of open dumps. Healthcare wastes are also mixed with the municipal waste. Women are responsible for managing waste at the household level but they are not adequately educated to deal with the problem in a sanitary manner.

4.2 Rural area

13. The problems in rural areas are much less severe compared with in the city. Waste generation rates are low, and there is a high organic content, making waste suitable for natural decomposition, or controlled composting.

14. Plastic bags are a growing problem in rural areas of the TMA, and there is lack of information on how to deal with this form of waste.

5 PRIORITIES

The Strategy Plan of the Taluka is based on the following priorities:

1. *The need to involve the community in working with the TMA to reduce waste and increase efficiency through greater awareness and concern for the environment in general and of the Taluka in particular; This will be done through public awareness campaigns and a programme of concerted area-by-area campaigns;*
2. *The need to adopt more participatory and transparent processes of working by the TMA. This will be done through the use of the "planning wall" and other devices for making the public more aware of the TMA's programmes and priorities;*
3. *To involve the private sector and the community in working with the TMA in the delivery of WSS services as part of the component-sharing approach;*
4. *The need to rehabilitate and refurbish existing systems and schemes;*
5. *The need to improve the capacity and efficiency of existing and installed schemes and systems;*
6. *The need to take greater control over the resources and services of the Taluka. This will be done through building up an updated database and management information systems*
7. *Then, to improve and extend WSS services delivery to the new and expanding parts of the Taluka;*
8. *Once the TMA service delivery has improved, the priority will be to collect an increased portion of increased tariff and user charges*

6 ISSUES

6.1 Water Supply

	House	Lane	Settlement
Larkana	Lack of awareness between water quality and health		System of regular monitoring of water quality does not exist
UCs			
Rest of Taluka	Safe drinking water is not available in most of the houses		Most of the rural areas are not served with municipal water supply.
	Lack of awareness about link between water quality and health		Ground Water and Canal Water are the sources at different locations. Some canals are non-perennial, and remain closed four to six months in a year. Perennial canals also close for 30 to 40 days in a year for maintenance purpose. Available water storage does not meet the requirements during canal closure period
			There are few water supply schemes but they are un-operational or functioning inadequately.
			Canal water is suspected to be contaminated by upstream pollution including dumping of raw sewage.
			Data for planning and for proper operation and maintenance is not available.
Financial	Budgeting is made difficult because of lack of information on contributions and commitments from district and provincial levels. Tariff structure is low and has no relation to expenses.		
Environment	Poor quality of water is a health hazard particularly for children. Intestinal disorders are endemic.		
Women	Women, particularly in rural areas, are responsible for water provision to the household. In rural areas, they are forced to fetch water over long distances, making it a tiring and wasteful task severely impacting on their ability to undertake other household tasks. The poor quality of water not only causes family health problems, but also makes other water-related tasks such as clothes washing and cleaning more difficult and time-consuming.		
UC1			
UC2			
UC3			
Institutional	TMA responsibilities are not clear because of the overlapping created by the re-designation of PHED. For example TO(I&S) has been placed under the command of the PHED. The PHED will supervise the O&M of water supply and drainage schemes of major cities. O&M responsibility for the vertical projects such as water Filtration Plants has been put on the TMA. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001.		

6.2 Sewerage and Drainage

	House	Lane	Settlement
Larkana	Toilet facility is not available in some of the houses	Most open drains are usually blocked with refuse	Untreated disposal into fields and canals
	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	All open drains carry human excreta	Inadequate Trunk Sewer network coverage
	Lack of awareness about link between sanitation and health	Underground pipes exist in some parts of the urban area but most are in poor condition	Sewage Treatment Plants are not functioning therefore there is no treatment of sewage
			Pump Stations in poor condition. Sewage is held up there.
Rest of Taluka	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	No facility in most of the area	Most of the area is un-served.
	Lack of awareness about link between sanitation and health	All open drains carry human excreta	Existing Sewerage Schemes in rural areas are not functioning or functioning inadequately
			Untreated disposal into fields
UC1			
UC2			
UC3			
Institutional	Major projects are being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001 Maps and Data of existing system is not available.		
Financial	Budgeting is made difficult because of lack of information from district and provincial levels.		
Environment	Open drains with faeces discharged directly from household toilets are a common sight. Drains blocked by polythene bags and leaking pipes cause ponding. This is particularly hazardous in lanes and residential areas where children play around untreated sewage. The discharge of untreated sewage for use in agriculture is harmful to both agricultural workers and consumers of the produce and its discharge in canals is a big environmental hazard.		
Women	The lack of toilets or poor facility in some houses is particularly onerous for women who are forced to curtail their activities and functions.		
Public Toilets	Absence of public toilets in urban areas, especially for women, severely limits activities and leads to open urinating		

6.3 Solid Waste Management

	House	Lane	Settlement
Larkana	Waste is mixed, thus reducing potential for composting and reducing value of recyclables	Incomplete sweeping of lanes due to large amounts of waste is thrown on the streets, low -attendance of sweepers and low-productivity	Only 62.5% of waste generated from the city is collected by TMA
	Waste thrown on streets, thus increasing sweeping work and choking sewers and drains	Sweepers use inefficient tools and poorly designed handcarts, thus reducing efficiency and exposing workers to occupational diseases	Ad hoc disposal facilities threatening public health and the environment
	No door-to-door collection system, encouraging indiscriminate dumping on streets	Poorly maintained and designed transfer points resulting waste scattering on street sides	Waste pickers operating at dump sites, posing a threat to themselves
		Scavengers working on the streets can scatter waste, and susceptible to health problems	Inadequate manually loaded vehicles for secondary collection
		Polythene bags spread around make the city look filthy, and caused choking of sewers and drains	Health risks from present final waste disposal practices (e.g. groundwater pollution, air pollution, disease vectors)
		Health risks from rotting piles of waste on streets/at transfer points	Health risks from lack of separate Healthcare waste management
		Health risks from blocked drains and sewers	
		Manual handling of waste when loading and unloading is dangerous and inefficient	
Rural areas			Plastic waste is a problem throughout rural areas and hinders composting of waste
Community participation	Lack of community engagement in solid waste management activities	Very few community organisations are established at present to facilitate community-led door-to-door collection	
Institutional		No NGOs working in the field of solid waste management	Lack of technical knowledge within TMA on solid waste management options
Finance	Required contributions from householders provided with door-to-door collection services		Lack of funds hinders investment and planning in solid waste management
Environment		Degradation of city environment as a result of indiscriminate dumping on streets	Environmental pollution from uncontrolled disposal of waste
Women	Women lack education on problems		No public awareness messages targeted at women

	House	Lane	Settlement
	caused by improper management of solid waste		
Private sector	Potential for informal-sector/small enterprises to undertake door-to-door collection services not being tapped.		Contracting out solid waste management at the city level not tried
Hospitals	Improper handling of healthcare waste can expose hospital staff, sanitary workers and citizens to health risks. In particular, the practice of recycling syringes, and handling and resale of infected equipment is hazardous.		
Schools	Due to storage of solid waste in open heaps, school children and staff are exposed to health risks.		
Commercial	Demolition and construction waste is presently mixed with other municipal wastes, and remains on the streets in commercial areas awaiting collection. It is a source of health risks as well as traffic hazard. Shopkeepers throwing waste onto the streets further aggravate the problems.		
Public awareness	Lack of public awareness about health impacts of poor solid waste management practices		Lack of awareness about Healthcare waste amongst professionals and public

7 STRATEGIC PLAN

7.1 Water supply

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
House Level									
Public awareness campaign for the connection between water quality and health.	Larkana								SDSSP
Rehabilitation Of Existing Rural Schemes	**Other UCs**								
Rehabilitation of existing water supply schemes after consultation with the community for the demand and O&M responsibility	Other UCs								SDSSP
New Rural Schemes									
Arrange land acquisition and construct water storage tanks	Other UCs								SDSSP
Arrange land acquisition and construct water treatment plant consisting of slow sand filter	Other UCs								SDSSP
Planning									
Continuous liaison and coordination with irrigation department on regular supply of water to operate existing water supply schemes.	Other UCs								TMA
Collect data of each settlement regarding the ground water condition, distance of the nearest water source etc. and plan for water supply schemes.	Other UCs								SDSSP

7.2 Sewerage and drainage

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
Lane Level Drains And Sewers									
Targeted action to unblock drains – area by area; accompanied by public awareness campaign									TMA
Cover the open drains or replace with underground pipe									SDSSP
Extend underground pipe network on a lane by lane basis									SDSSP
Trunk Sewers And Pump Stations									
Gradually repair and replace underground trunk sewers and pump stations.									SDSSP
Provide Additional Trunk Sewers and Pump Stations									SDSSP

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
Treatment									
Repair existing sewage treatment plants									SDSSP
Provide additional treatment plants									SDSSP
Cost Recovery									
Sell treated sewage effluent as fertiliser									-
Planning									
Prepare Map and Data of existing system									SDSSP
House Level									
Public awareness campaign to install toilets in low density areas, encourage installation of individual Ventilated Improved Pit (VIP) Latrine in rural areas	Other UCs								SDSSP
Lane Level									
Targeted action to unblock drains – area by area; public awareness campaign.	Other UCs								TMA
Cover the open drains or replace with underground pipe.	Other UCs								SDSSP
Trunk Sewer And Pumping Station									
Repair existing Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Provide Additional Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Sewage Treatment Plant									
Repair existing sewage treatment plants.	Other UCs								TMA
Provide additional sewage treatment plants.	Other UCs								SDSSP
Rehabilitation									
Rehabilitation of existing drainage schemes after consultation with the community for the demand and O&M responsibility.	Other UCs								SDSSP
Planning									
Plan new drainage/ sewerage schemes after consultation with community.	Other UCs								SDSSP
Public Latrines									
Provide public latrines at important places	Larkana								SDSSP

7.3 Solid waste management

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Onsite Storage and Processing								
Introduce 2-bin system for wet and dry waste in household								Households
Initiate home composting in barrels where space allows and appropriate								Households/ TMA/ NGO
Street Waste Management								
Provide litter bins on main streets for pedestrians' use								TMA/NGO/CBO
Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas								TMA
Hand over sweeping to private-sector (with staff and equipment)								TMA/ Private Sector
Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors								TMA
Enforce provision of containers/ bags on public vehicles, vendors' carts								TMA
Primary Collection/ Private Sector/ CBO								
Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area								TMA/NGO
Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers								TMA/CBO/Private Sector
Communal Storage								
Purchase demountable containers ($5m^3$) as communal storage facility								TMA/SDSSP
Secondary Collection/ Private Sector								
Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots								TMA
Purchase hydraulic hoist truck/multi loader system for use with demountable containers to replace the present manually loaded tractor trolleys								TMA/ SDSSP
Contract out secondary transportation to private-sector								TMA
Reuse and Recycling/ Organizing Scavengers								
Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors								TMA/CBO
Treatment and Final Disposal								
Improve and rehabilitate present disposal practices in line with basic public health and environmental standards (levelling and providing soil cover)								TMA
Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant								TMA/SDSSP

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Central compost plant								TMA/ Private Sector
Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available								TMA/ CBO/Private Sector
Special Waste Management								
Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste								TMA/ District Health Department
Awareness campaigns in hospitals								TMA/ District Health Department
Undertake viability study for installation of locally manufactured incinerator								TMA/SDSSP
Assess generation of hazardous waste within TMA, and devise strategy for its safe treatment and disposal								TMA
Enforce provisions for demolition and construction waste disposal								TMA/Private Sector
Awareness Raising								
Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment								TMA/NGO
Public awareness raising campaign for rural areas, providing information on composting and basic disposal								TMA/NGO
Hold a series of cleanup campaigns								TMA/NGO/CBO
Introduce public complaints system by establishing a complaint cell								TMA
Legislation								
Ban open burning of waste on streets and at final disposal points								TMA
Introduce anti-littering laws								TMA
SWM Fee								
Introduce fee systems for commercial producers of waste								TMA
Introduce fee system for door to door collection								TMA

SUPPORTING INFORMATION

1 General

1. Larkana District drives its name from its headquarters town Larkana which was once settled by a tribe called Larik. The district is bounded in the north by Jhal Magsi and Jafarabad districts of Baluchistan province and Jacobabad district. In the west it is bounded by Khuzdar district again of Baluchistan province. In the east it is bounded by Shikarpur and Khairpur districts and south by Dadu and Nausharo Feroze districts of Sindh province. River Indus flowing from north east to south west touches the borders of the district along Ratodero, Larkana and Dokri talukas.

2. The district has extreme climate in summer which is hot and moderate in winter. The mean maximum and minimum temperature in summer season is approximately 43 deg C and 33 deg C while that of winter season 21 deg C & 11 deg C respectively. The average annual rainfall is about 100 to 125 millimeters per year. Dust storms are common and hot winds blow continuously for about 40 days around the middle of May every year.

3. Larkana District comprises of seven Talukas; according to census report of 1998, it's population distribution and urban proportion is as follows.

TALUKAS, POPULATION AND URBAN PROPORTION IN THE DISTRICT

Administration Unit	Population	Urban Proportion
Larkana District	1,927,066	28.9
Dokri Taluka	308,975	16.6
Kambar Ali Khan Taluka	268,934	21.7
Larkana Taluka	466,424	57.9
Miro Khan Taluka	181,808	4.9
Ratodero Taluka	227,373	30.1
Shahdad Kot Taluka	190,325	31.8
Warah Taluka	283,227	13.9

4. Larkana Taluka has urban population only in Larkana City as 270,283 (57.95%) and rural population as 196,141 (42.05%). The details are provided in Table B4-1 and B4-2.

5. Information about tap water and latrine facility in the urban areas as available in the census report is provided in Table A4.1.

Table A4.1: Water and Latrine Facility in Urban Areas of the Taulka

Urban Areas	Population according to census 1998	Average House hold size	Total Houses	Houses with Potable Water Facility		Houses with Latrine Facility	
				Nos.	%	Nos.	%
Larkana	270,283	7.3	36,693	9,616	26	16,067	44

6. Situation of potable water facility in the houses of rural areas as given in census report is provided in Table 4.2.

Table A4.2: Potable Water Facility in Rural Areas of the Taluka

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
Larkana Taluka	196,141	32,840	3,678	11.20
Akil Stc	39,308	6,331	645	10.19
Agani Tc	9,817	1,776	117	6.59
Akil Tc	12,361	1,814	259	14.28
Maher Wada Tc	0	1,638	131	8.00
Sanhri Tc	6,412	1,103	138	12.51
Beriochandio Stc	48,019	8,319	921	11.07
Beriochandio Tc	17,810	3,311	345	10.42
Loungai Tc	10,423	1,647	30	1.82
Lungh Tc	8,285	1,348	313	23.22
Ratokot Tc	11,501	2,013	233	11.57
Kanga Stc	58,898	10,203	1,097	10.75
Dhamraha Tc	15,433	2,507	33	1.32
Kanga Tc	18,126	3,041	646	21.24

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
Kothi Tc	10,979	2,010	220	10.95
Vikia Sangi Tc	14,360	2,645	198	7.49
Larkana Stc	49,916	7,987	1,015	12.71
Abra Tc	16,292	2,625	385	14.67
Addl. Abra Tc	4,146	793	2	0.25
Bakapur Tc	9,111	1,455	189	12.99
Doodai Tc	13,308	2,149	410	19.08
Larkana Tc	7,059	965	29	3.01

* STC= Supervisor Tapedar Circle
TC= Tapedar Circle

2 WATER SUPPLY SYSTEM

2.1.1 Urban Area

7. Ground Water is sweet in the city. Private Arrangement of water exists throughout the city and motor pumps & hand pumps are used by individual households. Municipal water supply does not exist in the city and there is only one tubewell in public sector for Public Health Colony and Zulfiqar Bagh. There is no water vending in the city. The city map is attached at Figure A4-1.

8. Water quality tests are available with the TMA but at time of visit could not be located.

2.1.2 Rural Areas

9. In rural areas of Larkana, sweet water is available in most of the areas but there are many villages where water is brackish. Villages where sweet water is available, hand pumps and motor pumps are common. Tubewells are also installed in some villages. There are chances of Arsenic in shallow ground water but deep ground water is fit for drinking. There are villages where sweet water is available at some distance in the nearby vicinity; in these villages tubewells have to be installed at distance and pumping main will be required up to the village. For the villages in brackish zone, surface water is the only option.

Private Arrangement of Water

10. People use hand and motor pumps where sweet water is available and in brackish areas source of water is canal or water course. People use some depression in natural ground or dig irregular ponds where they store water to use during the canal closure period. They take water directly from the ponds during canal closure.

Beero Chandeu

11. Beero Chandeu is one example where canal water is used. Particularly in the village of Beero Chandeu water from hand pumps is within the tolerable limits but in the nearby villages, water is saline like Mittho Dero where water is saline.

12. In Beero Chandeu Water Works, There are three Ground Water Tanks ie Settling Tanks with a pump room. There are also tubewells in water works. Water Supply Scheme is not working.

Shahabad

13. There are two tubewells in the water works. This water works is not in working condition. Some persons are living in the water works along with their livestock.

Rohal Khan Bugti

14. Water supply scheme is working. In the village ground water is not sweet. Hand pumps are not in use here. A tubewell is installed at a distance near village Lutuf Ali Bugti and near railway line. In village Lutuf Ali Bugti, water is sweet. This scheme is an example where water in the village is saline and tubewell is installed at some distance from the village.

Rattokot

15. Rattokot is another example where water supply scheme is constructed but it is not working. Scheme consists of intake from canal, two Settling Tanks and pump room. There are also two tubewells there. Local people reported that the canal flows only for four months in winter. In the village, hand pump water is saline.

3 SEWERAGE AND DRAINAGE SYSTEM

3.1 Urban Area

16. In Larkana city, drainage through open drains at street level and after that carried through main sewers up to sewage lift or disposal station. These main sewers are now old and in poor condition. Similarly in sewage pumping stations, pipes and machinery require repair and replacement. In most of the cases little repair will serve the purpose but in some cases large scale repair will be needed. Oxidation ponds are provided at some locations but these are not serving the purpose as well as these are insufficient. Most important deficiency is discharge of sewage in the canals. Much planning and effort will be required to stop this practice.

17. Sewage from Main Disposal Station is disposed of in Scarp Drain after passing through oxidation ponds, which are in poor condition. Sachal Colony sewage pump station is discharging in to Rice Canal. People are living in disposal station with their families and livestock, which make it difficult ti inspect the disposal. Another small disposal is discharging in a seepage drain near Rice Canal. Abbas Colony Disposal is also discharging into Rice Canal. Abbas Colony is a poor locality, open drains are in very poor condition and chocked at many places due to solid waste in them. There is also solid waste in the disposal. Sewage Disposal Station of Shaikh Zaid Colony No.1 is discharging into Gharwah. Shaikh Zaid Colony No.2 is also discharging into Gharwah. Akil Road disposal is discharging into Dadu Canal after Waste Water Treatment ie Oxidation Ponds, which are not in satisfactory condition. Disposal of Pir Sher Road is also discharging in Dadu Canal after Oxidation ponds. Presently delivery pipes of the pumps are damaged and leaking and as a result sewage is flowing in nearby streets. Oxidation ponds are bye passing. Disposal of Phull Road is also in Dadu Canal after oxidation ponds. Delivery pipes of this disposal are also damaged and water is flowing on road.

18. All these sewage pump stations and Waste Water Treatment Plants need much improvement. There is an on-going project of 300 million rupees for the improvement of main sewers and sewage pump stations.

3.2 Rural Areas

19. In rural areas of Larkana, open drains are provided and waste water flows generally directly go into fields and other open areas. In the larger villages, drains are not functioning properly, waste water hold up in them and overflowing in the streets. Sewage disposal stations are not properly functioning.

20. In Goth Shah Abad, open drains for sanitary drainage flowing to the sewage pump station. After sewage pumping station, it is pumped to a minor. The disposal is about 14 years old and there is no electricity connection, therefore it is not working. Rehabilitation of whole drainage system is needed.

21. In Rohal Khan Bugti, drainage system is poor and drains are not working properly.

22. Sewage Disposal Station is not working due to non-availability of electric connection.

23. Drainage Scheme of Lal Bux Bugti is functional, its disposal is in Kandiwah nullah. It requires rehabilitation.

3.3 Legislation

24. There is Pakistan Environmental Protection Act 1997, which governs the pollution of water bodies, waste water disposal standards, but there is no practical enforcement of the act in the taluka. Any other Law, regulation, standard or guideline do not exist at national, provincial, district or local levels regarding drinking water supply, sewerage or drainage. For drinking water, WHO guidelines are generally referred in practice by the provincial departments but these are not being implemented in letter and spirit.

3.4 Private Sector Participation

25. There is no private sector participation in the fields of potable /drinking water, sewerage or drainage in the taluka.

3.5 Main Issues and Constraints

i) Responsibilities of Taluka, District and Public Health Engineering Department are not clear.

ii) TMA has not sufficient data and drawings of the water supply and sewerage systems of the urban areas of the Taluka.

iii) TMA has not a complete list and drawings with necessary details and drawings of its assets in shape of water and sewerage components. These include land, structures, pipes, machinery etc in rural areas.

iv) There is no system for water quality monitoring.

v) There is no comprehensive Master Plan of TMA regarding water and sanitation especially for rural areas.

vi) Existing sewage disposal stations need improvements.

vii) The operation of existing disposal stations also needs improvements. It should be planned in such a way that waste water should not hold up in the drainage network.

viii) In rural areas, although the problem of waste water is less than the urban areas, but waste water is ponding and spreading in the streets or open areas of the villages.

ix) Solid waste is being thrown in drains. Improvement of Solid Waste Management System will improve the Drainage System.

4 SOLID WASTE MANAGEMENT SITUATION

4.1 General

26. The current practices of solid waste management in the city are explained in stepwise form in the following paragraphs. Performance analysis has also been carried out at the end.

4.2 Storage and Collection

27. The storage and collection systems of solid wastes in the city are either inadequate or inappropriate. There are innumerable informal communal storage locations in the city where the waste is temporarily stored in form of the open heaps on the sides of the streets and at number of places in the centre of the streets (in congested areas). At some places masonry enclosures are also used for this purpose. The situation gets aggravated when the heaps of waste pour down into the open drains where choking and wastewater spillage is seen quite often.

4.2.1 Primary Collection

28. Primary collection is the shifting of waste from individual premises, i.e., houses, shops, offices etc., to communal storage places. The sanitary workers shift the wastes from smaller street side heaps to somewhat bigger heaps/filth depots, with the help of handcarts and donkey carts.

29. House to house collection is virtually non-existent. In certain cases the sanitary workers who are assigned the job of sweeping and collection of wastes from the street sides also serve a few households informally.

4.2.2 Secondary Collection

30. The tractor trolleys then serve these bigger heaps. The tractor trolleys shift the solid wastes to some designated open dumping sites haphazardly on the periphery of the city.

4.2.3 Vehicle and Equipment

31. The description of vehicles and equipment used for SWM in the city is given in Table A4.1. Data from discussion with TMA staff.

Table A4.1: Description of vehicles and equipment

S no.	Type	Capacity (m^3)	No	Condition
1.	Handcarts (wheel barrows)	0.1	40	Varied
2.	Donkey carts	0.7	20	Average

3.	Dumper truck	4.2	2	Good
4.	Trolleys with Tractor (2002)	3.5	2	Good
5.	Trolleys with Tractors (1993-96)	3.5	6	Average
6.	Mechanical loader (2002)	-	1	Good
7.	Mechanical loader (1994)	-	1	Bad

4.3 Sludge and Grit Collection

32. Due to significant an amount of solid wastes being thrown into the open drains and manholes of the sewerage system, blockages are very common. The municipality's sanitary workers are deployed for extracting sludge and grit from the system. After drying in open this sludge and grit is also picked up by bullock carts or tractor trolleys.

4.4 Recovery of Recyclable Wastes

33. The materials in wastes, like paper, board, plastics, metals and glass are either separated at source by the owners or by the scavengers from the street side open heaps. There are a number of shops in the city dealing with the recovered materials which channelise them to the recycling industries in other cities.

4.5 Disposal

34. Quite a portion of the wastes collected with the help of donkey carts are open dumped in the vacant plots or low lying areas within the town or on the periphery. The tractor trolleys shift the wastes to open dumps outside the city. There are no facilities like incineration composting or sanitary landfilling in the urban areas. The major dumping sites are along Nau Dero Road, air Port road and Phol Road.

4.6 Special Wastes

4.6.1 Slaughterhouse Wastes

35. Most of the wastes from slaughter house are taken up by the recycling industry. The rest of the wastes are thrown just nearby or collected by tractor trolleys to be open dumped at a distance haphazardly. On an average one trolley load is shifted five days/week.

4.6.2 Hospital Wastes

36. The solid waste of Chandka and sheikh Zaid Hospitals consisting of used cotton, bandages, and syringes etc., is disposed off by burning within the hospital's compound. Before disposal the used syringes are cut by cutting machine. The major portion of solid waste of the hospitals is thrown in masonry enclosures and street side open heaps from where it is picked up by the municipal vehicles.

4.6.3 Dead Animals

37. There is no separate arrangement for disposal of carcasses of the dead animals. They are collected alongwith other municipal solid wastes and buried alongwith the solid wastes in open dumps.

4.6.4 Demolition and Construction Waste

38. Most of the demolition and construction wastes are reused. Only a small portion is thrown out on the street sides. The generators of such wastes are responsible to dispose them off. In case they do not comply with the rules and regulations, they are to be charged for the service and the municipality has to take care of the situation, But there are cases that such wastes remain on the street sides for very long time.

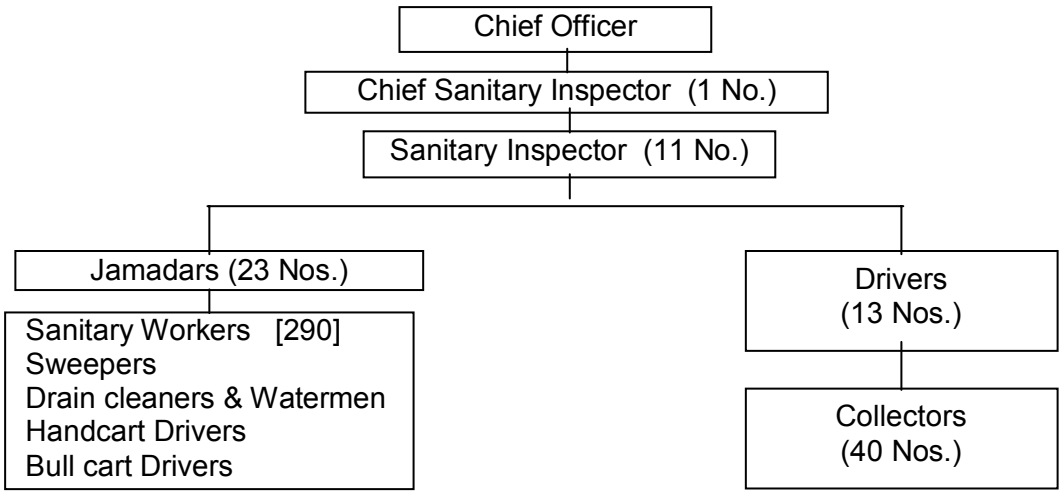
4.6.5 Industrial Wastes

39. Almost all the industrial solid wastes from the industries which are located outside the city are recycled. Normal municipal wastes are disposed off by the industrial administration at their own in open dumps.

4.7 Staff and Organization

40. Presently there are 13 drivers and 330 sanitary workers in total, out of which some are regular and others are on work charged basis. On daily basis they are deployed for sweeping, as drain cleaners and watermen, as collectors on tractor trolleys, work as donkey cartmen and as handcart drivers. The sanitary workers are supervised by 23 Jamadars who work under 11 Sanitary Inspectors and a Chief Sanitary Inspector. The overall organization is shown in Figure A4-2.

Figure A4-2: Present Organization Chart of Sanitation Section Larkana



4.8 PRIVATE SECTOR PARTICIPATION

41. In Larkana, the job of street sweeping waste collection, transportation and disposal is contracted out for two union councils of the city.

4.9 COMMUNITY PARTICIPATION

42. No such activity has been noted in the town. Actually solid waste management issues appear to be a low priority.

4.10 PUBLIC AWARENESS

43. Public awareness is very necessary to get their cooperation for efficient managements of solid waste. But no such effort has been launched in the town.

4.11 Legislation (Laws, Regulation, Standards, Guidelines)

44. Various type of legislation including laws, rules, guidelines exist at National and Provincial levels dealing with solid waste management. These include:

- Ordinance to prohibit manufacture, sale and use of black plastic polythene bags including polythene bags below 30 microns in thickness in the Sindh province. March 2006.
- Guidelines for Hospital Waste Management EPA, Sindh.june 2004 Rules 2005. Gazette of Pakistan.2005.
- Hospital Waste Management Rules 2005. Gazette of Pakistan.2005.
- (Draft) Guidelines for Solid Waste Management. Pakistan EPA. June 2005.

45. But there appears to be a lack of awareness regarding these documents in the community.

4.12 Performance Analysis

46. Based on the data obtained from discussion with TMA staff, the system performance can be evaluated in terms of collection efficiency i.e. the ratio between wastes collected and wastes generated, cost of collection/ton, staff employed per 1000 population, cost per inhabitant It is done in the following sub-sections, The results are presented in Tables 4.2 and 4.3. Drawbacks noted in the present system are also given separately.

4.13 Collection Efficiency

47. Table A4.2 shows the data (year 2006) regarding total collection per day. The figures reveal the total number of vehicles deployed, average trips made by each vehicle per day and the average amount of waste carried per trip. The total waste collected on the average is 110 tons/day while the generation rate is 176 tons/day. This gives a collection efficiency of 62.5%.

Table A4.2: Haulage Capacity of TMA Collection Vehicles

Sr. No.	Type of Vehicle	No. of Vehicles	Total Avail-able	Trips/ Vehicle/ day (No.)	Average Weight/ Trip (Tons)	Total Weight Carried (Tons)
1.	Tractor Trolley I	3	3	4	2.28	27.4
2.	Tractor Trolley II	6	6	4	2.28	54.6
3.	Dumper Trucks	2	2	5	2.8	28.0
					Total:	**110.0**

Total Generation/day = $389996 \times 0.45 = 176$ tons

Collection Efficiency = $\frac{110}{176} \times 100$ = 62.5%

4.14 Cost per Ton Collected and per Inhabitant

Wastes collected per day = 110 tons

Waste collected per year (for year 2002-2003) = $110 \times 365 = 40150$ tons

Total expenses incurred/year = Rs. 30,770,000

Cost/Ton = $\frac{30,770,000}{40150}$ = Rs. 766

Population for year 2003 = 389996

Cost/inhabitant = Rs. $\frac{30,770,000}{389996}$ = Rs. 79

4.15 Staff per 1000 Inhabitants

No. of staff = 378 (From Section 8)

Population = 389996

Staff/1000 inhabitants = $\frac{378}{389996} \times 1000$ = 0.97

Table A4.3: Present System Performance Indicators

Collection Efficiency	Cost per Ton	Cost per Inhabitant	Staff per 1000 Population
%	(Rs.)	(Rs.)	Ratio
62.5%	766	79	0.97

4.16 Drawbacks/Deficiencies in the Present System

48. Drawbacks and deficiencies have been noted at all the stages of the present system i.e. communal storage, street cleansing, collection vehicles like handcarts, bullcarts and tractor trolleys, and disposal in the form of open dumping. These are delineated in the following sub-sections. With the adoption of the new system, it is envisaged that these will be removed.

4.17 Communal Storage

49. The communal storage takes place in the form of small street side heaps. Besides that masonry enclosures are also being constructed. The following short comings are noted in this practice.

i) Because of design defects it is difficult to collect the waste from within the dust bins and filth depots.

ii) Refuse in these structures is scattered all over the surrounding area as a consequence of scavenging activity and wind action.

iii) Rodents become active in these dumps. Similarly these become the breeding places for larvae of the flies and scores of other disease causing organisms. These are merely health hazard.

iv) These are a constant source of obnoxious odours leading to pollution of local environment.

v) Rains wash away the waste to areas in the vicinity.

vi) These are uneconomical as compared with the metallic skips.

4.18 Street Cleansing

50. Hand tools and other equipment used during sweeping and collection are of low-standard and poor design. Therefore, the sweepers cannot give a satisfactory output. Major drawbacks are:

i) As a general practice sweepings are placed on the sides of the streets and roads, in open heaps making the condition of streets shabby.

ii) Brooms have handles of shorter length on account of which sweeping efficiency is reduced.

iii) Sweepers are hardly provided with any replacements for the damaged tools and equipment.

iv) Supervision on performance of the sweepers by the supervisory staff is generally lacking.

4.19 Donkey Carts

i) Donkey carts are slow and consume more time. The quantity of the waste collected is small. They need improvement in design.

ii) Defecation by the donkeys causes littering of streets.

4.20 Tractor Trolleys

i) Present vehicles can not collect the entire quantity of the generated waste.

ii) Ti me spent/trip is over 2 hours, which is quite long.

iii) Inaccessible areas are left uncovered.

iv) Collection vehicles are required to collect the scattered heaps of waste, thus spending unwanted time en-route to the dumping site.

v) Manual loading and unloading of the vehicles is un-economical in terms of time and effort.

vi) Collectors come in physical contact with the waste, due to which are liable to be affected by occupational diseases.

vii) Littering is caused by uncovered collection vehicles.

4.21 Open Dumping

i) Disease causing vectors are spread all around the dumping ground thus causing a constant health hazard for the surrounding population. Open dumping makes the area unsightly.

ii) Because of wind action components like paper and polyethylene bags are seen scattered in the adjoining areas.

iii) Groundwater pollution is not unexpected during rainy season.

4.22 Conclusions and Remarks

51. The solid waste management of Larkana is not satisfactory due to shortage of staff and equipment. Solid waste was seen lying on roads/streets sides. Unauthorized dumping of solid waste in vacant plots and depressions was noticed.

52. The Chief Sanitary Inspector was helpful and cooperative in assessment of the facilities and requirements for solid waste management.

4.23 Strength and Weaknesses of Solid Waste Management Activities

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
1	Introduce 2-bin system for wet and dry waste in household	- Improves quality and quantity of recyclable materials, and enables composting	- difficult to enforce, and requires major change in household habits. Could take many years.				100
2	Initiate home composting in barrels where space allows and appropriate	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting		2000/ barrel		
	Street Waste Management/ Private Sector						
3	Provide litter bins on main streets for pedestrians' use	- Potentially low-cost way of reducing littering, and therefore cost of labour to sweep	- Would have to be introduced along with anti-littering legislation and public awareness campaigns to be effective	60,000 (for 100 bins)	600/ bin	15,000	150/ bin
4	Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas	- Little extra cost -	- Provision of better tools, and education to sweepers required - Sweepers may react against working for longer/ harder hours				
5	Hand over sweeping to private-sector (with staff and equipment)	- TMA no longer has responsibility for this management and labour-intensive activity					500
6	Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers – cum- door to door collectors	- improved health and safety of staff - increased productivity	Extra cost for improved tools	5,400/ cart (100hh served)	54	2,700 (100hh served)	27
7	Enforce provision of containers/ bags on public vehicles, vendors' carts, covers on sand, bricks carriers	- Stops littering of streets - Saves time of street sweeping - Clean streets	- Little extra cost				10-100/ veicle
	Primary Collection/ Private Sector/ CBO						
8	Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area	Sweepers' work will become more efficient as less waste dumped on to streets	Systems would require contributions from householders. Would they pay?				300
9	Community-based organisations/	-Zero cost for TMA	- could take many years to	TMA			300

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	private sector arrange door-to-door collection staffed by informal sector waste workers	-Sweepers' work will become more efficient as less waste dumped on to streets - provides livelihoods for poor	establish community-based organisations - Systems would require contributions from householders. Would they pay? - Can be difficult to organise waste pickers	equipment leased			
	Communal Storage						
10	Purchase demountable containers ($5m^3$) as communal storage facility	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- Experience in other countries suggests that if not properly manufactured and maintained can be problematic and containers can have short useful lives due to corrosion.	60,000/ container (750hh served)	80	14,000/ container (750hh served)	19
	Secondary Collection/ Private Sector						
11	Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots	- no extra capital cost	Increased annual cost			100,000	
12	Purchase hydraulic multi loader /hoist truck system for use with demountable containers	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- high capital cost - Success depends on public behaviour, as if waste deposited around containers, very problematic. - extra space required	2,000,000/ vehicle (7500 hh served)	266	431,800/ vehicle (7500 hh served)	58

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
13	Contract out secondary transportation to private-sector	- TMA no longer required to manage fleet of vehicles - Could lease vehicle fleet to private-sector operator - Financial savings and improvements to service	- Lack of experience of tendering and contracting out				200
	Reuse and Recycling/ Organizing Scavengers						
14	Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors	- Provides better livelihood to scavengers - Reduces the waste quantities to be disposed off	- Effort needed to organize scavengers - May take long time to introduce				
	Treatment and Final Disposal						
15	Improve and rehabilitate present disposal practices in line with basic public health and environmental standards	- Reduced threat to environment in public health - basic but significant improvements can be made for relatively low cost	- Some investment and expertise required				
16	Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant	- Less environmentally damaging -Reduced pollution of groundwater - In line with Annual Strategic Plan guidelines from the ADB	- Vested interests of drivers who sell waste may discourage dumping at site - Cost of developing and running site	1,520,000	70	532,000	25
17	Central compost plant (30 tons waste per day)	Recycles the organic matter which is useful for agriculture	Capital cost	3,260,000	92		
18	Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting	65,000	92		
	Special Waste Management						
19	Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste	- Reduced hazards from healthcare waste - compliance with national guidelines on healthcare waste - Could possibly attract private-sector investment	- Funding from hospitals/Department of Health? - Enforcement challenging, and needs to be backed up with awareness campaigns	20,000		20,000	
20	Awareness campaigns in hospitals	-Reduced mixing of healthcare waste with municipal waste	- Awareness raising campaigns can take time and cost money				

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
		- Changes behaviour of waste generators					
21	Undertake viability study for installation of locally manufactured incinerator	- Widely accepted healthcare waste management technique	- Costly to purchase, and challenging to operate and maintain				
22	Assess generation of hazardous waste within TMA, and devise strategy for its safe treatment and disposal	- Essential for protecting public health and environment - Should be funded by the private sector	- needs to be backed up with enforceable legislation				
23	Enforce provisions for demolition and construction waste disposal as responsibility of the producer	- clearer highways/ streets	- Getting this funded may be difficult, but construction companies should contribute				
	Awareness Raising						
24	Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment	- likely cost-effective way of tackling many problems - If successful could result in increased recycling rates from separated waste, reduced dumping on streets, reduced labour requirements for sweeping, improved drainage	- Awareness raising campaigns can take time and cost money - Expertise in awareness raising required			50,000	
25	Public awareness raising campaign for rural areas, providing information on composting and basic disposal	- Could help solve problem of plastic disposal in villages	- Would need support of professionals to disseminate information			25,000	
26	Hold a series of cleanup campaigns	- Can be effective at giving visible results quickly, and thus attracting public support - Relatively low-cost option				25,000	
27	Introduce public complaints system by establishing a complaint cell	- makes public more willing to cooperate with TMA, and contribute to improved waste management services	- vital that systems of accountability are in place within the TMA so complaints can be followed up and affect change				
	Legislation						
28	Ban open burning of waste on streets and at final disposal points	- Reduced environmental pollution - popularity with local residents	- Difficulties of enforcing legislation				
29	Introduce anti-littering laws	- Potentially low-cost way of impacting urban environment, with benefits to public health, drainage and labour requirements for waste	- Difficulties of enforcing legislation				

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
		management					
	SWM Fee						
30	Introduce fee systems for commercial producers of waste	- following the 'producer pays' principle, enables better services to be provided to the areas most needy – particularly shopping and industrial areas	- Possible resistance, so needs to be backed up with legislation and enforcement mechanisms				100
31	Introduce fee system for door to door collection	- Cost shared by the communities	- Difficult to realize from the communities				

Table B4-1: Urban Population Projections

TALUKA LARKANA: LARKANA CITY - UNION WISE PROJECTED POPULATION

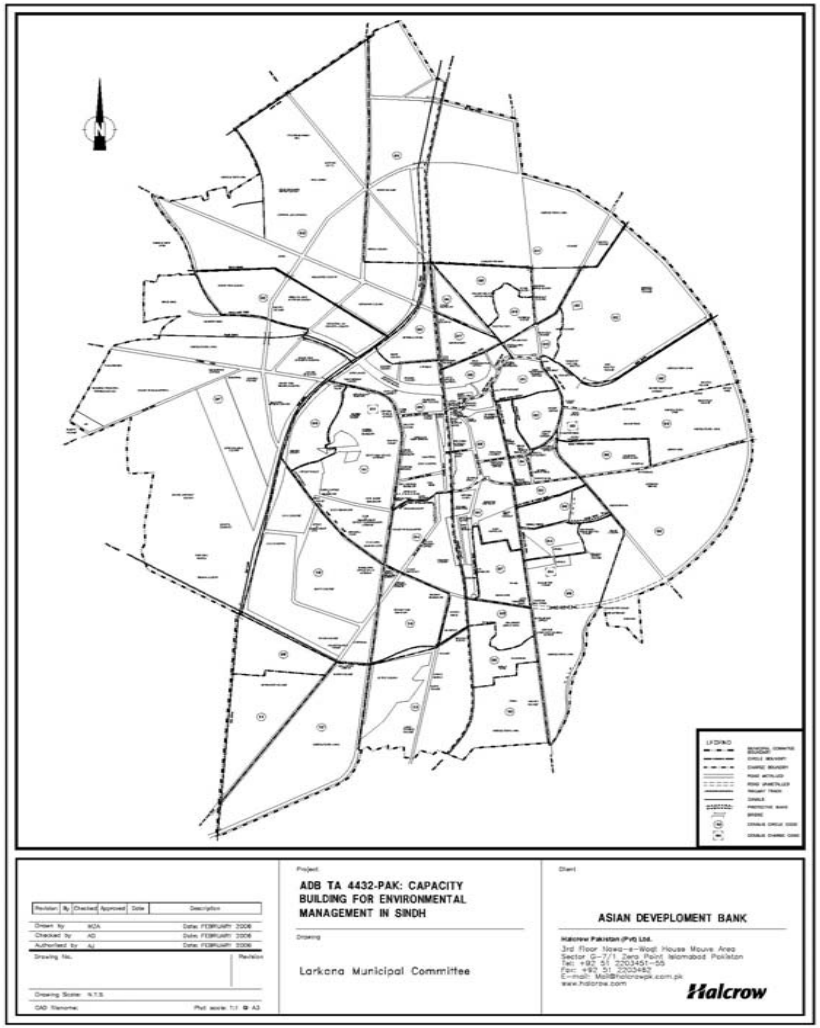
	POPULATION 1998	HOUSING CHARACTERISTICS							AVERAGE HOUSEHOLD SIZE	1998 POPULATION - UNION WISE											TOTAL
		TYPE OF STRUCTURE				HOUSING FACILITIES															
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	LATRINE	ELECTRICITY		UC 1	UC 2	UC3	UC4	UC5	UC6	UC7	UC8	UC 9	UC 10	UC 11	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
*LARKANA TALUKA	270,283	36,693	19,167	2,959	14,567	9,616	16,067	35,295	7.3												
*LARKANA M.CORP	270,283	36,693	19,167	2,959	14,567	9,616	16,067	35,295	7.3												
*CHARGE NO 01	121,219	16,796	8,364	1,553	6,879	4,100	6,782	16,105	7.1												
CIRCLE NO 01	6,633	834	354	93	387	170	414	779	8	6,633											
CIRCLE NO 02	11,706	1,766	1,206	188	352	258	796	1,739	6.7		11,706										
CIRCLE NO 03	6,589	1,004	362	106	536	814	345	969	6.7	6,589											
CIRCLE NO 04	6,626	944	544	98	302	114	397	929	7					6,626							
CIRCLE NO 05	4,463	622	288	34	300	51	228	569	7.2			4,463									
CIRCLE NO 06	5,372	758	534	28	196	157	418	751	7.1					5,372							
CIRCLE NO 07	12,206	1,694	828	116	750	349	503	1,649	7.1		12,206										
CIRCLE NO 08	9,314	1,056	517	32	507	167	338	849	8	9,314											
CIRCLE NO 09	8,437	1,237	691	269	277	845	596	1,209	6.6					8,437							
CIRCLE NO 10	10,311	1,494	721	52	721	124	740	1,475	6.9			10,311									
CIRCLE NO 11	6,474	931	208	146	577	58	423	861	7				6,474								
CIRCLE NO 12	6,034	878	360	35	483	175	380	834	6.9				6,034								
CIRCLE NO 13	11,353	1,685	584	155	946	35	590	1,616	6.7				11,353								
CIRCLE NO 14	8,127	953	574	71	308	244	403	922	8.5					8,127							
CIRCLE NO 15	7,472	950	593	130	227	518	261	944	7.6			7,472									
*CHARGE NO 02	49,504	6,845	3,282	455	3,108	1,999	3,359	6,537	7.2												
CIRCLE NO 01	7,999	1,115	382	74	659	408	717	991	7.1						7,999						
CIRCLE NO 02	6,534	1,112	396	65	648	414	357	1,073	5.9							6,534					
CIRCLE NO 03	3,697	494	269	19	186	33	77	473	7.4							3,697					
CIRCLE NO 04	4,741	618	224	42	352	297	310	597	7.7						4,741						
CIRCLE NO 05	6,366	707	310	84	313	62	512	699	9						6,366						
CIRCLE NO 06	4,690	763	322	68	373	131	407	734	6.1							4,690					
CIRCLE NO 07	5,905	843	569	26	248	344	358	807	7							5,905					
CIRCLE NO 08	3,703	431	285	38	108	106	303	419	8.6							3,703					
CIRCLE NO 09	5,868	762	502	39	221	194	318	744	7.7						5,868						
*CHARGE NO 03	38,540	5,176	2,982	376	1,818	2,105	1,851	4,998	7.4												
CIRCLE NO 01	5,144	780	458	126	196	239	269	770	6.5								5,144				
CIRCLE NO 02	7,300	996	341	130	525	252	379	991	7.3								7,300				
CIRCLE NO 03	9,251	1,225	584	43	498	643	390	1,104	7.5									9,251			
CIRCLE NO 04	5,964	764	425	32	307	313	430	752	7.8								5,964				
CIRCLE NO 05	4,058	523	416	-	107	195	202	521	7.8								4,058				
CIRCLE NO 06	6,823	888	658	45	185	492	181	860	7.7									6,823			
*CHARGE NO 04	61,020	7,876	4,539	575	2,762	1,412	4,075	7,655	7.7												
CIRCLE NO 01	4,571	638	493	68	77	199	501	631	7.1										4,571		
CIRCLE NO 02	3,400	391	290	2	99	29	218	391	8.7									3,400			
CIRCLE NO 03	5,795	680	305	73	302	91	305	623	8.5									5,795			
CIRCLE NO 04	5,199	589	388	48	153	73	217	594	8.8											5,199	
CIRCLE NO 05	8,126	1,217	597	57	563	85	696	1,191	6.7										8,126		
CIRCLE NO 06	6,609	999	282	109	608	140	444	924	6.6										6,609		
CIRCLE NO 07	9,131	1,120	847	77	196	358	770	1,115	8.2										9,131		
CIRCLE NO 08	6,818	735	532	7	196	220	546	732	9.2											6,818	
CIRCLE NO 09	7,110	958	613	30	315	197	330	925	7.4											7,110	
CIRCLE NO 10	4,261	549	192	104	253	10	88	539	7.8											4,261	
Population 1998										22,636	23,914	22,246	23,661	28,562	24,974	24,530	22,466	25,269	28,437	23,385	270,283
Growth Rate (4.69%)																					
Population 2005										32,562	34,406	32,009	34,029	41,213	35,935	35,295	32,317	36,351	41,032	33,747	389,096
Population 20012										43,000	45,428	42,260	45,327	54,256	47,442	46,598	42,677	48,002	54,020	44,429	513,441

Table B4-2: Rural Population Projections

TALUKA LARKANA: UNION WISE PROJECTED POPULATION

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	POPULATION 1998	HOUSING CHARACTERISTICS						AVERAGE HOUSEHOLD SIZE	AREA IN ACRES	PROJECTED POPULATION YEAR 2006 GROWTH RATE 3.64%	PROJECTED POPULATION YEAR 2012 GROWTH RATE 3.64%	UNION COUNCIL
		TYPE OF STRUCTURE				HOUSING FACILITIES						
		TOTAL	PAGGA	SEMI-PAGGA	KACHA	POT-ABLE WATER	ELECTRICITY					
1	2	3	4	5	6	7	8	9	10	11	12	13
*LARKANA TALUKA	196,141	32,840	4,014	3,672	25,254	3,678	28,946	6.0	136,155	261,090	323,564	
BERIO HANDIO	7,338	1,355	227	118	1,010	280	1,208	5.4	2340	9,768	12,105	UC 1
BUGTI BALOCH	3,606	607	115	18	474	27	697	5.9	2427	4,800	5,949	UC 1
GHAKAR ALI	2,988	530	150	50	330	22	508	5.6	1206	3,977	4,929	UC 1
MIANI NIHAL	6,265	961	116	116	729	16	698	6.5	3241	8,340	10,335	UC 1
MITHO DERO	3,876	819	78	96	645	16	786	4.7	1626	5,162	6,397	UC 1
	24,075									32,047	39,715	Total
FATI BILAWAL	1,059	197	3	3	191	-	182	5.4	1889	1,410	1,747	UC 2
JAMARANI	3,526	573	95	108	370	48	479	6.2	4291	4,694	5,817	UC 2
KHATRO BADO	3,840	744	38	65	641	33	537	5.2	1904	5,112	6,335	UC 2
LUNGH	1,476	184	10	33	141	56	184	8	1975	1,965	2,435	UC 2
NINDHERO	2,104	378	28	75	275	-	225	5.6	2667	2,801	3,471	UC 2
RASHID WAGAN	3,283	591	75	120	396	209	557	5.6	1756	4,370	5,416	UC 2
RATOKOT RAYATI	484	60	15	1	44	3	51	8.1	363	644	798	UC 2
RATOKOTE	4,014	634	29	22	583	197	602	6.3	2366	5,343	6,622	UC 2
	19,786									26,339	32,641	Total
AGANI	6,160	1,171	108	49	1,014	49	1,139	5.3	3570	8,200	10,162	UC 3
DARAGAD	6,954	1,190	138	118	894	12	1,018	6	3552	9,257	11,471	UC 3
DHAMRAHA	5,660	952	241	88	633	7	943	5.9	2485	7,534	9,337	UC 3
SULTAN ABRO	2,819	395	21	102	272	14	354	7.1	2696	3,752	4,650	UC 3
	21,593									28,743	35,620	Total
BAGO VIGHAMAL	815	118	80	2	36	-	118	6.9	350	1,085	1,344	UC 4
DANDANO	5,377	749	153	46	546	26	679	7.2	1991	7,157	8,870	UC 4
DODDAI	5,735	924	150	145	629	333	899	6.2	3367	7,634	9,461	UC 4
KHEDKAR	2,167	303	11	38	254	8	228	7.2	1594	2,885	3,575	UC 4
NASURULLAH	4,279	747	232	31	484	68	745	5.7	2452	5,696	7,059	UC 4
SOOMAR SANGI	867	102	17	17	68	3	99	8.5	1000	1,154	1,430	UC 4
VALID	1,127	176	58	30	37	1	169	6.4	1378	1,500	1,859	UC 4
	20,367									27,111	33,598	Total
AKIL	589	90	3	76	11	2	85	6.5	3366	784	972	UC 5
BAID SANGI	1,416	255	11	26	219	1	253	5.6	696	1,888	2,339	UC 5
BINDI	900	156	-	67	88	1	146	5.8	3000	1,198	1,485	UC 5
GANGRO	6,054	854	32	76	756	23	774	7	2306	8,059	9,987	UC 5
ILLYAS	-	-	-	-	-	-	-	-	53	-	-	UC 5
JIAND JATOI	2,842	456	28	46	382	26	400	5.7	866	3,517	4,358	UC 5
KHALID	1,020	126	-	126	-	102	-	8.1	2387	1,358	1,683	UC 5
LAHNO SAMITO	1,770	279	25	57	197	63	265	6.3	1610	2,356	2,920	UC 5
MASUHAB	3,280	479	45	56	378	131	427	6.8	1123	4,366	5,411	UC 5
MORIO KHUHRO	-	-	-	-	-	-	-	-	613	-	-	UC 5
NEO ABAD	967	171	-	53	118	4	127	5.6	2145	1,314	1,628	UC 5
PHULL	3,039	547	9	55	483	93	510	5.6	2361	4,045	5,013	UC 5
SANHARI	731	100	-	1	99	19	-	7.3	9000	973	1,206	UC 5
	22,430									29,858	37,002	Total
LAHORE	1,153	194	8	2	184	-	16	5.9	655	1,535	1,902	UC 6
NAZAR THARIRI	6,620	979	226	192	561	337	827	6.8	2511	8,812	10,920	UC 6
SHAH NAWAZ	8,519	1,452	91	91	1,280	48	1,309	5.9	4040	11,340	14,053	UC 6
TALBANI	4,146	793	91	49	653	2	713	5.2	4165	5,519	6,839	UC 6
	20,438									27,206	33,714	Total
BAKAPUR	4,801	726	104	110	512	117	710	6.3	2040	6,126	7,590	UC 7
DHADHRA	2,656	410	84	13	313	72	358	6.5	2581	3,535	4,381	UC 7
JATOI CHACHAR	5,367	817	58	45	714	10	793	6.6	2026	7,144	8,854	UC 7
MAHER WADA	2,901	409	42	11	356	107	295	7.1	2337	3,862	4,786	UC 7
MIRKHAN ABRO	2,450	412	4	61	347	14	132	5.9	2130	3,261	4,042	UC 7
WAH NABI BUX	1,954	319	19	20	280	-	272	5.8	2819	2,468	3,058	UC 7
	19,829									26,396	32,711	Total
AHMED PATHAN	2,387	423	11	87	325	17	310	5.6	2720	3,177	3,938	UC 8
CHATO MAHESAR	6,731	1,164	63	79	1,002	144	1,122	5.6	2685	8,960	11,104	UC 8
KOTHI	4,425	797	41	27	729	77	792	5.6	1995	5,890	7,300	UC 8
NANGAR SANGI	2,407	530	23	174	333	31	498	4.5	2560	3,204	3,971	UC 8
SACHEDINO	1,300	175	47	1	127	-	147	7.4	1907	1,730	2,145	UC 8
VIKIA SANGI	2,835	528	31	39	458	6	518	5.4	2654	3,774	4,677	UC 8
ZAKRIO NAHESAR	5,254	1,038	85	99	854	142	818	5.1	3897	6,994	8,667	UC 8
	25,339									33,729	41,802	Total
GHOHERPUR	6,313	959	241	62	656	119	896	6.6	2625	8,403	10,414	UC 9
FATEHPUR	6,285	1,144	247	82	815	9	1,008	5.5	2504	8,366	10,368	UC 9
KAWSA	3,338	528	68	21	437	106	466	6.3	1303	4,443	5,506	UC 9
KATHAR	2,190	412	48	61	303	410	392	5.3	1944	2,915	3,613	UC 9
LOUNGAI	2,530	374	16	64	294	11	248	6.8	3232	3,368	4,174	UC 9
LUND	1,628	312	15	3	294	3	225	5.2	1446	2,167	2,686	UC 9
	22,284									29,662	36,761	Total

Figure A4-1: Larkana City Map



Annexure - 5

SHIKARPUR

SHIKARPUR TALUKA

Strategic Plan For Water Supply and Sanitation

2006-2012

Table of Contents

1 BACKGROUND 1
1.1 Overview of Shikarpur Taluka 1
2 WATER SUPPLY 2
2.1 Urban areas 2
2.2 Rural areas 2
2.3 Private Arrangement of Water 2
3 SEWERAGE AND DRAINAGE 3
3.1 Urban areas 3
3.2 Rural area 3
4 SOLID WASTE MANAGEMENT 4
4.1 Urban Areas 4
4.2 Rural area 4
5 PRIORITIES 5
6 ISSUES 6
6.1 Water Supply 6
6.2 Sewerage and Drainage 7
6.3 Solid Waste Management 8
7 STRATEGIC PLAN 10
7.1 Water supply 10
7.2 Sewerage and drainage 10
7.3 Solid waste management 12

Supporting information and Appendices

Shikarpur Taluka – Strategic Plan for Water Supply and Sanitation – 2006-2012

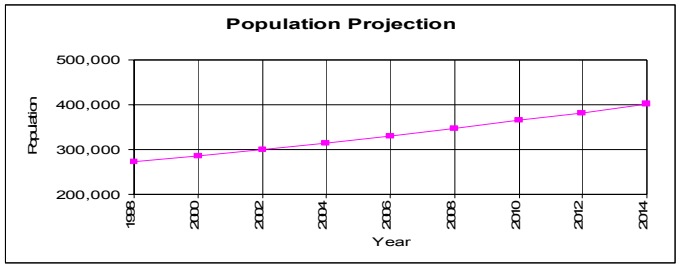
1 BACKGROUND

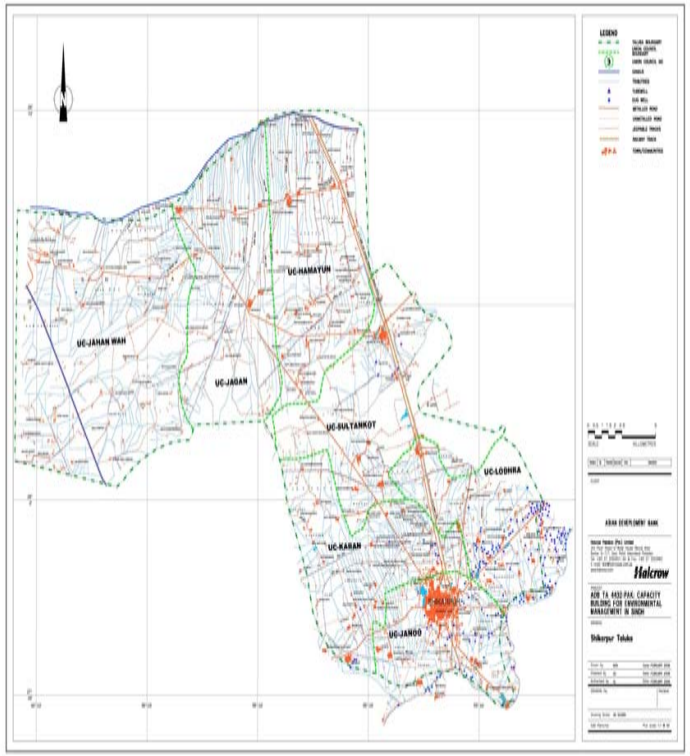
1.1 Overview of Shikarpur Taluka

1. The district is flat and level plain without any mountain or hill. The land gradually slopes from north-east to south-west. The general elevation of the land surface varies from about 50 to 100 meters above sea level. The plain area of Shikarpur is locally called “Pat”.

2. Indus flows through its north east and south west boundaries. On entering the Shikarpur district it is sub-divided into two parts. One part flows in the Shikarpur district, the other flows in Sukkur district. Sukkur and Guddu barrages are constructed on river Indus and canals take off from these two barrages which irrigate Shikarpur. The Kirthar canal take off from Sukkur barrage and Choi, Sindhwah and Begari canals from Guddu barrage.

3. Shikarpur Taluka had total population of 272,493 according to the 1998 census with the urban population only in Shikarpur city as 134,883 (49%) and rural population as 137,610 (51%). The graph of population projection indicates estimated projected population based on the growth rate of 2.45% as provided in the 1998 census report.





2 WATER SUPPLY

2.1 Urban areas

4. Ground Water is sweet in Shikarpur. Private Arrangement of water exists throughout the city and motor pumps & hand pumps are used by individual households. No scheme of water supply exists in the city and people have no demand for any such scheme as well as there is no water vending in the city.

2.2 Rural areas

5. In rural areas of Shikarpur, sweet water is available in most of the areas but there are many villages where water is brackish. Villages where sweet water is available, hand pumps and motor pumps are common. Tubewells are also installed in some villages. There are chances of Arsenic in shallow ground water but deep ground water is fit for drinking. There are villages where sweet water is available at some distance in the nearby vicinity; in these villages tubewells have to be installed at distance and pumping main will be required to bring the water to the village. For the villages in brackish zone, surface water is the only option.

6. There are a number of water supply schemes based on canal water, but these are not working due to the lack of coordination with irrigation or electric department or lack of VDA capability. Unicef has installed hand pumps at depths 200 to 300 ft depth. Arsenic is less at deep wells.

2.3 Private Arrangement of Water

7. Hand pumps and small motor pumps are in use where sweet water is available and in brackish areas source of water is canal or water course. People use some depression in natural ground or dig irregular ponds where they store water to use during the canal closure period. They take water directly from the ponds during canal closure.

3 SEWERAGE AND DRAINAGE

3.1 Urban areas

8. Central city has a very old sewerage system and an old sewage pump station now named as Low Level Pumping Station. This was constructed in year 1937. In old days, the city has separate rain water drainage system. In this way previously the city had ideal sewerage and drainage systems which were deteriorated with the time. Due to deterioration in old system and due to increase in population and expansion of the city, it is now insufficient to handle the requirements of the city.

9. At present the sewerage and drainage systems are mixed and in use jointly for sewage and rain water drainage. Water Table is shallow and so there are many intermediate pumping stations are in the city. Sewer pipes are on main roads and streets whereas other streets have open drains which also carry human excreta causing environment hazard. The city has 100% coverage with system of sewers and drains except the newly developed un-planned settlements all around the city. Most of these newly constructed areas are also low lying and waste water is ponding in open areas within the populated areas. The streets are narrow and zigzag and laying of sewer is difficult in these areas. Master Plan of the city has been prepared and one PC-1 submitted to the district government.

10. All disposal stations are discharging waste water in the canals, which is very harmful and an environmental hazard.

11. Previously there was a waste water treatment plant consists of about 200 acres but now there is no Waste Water Treatment Plant, but one proposal is in line in this regards.

3.2 Rural area

12. In rural areas of Shikarpur, open drains are provided and waste water flows generally directly into fields and other open areas. In most of the villages, drains are overflowing and waste water hold up in them and overflowing in the streets. Human excreta are directly discharged into the open drains which are great environment hazard. The open drains get blocked due to a combination of inadequate maintenance, gradient and solid waste. Sewage disposal stations are not properly functioning due to lack of interest of the VDA of the villages, lack of proper electricity connection or in need of repair. Waste water spreads in the vicinity of the disposal stations. People are facing much trouble due to improper drainage in big villages. Small rural settlements have open drains which carry waste water to the fields and open spaces. Most of drainage schemes have operation and maintenance problems but some require major repair and rehabilitation.

4 SOLID WASTE MANAGEMENT

4.1 Urban Areas

13. The TMA uses hand carts and donkey carts for primary collection and tractor-trolleys and front end loaders for secondary collection of the waste which is finally disposed off in form of open dumps inside the city and on the out skirts. No formal sanitary land filling is done.

14. The overall collection efficiency of the TMA is about 65% of the total generation and so quite a portion of waste remains uncollected in the city which is a source of environmental pollution. Major reasons for the situation are non provision of community bins and indiscriminate throwing of waste on the streets, manually loaded vehicles and disposal in form of open dumps. Healthcare wastes are also mixed with the municipal waste. Women are responsible for managing waste at the household level but they are not adequately educated to deal with the problem in a sanitary manner.

4.2 Rural area

15. The problems in rural areas are much less severe compared with in the city. Waste generation rates are low, and there is a high organic content, making waste suitable for natural decomposition, or controlled composting.

16. Plastic bags are a growing problem in rural areas of the TMA, and there is lack of information on how to deal with this form of waste.

5 PRIORITIES

The Strategy Plan of the Taluka is based on the following priorities:

1. *The need to involve the community in working with the TMA to reduce waste and increase efficiency through greater awareness and concern for the environment in general and of the Taluka in particular; This will be done through public awareness campaigns and a programme of concerted area-by-area campaigns;*
2. *The need to adopt more participatory and transparent processes of working by the TMA. This will be done through the use of the "planning wall" and other devices for making the public more aware of the TMA's programmes and priorities;*
3. *To involve the private sector and the community in working with the TMA in the delivery of WSS services as part of the component-sharing approach;*
4. *The need to rehabilitate and refurbish existing systems and schemes;*
5. *The need to improve the capacity and efficiency of existing and installed schemes and systems;*
6. *The need to take greater control over the resources and services of the Taluka. This will be done through building up an updated database and management information systems*
7. *Then, to improve and extend WSS services delivery to the new and expanding parts of the Taluka;*
8. *Once the TMA service delivery has improved, the priority will be to collect an increased portion of increased tariff and user charges*

6 ISSUES

6.1 Water Supply

	House	Lane	Settlement
Shikarpur			System of regular monitoring of water quality does not exist
UCs			
Rest of Taluka	Safe drinking water is not available in most of the houses in rural areas		Most of the rural areas are not served with municipal water supply.
	Lack of awareness about link between water quality and health		Ground Water and Canal Water are the sources at different locations. Some canals are non-perennial, and remain closed four to six months in a year. Perennial canals also close for 30 to 40 days in a year for maintenance purpose. Available water storage does not meet the requirements during canal closure period
			There are few water supply schemes but they are un-operational or functioning inadequately.
			Canal water is suspected to be contaminated by upstream pollution including dumping of raw sewage.
			Data for planning and for proper operation and maintenance is not available.
Financial	Budgeting is made difficult because of lack of information on contributions and commitments from district and provincial levels. Tariff structure is low and has no relation to expenses.		
Environment	Poor quality of water is a health hazard particularly for children. Intestinal disorders are endemic.		
Women	Women, particularly in rural areas, are responsible for water provision to the household. In rural areas, they are forced to fetch water over long distances, making it a tiring and wasteful task severely impacting on their ability to undertake other household tasks. The poor quality of water not only causes family health problems, but also makes other water-related tasks such as clothes washing and cleaning more difficult and time-consuming.		
UC1			
UC2			
UC3			
Institutional	TMA responsibilities are not clear because of the overlapping created by the re-designation of PHED. For example TO(I&S) has been placed under the command of the PHED. The PHED will supervise the O&M of water supply and drainage schemes of major cities. O&M responsibility for the vertical projects such as water Filtration Plants has been put on the TMA. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001.		

6.2 Sewerage and Drainage

	House	Lane	Settlement
Shikarpur	Toilet facility is not available in some of the houses	Most open drains are usually blocked with refuse	Untreated disposal into fields and canals
	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	All open drains carry human excreta	Inadequate Trunk Sewer network coverage
	Lack of awareness about link between sanitation and health	Underground pipes exist in some parts of the urban area but most are in poor condition	Sewage Treatment Plants are not functioning therefore there is no treatment of sewage
			Pump Stations are old and in poor condition. Sewage is held up there.
Rest of Taluka	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	No facility in most of the area	Most of the area is un-served.
	Lack of awareness about link between sanitation and health	All open drains carry human excreta	Existing Sewerage Schemes in rural areas are not functioning or functioning inadequately
			Untreated disposal into fields
UC1			
UC2			
UC3			
Institutional	Major projects are being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001 Maps and Data of existing system is not available.		
Financial	Budgeting is made difficult because of lack of information from district and provincial levels.		
Environment	Open drains with faeces discharged directly from household toilets are a common sight. Drains blocked by polythene bags and leaking pipes cause ponding. This is particularly hazardous in lanes and residential areas where children play around untreated sewage. The discharge of untreated sewage for use in agriculture is harmful to both agricultural workers and consumers of the produce. Disposal in to canals is a big environmental hazard.		
Women	The lack of toilets or poor facility in some houses is particularly onerous for women who are forced to curtail their activities and functions.		
Public Toilets	Absence of public toilets in urban areas, especially for women, severely limits activities and leads to open urinating.		

6.3 Solid Waste Management

	House	Lane	Settlement
Shikarpur	Waste is mixed, thus reducing potential for composting and reducing value of recyclables	Incomplete sweeping of lanes due to large amounts of waste is thrown on the streets, low -attendance of sweepers and low-productivity	Only 65% of waste generated from the city is collected by TMA
	Waste thrown on streets, thus increasing sweeping work and choking sewers and drains	Sweepers use inefficient tools and poorly designed handcarts, thus reducing efficiency and exposing workers to occupational diseases	Ad hoc disposal facilities threatening public health and the environment
	No door-to-door collection system, encouraging indiscriminate dumping on streets	Poorly maintained and designed transfer points resulting waste scattering on street sides	Waste pickers operating at dump sites, posing a threat to themselves
		Scavengers working on the streets can scatter waste, and susceptible to health problems	Inadequate manually loaded vehicles for secondary collection
		Polythene bags spread around make the city look filthy, and caused choking of sewers and drains	Health risks from present final waste disposal practices (e.g. groundwater pollution, air pollution, disease vectors)
		Health risks from rotting piles of waste on streets/at transfer points	Health risks from lack of separate Healthcare waste management
		Health risks from blocked drains and sewers	
		Manual handling of waste when loading and unloading is dangerous and inefficient	
Rural areas			Plastic waste is a problem throughout rural areas and hinders composting of waste
Community participation	Lack of community engagement in solid waste management activities	Very few community organisations are established at present to facilitate community-led door-to-door collection	
Institutional		No NGOs working in the field of solid waste management	Lack of technical knowledge within TMA on solid waste management options
Finance	Required contributions from householders provided with door-to-door collection services		Lack of funds hinders investment and planning in solid waste management
Environment		Degradation of city environment as a result of indiscriminate dumping on streets	Environmental pollution from uncontrolled disposal of waste
Women	Women lack education on problems caused by improper management of solid waste		No public awareness messages targeted at women
Private sector	Potential for informal-sector/small enterprises to undertake door-to-door		Contracting out solid waste management at the city level not tried

	House	Lane	Settlement
	collection services not being tapped.		
Hospitals	Improper handling of healthcare waste can expose hospital staff, sanitary workers and citizens to health risks. In particular, the practice of recycling syringes, and handling and resale of infected equipment is hazardous.		
Schools	Due to storage of solid waste in open heaps, school children and staff are exposed to health risks.		
Commercial	Demolition and construction waste is presently mixed with other municipal wastes, and remains on the streets in commercial areas awaiting collection. It is a source of health risks as well as traffic hazard. Shopkeepers throwing waste onto the streets further aggravate the problems.		
Public awareness	Lack of public awareness about health impacts of poor solid waste management practices		Lack of awareness about Healthcare waste amongst professionals and public

7 STRATEGIC PLAN

7.1 Water supply

PROPOSALS	PLACING	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.									
House Level									
Public awareness campaign for the connection between water quality and health.	Shikarpur								SDSSP
Rehabilitation Of Existing Rural Schemes	**Other UCs**								
Rehabilitation of existing water supply schemes after consultation with the community for the demand and O&M responsibility	Other UCs								SDSSP
New Rural Schemes									
Arrange land acquisition and construct water storage tanks	Other UCs								SDSSP
Arrange land acquisition and construct water treatment plant consisting of slow sand filter	Other UCs								SDSSP
Planning									
Continuous liaison and coordination with irrigation department on regular supply of water to operate existing water supply schemes.	Other UCs								TMA
Collect data of each settlement regarding the ground water condition, distance of the nearest water source etc. and plan for water supply schemes.	Other UCs								SDSSP

7.2 Sewerage and drainage

PROPOSALS	PLACING	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.									
Lane Level Drains And Sewers									
Targeted action to unblock drains – area by area; accompanied by public awareness campaign									TMA
Cover the open drains or replace with underground pipe									SDSSP
Extend underground pipe network on a lane by lane basis									SDSSP
Trunk Sewers And Pump Stations									
Gradually repair and replace underground trunk sewers and pump stations.									SDSSP
Provide Additional Trunk Sewers and Pump Stations									SDSSP
Treatment									

PROPOSALS	PLACING								FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	
Repair existing sewage treatment plants									SDSSP
									SDSSP
Cost Recovery									
Sell treated sewage effluent as fertiliser									-
Planning									
Prepare Map and Data of existing system									SDSSP
House Level									
Public awareness campaign to install toilets in low density areas, encourage installation of individual Ventilated Improved Pit (VIP) Latrine in rural areas	Other UCs								SDSSP
Lane Level									
Targeted action to unblock drains – area by area; public awareness campaign.	Other UCs								TMA
Cover the open drains or replace with underground pipe.	Other UCs								SDSSP
Trunk Sewer And Pumping Station									
Repair existing Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Provide Additional Trunk Sewers and Pump Stations.	Other UCs								SDSSP
Sewage Treatment Plant									
Repair existing sewage treatment plants.	Other UCs								TMA
Provide additional sewage treatment plants.	Other UCs								SDSSP
Rehabilitation									
Rehabilitation of existing drainage schemes after consultation with the community for the demand and O&M responsibility.	Other UCs								SDSSP
Planning									
Plan new drainage/ sewerage schemes after consultation with community.	Other UCs								SDSSP
Public Latrines									
Provide public latrines at important places	Shikarpur								SDSSP

7.3 Solid waste management

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Onsite Storage and Processing								
Introduce 2-bin system for wet and dry waste in household								Households
Initiate home composting in barrels where space allows and appropriate								Households/ TMA/ NGO
Street Waste Management								
Provide litter bins on main streets for pedestrians' use								TMA/NGO/CBO
Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas								TMA
Hand over sweeping to private-sector (with staff and equipment)								TMA/ Private Sector
Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors								TMA
Enforce provision of containers/ bags on public vehicles, vendors' carts								TMA
Primary Collection/ Private Sector/ CBO								
Enforce waste producers' responsibility for transporting waste to transfer points (i.e. community bins)								TMA/CBO
Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area								TMA/NGO
Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers								TMA/CBO/Private Sector
Communal Storage								
Purchase demountable containers ($5m^3$) as communal storage facility								TMA/SDSSP
Secondary Collection/ Private Sector								
Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots								TMA
Purchase hydraulic tractor container carrier system for use with demountable containers to replace the present manually loaded tractor trolleys								TMA/ SDSSP
Contract out secondary transportation to private-sector								TMA
Reuse and Recycling/ Organizing Scavengers								
Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors								TMA/CBO
Treatment and Final Disposal								
Improve and rehabilitate present disposal practices in line with basic public health and								TMA

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
environmental standards (levelling and providing soil cover)		■						
Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant			■	■	■			TMA/SDSSP
Central compost plant			■	■	■			TMA/ Private Sector
Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available				■	■			TMA/ CBO/Private Sector
Special Waste Management								
Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste		■	■					TMA/ District Health Department
Awareness campaigns in hospitals		■	■					TMA/ District Health Department
Undertake viability study for installation of locally manufactured incinerator				■	■	■	■	TMA/SDSSP
Assess generation of hazardous waste within TMA, and devise strategy for its safe treatment and disposal			■	■				TMA
Enforce provisions for demolition and construction waste disposal			■	■				TMA/Private Sector
Awareness Raising								
Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment		■						TMA/NGO
Public awareness raising campaign for rural areas, providing information on composting and basic disposal			■					TMA/NGO
Hold a series of cleanup campaigns		■						TMA/NGO/CBO
Introduce public complaints system by establishing a complaint cell			■	■				TMA
Legislation								
Ban open burning of waste on streets and at final disposal points		■						TMA
Introduce anti-littering laws		■						TMA
SWM Fee								
Introduce fee systems for commercial producers of waste			■					TMA
Introduce fee system for door to door collection				■				TMA

SUPPORTING INFORMATION

1 GENERAL

1. Shikarpur takes its name from its head quarters town which was known as Shikargah (a hunting place) for the rulers of Sindh prior to the British government.

2. The district is flat and level plain without any mountain or hill. The land gradually slopes from north-east to south-west. The general elevation of the land surface varies from about 50 to 100 meters above sea level. The plain area of Shikarpur is locally called “Pat”.

3. Indus flows through its north east and south west boundaries. On entering the Shikarpur district it is sub-divided into two parts. One part flows in the Shikarpur district, the other flows in Sukkur district. Sukkur and Guddu barrages are constructed on river Indus and canals take off from these two barrages which irrigate Shikarpur. The Kirthar canal takes off from Sukkur barrage and Choi, Sindhwah and Begari canals from Guddu barrage.

4. Shikarpur District comprises of four Talukas; according to census report of 1998, it’s population distribution and urban proportion is as follows.

TALUKAS, POPULATION AND URBAN PROPORTION IN THE DISTRICT

Administration	Population	Urban
Shikarpur District	880,438	24.1
Gari Yasin Taluka	227,966	11.0
Khanpur Taluka	191,681	9.7
Lakhi Taluka	188,298	17.8
Shikarpur Taluka	272,493	49.5

5. Shikarpur Taluka has one city Shikarpur having urban population as 134,883 (49%) and rural population as 137,610 (51%). The details are provided in Table B5-1 and B5-2.

6. Information about tap water and latrine facility in the urban areas as available in the census report is provided in Table A5-1.

Table A5.1: WATER AND LATRINE FACILITY IN URBAN AREAS OF THE TAULKA

Urban Areas	Population according to census 1998	Average House hold size	Total Houses	Houses with Potable Water Facility		Houses with Latrine Facility	
				Nos.	%	Nos.	%
Shikarpur	134,883	7.7	17,460	8,855	51	8,212	47

7. Situation of potable water facility in the houses of rural areas as given in census report is provided in Table A5.2.

Table A5.2: POTABLE WATER FACILITY IN RURAL AREAS OF THE TALUKA

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
SHIKARPUR TALUKA	137,610	22,705	3,490	15.37
JAGAN STC	37,633	5,705	513	8.99
ALI BAHAR TC	8,220	1,330	108	8.12
JAGAN TC	13,824	2,124	98	4.61
JAHANWAH TC	9,699	1,323	229	17.31
KHAN WAH TC	5,890	928	78	8.41
SHIKARPUR STC	51,368	9,195	1,495	16.26
BAID TC	7,596	1,450	191	13.17
JANO TC	13,886	2,365	914	38.65
KARAN TC	9,457	1,712	41	2.39
LALIYOON TC	14,069	2,471	32	1.30
SHIKARPUR TC	6,360	1,197	317	26.48
SULTAN KOT STC	48,609	7,805	1,482	18.99
HAMAYUN TC	10,490	1,492	536	35.92
LODRA TC	11,861	2,046	446	21.80
SHAHAL TC	10,127	1,547	27	1.75
SULTAN KOT TC	16,131	2,720	473	17.39

* STC = Supervisor Tapedar Circle
TC = Tapedar Circle

2 WATER SUPPLY SYSTEM

2.1.1 Urban Area

8. Sweet ground water is available in whole the city. People have their private arrangement for water and are using motor pumps and hand pumps and satisfy with the water quality rather they are proud of availability of good water. Some people, who can afford when move to other place for visit, take water with them for drinking which reflects their confidence on ground water. No scheme of water supply exists in the city and people have no demand for any such scheme. However water monitoring system should be established to check regularly the water quality. No water vending is in the city. The city map is provided at Figure A5-1.

2.1.2 Rural Areas

9. Most of the rural areas have sweet ground water, but there are villages where ground water is brackish and water supply schemes are needed. Out of these brackish zone villages, at some places sweet water is available at some distance but even then some villages require canal water as water source.

10. Water Supply Schemes handed over to VDAs are generally not working properly.

11. Sultan Kot Water Works is about 2 Kms from the village near the canal. There are Storage/ Settling Tanks from where arrangement is there to pump the water to clarifier, filter and then to clear water tanks. There is pump station to pump water from clear water tanks to the village. All this treatment plant is not in working condition. Now there are six tubewells in the water works ie near the canal, out of which three are in working condition. These tubewells provide water to the village. It is not understood that if tubewell can provide water then why such huge system was built. Improvement in the tubewells is required and also operation of tubewells should be regular. People in the village are facing shortage of water. There is one existing OHT, which is now in very poor condition and its structure is damaged. It is still in use where as now it should not be used. One OHT is under construction.

3 SEWERAGE AND DRAINAGE SYSTEM

3.1.1 Urban Area

12. Central city has a very old sewerage system and a old sewage pump station now named as Low Level Pumping Station. This was constructed in year 1937. In old days, the city has separate rain water drainage system. In this way previously the city had ideal sewerage and drainage systems which were deteriorated with the time. Due to deterioration in old system and due to increase in population and expansion of the city, it is now insufficient to handle the requirements of the city.

13. At present the sewerage and drainage systems are mixed and in use jointly for sewage and rain water drainage. Water Table is shallow and so there are many intermediate pumping stations are in the city. Sewer pipes are on main roads and streets whereas other streets have open drains. The city has 100% coverage with system of sewers and drains except the newly developed un-planned settlements all around the city. Most of these newly constructed areas are also low lying and waste water is ponding in open areas within the populated areas. The streets are narrow and zigzag and laying of sewer is difficult in these areas. Master Plan of the city has been prepared and one PC-1 submitted to the district government.

14. All disposal stations are discharging waste water in the canals, which is very harmful and an environmental hazard.

15. Previously there was a waste water treatment plant consists of about 200 acres but now there is no Waste Water Treatment Plant, but one proposal is in line in this regards.

16. Brief information on the existing twelve sewage pumping stations in the city is attached as Appendix 5-1.

3.1.2 Rural Areas

17. In rural areas, open drains are provided for sewage flow. The drains and disposal stations are not functioning properly due to improper operation and there is no maintenance. Drains have not adequate slopes. Due to these reasons, drains are overflowing in the streets and also waste water spreads in the vicinity of the disposal stations. People are facing much trouble due to improper drainage in larger villages. Small rural settlements have open drains which carry waste water to the fields and open spaces. Most of drainage schemes have operation and maintenance problems but some require major repair and rehabilitation.

18. Village Janno has two disposal stations. Waste Water came to these disposals through open drains. These drains often remained blocked and sewage overflows in the streets. The reasons are that drains are not at proper slope and waste water flowing in do not attain self cleansing velocity, pump station do not operate continuously, but operated when collecting tank filled up to top due to which deposition of sludge occurs in the

screening chamber, wet well and also in the drains approaching to the disposal station. Another reason of blockage of drains is the improper solid waste management due to which solid waste falls in the drains and chokes them.

19. In village Lodra, Drainage Scheme exists and now under VDA. Disposal Station is there where two electric pumps and one diesel pump are installed. At time of visit, situation of the disposal station looked that it seldom works, although it was in working condition. In certain locations, waste water overflows and comes on streets.

20. Drainage of Sultan Kot is in poor condition. Drains were full of waste water and the transformer at pumping station is out of order. 2nd disposal was also not at working condition.

21. In Karan Sharif, Open Drains and Pumping Station exists. There is one electric pump and one diesel pump are in the pumping station. There are oxidation ponds but they are not working now.

3.2 Legislation

22. There is Pakistan Environmental Protection Act 1997, which governs the pollution of water bodies, waste water disposal standards, but there is no practical enforcement of the act in the taluka. Any other Law, regulation, standard or guideline do not exist at national, provincial, district or local levels regarding drinking water supply, sewerage or drainage. For drinking water, WHO guidelines are generally referred in practice by the provincial departments but these are not being implemented in letter and spirit.

3.3 Private Sector Participation

23. There is no private sector participation in the fields of potable /drinking water, sewerage or drainage in the taluka.

3.4 Main Issues and Constraints

i) Responsibilities of Taluka, District and Public Health Engineering Department are not clear.
ii) TMA has not sufficient data and drawings of the water supply and sewerage systems of the urban areas of the Taluka.
iii) TMA has not a complete list and drawings with necessary details and drawings of its assets in shape of water and sewerage components. These include land, structures, pipes, machinery etc in rural areas.
iv) There is no system for water quality monitoring.
v) There is no comprehensive Master Plan of TMA regarding water and sanitation especially for rural areas.
vi) Existing sewage disposal stations need improvements.
vii) The operation of existing disposal stations also needs improvements. Presently these are operated in such a way that waste water held up in the drainage network.
viii) In rural areas, although the problem of waste water is less than the urban areas, but waste water is ponding and spreading in the streets or open areas of the villages.
ix) Solid waste is being thrown in drains. Improvement of Solid Waste Management System will improve the Drainage System.

INFORMATION OF MACHINERY IN THE SEWAGE PUMP STATIONS

1. Low Level Pumping Station
   Constructed in 1937. Its disposal is in Begari Canal.
   Pump 6X6 40 HP Functioning
   Pump 6X6 50 HP Out of Order

   Delivery main of size 18 inches is available. In pump house space for six pumps is available. The structure of the pumping station is now in very poor condition. Wiring is open at many places. There is no boundary wall of the pumping station.

2. Municipal Rain Water Pumping Station
   Its disposal is in Begari Canal.
   Three pumps 8X8 50 HP each functioning
   Delivery main size is 20 inches. Generator of size 135 KVA is available.

3. Khan Chanda Abad Pumping Station
   Its disposal is in Begari Canal.
   Pump 6X6 40 HP Out of order
   Pump 6X6 40 HP Functioning

4. Eid Gah Pumping Station
   Constructed in year 1937. Its disposal is in a depression (khada) then in a Sim Shakh (Seepage Channel Branch)
   Pump 6X6 50 HP Functioning Poor Condition
   Pump 6X6 40 HP Functioning Poor Condition

5. Ghari Yasin-36 Pumping station
   Its disposal is in a depression and then in Seepage Channel Branch
   Pump 6X6 60 HP Functioning
   Pump 6X6 40 HP Out of order

6. Ghari Yasin Curve Pumping Station
   Its disposal is in a depression and then in Seepage Channel Branch
   Pump 6X6 40 HP Functioning
   Pump 6X6 40 HP Out of order

Pump 6X6 40 HP Motor out of order

7. Rustam Road Pumping Station
   Its disposal is in Racewah and then to Sim Shakh
   Pump 4X5 25 HP Functioning

8. Sunjrani Mohallah Pumping Station
   Its disposal is in Racewah and then to Sim Shakh
   Pump 4X5 10 HP Functioning
   Pump 4X5 10 HP Out of order

9. Dawan Shah Pumping Station
   Pump 4X5 10 HP Functioning
   Pump 4X5 10 HP Out of order

10. Lucky Gate Pumping Staion
    It is a Lift Station and disposal is in a Nullah.
    Pump 4X5 20 HP Functioning

11. Lift Alaf Shah Shaheed Pumping Station
    Its disposal is in Begari Canal.
    Pump 6X6 40 HP Functioning

12. Mari (Shahi Bagh) Pumping Station
    Its disposal is in Begari Canal.
    Pump 6X6 40 HP Functioning

4 SOLID WASTE MANAGEMENT SITUATION

4.1 General

24. The current practices of solid waste management in the city are explained in stepwise form in the following sections. Performance analysis has also been carried out at the end.

4.2 Storage and Collection

25. The storage and collection systems of solid wastes in the city are either inadequate or inappropriate. There are innumerable informal communal storage locations in the town where the waste is temporarily stored in the form of the open heaps on the sides of the streets and at number of places in the centre of the streets (in congested areas). The situation gets aggravated when the heaps of waste pour down into the open drains where choking and wastewater spillage is seen quite often.

4.2.1 Primary Collection

26. Primary collection is the shifting of wastes from points of generation, i.e., homes, shops, offices, institutions etc., to communal storage places. The sanitary workers shift the wastes from these sources and smaller street side heaps to somewhat bigger heaps/filth depots, with the help of handcarts and donkey carts.

27. House to house collection is virtually non-existent. In certain cases the sanitary workers who are assigned the job of sweeping and collection of wastes from the street sides also serve a few households informally.

4.2.2 Secondary Collection

28. The tractor trolleys then serve these bigger heaps/filth depots. In certain situations sanitary workers with the hand carts dispose off the wastes in some vacant plots or low-lying areas on the periphery of the city. The tractor trolleys shift the solid wastes to open dumping sites outside the city.

4.2.3 Vehicles and Equipment

29. Collection vehicles of different description used for the purpose are given in Table A5.1. Data from discussion with TMA staff.

Table A5.1: Vehicles and equipment in use for solid waste collection

Type	Capacity (m^3)	No
Hand Cart (Wheel barrows)	0.1	24
Donkey Cart	0.7	10
Trolley with Tractor (1990)	5.0	3
Trolley with Tractor (2002)	5.0	2

4.3 Sludge and Grit Collection

30. Due to quite an amount of solid wastes being thrown into the open drains and manholes of the sewerage system, blockages are very common. The municipality's sanitary workers are deployed for extracting sludge and grit from the system. After drying in open this sludge and grit is also picked up by donkey carts or tractor trolleys.

4.4 Recovery of Recyclable Wastes

31. The recyclable materials in wastes, like paper, board, plastics, metals and glass are either separated at source by the owners or by the scavengers from the street side open heaps. There are a number of shops in the town dealing with the recovered materials which channelise them to the recycling industries in other cities.

4.5 Disposal

32. Quite a portion of the wastes collected with the help of donkey carts are open dumped in the vacant plots or low lying areas within the city or on the periphery. The tractor trolleys shift the wastes to open dumps at main disposal site, in wastewater ponds along Garhi Yaseen Road and in the vicinity of Amin Shah Halo. The land belongs to private owners and partially Auqaf Department. It is more than 10 acres.

4.6 Special Wastes

4.6.1 Slaughterhouse Wastes

33. One slaughterhouse has been built near general bus stand to cater the needs for meat. On an average 150 cattle and 500 sheep or goats are daily slaughtered there. The wastes are thrown just nearby or collected by tractor trolleys once per week to be open dumped at Gharibabad disposal site.

4.6.2 Hospital Wastes

34. The Civil Hospital in the city was built in year 1935 initially, and it has been extended and enjoys the status of DHQ Hospital. But there are no proper arrangements for storage, collection and disposal of the wastes. There are very few wastes baskets provided in the wards, and the wastes were found in form of open heaps on the corners. Communal storage is also in form of open heaps outside the wards, from where it is collected by municipal tractor-trolleys, and dumped alongwith municipal solid wastes in form of open dumps.

4.6.3 Dead Animals

35. There is no separate arrangement for disposal of carcasses of the dead animals. They are collected alongwith other municipal solid wastes and buried alongwith the solid wastes in open dumps or separately. Dead donkeys were found lying on the heap without cover.

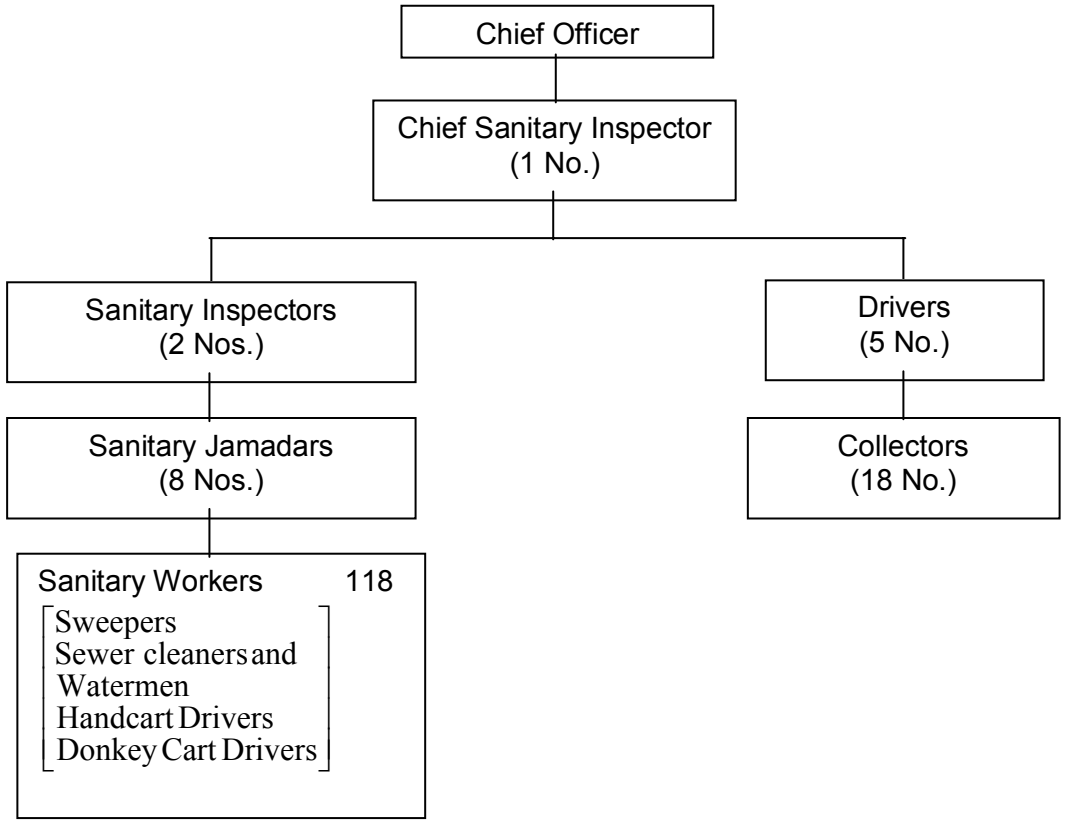
4.6.4 Demolition and Construction Waste

36. Most of the demolition and construction wastes are reused. Only a small portion is thrown out on the street sides. The generators of such wastes are responsible to dispose them off. But the municipality has to take care of the situation with out any charges.

4.7 Staff and Organization

37. Presently there are 5 drivers and 136 sanitary workers in total, out of which some are regular and other are on work charged basis. On daily basis they are deployed for sweeping, as drain cleaners and watermen, as collectors on tractor trolleys, as donkey cartmen and as handcart drivers. The sanitary workers are supervised by 8 jamadars who work under 2 sanitary inspectors and one Chief Sanitary Inspector. The overall organization is shown in Figure A5.2.

Figure A5.2: Present Organization Chart of Sanitation Section Shikarpur



4.8 Private Sector Participation

38. There is no private sector participation experienced in the town/city up till now.

4.9 Community Participation

39. No such activity has been noted in the town. Actually solid waste management issues appear to be a low priority.

4.10 Public Awareness

40. Public awareness is very necessary to get their cooperation for efficient managements of solid waste. But no such effort has been launched in the town.

4.11 Legislation (Laws, Regulation, Standards, Guidelines)

41. Various type of legislation including laws, rules, guidelines exist at National and Provincial levels dealing with solid waste management. These include:

- Ordinance to prohibit manufacture, sale and use of black plastic polythene bags including polythene bags below 30 microns in thickness in the Sindh province. March 2006.
- Guidelines for Hospital Waste Management EPA, Sindh.june 2004 Rules 2005. Gazette of Pakistan.2005.
- Hospital Waste Management Rules 2005. Gazette of Pakistan.2005.
- (Draft) Guidelines for Solid Waste Management. Pakistan EPA. June 2005.

42. But there appears to be a lack of awareness regarding these documents in the community.

4.12 Performance Analysis

43. Based on the data obtained from discussion with TMA staff., the system performance analysis can be made in terms of collection efficiency i.e. the ratio between wastes collected and wastes generated, cost of collection/ton, staff employed per 1000 population, cost per inhabitant It is done in the following sub-sections, The results are presented in Tables 5.2 and 5.3. Drawbacks noted in the present system are also given separately.

4.13 Collection Efficiency

44. Table A5.2 shows the data (year 2006) regarding total collection per day. The figures reveal the total number of vehicles deployed, average trips made by each vehicle per day and the average amount of waste carried per trip. The total waste collected on the average is 45 tons/day while the generation rate is 69.2 tons/day. This gives a collection efficiency of 65%.

Table A5.2: Haulage Capacity of TMA Collection Vehicles (Year 2003)

Sr. No.	Type of Vehicle	No. of Vehicles	Total Available	Trips/ Vehicle/ day (No.)	Average Weight/ Trip (Tons)	Total Weight Carried (Tons)
1.	Tractor Trolley I	3	3	3	3	27
2.	Tractor Trolley II	2	2	3	3	18
					Total:	45

Total Generation/day (2006) = 164727 × 0.42 = 69.2 tons

Collection Efficiency = 45 / 69.2 = 65 %

4.14 Cost per Ton Collected and per Inhabitant

45. The cost of collection per ton is Rs. 823 and per capita/year is Rs. 82 as per calculations below:

Wastes collected per day = 45 tons

Waste collected per year (for year 1999-2000) = 75 x 365 = 16425 tons

Total expenses incurred/year = Rs.1,35,17,000 (from TMA office files)

Cost/Ton = $\frac{1,35,17,000}{16425}$ = Rs. 823

Population for year 2006 = 164,727

Cost/inhabitant = $\frac{1,35,17,000}{1,64,727}$ = Rs. 82

4.15 Staff per 1000 Inhabitants

No. of staff = 151 (From Section 5.8)

Population = 164,727

Staff/1000 inhabitants = $\frac{151}{164,727} \times 1000$ = 0.92

Table A5.3: Present System Performance Indicators

Collection Efficiency	Cost per Ton	Cost per Inhabitant	Staff per 1000 Population
%	(Rs.)	(Rs.)	Ratio
65	823	82	0.92

4.16 Drawbacks/Deficiencies in the Present System

46. Drawbacks and deficiencies have been noted at all the stages of the present system i.e. communal storage, street cleansing, collection vehicles like handcarts, donkey carts and tractor trolleys, and disposal in the form of open dumping. These are delineated in the following sub-sections. With the adoption of the new system, and it is envisaged that these drawbacks and deficiencies will be removed.

4.17 Communal Storage

47. The communal storage is done in the form of small street side heaps. Besides that masonry enclosures are also being constructed. The following shortcomings are noted in this practice.

i) Because of design defects it is difficult to collect the waste from within the dust bins and filth depots.

ii) Refuse in these structures is scattered all over the surrounding area as a consequence of scavenging activity and wind action.

iii) Rodents become active in these dumps. Similarly these become the breeding places for larvae of the flies and scores of other disease causing organisms. These are merely health hazard.

iv) These are a constant source of obnoxious odours leading to pollution of local environment.

v) Rains wash away the waste to areas in the vicinity.

vi) Masonry enclosures are uneconomical as compared with the metallic skips.

4.18 Street Cleansing

48. Hand tools and other equipment used during sweeping and collection are of low-standard and poor design. And because of littering habit sweepers are confronted with enormous work load. Therefore, the sweepers cannot give a satisfactory output. Major drawbacks are:

i) As a general practice sweepings are placed on the sides of the streets and roads, in open heaps making their condition shabby.

ii) Brooms have handles of shorter length on account of which sweeping efficiency is reduced.

iii) Sweepers are hardly provided with any replacements for the damaged tools and equipment.

iv) Supervision on performance of the sweepers by the supervisory staff is generally lacking.

4.19 Hand Carts

i) Hand carts are of poor design and low capacity.

ii) The carried wastes can only be tipped on the ground and not in a metallic container.

iii) It is cumbersome to drive these carts as they have only one wheel.

iv) Number of handcarts is totally inadequate.

4.20 Donkey Carts

i) Donkey carts are slow and consume more time. The quantity of the waste collected is small.

ii) It is quite costly option and works even lesser than a hand cart in some cases.

4.21 Tractor Trolleys

i) Present vehicles can not collect the entire quantity of the generated waste.

ii) Ti me spent/trip is over 2 hours, which is quite long and makes the system uneconomical.

iii) Inaccessible areas are left uncovered.

iv) Collection vehicles are required to collect the scattered heaps of waste, thus spending unwanted time en-route to the dumping site.

v) Manual loading and unloading of the vehicles is un-economical in terms of time and effort.

vi) Collectors come in physical contact with the waste, due to which they are liable to be affected by occupational diseases.

vii) Littering is caused by uncovered collection vehicles during transportation.

4.22 Open Dumping (Disposal)

i) Disease causing vectors can spread all around the dumping ground thus causing a constant health hazard for the surrounding population. Open dumping makes the area unsightly.

ii) Because of wind action components like paper and polyethylene bags are seen scattered in the adjoining areas.

iii) Groundwater pollution is an essential sequence of the practice.

4.23 CONCLUSIONS AND REMARKS

49. The solid waste management of Shikarpur is not satisfactory due to shortage of proper vehicles. Solid waste was seen by roads/streets sides. Unauthorized dumping of solid waste in vacant plots and depressions was noticed.

50. The Chief Officer and Sanitary Inspector were helpful and cooperative in assessment of the facilities and requirements for solid waste management.

4.24 Strength and Weaknesses of Solid Waste Management Activities

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
1	Introduce 2-bin system for wet and dry waste in household	- Improves quality and quantity of recyclable materials, and enables composting	- difficult to enforce, and requires major change in household habits. Could take many years.				100
2	Initiate home composting in barrels where space allows and appropriate	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting		2000/ barrel		
	Street Waste Management/ Private Sector						
3	Provide litter bins on main streets for pedestrians' use	- Potentially low-cost way of reducing littering, and therefore cost of labour to sweep	- Would have to be introduced along with anti-littering legislation and public awareness campaigns to be effective	60,000 (for 100 bins)	600/ bin	15,000	150/ bin
4	Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas	- Little extra cost -	- Provision of better tools, and education to sweepers required - Sweepers may react against working for longer/ harder hours				
5	Hand over sweeping to private-sector (with staff and equipment)	- TMA no longer has responsibility for this management and labour-intensive activity					500
6	Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors	- improved health and safety of staff - increased productivity	Extra cost for improved tools	5,400/ cart (100hh served)	54	2,700 (100hh served)	27
7	Enforce provision of containers/ bags on public vehicles, vendors' carts, covers on sand, bricks carriers	- Stops littering of streets - Saves time of street sweeping - Clean streets	- Little extra cost				10-100/ veicle

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	Primary Collection/ Private Sector/ CBO						
8	Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area	Sweepers' work will become more efficient as less waste dumped on to streets	Systems would require contributions from householders. Would they pay?				300
9	Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers	-Zero cost for TMA -Sweepers' work will become more efficient as less waste dumped on to streets - provides livelihoods for poor	- could take many years to establish community-based organisations - Systems would require contributions from householders. Would they pay? - Can be difficult to organise waste pickers	TMA equipment leased			300
	Communal Storage						
10	Purchase demountable containers ($5m^3$) as communal storage facility	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- Experience in other countries suggests that if not properly manufactured and maintained can be problematic and containers can have short useful lives due to corrosion.	60,000/ container (750hh served)	80	14,000/ container (750hh served)	19
	Secondary Collection/ Private Sector						
11	Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots	- no extra capital cost	Increased annual cost			100,000	
12	Purchase hydraulic tractor container carrier system for use with demountable containers	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM	- high capital cost - Success depends on public behaviour, as if waste deposited around containers, very problematic.	600,000/ vehicle (4500 hh served)	130	444,000/ vehicle (4500 hh served)	96

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
		system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- extra space required				
13	Contract out secondary transportation to private-sector	- TMA no longer required to manage fleet of vehicles - Could lease vehicle fleet to private-sector operator - Financial savings and improvements to service	- Lack of experience of tendering and contracting out				200
	Reuse and Recycling/ Organizing Scavengers						
14	Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors	- Provides better livelihood to scavengers - Reduces the waste quantities to be disposed off	- Effort needed to organize scavengers - May take long time to introduce				
	Treatment and Final Disposal						
15	Improve and rehabilitate present disposal practices in line with basic public health and environmental standards	- Reduced threat to environment in public health - basic but significant improvements can be made for relatively low cost	- Some investment and expertise required				
16	Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant	- Less environmentally damaging -Reduced pollution of groundwater - In line with Annual Strategic Plan guidelines from the ADB	- Vested interests of drivers who sell waste may discourage dumping at site - Cost of developing and running site	1,520,000	70	532,000	25
17	Central compost plant (30 tons waste per day)	Recycles the organic matter which is useful for agriculture	Capital cost	3,260,000	92		
18	Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting	65,000	92		
	Special Waste Management						
19	Enforce Healthcare waste legislation and provide separate	- Reduced hazards from healthcare waste	- Funding from hospitals/Department of Health?	20,000		20,000	

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	facilities for collection, transport, treatment and disposal of healthcare waste	- compliance with national guidelines on healthcare waste - Could possibly attract private-sector investment	- Enforcement challenging, and needs to be backed up with awareness campaigns				
20	Awareness campaigns in hospitals	-Reduced mixing of healthcare waste with municipal waste - Changes behaviour of waste generators	- Awareness raising campaigns can take time and cost money				
21	Undertake viability study for installation of locally manufactured incinerator	- Widely accepted healthcare waste management technique	- Costly to purchase, and challenging to operate and maintain				
	Awareness Raising						
22	Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment	- likely cost-effective way of tackling many problems - If successful could result in increased recycling rates from separated waste, reduced dumping on streets, reduced labour requirements for sweeping, improved drainage	- Awareness raising campaigns can take time and cost money - Expertise in awareness raising required			50,000	
23	Public awareness raising campaign for rural areas, providing information on composting and basic disposal	- Could help solve problem of plastic disposal in villages	- Would need support of professionals to disseminate information			25,000	
24	Hold a series of cleanup campaigns	- Can be effective at giving visible results quickly, and thus attracting public support - Relatively low-cost option				25,000	
25	Introduce public complaints system by establishing a complaint cell	- makes public more willing to cooperate with TMA, and contribute to improved waste management services	- vital that systems of accountability are in place within the TMA so complaints can be followed up and affect change				
	Legislation						
26	Ban open burning of waste on streets and at final disposal points	- Reduced environmental pollution - popularity with local residents	- Difficulties of enforcing legislation				
27	Introduce anti-littering laws	- Potentially low-cost way of impacting urban environment, with benefits to public health,	- Difficulties of enforcing legislation				

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
		drainage and labour requirements for waste management					
	SWM Fee						
28	Introduce fee systems for commercial producers of waste	- following the 'producer pays' principle, enables better services to be provided to the areas most needy – particularly shopping and industrial areas	- Possible resistance, so needs to be backed up with legislation and enforcement mechanisms				100
29	Introduce fee system for door to door collection	- Cost shared by the communities	- Difficult to realize from the communities				

Table B5-1: Urban Population Projections

TALUKA SHIKARPUR: SHIKARPUR CITY - UNION WISE PROJECTED POPULATION

	POPULATION 1998	HOUSING CHARACTERISTICS							AVERAGE HOUSEHOLD SIZE	1998 POPULATION - UNION WISE								TOTAL
		TYPE OF STRUCTURE				HOUSING FACILITIES												
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	LATRINE	ELECTRICITY		UC 1	UC 2	UC3	UC4	UC5	UC6	UC7	UC8	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
*SHIKARPUR TALUKA	134,883	17,460	7,523	2,351	7,586	8,855	8,212	16,481	7.7									
*SHIKARPUR MC	134,883	17,460	7,523	2,351	7,586	8,855	8,212	16,481	7.7									
*CHARGE NO 01	134,883	17,460	7,523	2,351	7,586	8,855	8,212	16,481	7.7									
CIRCLE NO 01	8,170	1,017	393	105	519	419	479	976	8	8,170								8,170
CIRCLE NO 02	11,015	1,469	490	131	848	494	802	1,444	7.5	9,451	1,564							11,015
CIRCLE NO 03	9,003	1,130	648	59	423	548	327	1,114	8		3,674					5,329		9,003
CIRCLE NO 04	4,929	694	390	52	232	503	509	647	7.4		4,929							4,929
CIRCLE NO 05	7,464	883	634	24	225	543	543	878	8.5		3,905					3,579		7,464
CIRCLE NO 06	10,127	1,216	604	44	568	666	638	1,205	8.3		1,701	8,426						10,127
CIRCLE NO 07	11,399	1,552	413	387	752	808	263	1,230	7.3				11,399					11,399
CIRCLE NO 08	9,335	1,221	608	57	556	336	642	1,203	7.6			9,335						9,335
CIRCLE NO 09	10,265	1,400	315	450	635	769	642	1,294	7.3				4,767	5,516				10,265
CIRCLE NO 10	10,806	1,400	503	203	694	899	474	1,348	7.7					10,806				10,806
CIRCLE NO 11	16,569	2,507	1,179	519	809	1,396	1,044	2,319	6.6						16,569			16,569
CIRCLE NO 12	8,483	948	549	126	271	684	344	937	8.9							8,483		8,483
CIRCLE NO 13	8,850	1,019	436	66	515	556	626	906	8.6								8,850	8,850
CIRCLE NO 14	8,396	1,034	369	126	539	214	879	960	8.1								8,396	8,396
Population 1998										17,621	15,773	17,761	16,166	16,324	16,569	17,391	17,276	134,883
Growth Rate (2.53%)																		
Population 2006										21,520	19,263	21,691	19,743	19,936	20,235	21,239	21,101	164,728
Population 20012										25,000	22,378	25,199	22,936	23,160	23,506	24,674	24,514	191,369

Table B5-2: Rural Population Projections

TALUKA SHIKARPUR: UNION WISE PROJECTED POPULATION

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	POPULATION 1998	HOUSING CHARACTERISTICS						AVERAGE HOUSEHOLD SIZE	AREA IN ACRES	PROJECTED POPULATION YEAR 2006	PROJECTED POPULATION YEAR 2012	UNION COUNCIL
		TYPE OF STRUCTURE				HOUSING FACILITIES						
		TOTAL	PACCA	SEMI-PACCA	KACHA	POT-ABLE WATER	ELECTRICITY			Growth Rate 2.45%	Growth Rate 2.45%	
1	2	3	4	5	6	7	8	9	10	11	12	13
*SHIKARPUR TALUKA	137,610	22,705	1,796	5,268	15,641	3,490	15,662	6.1	139,933	167,010	193,115	
HAMAYUN	5,392	711	143	164	414	145	963	7.6	3536	6,544	7,567	UC HAMAYUN
MAHBAT FAQIR JAGIR	1,808	227	7	1	219	-	117	7.8	1769	2,194	2,537	UC HAMAYUN
MUNDHUWAH	3,290	554	104	164	286	391	442	5.9	4118	3,993	4,617	UC HAMAYUN
ABDUL BELO ABDAL	4,232	664	39	109	516	-	261	6.4	3992	5,136	5,939	UC HAMAYUN
CHODIO JAGIR	1,919	269	13	41	215	21	244	7.1	3078	2,329	2,693	UC HAMAYUN
LARWAH	1,766	263	-	161	102	2	93	6.7	2290	2,143	2,478	UC HAMAYUN
SHAHAL	2,210	361	16	80	266	4	315	6.3	2380	2,682	3,101	UC HAMAYUN
	20,617									25,021	28,932	**Total**
MIRDAHO (JAGIR)	3,362	663	56	126	471	43	536	5.1	2954	4,080	4,718	UC JAGAN
RAJWAH	1,023	109	-	-	109	-	71	9.4	2458	1,242	1,436	UC JAGAN
CHAK CHODIO (JAGIR)	4,536	801	59	135	607	91	628	5.7	2948	5,505	6,366	UC JAGAN
JAGAN	4,397	575	28	79	468	3	484	7.6	2853	5,336	6,171	UC JAGAN
KAZIWAH	1,355	225	3	93	129	3	98	5.6	1914	1,535	1,775	UC JAGAN
PIR JALIL	1,436	209	2	3	204	-	8	6.9	3629	1,742	2,014	UC JAGAN
RIP	2,191	314	-	78	236	1	135	7	4606	2,659	3,075	UC JAGAN
	18,209									22,099	25,555	**Total**
ALI BAHAR	2,126	296	-	61	235	1	78	7.2	4585	2,580	2,984	UC JAHAN WAH
DASTI	1,709	272	15	182	75	64	25	6.3	4300	2,074	2,398	UC JAHAN WAH
JAHANWAH	2,535	358	1	138	217	21	200	7.1	4689	3,077	3,558	UC JAHAN WAH
NIMAR THARIRI	2,484	321	3	289	29	121	285	7.7	2856	3,015	3,486	UC JAHAN WAH
NIZAM THARIRI	2,611	373	41	231	101	14	193	7	3297	3,169	3,664	UC JAHAN WAH
THAHIM WAH	2,069	273	4	130	139	73	162	7.6	2407	2,511	2,904	UC JAHAN WAH
BARI	1,416	237	10	30	197	7	110	6	4164	1,719	1,987	UC JAHAN WAH
KHAN WAH	1,174	146	-	1	145	-	12	8	2785	1,425	1,648	UC JAHAN WAH
KHUH BIRO	1,728	316	8	164	154	1	72	5.5	4232	2,097	2,425	UC JAHAN WAH
WAKRO JAGIR	1,572	229	39	75	115	70	85	6.9	2624	1,908	2,206	UC JAHAN WAH
	19,424									23,575	27,260	**Total**
BEKHARI	2,068	363	63	37	263	101	252	5.8	2213	2,534	2,930	UC JANOO
CHAK JANO	1,111	181	16	72	93	175	175	6.1	336	1,348	1,559	UC JANOO
CHAWANI	544	101	6	57	38	97	59	5.4	740	660	763	UC JANOO
JANO	7,619	1,367	204	266	898	270	1,183	5.6	3081	9,247	10,692	UC JANOO
PHULPOTA	2,524	353	7	192	154	271	271	7.2	2063	3,063	3,542	UC JANOO
RAHUJA	4,141	834	13	155	666	314	628	5	1512	5,026	5,811	UC JANOO
SHIKARPUR	2,219	363	22	55	286	3	260	6.1	2612	2,693	3,114	UC JANOO
	20,246									24,571	28,411	**Total**
BAID	4,724	897	38	239	632	8	822	5.3	2568	5,733	6,629	UC KARAN
RAISWAH	2,872	553	150	21	382	183	495	5.2	2190	3,486	4,030	UC KARAN
DARO SONO	1,748	250	32	16	212	5	66	6.7	4031	2,121	2,453	UC KARAN
KAKEPOTA	2,848	606	10	67	529	11	491	4.7	2064	3,456	3,997	UC KARAN
KARAN	4,861	846	97	27	722	25	737	5.7	3980	5,900	6,822	UC KARAN
GHALOO	3,576	676	2	395	279	42	599	5.3	3028	4,340	5,018	UC KARAN
	20,629									25,036	28,949	**Total**
DAKHAN	2,578	389	4	69	328	5	379	6.6	1627	3,129	3,618	UC LODHRA
LALIYOON NEW	3,556	630	13	76	542	1	524	5.7	2314	4,368	5,051	UC LODHRA
LALIYOON OLD	2,670	466	15	129	322	6	46	5.7	3172	3,240	3,747	UC LODHRA
MURID SETHAR	5,222	966	78	119	789	20	794	5.3	2321	6,338	7,328	UC LODHRA
LODRA	5,016	762	207	156	400	55	528	6.6	2703	6,086	7,038	UC LODHRA
	19,084									23,161	26,782	**Total**
JUNEJA	3,270	608	19	102	487	349	468	5.4	3025	3,969	4,589	UC SULTANKOT
BELO DOST WAH	1,193	230	1	32	197	69	1	5.2	4064	1,448	1,674	UC SULTANKOT
BELO KOT SULTAN	1,794	260	-	4	256	1	-	6.9		2,177	2,518	UC SULTANKOT
BELO MACHHI	497	99	-	71	28	2	23	5		603	697	UC SULTANKOT
MACHHI	4,257	845	39	228	582	29	786	5	3788	5,167	5,974	UC SULTANKOT
MOHAMMAD RAHIM	2,504	394	11	22	361	18	61	6.4	2479	3,039	3,514	UC SULTANKOT
SULTAN KOT	5,886	858	170	169	519	364	821	6.6	5871	7,144	8,260	UC SULTANKOT
	19,401									23,547	27,226	**Total**

Figure A5-1: Shikarpur City Map

Annexure - 6

SUKKUR

SUKKUR TALUKA

Strategic Plan For Water Supply and Sanitation

2006-2012

Table of Contents

1 BACKGROUND 1
1.1 Overview of Sukkur Taluka 1
2 WATER SUPPLY 2
3 SEWERAGE AND DRAINAGE 4
3.1 Urban Areas 4
4 PRIORITIES 5
5 ISSUES 6
5.1 Water Supply 6
5.2 Solid Waste Management 7
6 STRATEGIC PLAN 9
6.1 Water supply 9
6.2 Sewerage and drainage 10
6.3 Solid waste management 10

Supporting Information & Appendices

Sukkur Taluka – Strategic Plan for Water Supply and Sanitation – 2006-2012

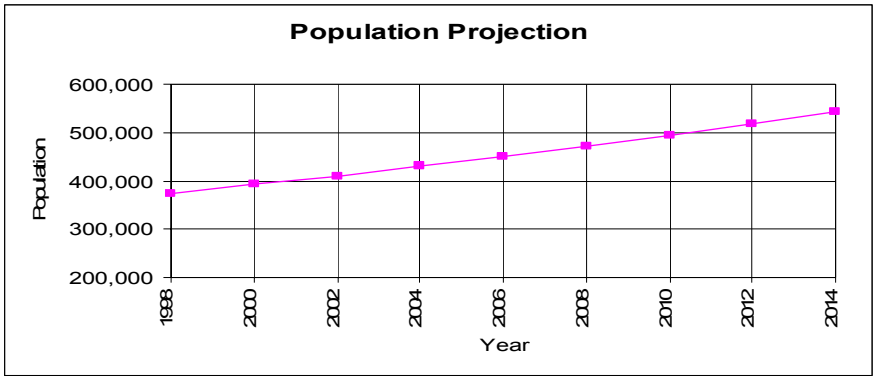
1 BACKGROUND

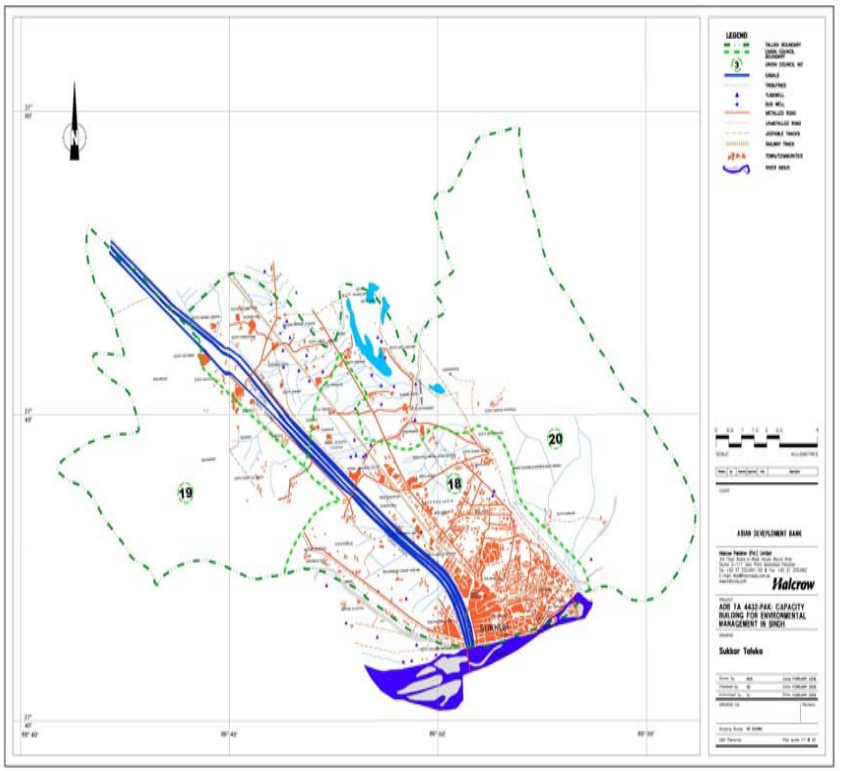
1.1 Overview of Sukkur Taluka

1. Indus passes through the north western boundary of the Sukkur district. At Sukkur it passes through the gorge between Sukkur and Rohri towns, the island of Bukkur bisecting the channel. The climate of Sukkur district is hot and dry. The hot season commences in April and ends in October. Dust storms are common and fierce hot winds blow during the Chaliho, the forty days succeeding the 15th May. The heat continues up to end of September or even up to middle of October.

2. The mean maximum and minimum temperature during summer in the month of June is about 44ºC and 29ºC and during winter in the month of January 23ºC and 9ºC. The average annual rainfall of the district is about 88 millimetres.

3. According to the 1998 census, total population of Sukkur Taluka was 374,178. Urban population was 342,343 (91.5%) and was divided in Sukkur and Bagerji having population of 335,551 and 6,792 respectively. The rural population was provided as 31,835 (8.5%) in the report. Population projection of the taluka on the basis of growth rate of 2.35% as mentioned in the census report is shown in the graph.





2 WATER SUPPLY

4. Ground water is generally saline, except in some pockets where it is in the acceptable limits but drawing of large quantity of water changes it to more brackish. Source of municipal water supply is river and canal. Water storage/ settling tanks are provided where source is canal. Water is first treated in the water treatment plants and then supplied to the city. Water distribution network is now not capable to provide the consumers safe water in sufficient quantity due to the facts that pipes are damaged and leaking. The water intakes and treatment plants need major repairs and improvements to fulfil the water requirements of the city. Reforms in the billing system are in progress. The billing and receipt is computerized through involvement of private sector. There are approximately 19,000 registered connections in the city. Payment is about 40% of the distributed bills. Domestic water rate is Rs.365 per annum. Some areas are high and require additional pumping; in these areas water rate is more than Rs.500 per annum. Rate of Commercial connection is Rs.1050 per month.

5. Sukkur city is served through three following Water Treatment Plants.

Water Treatment Plant	Filtered Water MGD	Settled Water MGD	Total Water MGD
Main Water Works Bunder Road	5.00	----	5.00
Numaish Gah Old Sukkur	2.50	1.00	3.50
Airport Road	----	2.00	2.00

6. Source of water for water works at Bunder Road is River Indus. Phase-I of this water works was constructed in 1932. In 1981 to 1984, Municipal Corporation constructed filter plant for 2.00 MGD.

7. Hand pumps and motor pumps are also in use and at some places water from these sources is in tolerable limit. Arsenic is present at shallow depths. Water vending is not common in the city.

8. PC-1 of amount Rs.595.609 millions for Water Supply Scheme has been prepared and submitted. New site for water intake/ Jetty is proposed on Indus near the bridge. This scheme will provide filtration to existing settled water at Numaish Gah and Airport Road as well as it will extend the capacity of water treatment plant at all the three water works. Summery is as follows.

Water Treatment Plant	Filtration of available Settled water MGD	Additional Filtered Water MGD	Total Filtered Water MGD
Main Water Works Bunder Road	----	3.50	3.50
Numaish Gah Old Sukkur	1.00	2.50	3.50
Airport Road	2.00	1.00	3.00

After the above improvements, capacities of the Treatment Plants will be enhanced as follows.

Water Treatment Plant	Filtered Water capacity at Present MGD	Filtered Water additional capacity MGD	Total Filtered water after improvement MGD
Bunder Road	5.00	3.50	8.50
Numaish Gah Old Sukkur	2.50	3.50	6.00
Airport Road	----	3.00	3.00

Total Filtered Water available from WTPs after improvements= 17.50 MGD

Proposed Tubewells 8Nos will also provide water= 1.00 MGD

Total potable water available after implementation of Scheme= 18.50 MGD

A comprehensive map of existing water supply system is not available with TMA. Previously the system was under PHED, so the maps are still available with them.
Sukkur city is recently divided in two talukas. Presently city taluka is maintaining the system. It is difficult to divide Water Supply and Sewerage Systems in the two talukas so some arrangement will have to sort out for efficient operation of these systems.

3 SEWERAGE AND DRAINAGE

Open drains are provided at lane level in most part of the city, however in some streets, sewers are present. Human excreta are directly discharged into the open drains which are big health hazard. The open drains get blocked due to a combination of inadequate gradients and solid waste (particularly polythene bags). Sewage held up in the drains, overflows and pondage is frequent. The waste water from streets through open drains and small sewer pipes is collected in trunk sewers which carry it to the sewage disposal station or to some intermediate pumping station. The sewerage and drainage network is under capacity and in poor condition. Waste water treatment is also required.
Waste water of Sukkur city is presently being thrown in the River Indus or Canals which is a big environmental hazard.

SOLID WASTE MANAGEMENT

3.1 Urban Areas

The TMA uses hand carts and donkey carts for primary collection and tractor-trolleys and front end loaders for secondary collection of the waste. Besides that TMA has acquired one mechanically operated tractor-container carrier, which serves 5 demountable containers. The collected waste is finally disposed off in form of open dumps on the out skirts of the city mainly along Pir Murad road and near Qureshi Goth. No formal sanitary land filling is done.

The overall collection efficiency of the TMA is about 72% of the total generation. But even then quite a portion of waste remains uncollected in the city which is a source of environmental pollution. Major reasons for the situation are non provision of community bins and indiscriminate throwing of waste on the streets, manually loaded vehicles and disposal in form of open dumps. Healthcare wastes are disposed of partially by burning within the hospitals` compounds and mostly by throwing in masonry enclosures. These masonry enclosures are then served by the TMA collection vehicles. Women are responsible for managing waste at the household level but they are not adequately educated to deal with the problem in a sanitary manner.

4 PRIORITIES

The Sukkur Taluka Strategy Plan is based on the following priorities:

1. *The need to involve the community in working with the TMA to reduce waste and increase efficiency through greater awareness and concern for the environment in general and of the Taluka in particular; This will be done through public awareness campaigns and a programme of concerted area-by-area campaigns;*
2. *The need to adopt more participatory and transparent processes of working by the TMA. This will be done through the use of the "planning wall" and other devices for making the public more aware of the TMA's programmes and priorities;*
3. *To involve the private sector and the community in working with the TMA in the delivery of WSS services as part of the component-sharing approach;*
4. *The need to rehabilitate and refurbish existing systems and schemes;*
5. *The need to improve the capacity and efficiency of existing and installed schemes and systems;*
6. *The need to take greater control over the resources and services of the Taluka. This will be done through building up an updated database and management information systems*
7. *Then, to improve and extend WSS services delivery to the new and expanding parts of the Taluka;*
8. *Once the TMA service delivery has improved, the priority will be to collect an increased portion of increased tariff and user charges*

5 ISSUES

5.1 Water Supply

	House	Lane	Settlement
Sukkur	Piped water still not available in some houses.	Water pipes not laid in some areas of city.	Water supply network inadequate, and in poor condition
	Availability of Municipal water supply is not completely reliable and in some areas insufficient quantity of water reaches.	Underground pipes are leaking and are in poor condition causing contamination of water.	Canal water storage tanks have inadequate capacity to meet demand in the canal closure period. The existing capacity has been also reduced due to silting.
	Citizens have no confidence over the quality of municipal water supply due to absence of regular monitoring system.	House connections are leaking and some are passing through the drains.	Though existing treatment facilities exist for major part of the city but they require rehabilitation. Additional treatment facilities are also required.
	Lack of awareness about link between water quality and health.	Water distribution can not be properly managed due to shortage of control valves.	Water pumping stations are in poor condition
	Many connections are not registered with TMA.		The quantity of water being supplied is not measured
	Wastage and poor water management at house hold level and poor plumbing causes loss of water.		A system of regular monitoring of the quality of supplied municipal water is required.
	Households reluctant to pay for water services.		Water tariff and collection efficiency is low.
			Revenue does not cover the O&M cost.
			Topographic and infrastructure plans and information on existing system is not available.
Financial	Budgeting is made difficult because of lack of information on contributions and commitments from district and provincial levels. Tariff structure is set too low and has no relation to expenses.		
Environment	Poor quality of water is health hazard particularly for the children. Intestinal disorders are endemic.		
Women	Women are generally responsible for water provision to the household. They are forced to fetch water when municipality water is not available. It is a tiring and wasteful task severely impacting on their ability to undertake other household tasks.		
Institutional	TMA responsibilities are not clear because of the overlapping created by the re-designation of PHED. For example TO(I&S) has been placed under the command of the PHED. The PHED will supervise the O&M of water supply and drainage schemes of major cities. O&M responsibility for the vertical projects such as water Filtration Plants has been put on the TMA. A major project is being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001.		

Sewerage and Drainage	**House**	**Lane**	**Settlement**

Sewerage and Drainage	House	Lane	Settlement
Sukkur	Toilet facility is still not available in some houses.	Open drains are usually blocked with refuse.	Untreated disposal into fields, canals and river.
	No Septic Tank or other on-plot treatment or holding facility. Sewage discharged directly into open drains	All open drains carry human excreta.	Inadequate Trunk Sewer network coverage.
	Lack of awareness about link between sanitation and health	Underground pipes exist in some parts of the city but most are in poor condition.	Sewage Treatment Plants are not functioning therefore there is no treatment of sewage.
			Pump Stations in poor condition. Sewage held up there at peak times.
Institutional	A major project is being implemented by the province without TMA involvement. The release of funds and project duration does not match, making it difficult for TMA to plan its service obligations. TMA lacks the capacity to maintain and manage the database required under section 54(K) of SLGO 2001 and Maps and Data of existing system is not available.		
Financial	Budgeting is made difficult because of lack of information from district and provincial levels.		
Environment	Open drains with faeces discharged directly from household toilets are a common sight. Drains blocked by polythene bags and leaking pipes cause ponding. This is particularly hazardous in lanes and residential areas where children play around untreated sewage. The discharge of untreated sewage for use in agriculture is harmful to both agricultural workers and consumers of the produce. Disposal of raw sewage in to canals and river is a great environment hazard.		
Women	The lack of toilets or poor sanitation facility in some houses is particularly onerous for women who are forced to curtail their activities.		
Pub Toilets	Absence of public toilets in urban areas, especially for women, severely limits activities and leads to open urinating.		

5.2 Solid Waste Management

	House	Lane	Settlement
Sukkur	Waste is mixed, thus reducing potential for composting and reducing value of recyclables	Incomplete sweeping of lanes due to large amounts of waste is thrown on the streets, low -attendance of sweepers and low-productivity	Only 72% of waste generated from the city is collected by TMA
	Waste thrown on streets, thus increasing sweeping work and choking sewers and drains	Sweepers use inefficient tools and poorly designed handcarts, thus reducing efficiency and exposing workers to occupational diseases	Ad hoc disposal facilities threatening public health and the environment
	No door-to-door collection system, encouraging indiscriminate dumping on streets	Poorly maintained and designed transfer points resulting waste scattering on street sides	Waste pickers operating at dump sites, posing a threat to themselves
		Scavengers working on the streets can scatter waste, and susceptible to health problems	Inadequate manually loaded vehicles for secondary collection

	House	Lane	Settlement
		Polythene bags spread around make the city look filthy, and caused choking of sewers and drains	Health risks from present final waste disposal practices (e.g. groundwater pollution, air pollution, disease vectors)
		Health risks from rotting piles of waste on streets/at transfer points	Health risks from lack of separate Healthcare waste management
		Health risks from blocked drains and sewers	
		Manual handling of waste when loading and unloading is dangerous and inefficient	
Rural areas			Plastic waste is a problem throughout rural areas and hinders composting of waste
Community participation	Lack of community engagement in solid waste management activities	Very few community organisations are established at present to facilitate community-led door-to-door collection	
Institutional		No NGOs working in the field of solid waste management	Lack of technical knowledge within TMA on solid waste management options
Finance	Required contributions from householders provided with door-to-door collection services		Lack of funds hinders investment and planning in solid waste management
Environment		Degradation of city environment as a result of indiscriminate dumping on streets	Environmental pollution from uncontrolled disposal of waste
Women	Women lack education on problems caused by improper management of solid waste		No public awareness messages targeted at women
Private sector	Potential for informal-sector/small enterprises to undertake door-to-door collection services not being tapped.		Contracting out solid waste management at the city level not tried
Hospitals	Improper handling of healthcare waste can expose hospital staff, sanitary workers and citizens to health risks. In particular, the practice of recycling syringes, and handling and resale of infected equipment is hazardous.		
Schools	Due to storage of solid waste is in open heaps, schoolchildren and staff are exposed to health risks.		
Commercial	Demolition and construction waste is presently mixed with other municipal wastes, and remains on the streets in commercial areas awaiting collection. It is a source of health risks as well as traffic hazard. Shopkeepers throwing waste onto the streets further aggravate the problems.		
Public awareness	Lack of public awareness about health impacts of poor solid waste management practices		Lack of awareness about Healthcare waste amongst professionals and public

6 STRATEGIC PLAN

6.1 Water supply

PROPOSALS	PLACING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
House Level								
All households should have individual house connections and charged according to usage	Sukkur							Households
Public awareness campaign for the connection between water quality and health.								SDSSP
New Raw Water Intake from River								
Construction of new raw water intake from river.	Sukkur							Vertical Project
Raw Water Storage								
Carry out de-silting and repair of existing raw water storage tanks to rehabilitate capacity	Sukkur							SDSSP
Construct new raw water storage tanks to meet current and expected demand	Sukkur							Vertical Project
Water Treatment								
Rehabilitate existing water treatment plants	Sukkur							SDSSP
Construct additional water treatment plants	Sukkur							Vertical Project
Water Distribution	Sukkur							
Repair and replace pipes and house connections in poor condition and provide control valves.	Sukkur							SDSSP
Extend piped network to provide full coverage	Sukkur							SDSSP
Rehabilitate pump stations	Sukkur							TMA
Planning	Sukkur							
Proper topographic survey, inventory of all civil and mechanical works. Compilation of information and preparation of the maps on some computer software with marking/ connecting the relative information.	Sukkur							SDSSP
Draw up and introduce a programme of regular maintenance of water supply system including network, treatment plant, pumping stations and storage tanks.	Sukkur							SDSSP
Cost Recovery								
Investigate and introduce a programme to increase Water Tariff and Revenue Collection.	Sukkur							TMA
Install meters at all sources to measure the quantity of water to be supplied.	Sukkur							SDSSP
Consider component-sharing through involvement of community and/or private sector, for example Private/community contractors to purchase bulk water from TMA –and distribute to households through Community/group metered supply	Sukkur							TMA

6.2 Sewerage and drainage

PROPOSALS	PLACING							FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Lane Level Drains And Sewers								
Targeted action to unblock drains – area by area; accompanied by public awareness campaign	Sukkur							TMA
Cover the open drains or replace with underground pipe	Sukkur							SDSSP
Extend underground pipe network on a lane by lane basis	Sukkur							Vertical Project
Trunk Sewers And Pump Stations	Sukkur							
Gradually repair and replace underground trunk sewers and pump stations.	Sukkur							SDSSP
Provide Additional Trunk Sewers and Pump Stations	Sukkur							Vertical Project
Treatment	Sukkur							
Repair existing sewage treatment plants	Sukkur							SDSSP
Provide additional treatment plants	Sukkur							Vertical Project
Cost Recovery	Sukkur							
Sell treated sewage effluent as fertiliser	Sukkur							-
Planning	Sukkur							
Prepare Map and Data of existing system	Sukkur							SDSSP
Rehabilitation	Sukkur							
Rehabilitation of existing drainage schemes after consultation with the community for the demand and O&M responsibility.	Sukkur							SDSSP
Planning	Sukkur							
Plan new drainage/ sewerage schemes after consultation with community.	Sukkur							SDSSP
Public Latrines								
Provide public latrines at important places	Sukkur							SDSSP

6.3 Solid waste management

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Onsite Storage and Processing								

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Introduce 2-bin system for wet and dry waste in household								Households
Initiate home composting in barrels where space allows and appropriate								Households/ TMA/ NGO
Street Waste Management								
Provide litter bins on main streets for pedestrians' use								TMA/NGO/CBO
Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas								TMA
Hand over sweeping to private-sector (with staff and equipment)								TMA/ Private Sector
Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors								TMA
Enforce provision of containers/ bags on public vehicles, vendors' carts								TMA
Primary Collection/ Private Sector/ CBO								
Enforce waste producers' responsibility for transporting waste to transfer points (i.e. community bins)								TMA/CBO
Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area								TMA/NGO
Community-based organisations/ private sector arrange door-to-door collection staffed by informal sector waste workers								TMA/CBO/Private Sector
Communal Storage								
Purchase demountable containers ($5m^3$) as communal storage facility								TMA/SDSSP
Secondary Collection/ Private Sector								
Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots								TMA
Purchase hydraulic hoist truck/multi loader system for use with demountable containers to replace the present manually loaded collection vehicles								TMA/ SDSSP
Contract out secondary transportation to private-sector								TMA
Reuse and Recycling/ Organizing Scavengers								
Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors								TMA/CBO
Treatment and Final Disposal								
Improve and rehabilitate present disposal practices in line with basic public health and environmental standards (levelling and providing soil cover)								TMA
Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant								TMA/SDSSP

PROPOSALS	PLACING	PHASING						FINANCING
Each of the proposals given below will have to be detailed as programmes and projects of the Annual Action Plans.		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
Central compost plant								TMA/ Private Sector
Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available								TMA/ CBO/Private Sector
Special Waste Management								
Enforce Healthcare waste legislation and provide separate facilities for collection, transport, treatment and disposal of healthcare waste								TMA/ District Health Department
Awareness campaigns in hospitals								TMA/ District Health Department
Undertake viability study for installation of locally manufactured incinerator								TMA/SDSSP
Assess generation of hazardous waste within TMA, and devise strategy for its safe treatment and disposal								TMA
Enforce provisions for demolition and construction waste disposal								TMA/Private Sector
Awareness Raising								
Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment								TMA/NGO
Public awareness raising campaign for rural areas, providing information on composting and basic disposal								TMA/NGO
Hold a series of cleanup campaigns								TMA/NGO/CBO
Introduce public complaints system by establishing a complaint cell								TMA
Legislation								
Ban open burning of waste on streets and at final disposal points								TMA
Introduce anti-littering laws								TMA
SWM Fee								
Introduce fee systems for commercial producers of waste								TMA
Introduce fee system for door to door collection								TMA

SUPPORTING INFORMATION

1 GENERAL

1. The district is situated from 27º-05´ to 28º-02´ north latitudes and from 68º-47´ to 69º-43´ east longitudes. It is bounded on the north by Ghotki and Shikarpur districts, on the south by Khairpur, on the east by Ghotki and Jaisalmir (India) and on the west by Shikarpur and Khairpur districts. The western half of the district forms a vast alluvial plain, broken only at Sukkur and Rohri by low limestone hills, which tend to preserve a permanent bank for the Indus at those places.

2. Indus is only river which passes through the north western boundary of the district. At Sukkur it passes through the gorge between Sukkur and Rohri towns, the island of Bukkur bisecting the channel. The climate of Sukkur district is hot and dry. The hot season commences in April and ends in October. Dust storms are common and fierce hot winds blow during the Chaliho, the forty days succeeding the 15th May. The heat continues up to end of September or even up to middle of October.

3. The mean maximum and minimum temperature during summer in the month of June is about 44ºC and 29ºC and during winter in the month of January 23ºC and 9ºC. The average monthly rainfall ranges from 0.59mm to 25.62mm, however, the average annual rainfall of the district is about 88 millimeters.

4. Sukkur District comprises of four Talukas; according to census report of 1998, it's population distribution and urban proportion is as follows.

TALUKAS, POPULATION AND URBAN PROPORTION IN THE DISTRICT

Administration Unit	Population	Urban Proportion
Sukkur District	908,373	50.9
Pano Aqil Taluka	245,187	25.4
Rohri Taluka	224,362	25.6
Salehpat Taluka	64,646	-
Sukkur Taluka	374,173	91.5

5. Sukkur Taluka has one city Sukkur having urban population as 335,551 (91.5%) and rural population as 31,835 (8.5%). The details are provided in Table B6-1 and city map is given at Figure A6.1.

6. Information about tap water and latrine facility in the urban areas as available in the census report is provided in Table A6.1.

Table A6.1: water and latrine facility in urban areas of the taulka

Urban Areas	Population according to census 1998	Average House hold size	Total Houses	Houses with Potable Water Facility		Houses with Latrine Facility	
				Nos.	%	Nos.	%
Sukkur	335,551	7.6	43,643	31,062	71	19,997	46

7. Situation of potable water facility in the houses of rural areas as given in census report is provided in Table A6.2.

Table A6.2: POTABLE WATER FACILITY IN RURAL AREAS OF THE TALUKA

NAME OF STC* AND TC*	POPULATION	TOTAL HOUSES	HOUSES WITH POTABLE WATER	
			Nos	%
SUKKUR TALUKA	31,835	5,204	228	4.38
BAGERJI STC	20,935	3,602	153	4.25
BAGERJI TC	6,897	1,047	74	7.07
BECHANJI TC	4,345	840	7	0.83
GOSERJI TC	9,693	1,715	72	4.20
SUKKUR CITY STC	10,900	1,602	75	4.68
ARAIN TC	8,896	1,316	54	4.10
OLD SUKKUR TC	2,004	286	21	7.34
* STC = Supervisor Tapedar Circle				
TC = Tapedar Circle				

2 WATER SUPPLY SYSTEM

2.1 Urban Area

8. Ground water is generally saline, except in some pockets where it is in the acceptable limits especially drawing of large quantity of water changes it to more brackish. Source of municipal water supply is river and canal. Water storage/ settling tanks are provided where source is canal. Water is first treated in the water treatment plants and then supplied to the city. Water distribution network is now not capable to provide the consumers safe water in sufficient quantity due to the facts that pipes are damaged and leaking. The water intakes and treatment plants need major repairs and improvements to fulfill the water requirements of the city. Taluka has already submitted a PC-1 stating different components of the work, summery of which is attached as Appendix 6-1.

9. People have private arrangement of water as hand pumps and motor pumps. Water vending did not seen in the city during the visit of experts.

10. Reforms in the billing system are in progress. The billing and receipt is computerized through involvement of private sector. TMA have hopes of betterment in billing and collection system within one or two months. There are approximately 19,000 registered connections in the city. Bill payment is about 40% of distributed bills. Domestic water rate is Rs.360 per annum. Some areas are high and require additional pumping; in these areas water rate is more than Rs.500 per annum. Rate of Commercial connection is Rs.1050 per annum.

11. Sukkur city is served through three following Water Treatment Plants.

Water Treatment Plant	Filtered Water MGD	Settled Water MGD	Total MGD
Main Water Works			
Bunder Road	5.00		5.00
Numaish Gah	2.50	1.00	3.50
Old Sukkur			
Airport Road	-	2.00	2.00

12. Source of water for water works at Bunder Road is River Indus. Phase-I of this water works was constructed in 1932. In 1981 to 1984, Municipal Corporation constructed filter plant for additional 2.00 MGD.

13. Hand pumps and motor pumps are also in use and at some places water from these sources is in tolerable limit. Arsenic is present at shallow depths.

14. PC-1 of amount Rs.595.609 millions for Water Supply Scheme has been prepared and submitted. New site for water intake/ Jetty is proposed on Indus near the bridge.This scheme will provide filtration to existing settled water at Numaish Gah and Airport Road as well as it will extend the capacity of water treatment plant at all the three water works. Summery is as follows.

Water Treatment Plant	Filteration of available settled Water MGD	Additional filtered Water MGD	Total filtered Water MGD
Main Water Works			
Bunder Road	-	3.50	3.50
Numaish Gah	1.00	2.50	3.50
Old Sukkur			
Airport Road	2.00	1.00	3.00

15. After the above improvements, capacities of the Treatment Plants will be enhanced as follows.

Water Treatment Plant	Filtered Water capacity at Present MGD	Filtered Water additional capacity MGD	Total Filtered water after improvement MGD
Bunder Road	5.00	3.50	8.50
Numaish Gah - Old Sukkur	2.50	3.50	6.00
Airport Road	-	3.00	3.00
Total Filtered Water available from WTPs after improvements			17.50 MGD
Proposed Tubewells 8Nos will also provide water			1.00 MGD
Total potable water available after implementation of Scheme			18.50 MGD

16. In the PC-1 mentioned earlier different components are divided in short and long term needs. A summery of these components in PC-1 is provided in Appendix-6-1.

17. A comprehensive map of existing water supply system is not available with TMA. Previously the system was under PHED, so the maps are still available with them.

18. Sukkur city is recently divided in two talukas. Presently city taluka is maintaining the system. It is difficult to divide Water Supply and Sewerage Systems in the two talukas so some arrangement will have to sort out for efficient operation of these systems.

19. The detail of the pumps in the water works and their present status, provided by the taluka is provided in Appendix-6-2.

2.2 Rural Areas

20. Practically the rural areas in the taluka are now part of the urban area.

3 SEWERAGE AND DRAINAGE SYSTEM

3.1 Urban Area

21. Open drains are provided in most of the cities, however in some streets, sewers are provided. The waste water from streets through open drains and small sewer pipes is collected in trunk sewers which carry it to the sewage disposal station or to some intermediate pumping station. The sewerage and drainage network is under capacity and in poor condition. Waste water treatment is also required.

22. Waste water of Sukkur city is being thrown in the River Indus or Canals which is a big environmental hazard.

23. Detail of pumping machinery in the disposal stations is provided in Appendix 6-3.

3.2 Rural Areas

24. Practically the rural areas in the taluka are part of the city.

3.3 Legislation

25. There is Pakistan Environmental Protection Act 1997, which governs the pollution of water bodies, waste water disposal standards, but there is no practical enforcement of the act in the taluka. Any other Law, regulation, standard or guideline do not exist at national, provincial, district or local levels regarding drinking water supply, sewerage or drainage. For drinking water, WHO guidelines are generally referred in practice by the provincial departments but these are not being implemented in letter and spirit.

3.4 Private Sector Participation

26. There is no private sector participation in the fields of potable /drinking water, sewerage or drainage in the taluka.

3.5 Main Issues and Constraints

i) Responsibilities of Taluka, District and Public Health Engineering Department are not clear.
ii) TMA has not sufficient data and drawings of the water supply and sewerage systems in the Taluka.
iii) People are not satisfied with quality and quantity of water supplied by the TMA.
iv) There is no system for water quality monitoring.
v) There is no comprehensive Master Plan of TMA regarding water and sanitation.
vi) Existing water works and distribution system needs rehabilitation and improvement.
vii) Waste water is standing in open spaces at many locations of the city. At some locations it is overflowing in the streets.
viii) Sewage disposal stations need rehabilitation.
ix) Solid waste is being thrown in drains.

APPENDIX 6-1

COMPONENTS OF WORKS IN PC-1

Components of short term need are as follows

1.	Diesel Generator	MRs. 36.05
2.	Interconnections between higher and lower pressure	MRs. 1.09
3.	Interconnection of Turbine Motors with delivery main of OHT of WW,ph-I	MRs. 4.04
4.	Replacement of worn out/ rusted pipes which are causing antamination	MRs. 15.76
5.	Change of undersize, rusted & contaminated water lines	MRs. 5.58
6.	Rehabilitation of Alum Mixers, chlorinator, change of filter media, restoring backwash system to improve quality of water.	MRs. 2.63
7.	Gas chlorinator for phase-I, II & III	MRs. 0.60
8.	Filter media wash system	MRs. 0.75
9.	Silt Clearence ph-IV	MRs. 19.73
	Total for short term measures	**MRs. 86.24**

The main components (Long Term) of the PC-1 are as follows

1.	Construction of Intake Works at Sadaruddin Badshah	MRs. 42.67
2.	Construction of Filter Plants 3.5 MGD at Bunder Road	MRs. 104.17
3.	Construction of 3.5 MGD Filter Plant near Numaish Ground	MRs. 110.57
4.	Construction of 3.0 MGD Filter near Phase-IV Water Works Airport Road	MRs. 135.73
5.	Construction of Tubewells near NW Canal	MRs. 7.55
6.	Cartage Details	MRs. 7.96
7.	Maintenance Cost	MRs. 39.34
8.	Physical Contigencies	MRs. 8.01
9.	Price Contingencies	MRs. 53.39
	Total for long term measures	**MRs. 509.37**
	Grand Total	**MRs. 595.61**

APPENDIX 6-2

LIST OF MACHINERY AT WATER WORKS

New Water Works

Sr.No	Motor	Qty	Pump	Condition	Remarks
1	Turbine Motor 80 HP	3		In working condition	

Main Water Works

Sr.No	Motor	Qty	Pump	Condition	Remarks
1	Motor125 HP	2	Set	One in working condition	Out of order 1
2	Motor 75 HP	1	Set		Out of order 1
3	Motor 60 HP	3	Set	Two in working condition	Out of order 1
4	Motor 45 HP	1	Set	In working condition	

Raw Water Side

Sr.No	Motor	Qty	Pump	Condition	Remarks
1	Motor 30 HP	5	Set	Three in working condition	Out of order 2
2	Motor 40 HP	3	Set	In working condition	

J.T. Nusrat

Sr.No	Motor	Qty	Pump	Condition	Remarks
1	Motor 60 HP	1	Set	In working condition	
2	Motor 40 HP	2	Set	In working condition	

J.T. Phase-III

Sr.No	Motor	Qty	Pump	Condition	Remarks
1	Motor 40 HP	5	Set	Three in working condition	Out of order 2
2	Motor 75 HP	1	Set	In working condition	

Water Supply Phase-III, Numaish Road, Old Sukkur

Filter Plant

Sr.No	Motor	Pump	Condition	Remarks
1	100HP Siemens	4X5 KSB	In working condition	
2	100HP Siemens	4X5 KSB	In working condition	
3	100HP Siemens	4X5 KSB	In working condition	

Khushaal Scheme Pump House

Sr.No	Motor	Pump	Condition	Remarks
1	80 HP Siemens	3X4 KSB	In working condition	
2	80HP Siemens	3X4 KSB	In working condition	

S.R. Tank

Sr.No	Motor	Pump	Condition	Remarks
1	25 HP Siemens	4X5 KSB	In working condition (Low Speed)	
2	25 HP Siemens	4X5 KSB	In working condition (Low Speed)	

Filter Bed Room

Sr.No	Motor	Pump	Condition	Remarks
1	Compressor		In working condition	
2	Compressor		In working condition	

Chlorine Gas Room

Sr.No	Motor	Pump	Condition	Remarks
1	1 HP Deluxe	Rotor Pump	In working condition	

2	1 HP Deluxe	Rotor Pump	In working condition	

Chemical House

Sr.No	Motor	Pump	Condition	Remarks
1	1 HP		In working condition	Dozing Pump Motor
2	1 HP		In working condition	Dozing Pump Motor
3	3 HP		In working condition	Alum Mixture Motor
4	3 HP		In working condition	Alum Mixture Motor
5	1 HP		In working condition	Lime Mixture Dozing Motor Pump
6			In working condition	Mixture Machine
7	5 HP		In working condition	Alum Mixture Machine

Raw Water

Sr.No	Motor	Pump	Condition	Remarks
1	10HP Siemens	6X5 KSB	In working condition	
2	10HP Siemens	6X5 KSB	In working condition	
3	10HP Siemens	6X5 KSB	In working condition	

Silt Turbine Pump House

Sr.No	Motor	Pump	Condition	Remarks
1	10HP Siemens	5X4 KSB	Not in working condition	

2	10HP Siemens	5X4 KSB	Not in working condition	

Main Pump House New Pind/ Qureshi Goth

Sr.No	Motor	Pump	Condition	Remarks
1	75 HP China	5X4 KSB	Not in working condition	In custody of contractor for repair
2	80 HP China	5X4 KSB	In working condition	
3	75 HP China	5X4 KSB	Not in working condition	In custody of contractor for repair
4	80 HP China	5X4 KSB	In working condition	
5	75 HP China	5X4 KSB	In working condition	
6	75 HP China	5X4 KSB	Not in working condition	In custody of contractor for repair
7	75 HP China		In working condition	Motor in spare

Madina Colony/ Microwave

Sr.No	Motor	Pump	Condition	Remarks
1	20 HP BECO	3X4 KSB	In working condition	
2	20 HP BECO	3X2-1/2 Deluxe	Not in working condition	In custody of contractor for repair

Nusrat Colony No.5 Pump House

Sr.No	Motor	Pump	Condition	Remarks

1	75 HP China	5X4 KSB	In working condition	
2	75 HP China	5X4 KSB	Not in working condition	In custody of contractor for repair
3	75 HP China	5X4 KSB	In working condition	
4	75 HP China	5X4 KSB	In working condition	

Main Pump House

Sr.No	Motor	Pump	Condition	Remarks
1	75 HP	5X4 KSB	Not in working condition	Not in use due to damage of its foundation
2	75 HP	5X4 KSB	In working condition	
3	60 HP	5X4 KSB	Not in working condition	
4	80 HP	5X4 KSB	In working condition	

Society Pump House

Sr.No	Motor	Pump	Condition	Remarks
1	75 HP	5X4 KSB	In working condition	
2	80 HP	5X4 KSB	Not in working condition	
3	75 HP	5X4 KSB	Not in working condition	Pump is out of order
4	80 HP	5X4 KSB	In working condition	Not in use due to damage of its foundation

Jetty Pump House

Sr.No	Motor	Pump	Condition	Remarks
1	30 HP	8X6 KSB	Not in working condition	
2	30 HP	8X6 KSB	In working condition	
3	30 HP	8X6 KSB	In working condition	
4	40 HP	8X6 KSB	In working condition	

Lal Mashaikh

Sr.No	Motor	Pump	Condition	Remarks
1	15 HP	3X2-1/2	In working condition	

APPENDIX 6-3

SEWAGE DISPOSAL STATIONS IN SUKKUR

1. Mirani Muhallah Bachal Shah Miani Drainage
   Its disposal is in Dadu Canal

   i) Motor 10 HP with Pump 1 No (Working Condition)
   ii) Oil Engine 12 HP with Pump 1 No (Damaged & not working)

2. Solangi Muhallah Bachal Shah Miani Drainage
   Its disposal is in Dadu Canal

   i) Motor 10 HP with Pump 1 No (Working Condition)
   ii) Oil Engine 12 HP with Pump 1 No (Working)
   iii) Room 2 Nos

3. Malka Muhallah Bachal Shah Miani Drainage
   Its disposal is in Dadu Canal

   i) Motor 10 HP with Pump 3 Nos (Working)
   ii) Oil Engine 12 HP with Pump 1 No (Working)
   iii) Room 3 Nos

4. Bashirabad Drainage
   Its disposal is in Kerther Canal

   i) Motor 20 HP with Pump 2 Nos (Working)
   ii) Room 2 No

5. Bihar Colony Drainage
   Its disposal is in Kerther Canal

   i) Motor 40 HP with Pump 1 Nos (Working)

6. By-Pass Drainage
   Its disposal is in Kerther Canal

   i) Motor 10 HP with Pump 1 No (Working)
   ii) Oil Engine 2 HP with Pump 1 No (Working)
   iii) Room 1 Nos

7. D.C.O. Drainage
   Its disposal is in Rice Canal

   i) Motor 60 HP with pump 1 Nos (Working)
   ii) Motor 60 HP with pump 8X8 1 No (Working)

8. Arain Drainage
   Its disposal is in Rice Canal

   i) Motor 10 HP with Pump 2 No (Working Condition)
   ii) Oil Engine 12 HP with Pump 1 No (Damaged & not working)

9. Abad Drainage
   Its disposal is in agriculture field and pond

   i) Motor 10 HP with Pump 2 No (Not Working)
   ii) Oil Engine 12 HP with Pump 1 No (Not working)

10. Azizabad Qureshi Goth Drainage
    Its disposal is in Indus River

    i) Motor 10 HP with Pump 2 No (Working)
    ii) Oil Engine 12 HP with Pump 1 No (Working)

11. Rajoo Marwari Drainage
    Its disposal is in Kerther Canal

    i) Motor 10 HP with Pump 1 No (Working)

12. Makka Drainage
Its disposal is in Kerther. Previously it was treated in WWTP and then disposed in Indus River

i)	Motor 75 HP with Pump	2 Nos (Not Working)
ii)	Motor 75 HP with Pump	1 No (Destroy by fire)
iii)	Motor 55 HP with Pump	1 No (Working)
iv)	Motor 60 HP with Pump	1 No (Working)
v)	Motor 60 HP with Pump	2 No (Not Working)
vi)	Hussain Oil Engine 35 HP with Pump	1 No (Not Working)
vii)	Pico Oil Engine 35 HP with Pump	2 No (Not Working)
viii)	China Oil Engine 35 HP with Pump	2 No (Not Working)
ix)	Motor 1 HP with Pump	1 No (Working)
x)	Room	4 Nos
xi)	Quarter	2 Nos

13. Shah Faisal Colony Drainage
Its disposal is in Kerther Canal

i)	Motor 10 HP with pump	1 No. (Working condition)
ii)	Oil Engine 12 HP with pump	1 No. (Not working)

14. Sabzi Mandi Drainage
Its disposal is in Kerther Canal

i)	Motor 15 HP with pump	1 No. (Working condition)
ii)	Motor 15 HP with pump	1 No. (Not working)
iii)	Oil Engine 12 HP with pump	1 No. (Not working)

15. Gadani Muhallah Drainage
Its disposal is in Indus River

i) Motor 40 HP with pump 2 Nos. (Working condition)

16. Shahbaz Colony Drainage
Its disposal is in Indus River

i) Motor 60 HP with pump 2 Nos. (Working condition)

17. Islam Colony Drainage
Its disposal is in Indus River

i) Motor 60 HP with pump 2 Nos. (Working condition)

18. Ahmed Nagar Colony Drainage
Its disposal is in Indus River

i) Motor 10 HP with pump 1 No. (Working condition)

19. Unisaif Drainage
Its disposal is in Indus River

i) Motor 75 HP with pump 1 No. (Not working condition)

20. Mirani Muhallah Drainage
Its disposal is in Indus River

i) Motor 10 HP with Pump 1 No. (Working condition)
ii) Motor 20 HP with Pump 1 No. (Working condition)

21. Gul Shah Drainage
Its disposal is in Indus River

i) Motor 10 HP with Pump 1 No. (Not working)

ii) Motor 20 HP with Pump 1 Nos. (Working condition)

22. Jagir Abad Bajarji Drainage
Its disposal is in Indus River

i) Motor 10 HP with Pump 3 No. (Working condition)
ii) Motor 20 HP with Pump 1 Nos. (Working condition)

23. Saeedabad Drainage
WWTP is provided (Not working)

24. Lal Mashaique
Its disposal is in Rice Canal (Not working)

25. Jafarabad Drainage
Its disposal is in Agricultural Field (Working condition)

26. Canda Wahan Drainage
Its disposal is in Agricultural Field (Working condition)

4 SOLID WASTE MANAGEMENT SITUATION

4.1 General

27. The current practices of solid waste management in the city are explained in stepwise form in the following paragraphs. Performance analysis has also been carried out at the end.

4.2 Storage and Collection

28. The storage and collection systems of solid wastes in the city are either inadequate or inappropriate. There are innumerable informal communal storage locations in the city where the waste is temporarily stored in form of the open heaps on the sides of the streets and at number of places in the centre of the streets (in congested areas). At some places masonary enclosures and a few metallic containers are also used for this purpose. The situation gets aggravated when the heaps of waste pour down into the open drains where choking and wastewater spillage is seen quite often.

4.2.1 Primary Collection

29. Primary collection is the shifting of waste from individual premises, i.e., houses, shops, offices etc., to communal storage places. The sanitary workers shift the wastes from smaller street side heaps to somewhat bigger heaps/filth depots, with the help of handcarts and donkey carts.

30. House to house collection is virtually non-existent. In certain cases the sanitary workers who are assigned the job of sweeping and collection of wastes from the street sides also serve a few households informally.

4.2.2 Secondary Collection

31. The tractor trolleys and dumper trucks then serve these bigger heaps While the metallic containers are mechanically handled by tractor with container carrier. These vehicles shift the solid wastes to some designated open dumping sites haphazardly on the periphery of the city.

4.2.3 Vehicle and Equipment

32. The description of vehicles and equipment used for SWM in the city is given in Table A6.3. Data from discussion with TMA staff.

Table A6.3: Vehicles and Equipment

Type	Capacity (m^3)	No	Condition
Hand Carts (wheel barrows)	0.1	150	Varied
Donkey carts	0.7	11	Average
Dumper Trucks	9	5	Good
Tractor container carrier	5	1	Good
Trolleys with Tractors (1996)	4	6	Good
Trolleys with Tractors (1990)	4	2	Satisfactory
Mechanical loader (1996)	-	1	Good

4.3 Sludge and Grit Collection

33. Due to significant amount of solid wastes being thrown into the open drains and manholes of the sewerage system, blockages are very common. The municipality's sanitary workers are deployed for extracting sludge and grit from the system. After drying in open this sludge and grit is also picked up by dumper trucks.

4.4 Recovery of Recyclable Wastes

34. The materials in wastes, like paper, board, plastics, metals and glass are either separated at source by the owners or by the scavengers from the street side open heaps. There are a number of shops in the city dealing with the recovered materials which channelise them to the recycling industries in other cities.

4.5 Disposal

35. Quite a portion of the wastes collected with the help of donkey carts are open dumped in the vacant plots or low lying areas within the town or on the periphery. The tractor trolleys dumper trucks and tractor with container carrier shift the wastes to open dumps outside the city. There are no facilities like incineration composting or sanitary landfilling in the city. The major dumping sites are along Pir Murad road in sasti Basti and Qureshi goth near Gulshan-e-Iqbal

4.6 Special Wastes

4.6.1 Slaughterhouse Wastes

36. Most of the wastes from slaughter house are taken up by the recycling industry. The rest of the wastes are thrown just nearby or collected by tractor trolleys to be open dumped at a distance haphazardly. On an average three trolley loads are shifted five days/week.

4.6.2 Hospital Wastes

37. The solid waste of DHQ and other Hospitals consisting of used cotton, bandages, and syringes etc., is disposed off by burning within the hospital's compound. Before disposal the used syringes are cut by cutting machine. The major portion of solid waste of the hospitals is thrown in masonry enclosures and street side open heaps from where it is picked up by the municipal vehicles.

4.6.3 Dead Animals

38. There is no separate arrangement for disposal of carcasses of the dead animals. They are collected alongwith other municipal solid wastes and buried alongwith the solid wastes in open dumps.

4.6.4 Demolition and Construction Waste

39. Most of the demolition and construction wastes are reused. Only a small portion is thrown out on the street sides. The generators of such wastes are responsible to dispose them off. In case they do not comply with the rules and regulations, they are to be charged for the service and the municipality has to take care of the situation, But there are cases that such wastes remain on the street sides for very long time.

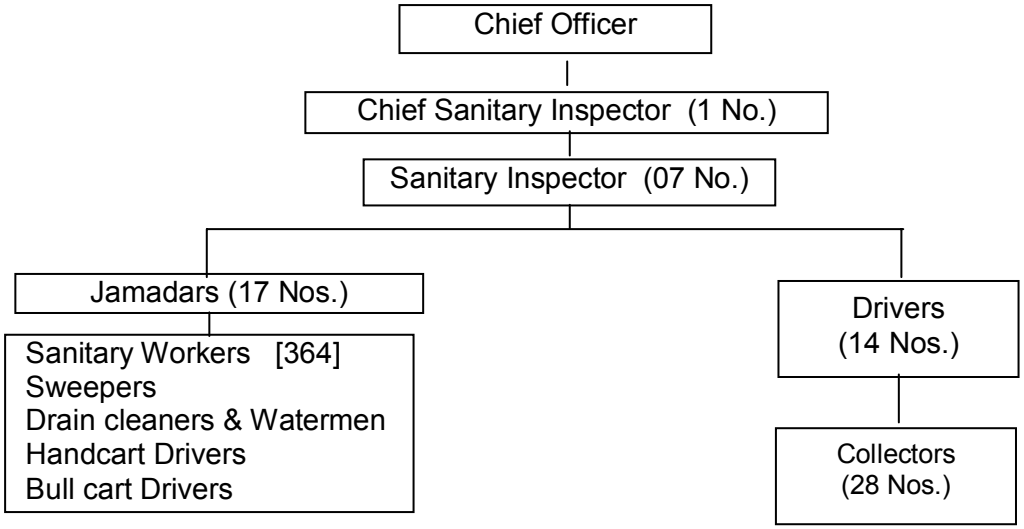
4.6.5 Industrial Wastes

40. Almost all the industrial solid wastes from the industries which are located outside the city are recycled. Rice mills were seen installed at a distance from the city. Normal municipal wastes are disposed off by the industrial administration at their own in open dumps.

4.7 Staff Organization

41. Presently there are 14 drivers and 364 sanitary workers in total, out of which some are regular and others are on work charged basis. On daily basis they are deployed for sweeping, as drain cleaners and watermen, as collectors on tractor trolleys, work as donkey cartmen and as handcart drivers. The sanitary workers are supervised by 17 Jamadars who work under 7 Sanitary Inspectors and a Chief Sanitary Inspector. The overall organization is shown in Figure A6.2.

Figure A6.2: Present Organization Chart of Sanitation Section Sukkur



4.8 Private Sector Participation

42. There is no private sector participation experienced in the town/city up till now.

4.9 Community Participation

43. No such activity has been noted in the town. Actually solid waste management issues appear to be a low priority.

4.10 Public Awareness

44. Public awareness is very necessary to get their cooperation for efficient managements of solid waste. But no such effort has been launched in the town.

4.11 Legislation (Laws, Regulation, Standards, Guidelines)

45. Various type of legislation including laws, rules, guidelines exist at National and Provincial levels dealing with solid waste management. These include:

- Ordinance to prohibit manufacture, sale and use of black plastic polythene bags including polythene

bags below 30 microns in thickness in the Sindh province. March 2006.

- Guidelines for Hospital Waste Management EPA, Sindh. June 2004 Rules 2005. Gazette of Pakistan.2005.
- Hospital Waste Management Rules 2005. Gazette of Pakistan.2005.
- (Draft) Guidelines for Solid Waste Management. Pakistan EPA. June 2005.

46. But there appears to be a lack of awareness regarding these documents in the community.

4.12 Performance Analysis

47. Based on the data obtained from discussion with TMA staff., the system performance can be evaluated in terms of collection efficiency i.e. the ratio between wastes collected and wastes generated, cost of collection/ton, staff employed per 1000 population, cost per inhabitant It is done in the following sub-sections, The results are presented in Tables A6.4 and 6.3. Drawbacks noted in the present system are also given separately.

4.13 Collection Efficiency

48. Table A6.2 shows the data (year 2006) regarding total collection per day. The figures reveal the total number of vehicles deployed, average trips made by each vehicle per day and the average amount of waste carried per trip. The total waste collected on the average is 78.5 tons/day while the generation rate is 108 tons/day. This gives a collection efficiency of 72%.

Table A6.4: Haulage Capacity of TMA Collection Vehicles

Sr. No.	Type of Vehicle	No. of Vehicles	Total Avail-able	Trips/ Vehicle/ day (No.)	Average Weight/ Trip (Tons)	Total Weight Carried (Tons)
1.	Tractor Trolley I	5	5	2.5	2.2	27.5
2.	Tractor Trolley II	2	2	2.5	2.2	11
3.	Dumper Trucks	5	5	2	4	40
					Total:	**78.5**

Total Generation/day = 240,776 × 0.45 = 108 tons

Collection Efficiency = $\frac{78.5}{108} \times 100$ = 72%

4.14 Cost per Ton Collected and per Inhabitant

The cost of collection per ton is Rs. 1037/- as per calculations below:

Wastes collected per day = 78.5 tons

Waste collected per year (for year 2002-2003) = 78.5 × 365 = 28,652 tons

Total expenses incurred/year = Rs. 29731743

Cost/Ton = $\frac{29731743}{28652}$ = Rs. 1037

Population for year 2003 = 240776 *(See note on first page this Annex)*

Cost/inhabitant = Rs. $\frac{29731743}{240776}$ = Rs. 123

4.15 Staff per 1000 Inhabitants

No. of staff = 431 (From Section 2.11)

Population = 240776

Staff/1000 inhabitants = $\frac{431}{240776} \times 1000$ = 1.79

Table A6.5: Present System Performance Indicators

Collection Efficiency	Cost per Ton	Cost per Inhabitant	Staff per 1000 Population
%	(Rs.)	(Rs.)	Ratio
72 %	1037	123	1.79

4.16 Drawbacks/Deficiencies in the Present System

49. Drawbacks and deficiencies have been noted at all the stages of the present system i.e. communal storage, street cleansing, collection vehicles like handcarts, bullcarts and tractor trolleys, and disposal in the form of open dumping. These are delineated in the following sub-sections. With the adoption of the new system, it is envisaged that these will be removed.

4.17 Communal Storage

50. The communal storage takes place in the form of small street side heaps. Besides that masonry enclosures are also being constructed. The following short comings are noted in this practice.

    i) Because of design defects it is difficult to collect the waste from within the dust bins and filth depots.

    ii) Refuse in these structures is scattered all over the surrounding area as a consequence of scavenging activity and wind action.

    iii) Rodents become active in these dumps. Similarly these become the breeding places for larvae of the flies and scores of other disease causing organisms. These are merely health hazard.

    iv) These are a constant source of obnoxious odours leading to pollution of local environment.

    v) Rains wash away the waste to areas in the vicinity.

    vi) These are uneconomical as compared with the metallic skips.

4.18 Street Cleansing

51. Hand tools and other equipment used during sweeping and collection are of low-standard and poor design. Therefore, the sweepers cannot give a satisfactory output. Major drawbacks are:

    i) As a general practice sweepings are placed on the sides of the streets and roads, in open heaps making the condition of streets shabby.

ii) Brooms have handles of shorter length on account of which sweeping efficiency is reduced.

iii) Sweepers are hardly provided with any replacements for the damaged tools and equipment.

iv) Supervision on performance of the sweepers by the supervisory staff is generally lackings

4.19 Donkey Carts

i) Donkey carts are slow and consume more time. The quantity of the waste collected is small. They need improvement in design.

ii) Defecation by the donkeys causes littering of streets

4.20 Tractor Trolleys

i) Present vehicles can not collect the entire quantity of the generated waste.

ii) Ti me spent/trip is over 2 hours, which is quite long.

iii) Inaccessible areas are left uncovered.

iv) Collection vehicles are required to collect the scattered heaps of waste, thus spending unwanted time en-route to the dumping site.

v) Manual loading and unloading of the vehicles is un-economical in terms of time and effort.

vi) Collectors come in physical contact with the waste, due to which are liable to be affected by occupational diseases.

vii) Littering is caused by uncovered collection vehicles.

4.21 Open Dumping

i) Disease causing vectors are spread all around the dumping ground thus causing a constant health hazard for the surrounding population. Open dumping makes the area unsightly.

ii) Because of wind action components like paper and polyethylene bags are seen scattered in the adjoining areas.iii) Groundwater pollution is not unexpected during rainy season.

4.22 Strength and Weaknesses of Solid Waste Management Activities

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
1	Introduce 2-bin system for wet and dry waste in household	- Improves quality and quantity of recyclable materials, and enables composting	- difficult to enforce, and requires major change in household habits. Could take many years.				100
2	Initiate home composting in barrels where space allows and appropriate	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting		2000/ barrel		
	Street Waste Management/ Private Sector						
3	Provide litter bins on main streets for pedestrians' use	- Potentially low-cost way of reducing littering, and therefore cost of labour to sweep	- Would have to be introduced along with anti-littering legislation and public awareness campaigns to be effective	60,000 (for 100 bins)	600/ bin	15,000	150/ bin
4	Improve efficiency of staff, e.g. review beats, rationalize timings, monitor attendance to achieve 100% coverage in urban areas	- Little extra cost -	- Provision of better tools, and education to sweepers required - Sweepers may react against working for longer/ harder hours				
5	Hand over sweeping to private-sector (with staff and equipment)	- TMA no longer has responsibility for this management and labour-intensive activity					500
6	Provide improved handcarts, tools (e.g. brooms) and uniform to sweepers –cum- door to door collectors	- improved health and safety of staff - increased productivity	Extra cost for improved tools	5,400/ cart (100hh served)	54	2,700 (100hh served)	27
7	Enforce provision of containers/ bags on public vehicles, vendors' carts, covers on sand, bricks carriers	- Stops littering of streets - Saves time of street sweeping - Clean streets	- Little extra cost				10-100/ veicle
	Primary Collection/ Private Sector/ CBO						
8	Introduce door to door collection along with street sweeping by TMA staff at pilot scale and then for total urban area	Sweepers' work will become more efficient as less waste dumped on to streets	Systems would require contributions from householders. Would they pay?				300
9	Community-based organisations/	-Zero cost for TMA	- could take many years to	TMA			300

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	private sector arrange door-to-door collection staffed by informal sector waste workers	-Sweepers' work will become more efficient as less waste dumped on to streets - provides livelihoods for poor	establish community-based organisations - Systems would require contributions from householders. Would they pay? - Can be difficult to organise waste pickers	equipment leased			
	Communal Storage						
10	Purchase demountable containers ($5m^3$) as communal storage facility	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- Experience in other countries suggests that if not properly manufactured and maintained can be problematic and containers can have short useful lives due to corrosion.	60,000/ container (750hh served)	80	14,000/ container (750hh served)	19
	Secondary Collection/ Private Sector						
11	Improve efficiency of existing vehicles, e.g. reduce downtimes, improve routing and coordination with front loaders etc. for daily removal of the waste accumulated at filth depots	- no extra capital cost	Increased annual cost			100,000	
12	Purchase hydraulic multi loader /hoist truck system for use with demountable containers	- Potentially cleaner system of waste transfer - improvements in community bins facilities could increase efficiency of entire SWM system - Prestige of modern system - Potentially safer system for waste workers with reduced waste handling	- high capital cost - Success depends on public behaviour, as if waste deposited around containers, very problematic. - extra space required	2,000,000/ vehicle (7500 hh served)	266	431,800/ vehicle (7500 hh served)	58

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
13	Contract out secondary transportation to private-sector	- TMA no longer required to manage fleet of vehicles - Could lease vehicle fleet to private-sector operator - Financial savings and improvements to service	- Lack of experience of tendering and contracting out				200
	Reuse and Recycling/ Organizing Scavengers						
14	Introduce door to door collection of recyclable wastes by organizing scavengers accompanying municipal collectors	- Provides better livelihood to scavengers - Reduces the waste quantities to be disposed off	- Effort needed to organize scavengers - May take long time to introduce				
	Treatment and Final Disposal						
15	Improve and rehabilitate present disposal practices in line with basic public health and environmental standards	- Reduced threat to environment in public health - basic but significant improvements can be made for relatively low cost	- Some investment and expertise required				
16	Identify new safe disposal site in appropriate location, and acquire land if necessary along with provision for a compost plant	- Less environmentally damaging -Reduced pollution of groundwater - In line with Annual Strategic Plan guidelines from the ADB	- Vested interests of drivers who sell waste may discourage dumping at site - Cost of developing and running site	1,520,000	70	532,000	25
17	Central compost plant (30 tons waste per day)	Recycles the organic matter which is useful for agriculture	Capital cost	3,260,000	92		
18	Initiate decentralised composting at neighbourhood level through community-based organisations, where appropriate/space available	- Potential reduced volumes of solid waste for disposal - Environment friendly way of processing organic waste	- Could take time to educate and convince people about composting	65,000	92		
	Special Waste Management						
19	Enforce Healthcare waste legislation and provide separate facilities for collection, transport,	- Reduced hazards from healthcare waste - compliance with national	- Funding from hospitals/Department of Health? - Enforcement challenging, and	20,000		20,000	

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	treatment and disposal of healthcare waste	guidelines on healthcare waste - Could possibly attract private-sector investment	needs to be backed up with awareness campaigns				
20	Awareness campaigns in hospitals	-Reduced mixing of healthcare waste with municipal waste - Changes behaviour of waste generators	- Awareness raising campaigns can take time and cost money				
21	Undertake viability study for installation of locally manufactured incinerator	- Widely accepted healthcare waste management technique	- Costly to purchase, and challenging to operate and maintain				
22	Assess generation of hazardous waste within TMA, and devise strategy for its safe treatment and disposal	- Essential for protecting public health and environment - Should be funded by the private sector	- needs to be backed up with enforceable legislation				
23	Enforce provisions for demolition and construction waste disposal as responsibility of the producer	- clearer highways/ streets	- Getting this funded may be difficult, but construction companies should contribute				
	Awareness Raising						
24	Run public awareness raising campaign to promote source segregation of waste, reduce street dumping, and show links between waste, health and environment	- likely cost-effective way of tackling many problems - If successful could result in increased recycling rates from separated waste, reduced dumping on streets, reduced labour requirements for sweeping, improved drainage	- Awareness raising campaigns can take time and cost money - Expertise in awareness raising required			50,000	
25	Public awareness raising campaign for rural areas, providing information on composting and basic disposal	- Could help solve problem of plastic disposal in villages	- Would need support of professionals to disseminate information			25,000	
26	Hold a series of cleanup campaigns	- Can be effective at giving visible results quickly, and thus attracting public support - Relatively low-cost option				25,000	
27	Introduce public complaints system by establishing a complaint cell	- makes public more willing to cooperate with TMA, and contribute to improved waste management services	- vital that systems of accountability are in place within the TMA so complaints can be followed up and affect change				

S.No.	Activity & Description	Strengths	Weaknesses	Capital cost Rs		Annual cost Rs	
				Total	/hh	Total	/hh
	Onsite Storage and Processing						
	Legislation						
28	Ban open burning of waste on streets and at final disposal points	- Reduced environmental pollution - popularity with local residents	- Difficulties of enforcing legislation				
29	Introduce anti-littering laws	- Potentially low-cost way of impacting urban environment, with benefits to public health, drainage and labour requirements for waste management	- Difficulties of enforcing legislation				
	SWM Fee						
30	Introduce fee systems for commercial producers of waste	- following the 'producer pays' principle, enables better services to be provided to the areas most needy – particularly shopping and industrial areas	- Possible resistance, so needs to be backed up with legislation and enforcement mechanisms				100
31	Introduce fee system for door to door collection	- Cost shared by the communities	- Difficult to realize from the communities				

Table B6-1: Urban Population Projections

TALUKA SUKKUR: SUKKUR CITY - UNION WISE PROJECTED POPULATION

	POPULATION 1998	HOUSING CHARACTERISTICS							AVERAGE HOUSEHOLD SIZE	1998 POPULATION - UNION WISE																			TOTAL
		TYPE OF STRUCTURE				HOUSING FACILITIES																							
		TOTAL	PACCA	SEMI-PACCA	KACHA	POTABLE WATER	LATRINE	ELECTRICITY		UC 1	UC 2	UC 3	UC 4	UC 5	UC 6	UC 7	UC 8	UC 9	UC 10	UC 11	UC 12	UC 13	UC 14	UC 15	UC 16	UC 17	UC 18	
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
*SUKKUR TALUKA	542,245	44,689	27,964	5,560	11,165	31,101	20,589	41,457	7.6																			-
*SUKKUR M.CORP.	306,951	43,643	27,743	5,907	10,293	31,062	19,997	40,557	7.6																			-
*CHARGE NO 01	42,616	5,592	3,968	440	1,284	4,807	3,484	6,208	7.6																			-
CIRCLE NO 01	9,281	1,179	696	210	274	829	580	1,104	7.8	9,281																		9,281
CIRCLE NO 02	9,654	1,262	821	76	365	1,170	896	1,290	7.6									6,449			3,211							9,654
CIRCLE NO 03	4,995	697	579	22	96	679	540	690	7.2									4,995										4,995
CIRCLE NO 04	9,625	1,300	926	60	314	1,224	1,023	1,270	7.4									9,625										9,625
CIRCLE NO 05	9,061	1,194	847	72	226	926	782	1,071	7.9										9,061									9,061
*CHARGE NO 02	31,992	4,287	3,470	270	644	3,631	1,900	4,150	7.2																			-
CIRCLE NO 01	9,425	1,211	1,035	40	136	1,150	474	1,171	7.4	9,425																		9,425
CIRCLE NO 02	6,534	884	710	104	77	736	455	767	7.3		6,534																	6,534
CIRCLE NO 03	7,751	1,201	937	65	199	918	369	1,177	6.5								7,751											7,751
CIRCLE NO 04	8,182	1,081	784	64	233	827	615	1,035	7.5								8,182											8,182
*CHARGE NO 03	48,094	6,177	4,665	557	955	5,118	3,491	6,066	7.8																			-
CIRCLE NO 01	7,584	904	522	181	231	840	627	922	8.1							5,651	1,933											7,584
CIRCLE NO 02	6,926	929	836	50	44	898	690	920	7.5							6,926												6,926
CIRCLE NO 03	7,724	970	857	41	75	885	560	969	7.9							7,724												7,724
CIRCLE NO 04	6,333	779	568	54	157	649	346	765	8.1						6,333													6,333
CIRCLE NO 05	4,850	643	508	36	99	500	434	602	7.5						4,850													4,850
CIRCLE NO 06	8,695	1,147	849	111	187	967	695	1,120	7.5								1,076		7,579									8,655
CIRCLE NO 07	5,982	772	525	84	162	419	309	740	7.7										5,982									5,982
*CHARGE NO 04	52,286	6,782	5,618	470	691	4,495	3,241	6,689	7.7																			-
CIRCLE NO 01	9,732	1,295	1,092	122	82	969	440	1,279	7.5		9,732																	9,732
CIRCLE NO 02	7,543	994	779	85	130	790	546	977	7.6			7,543																7,543
CIRCLE NO 03	9,977	1,340	1,123	84	130	983	693	1,205	7.4			9,977																9,977
CIRCLE NO 04	12,628	1,632	1,297	146	89	936	801	1,610	7.7				12,628															12,628
CIRCLE NO 05	7,130	852	664	24	164	509	436	836	8.4						7,130													7,130
CIRCLE NO 06	5,276	668	563	12	93	396	325	680	7.9				5,276															5,276
*CHARGE NO 05	37,294	4,709	3,914	659	736	3,528	2,503	4,480	7.8																			-
CIRCLE NO 01	6,907	782	418	231	133	651	351	761	8.8															6,907				6,907
CIRCLE NO 02	9,813	1,216	915	65	246	1,119	969	1,159	8.1											9,813								9,813
CIRCLE NO 03	7,104	912	606	287	120	790	590	905	7.8					7,104														7,104
CIRCLE NO 04	13,470	1,799	1,476	86	237	1,368	830	1,695	7.1					13,470														13,470
*CHARGE NO 06	89,516	11,253	5,612	2,227	3,214	8,008	4,226	9,988	7.9																			-
CIRCLE NO 01	7,519	995	670	116	209	969	311	961	7.5												7,519							7,519
CIRCLE NO 02	7,569	952	414	194	344	830	422	875	8												7,569							7,569
CIRCLE NO 03	13,314	1,700	695	405	732	1,415	425	1,267	7.8													13,314						13,314
CIRCLE NO 04	5,847	786	435	105	246	402	106	551	7.4													5,847						5,847
CIRCLE NO 05	12,395	1,585	769	363	453	827	440	1,448	7.8														12,395					12,395
CIRCLE NO 06	16,978	2,199	1,025	682	452	1,499	824	1,959	7.9															16,978				16,978
CIRCLE NO 07	11,726	1,401	960	176	265	1,011	719	1,204	8.3																11,726			11,726
CIRCLE NO 08	7,248	824	341	153	330	507	535	808	8.7														7,248					7,248
CIRCLE NO 09	6,920	847	432	132	283	678	415	765	8.2											6,920								6,920
*CHARGE NO 07	33,793	4,743	1,196	778	2,769	1,415	1,369	3,826	7																			-
CIRCLE NO 01	16,205	2,517	404	365	1,746	604	494	1,995	6.4																		16,205	16,205
CIRCLE NO 02	4,990	741	190	169	382	74	141	592	6.4																		4,990	4,990
CIRCLE NO 03	5,601	781	194	136	451	319	321	661	7.2																	5,601		5,601
CIRCLE NO 04	6,997	704	408	108	188	418	410	608	9.6																	6,997		6,997
Rural Deh Farash																										2,820		2,820
Population 1998										18,706	16,266	17,520	17,904	20,574	18,013	20,301	18,942	21,053	22,822	16,733	18,299	19,161	19,643	18,630	16,978	15,401	21,195	308,884
Growth Rate (3.26%)																												
Population 2006										24,405	21,362	22,857	23,358	26,842	23,502	26,486	24,715	27,480	29,514	21,831	23,874	24,998	25,627	24,309	22,150	20,102	27,652	441,472
Population 20012										29,791	26,085	27,903	28,514	32,767	29,166	32,332	30,167	33,545	36,028	26,649	29,143	30,515	31,284	29,675	27,039	24,545	33,756	538,916

Figure A6.1: Sukkur City Map

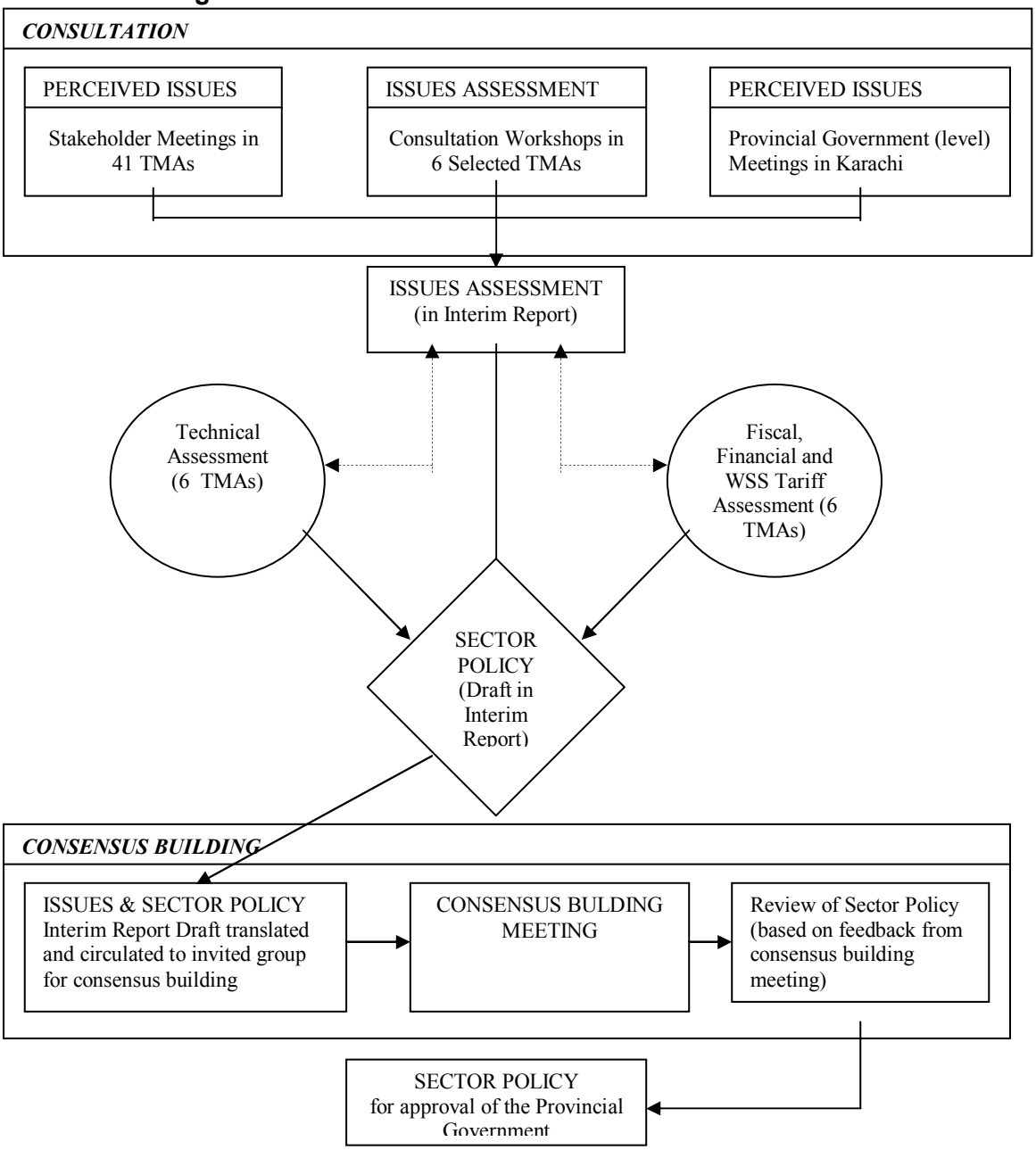
Annexure - 7

CONSULTATIONS

CONSULTATION AND CONSENSUS BUILDING

1. The objective of Consultations and Consensus Building was to ensure participation of stakeholder groups both in (i) identification of issues, and (ii) together with the technical, fiscal and financial assessment carried out by the TA Team, build a consensus on policy response to the identified issues. The process involved two stages: Consultation, and, Consensus Building. The process is outlined in the following paragraphs and shown on Diagram A7-1.

Diagram 1



CONSULTATION MEETINGS

2. This process involved three principal activities: (1) Consultation meetings with stakeholders in 41 Taluka Municipal Adminstrations (TMAs); (2) Issues assessment in 6 TMAs; and Meetings at the provincial government level. This process is briefly discussed below.

- Stakeholders Meetings in 41 TMAs (List 1, Part One) were held primarily with TMA elected officials and representatives, technical and administrative staff. The Meetings were conducted by the social specialists on the TA Team.
- Issues Assessment of selected TMAs (List 1, Part Two) are based on Consultation Workshops by the TA Team technical and social specialists. The Workshops were attended by TMA elected officials and representatives, technical, financial and administrative staff, citizens and civic groups.
- Meetings at the Provincial Government level were held by TA Team Leader, Deputy Leader and technical and financial specialists. These meetings included senior policy making and administrative officials, officials and staff of the provincial Local Government Commission and staff of the Sindh Devolved Social Services Program and WSS and WSS related programs and projects in Sindh.

3. The names of people involved in the consultation meetings are given in List 2.

Outputs of Consultation Meetings

4. The outputs of the Consultation Meetings were analysed in the background of the detailed technical, fiscal, financial and WSS tariff assessments in the 6 selected TMAs and were summarized as “Issues Assessment” in the Interim Report.

Draft Sector Policy

5. The summary of the issues highlighted in the Consultation process in the form of Issues Assessment, together with reports from the technical and financial assessment conducted by the TA Team, provided the basis for preparing the draft of the Sector Policy included in the Interim Report.

CONSESUS BUILDING MEETING

6. The second and final stage of the process involved consensus building on the draft Sector Policy included in the Interim Report and was carried out after the submission of the Interim Report. This stage comprised of:

   a. Circulation of translation of the summary issues statement and draft sector policy included in the interim report to a stakeholder group invited to a Consensus Building Meeting (in Karachi). The group included high-level Provincial Government officials, invited representatives from selected local governments who made commitments on behalf of their organizations, and civic and civil society groups. A gender balance amongst the participants was attempted. The list of participants invited to the consensus building workshop are given in List 3.
   b. Consensus Building Meeting at Karachi to discuss the draft Sector Policy. At the start of each session, participants were briefed about the guidelines for this process including the basis for consensus building and the target output. Active participation of all participants was facilitated and attempts were made to reach a consensus, as far as

was possible, on important issues. The issues to be discussed included (a) the draft sector policy and the proposed methodology for preparing participatory action plans for the WSS and SWM sectors at the TMA level; (b) the institutional mechanisms suitable for delivery schemes within the context of the SLGO 2001; (c) a policy for community mobilization, with a special focus on women's involvement; and, (d) policy options for O&M, addressing institutional and financial sustainability issues.

c. Review of draft Sector Policy in the light of the feedback from the Consensus Building Meeting

7. The Government published the Draft Policies in the national press and invited comments from the general public. These have also been incorporated in the review process.

Feedback and Output of consensus building

8. The feedback from the consensus-building meetings provided the basis for a review of the draft Sector Policy. The output of the review has been finalized as the Sector Policy for approval of the Provincial Government.

List 1

TALUKA MUNICIPAL ADMINISTRATIONS (TMAs) COVERED IN CONSULTATION MEETINGS

Part One: Consultation Meetings with TMAs

1. Badin
2. Matli
3. Tando Bago
4. Talhar
5. Shaheed Fazil Rahu
6. Tando Mohammad Khan
7. Tando Ghulam Haider
8. Tando Allah Yar
9. Hussain Baksh Marri
10. Sindhri
11. Jhado
12. Digri
13. Kot Ghulam Mohammad
14. Kiniri
15. Samro
16. Pithro
17. New Sukkur
18. Rohri
19. Saleh Pat
20. Garhi Yasin
21. Khanpur
22. Ratho Dero
23. Dokri
24. Bakrani
25. Shadat Kot
26. Qabo Saeed Khan
27. Kambar
28. Warah
29. Miro Khan
30. Jacobabad
31. Lakhi
32. Ghotki
33. Khangarh
34. Pano Aqil
35. Khairpur
36. Sobhodero
37. Gambat
38. Kingri
39. Nara
40. Kot Digi
41. Thari Mirwah

Part Two: Consultation Meetings and Issues Assessment in TMAs – Technical, Fiscal, Financial Tariff Assessment and Civil Society Meetings

42. TMA Old Sukkur
43. TMA Shikarpur
44. TMA Larkana
45. TMA Juhi
46. TMA Umerkot
47. TMA Mirpurkhas

List 2

CONSULTATION MEETINGS – PARTICIPANTS

Provincial Level at Karachi

1. Hakim Din Tunio, Special Secretary (Development)
   Government of Sindh.
2. Dr. Capt. Sikandar Ali Panwar, Local Government Department.
3. Khalid Mahmood Siddiqui, Chief PP&H Section, Planning and Development Department (P&DD).
4. Mohammad Saleem Jalbani, Planning Officer, Environment Section, P&DD.
5. Muhammad Afzal Arian, Principal/Director, Municipal Research and Training Institute (Government of Pakistan).
6. Dr. Iqbal Saeed Khan, Director, Sindh Environmental Protection Agency.
7. Abdul Ghaffar Surahio, Project Officer, Local Government Department.
8. Manzar Abbas, Sindh Katchi Abadi Authority.
9. Qazi Abdul Kabir, Project Director, Sindh Devolved Social Services Program (SDSSP).
10. Imtiaz Bhatti, Program Officer, SDSSP.
11. Roger Jackson, Team Leader, Sindh Basic Urban Services [SBUS], (ADBTA)
12. Mitsuhiro Doya, Senior Economist/Financial Analyst, SBUS.
13. Jamshed Tirmizi, Urban Governance and Institutional Expert, SBUS.
14. Tasneem Bhatti, Social Development and Community Mobilization Specialist, SBUS.
15. Dr. Chand Bibi, Gender and Resettlement Specialist, SBUS.
16. Tasneem Ahmad Siddiqui, Saiban.
17. Arif Hasan, Consultant.
18. Akbar Zaidi, Economist.
19. Safdar Saeed, Indus Resource Centre (IRC).
20. Waqar Ahmad Patoli, Sindh Graduates Association (SGA).
21. Parween Rahman, Director, Orangi Pilot Project (OPP).
22. Mohammad Younas, Urban Resource Centre (URC).
23. Mohammad Khursheed Khan, Senior Instructor, National Institute of Public Administration (Government of Pakistan).
24. Professor Saeed Ahmad Khan, Chairman, Department of Environmental Engineering, NED University.

Taluka Level

TMA Badin
- Ahmad Khan Abro, TMO.
- Mohammas Aslam Pervaiz Memon, TO-I&S.

TMA Matli
- Manzoor Hussain Leghari, TO-I&S.
- Saleemullah, Sub-Engineer TMA.
- Mohammad Yasin, Accounts Officer TMA.
- Mohammad Wasim, Staff TMA.

TMA Tando Bago
- Naushad Ali Abro, TMO.
- Aseer ul Hasnain Larak, TO-I&S.

TMA Talhar
- Mohammad Aslam Memon, TMO.
- Hussain Khwaja, TO I&S.
- Mohammad Hussain Soomro, Assistant Engineer.

TMA Shaheed Fazil Rahu
- Abdul Rehman Qureshi, TO-I&S.
- Rajab Ali Solangi, Sanitary Inspector, TMA.
- Akbar Khan, Water Supply Supervisor, TMA.
- Mohammad Rafiq Memon, General Secretary “Shehri Itehad”, (Citizen Action Group).

TMA Tando Mohammad Khan
- Mir Ghulam Ullah Khan Talpur, Taluka Nazim.
- Babu Sarfraz Bhati, Taluka Naib Nazim.
- Mohammad Umer Buzdar, TMO.
- Mohammad Rafiq Memon, TO I&S.
- Lal Mohammad Patoli, Staff TMA.

TMA Tando Ghulam Haider
- Iqtidar Ali Khwaja, TMO.

TMA Allah Yar
- Shamsuddin Sheikh, TO-I&S.
- Imdad Hussain Meerjat, Sub-Engineer TMA.
- Imdad Ali Moryo, Sub-Engineer TMA.

TMA Hussain Baksh Marri (newly formed, office being established no records)
- Mohammad Murad, Taluka Office.

TMA Sindhri (newly formed, temporary office in Sultan Mohajir, no records)
- Elected representatives.

TMA Jhado
- Tahir Ali Qaimkhani, TO-F.
- Islamuddin Khan, Sub-Engineer Water Supply TMA.
- Liaqat Ali Qureshi, Accounts Office TMA.

TMA Digri
Mitho Khan Hot Baloch, Sub-Engineer, TMA.
Mohammad Ismail, Technical Staff TMA.
Abdul Sattar Qureshi.

TMA Kot Ghulam Mohammad (formerly Jamesabad)
Munawwar ud din Tunio, TMO.
Johawar Lal, TO-I&S.

TMA Kinri
Mohammad Jan Memon, Taluka Nazim.
Gul Zaman Chandio, Taluka Naib Nazim.
Ahmad Khan Leghari, TMO.
Ghulam Qadir Memon, TO-I&S.
Mohammad Siddiq, Sanitary Inspector TMA.
Mohammad Saleem, Sanitary Inspector TMA.

TMA Samaro
Faqir Mataro Khan Mangrio, TMO.
Mohammad Salim, TO-I&S.

TMA Pithoro
Faqir Haji Mohamamd Mangrio, Taluka Nazim.
Mohammad Aslam Malik, Taluka Naib Nazi.
Faqir Mataro Khan Mangrio, TMO Samaro (addl. charge as TMO Pithoro Pithoro.
Hakamchan Odh, TO-I&S.

TMA New Sukkur
Mohammad Akram Pathan, TMO.
Dost Mohammad Khosa, Slaughter House Staff, TMA.
Khan Mohammad Khosa, Slaughter House Staff, TMA.
Habib Ullah, TMA.

TMA Rohri
Mohamamd Aslam Magsi, TMO.

TMA Saleh Pat
Qalandar Baksh Chachar, Engineering Staff, TMA.
Mohammad Dino, Staff TMA.

TMA Garhi Yasin
Sanaullah Memon, TO I&S (additional charge of TMO).
Asad Ullah, Staff TMA.
Shafqat, Staff TMA.
Wazir Ali, Staff TMA.

TMA Khanpur
Pir Abdus Sattar Sarhadi, TMO.
Nawazish Ali Memon, TO-F
Qadir Baksh, Account Office TMA.

TMA Ratho Dero
Dr. Shafqat Hussain Soomro, Taluka Nazim.
Didar Ali Bhutto, Taluka Naib Nazim.
Sarfaraz Ahmad Barohi, TMO.

Diwan Suresh Kamar, TO-I&S.
Rehmat Ullah Soomro, Office Superintendent TMA.

TMA Dokri
Ali Roshan Gadh, TMO
Abdul Qadri Sheikh, TO-F.

TMA Bakrani
Abdul Qadir Sheikh, TO-F.
Ijaz Ahmad, Senior Clerk TMA.

TMA Shadatkot
Sardar Ali Jarwan, Taluka Nazim.
Shahid Hussain Langah, Taluka Naib Nazim.
Abdullah Saanghi, TO-I&S.
Ali Hasan, Head Clerk TMA.

TMA Kabo Saeed Khan
Mir Ijaz Ahmad Brohi, Taluka Nazim.

TMA Kambar
Zamir Hussain Abro, TMO (also TMO Warah and Miro Khan).
Dilip Kumar, TO-F.

TMA Warah
Zamir Hussain Abro, TMO (also TMO Kamabar and Miro Khan).

TMA Miro Khan
Zamir Hussain Abro, TMO (also TMO Kambar and Warah).

MA Jacobabad
Begum Saeeda Soomro, Zila Nazim.
Mohammad Hussain, TO-I&S.

TMA Lakhi
Altaf Ujar, TMO.

TMA Ghotki
Manzoor Ahmad Sheikh, TMO Ghotki.

TMA Khangarh
Mohammad Hussain Salongi, TMO
Abdul Rauf Kolachi, TO-I&S.

TMA Pani Aqil
Manzoor Ahmad Kalwar, TO-I&S.

TMA Khairpur
Amir Abbas Qazi, TMO.
Kishan Chand, Office Superinendent TMA.

TMA Sobhodero
Syed Muhram Ali Shah, Taluka Nazim.
Sikandar Ali Sahto, TMO.
Imdad Ali, TO-I&S.

Afzal Hussain, TO-F.

TMA Gambat
Riaz Ahamd Khan Rajput, TMO
Ali Muhammad, TO-I&S.

TMA Kingri
Ali Zulfikar Shah, TO-R.

TMA Nara
Mohammd Bakoh Khaskhali, Taluka Naib Nazim.
Abdul Karim Phulpoto, TMO.
Jamil Ahmad, Sub-Engineer TMA.
Moolchand, Sub-Engineer TMA.

TMA Kot Diji
Engr. Ghulam Hyder, TO-I&S (acting TMO).
Ghulam Hussain Shah, TO-F.
Javed Hussain, Sub-Engineer TMA.

TMA Mirwah
Mohammd Hussain Sahto, Staff TMA

TMA Old Sukkur
Naeem Ahmad Siddiqui, Taluka Nazim.
Rizwan Ahmad Siddiqui, Taluka Naib Nazim.
Allah Dino Chaddar, TMO.
Zahoor Ahmad Sheikh, TO-I&S.
Agha Mukhtar Ali, TO (Taxation).
Javed Akhtar Sheikh, Chief Officer Headquarters, TMA.
Mashri Malik, Assistant Executive Engineer, TMA.
Nazir Ahmad Channa, Chief Sanitary Inspector, TMA.
Nazim ud din Deerashani Awan, staff, TMA
Imdad Ali Sheikh, Food Inspector, TMA.
Ali Muhammad, Sub-Engineer, Water Works, TMA.
Zaman Khoso, Incharge, Water Works Phase III, TMA.
Dost Muhammad Khoso, Slaughter House (TMA).
Khan Mohammad Khoso, Slaughter House (TMA).
Dr. Safdar Soomro , Sub-Medical Officer, Civil Hospital.
Agha Syed Muhammad, President, Fruit & Vegetable Market.
Hafiz Ahsan-ul-Haq, President, Fruit & Vegetable Market.
Muhammad Arshad, Furniture Manufacture.
Mushtaq Ahmad, Shopkeeper.
Moeen Shah, Shopkeeper.
Abdul Wahab, Fruit Market at Chowk Clock Tower.

TMA Shikarpur
Zafar Ali Sheikh, Taluka Nazim.
Imdad Hussain Tunio, TMO.
Engr. Sabir Ali Sheikh, TO I&S.
Nazir Ahmad Soomro, Chief Officer Headquarter, TMA.
Pinjal Shah, Deputy TO-F, TMA.
Ghulam Sarwar Abro, Sub-Engineer, TMA.
Omnamon, Chief Sanitary Inspector, TMA.
Mir Muhammad Soomro, staff, TMA.

Dr. Obaid Ullah Mehr, Assistant Medical Superintendent, Civil Hospital.
Ghulam Isaani, Resident.

TMA Larkana

Qurban Ali Abbasi, Taluka Nazim
Allah Dino Jeveno, TMO.
Ehsan Ali Shah, TO-I&S.
Ata Mohammad Channu TO-F.
Ahmad Buksh, Budget Officer, TMA.
Hakim Ali Kolhore, Chief Sanitary Inspector, TMA.
Yusuf Jan, Sanitation Officer, TMA.
Ghulam Ullah Hajeno, Transport Officer TMA.
Karim Buksh Soomro, Resident/Educationist.

TMA. Juhi

Dr. Banda Ali Leghari, Taluka Nazim.
Imdad Ali Shahani, Taluka Naib Nazim
Mohammad Saleh Rahpoto, TMO.
Nasrullah Malik, TO-F.
Nizamuddin Khoro, TO-I&S.
Mohammad Usman, Accounts Clerk, TMA.
Mohammad Baksh, Sanitary Inspector, TMA.
Mohammad Sharif Jamali, Sanitation Contractor.
Abdul Fateh Dabri, School Headmaster/Resident
Abbas Jamali, Field Coordinator 'Village Shadabad'.
Mumtaz, Resident.
Nadeem, Resident.
Karam Ali Baloch Gopong, Resident.
Din Mohammad Baloch, Resident.
Ghulam Farid, Resident.

TMA Umerkot.

Saifullah Khalid Siraj, Taluka Nazim.
Hafeez Mir Mohammad Nohri, Taluka Naib Nazim.
Amir Baksh Junejo, TMO.
Pervaiz Aabid, TO-I&S.
Mohammad Iqbal Pathan, TO-R.
Mohammad Altaf Qaimkhani, TO-F.
Syed Mohammad Haider, Sub-Engineer TMA.
Fateh Mohammad Malingo, Dy. Accountant TMA.
Khudadad, Recovery Clerk, Water Supply, TMA.
Dr. Farzana, Women Councillor, Zila Council Umerkot.
Ms. Rehana Parween, Councillor.
Dr. Ruby Dharmdas.
Panoo, Treasurer, Village Department Association (VDA).
Khan Mohammad, Secretary VDA.
Rasool Baksh Khashkheli, Journalist, Incharge Press Club.
Ilyas Thari, Journalist.
Lajpat, Journalist, Kansh Tebarsion Network.
Jetta Nand Rajput (Shera Bhai).
Haji Soomro Khan, Landlord/Resident Umerkot.
Vashan Das, Resident Megwair.
Pehaliwan, Resident Megwair.
Mohammad Ali Arya, TMA Official, at Chor, Taluka Umerkot.
Gulab Shah, Resident Barari, Near Chor.

Ghamae, Resident, Barari, Near Chor.
Madan Lal, Ammunition Maker, New Chor.
Sain Dad, Inchrge Water Supply Scheme, Dhoronaro, Taluka Umerkot.
Mohammad Hashmi Mehr, Sanitary Inspector Dhoronaro, Taluka Umerkot.
Ratan, Sanitary Worker, Dhoronaro, Taluka Umerkot.
Sajjo, Sanitary Worker, Dhoronaro, Taluka Umerkot.
Muhammad Sultan, Shopkeeper/Resident, Dhoronaro, Taluka Umerkot.
Ramash Kumar, Resident Dhoronaro, Taluka Umerkot.

TMA Mirpurkhas

Ghulam Dastgir Khan Kamali, Taluka Nazim.
Shafiq Ahmad Khan, Taluka Naib Nazim.
Mumtaz Ali Magsi, TMO.

Ramchandar, Executive Engineer, Sindh Local Government Department.
Sohail Anwar Bhutto, TO-I&S.
Ziauddin Ahmad Sheikh, staff, TMA.
Naimat Ali Mangrio, Administrative Officer, TMA.
Abdul Kaleem, Sub-Engineer, TMA.
Naimat Ali, Sub-Engineer, TMA.
Manzoor Ali Khan, Administrative Officer, I&S, TMA.
Mohammad Hanif, TMA Staff.
Muzammil Hussain, Dy. District Officer HRM/GA, District Government Mirpurkhas.
Engr. Ehsan ul Haq Arian, Nazim Union Council 17, Mirpurkhas.
Mujib ul Ahsan, Resident.
Waseem Ahmad, Resident/Former General Secretary Trader Association.
Nizamuddin, Resident/Teacher
Sharafuddin, Resident.
Mohammad Akhtar, Resident/Stores Officer Sugar Mills.
Ghulam Mohammad, Resident/Education Board Official.
Haresh Chandar, Resident.
Ms. Zahida Detho, SRPO.
Irfan Haroon, director SRPO.
Kamlesh, Pharmacist/Shopkeeper.
Abdul Nasir Khan, Journalist, Bureau Chief, 'Khabrain'.
Mohammad Rahim, Resident/Employee Sugar Mills.
Pareta Kohli, Sanitary Worker.
Chettan Kohli, Sanitary Worker.

List 3

PARTICIPANTS
FOR CONSENSUS BUILDING WORKSHOP ON
WSS POLICY FOR SINDH

Provincial Government (Policy Makers)

1. Chief Secretary, Government of Sindh.
2. Additional Chief Secretary, Local Government.
3. Additional Chief Secretary, Planning and Development (P&D).
4. Secretary, Local Government.
5. Secretary, Finance.
6. Focal Person TA-4432, Local Government Department.
7. Chief, Physical Planning and Housing Section, P & D.
8. irector General, Sindh Kachi Abadies Authority.
9. Director General, Sindh Environmental Protection Agency.

Provincial Government Programs

1. Program Director, Sindh Devolved Social Services Program.
2. Program Director, Decentralisation Support Program, Sindh.
3. Dr. Chand Bibi, Sindh Basic Urban Services Project.

Representatives of Civil Society and Sector NGOs

1. Mr. Tasneem Ahmad Siddiqui, Saiban, Karachi.
2. Ms. Parween Rehman, Director OPP, Karachi.
3. Ms. Zahida Detho, SRPO, Mirpurkhas.
4. Ms. Sadiqa Salahuddin, Indus Resource Centre, Dadu/Karachi.
5. Women's Representative, Sindh Graduates Association.

Representatives of Taluka Municipal Administrations (Service Providers)

Taluka Nazim

1. Mr. Sardar Ali Jarwar, Taluka Nazim, Shahdad Kot
2. Mr. Ghulam Dastgir Khan Kamali, Taluka Nazim, Mirpur Khas
3. Mr. Saif Khalid Siraj Soomro, Taluka Nzim, Umerkot
4. Mr. Syed Muhram Ali Shah, Taluka Nazim, Sobhodero

TMO

5. Mr. Zamir Hussain, TMO, Qambar
6. Mr. Ali Roshan Gadh, TMO, Dokri
7. Mr. Faqir Mataro Mangrio, TMO, Samaro
8. Mr. Manzoor Ahmad Shaikh, TMO, Ghotki
9. Mr. Allah Dini Chachar, TMO, Sukkur

TO(I&S)

10. Mr. Sohail Anwar Bhutto, TO(I&S), Mirpur Khas
11. Mr. Sabir Ali Sheikh, TO(I&S), Shikarpur
12. Mr. Ihsan Ali Shah, TO(I&S), Larkana

Chief Officer

13. Mr. Javed Akhtar, Chief Officer, Sukkur

Private Sector/ Contractor

14. Mr. Muhammad Sharif Jamali, Contractor SWM, Johi

Annexure - 8

GENDER SURVEY

GENDER SURVEY

1. Women are primarily responsible for WSS and SWM aspects within the household and in order to identify key issues and formulate appropriate policy responses regarding these services it is essential to solicit women's views and opinions. A survey on women's perspective was therefore designed and conducted in the six case study TMAs.

A. Survey Design and Methodology

2. The survey was conducted in six localities in each of the case study TMAs (See Table A8-1 for sample distribution). Key informant interviews were conducted with 97 women while group discussions, with an average of 5 women from different households, were conducted in each chosen locality.

Table A8-1: Sample distribution

	Locality	
District	**Urban**	**Rural**
Johi	Rind Mohalla	Allah Bachaio Panhwar
	Gharibabad	Pir Mashaik
		Haji Khan Leghari
Total No. of localities	2	3
Larkana	Sachal Colony	Beero Chandio
	Abbasi Colony	Roheel Khan Bugti
		Shahabad
		Pir Bux Jatoi
Total No. of localities	2	4
Mirpurkhas	Walkert	Kak Banglow
	Hirabad	Jhalori
	Gharibabad	
	Balouch Para	
Total No. of locaities	4	2
Shikarpur	Nehar Wali Abadi	Karan Sharif
	Khan Chand abad	Mari
		Jano
		Sultan Kot
Total No. of localities	2	4
Sukkur	Rigent Colony	
	Nimash Gah	
	Adam Shah colony	
	Pathan Mohallah	
	Nusrat colony No: 3-4	
	Military Quarter	
	Miani Drainage	
Total No. of localities	7	
Umerkot	Manghwar Mohalla	Mohammad Essa Mangrio
	Dhobi Mohalla	Ghamoori
		Chore
		New Chore
Total No. of localities	2	4

3. The survey was composed of three components: (i) locality profiles, (ii) key informant interviews, and (iii) focus group discussions.

B. Results

4. The following results have been derived from the key informant interviews and focus group discussions:

C. *Present state of services*

Water

5. *Umerkot:* Most discussants reported using different sources for drinking water and water for other household purposes. Surveyed localities such as Ghamoori, Manghwar Mohalla and Dhobi Para did not have access to government water supply schemes and are entirely dependent on groundwater sources (hand pumps, tube wells and wells), ponds and/or water purchased from areas with access to piped water, and from vendors selling water in tankers. Residents of localities with access to government schemes also obtain water from vendors and groundwater sources.

6. *Johi:* Piped water is available, in a limited number of homes, in the locality of Rind Mohalla. However, this is only used for drinking purposes while pond and well water was used for other household purposes. In most other areas, drinking water is either obtained from hand pumps or purchased from areas with access to piped water. Water for other household purposes is taken from streams, wells or ponds.

7. *Shikarpur:* Only two surveyed areas have access to water supply schemes- Sultan Kot and Khan Chand Abad. In all areas, water is obtained from multiple sources including hand pumps, tube wells, and piped water sources either outside the homes or in areas at a distance from the surveyed locality.

8. *Mirpurkhas:* Most discussants, except those from Jhalori, identified piped water as a source of drinking water. They added that water for drinking and other household purposes is also taken from groundwater sources, and ponds and piped water supplies in other localities/areas.

9. *Larkana:* Discussants reported that very few households have access to water supply schemes while Sachal Colony and Abbasi Colony have no access at all. In most instances residents are entirely dependent on groundwater for all their water needs.

10. *Sukkur:* Respondents said that while most areas have access to water supply schemes, water requirements are met by obtaining water from other sources such as groundwater, ponds and other localities/areas with access to piped water or sweet groundwater.

Sanitation

11. *Umerkot*: Discussants reported that very few households have access to proper toilet facilities and in most localities people either use pits or open spaces/fields. All surveyed areas are serviced by open drains.

12. *Johi*: Most households do not have toilet facilities and instead either use pit latrines or fields/open spaces.

13. *Shikarpur*: Respondents said that majority households do not have proper toilet facilities and either use pit latrines or open spaces/fields. All the survey areas have open drains and sewers which are either cleaned by

residents themselves or not cleaned at all. In only one area, Khan Chand Abad, drains are cleaned by municipality cleaners.

14. *Mirpurkhas:* There open drains and uncovered gutters in all the survey localities. Discussants from Hirabad and Gharibabad reported having access to flush latrines connected to open drains.

15. *Larkana:* Most respondents said that they do not have access to proper toilet facilities and instead use pit latrines, dry pits (outside the home) or open space/fields. There are open drains in all the localities.

16. *Sukkur:* There are open drains in all the survey areas except Miani Drainage.

Solid Waste Services

17. *Umerkot:* In all localities, except Manghwar Mohalla, household garbage is thrown in the streets. In Manghwar Mohalla, garbage is taken to an allocated site from where it is collected by the municipality either once in two weeks or once a month. While household garbage is also kept outside homes in the locality of Dhobi Mohalla, it is removed daily by municipality cleaners. In other survey areas, garbage is never removed by the municipality and on occasion, burnt by residents.

18. *Johi:* In all the survey areas household garbage is thrown either in open fields or in the streets. It is never removed by the municipality or disposed off by the residents themselves.

19. *Shikarpur*: In all survey localities household garbage is thrown in the streets. In one locality, Khan Chand Abad, it is collected by the municipality while in other areas it either accumulates or is occasionally burnt by the residents.

20. *Mirpurkhas:* In most survey localities household garbage is thrown in the streets and not removed by the municipality or residents. In the areas of Gharibabada and Hirabad, however, it is collected by the municipality workers.

21. *Larkana:* In all the surveyed areas garbage is either thrown in the streets or in empty plots/open spaces. It is either never removed by the municipality or occasionally burnt by residents.

22. *Sukkur:* Garbage is placed outside homes or thrown in open plots and in most instances collected by municipality workers.

D. *Degree of satisfaction with services:*

Water

23. *Umerkot:* Almost all the discussants (except those from Jhalori) said that the quality of water services is unsatisfactory. Water from government schemes is invariably contaminated and unfit for drinking. In most areas, water is available only once or twice a week and the quantity provided is insufficient. Those dependent on groundwater were also dissatisfied as in most instances the water is salty and contaminated. Buying water is also problematic due to high transportation costs.

24. *Johi:* All the discussants were dissatisfied with the quality of water services. They stated that the available water is either contaminated and therefore a cause of waterborne diseases, or the source is too far away. Furthermore, the quantity available is insufficient.

25. *Shikarpur:* Most discussants, except those from Khan Chand Abad and Karan Sharif, were dissatisfied with the water services. They said that drinking water, especially from water supply schemes, is contaminated and causes waterborne diseases such as gastroenteritis, typhoid, and diarrhoea. Also, in most instances women have to fetch water from far off locations, thus adding to their burden of work. Finally, obtaining underground water is difficult as several residents cannot afford motorized pumps.

26. *Mirpurkhas*: Most discussants, except those from Hirabad and Gharibabad, were dissatisfied with government water supply services largely because the water supplied is contaminated and leads to a high incidence of waterborne diseases. For most residents, the resultant medical costs place a further burden on the already unaffordable cost of living. Those dependent on underground water were also dissatisfied as the water is salty and not fit for drinking. Women also reported having to walk long distances, in extreme heat, to fetch water for drinking and other household needs.

27. *Larkana:* Most users of government water supply schemes were dissatisfied largely due to water contamination. The users of groundwater were also dissatisfied as the water obtained is salty and unsuitable for drinking. Also, pumping water is difficult as residents cannot afford motorised pumps. Only the residents of Sachal Colony and Abbasi Colony were satisfied because in their locality they are able to access sufficient quantity of sweet groundwater.

28. *Sukkur:* Users of government water supply schemes were dissatisfied because the water is contaminated (leading to high incidence of waterborne diseases) and the quantity provided is insufficient. Users of groundwater also face problems because while the water is sweet and fit for drinking, frequent power cuts make pumping water very difficult and expensive.

Sanitation

29. *Umer Kot*: Most women, except those from Manghwar Mohalla, were dissatisfied with sanitation services. They reported that in most areas gutters are uncovered and several residents, especially children, often fall in these and get seriously injured. Also, as drains drains are rarely cleaned, they are often blocked and overflow. Discussants added that lack of proper sanitation creates unhygienic conditions and facilitates the spread of malaria and infectious diseases.

30. *Johi:* Discussants reported that most areas have no formal sanitation system. In most survey areas people do not have access to proper toilets and instead use open pits which are never cleaned. This creates unhygienic conditions in the neighbourhood and leads to the spread of infectious diseases.

31. *Shikarpur*: Most respondents, except those from Khan Chand Abad, do not have access to proper toilet or sanitation facilities. They said that most places have open sewers and drains which are never cleaned and consequently get blocked and overflow. They added that municipal workers only work after they have been bribed.

32. *Mirpurkhas:* In most survey areas, except Hirabad and Gharibabad, people do not have access to proper toilet and sanitation facilities. Drains remain blocked (and consequently overflow) as they are rarely cleaned by municipal workers. In Gharibabad and Hirabad however, drains and sewers are regularly cleaned by the municipality.

33. *Larkana:* Discussants reported that most households do not have access to proper toilet and sanitation facilities and often use pits which are rarely cleaned. Drains are also never cleaned. Consequently, there is a high incidence of infectious diseases and malaria in the area.

34. *Sukkur:* The women said that most households do not have access to proper toilet and sanitation facilities. Drains are rarely cleaned and as a result get blocked and overflow regularly. Consequently, there is a high incidence of infectious diseases and malaria in the area. Some women reported that municipal workers only provide cleaning services when they are bribed.

Solid Waste Services

35. *Umerkot:* Most discussants, except those from Manghwar Mohalla and Dhobi Mohalla, expressed their dissatisfaction as they do not have access to solid waste disposal services. In Manghwar Mohalla and Dhobi Mohalla however, streets are cleaned regularly and garbage is both removed from streets as well as from allocated dumping sites.

36. *Johi:* All the discussants complained that they have no access to solid waste disposal services.

37. *Shikarpur:* All residents, except those from Khan Chand Abad, complained that they do not have access to solid waste disposal services. Residents of Khan Chand Abad however, were satisfied as in their area garbage is regularly removed by the municipality.

38. *Mirpurkhas:* Most residents, except those from Hirabad and Gharibabad, were dissatisfied as they do not have access to solid waste disposal services. Thus, garbage is never removed from their localities, creating unhygienic conditions. In Hirabad and Gharibabad however, garbage is regularly removed by municipality workers.

39. *Larkana:* Discussants were dissatisfied due to lack of solid waste disposal services. Garbage is never removed and accumulates in streets and open spaces, leading to air pollution and unhygienic conditions.

40. *Sukkur:* Discussants from Regent and Adam Shah Colonies and Namaish Ghah complained that they do not have access to solid waste disposal services. They added that in certain instances, municipality workers have to be bribed to perform their duty of removing garbage. In contrast, municipality workers regularly remove garbage from Military Quarter, Pathan and Nusrat Colonies, and Maini Drainage.

E. *Willingness to pay for improved services*

41. *Umerkot:* Most respondents in urban areas were willing to pay Rs.150-160 for improved water services. Majority of urban respondents however, were unwilling to pay for improved sanitation and solid waste management services (a minority were willing to pay between Rs. 5- 20). Most rural respondents were willing to pay Rs. 100-350, Rs. 60, and Rs. 80 for improved water, sanitation and solid waste management services respectively.

42. *Johi:* 50% of urban respondents were willing to pay Rs. 80-100 for improved water services while a minority were willing to pay Rs. 100 and Rs. 130 respectively, for improved sanitation and solid waste management services. Most rural respondents were willing to pay Rs. 40-125 for improved water services.

43. *Shikarpur:* Most urban respondents were not willing to pay for improved services. A minority were willing to pay Rs. 10-30, Rs. 105 and Rs. 120 for improved water, sanitation and solid waste management services respectively. Most rural respondents were also not willing to pay for improved services. A minority were willing to pay Rs. 20-40, Rs. 195 and Rs. 105 respectively for improved water, sanitation and solid waste management services.

44. *Mirpurkhas:* Most urban respondents were willing to pay Rs. 240-260, Rs. 120 and Rs. 120 for improved water, sanitation and solid waste management services. Most rural respondents however, were not willing to pay for improved services. A small minority were willing to pay Rs. 15, Rs. 25 and Rs. 25 for improved water, sanitation and solid waste management services.

45. *Larkana:* Most urban respondents were willing to pay Rs. 45, Rs. 100 and Rs. 120 for improved water, sanitation and solid waste management services. Most rural respondents were not willing to pay for improved water and sanitation services. However, they were willing to pay Rs. 160 for improved solid waste management services.

46. *Sukkur:* Most respondents were willing to pay Rs. 100 and Rs. 66 for improved sanitation and solid waste management services while a small minority were willing to pay Rs. 60-130 for improved water services.

F. *Conclusion*

47. The above results show that:

i. Most areas surveyed do not have adequate access to WSS and SWM services.

ii. An absence of satisfactory drinking water, sanitation and solid waste management services creates immense difficulties for women as it increases their already heavy work load.

iii. Lack of adequate government water supply schemes invariably means that women have to perform the task of fetching water from external sources. The task becomes even more arduous when they have to walk long distances in extreme heat.

iv. Children, especially girls, are also responsible for fetching water. This has an adverse effect on their education as girls often drop-out of school due to increased household chores.

v. Poor quality water makes ordinary household tasks such as cleaning and washing difficult and more time consuming.

vi. Absence or poor quality of WSS and SWM services is further problematic as it leads to a high incidence of disease (due to unhygienic conditions) which in turn requires that women provide nursing care for sick family members.

vii. Lack of or poor quality government WSS and SWM services also creates financial problems as households incur extra costs including those of purchasing water (to meet household needs), and medicines (required due to high incidence of waterborne and infectious diseases).

viii. Most respondents in urban areas are willing to pay for improved services while rural respondents are reluctant to do so.

Annexure - 9

FINANCE & TARIFF

FINANCE AND TARIFFS IN SELECTED TMAs

1 Institutional and Financial Set-up of the TMAs

1. **Budget, Accounts and Audit:** Rules are in place for proper budgeting, accounting and audit of TMA accounts. The TMA budget is to be prepared in accordance with the Sindh Taluka/ Town Municipal Administration (Budget) Rules, 2002. The accounts of a TMA are to be kept in such form and in accordance with such principles and methods as the PGS may prescribe. An internal audit office is required to function directly under the Nazim[1]. The external audit of a TMA is to be conducted by the Local Fund Audit department.

2. **Allocation of Resources to the TMAs:** The setting up of the PFC and formula based transfers to the local governments has provided the enabling framework for (a) equitable distribution of resources; (b) controlling the bureaucratic and political imperatives being employed for resource allocation; and (c) rationalization of decision making. Provincial governments can now base systems for inter-governmental transfers and grants on a formula in order to (a) facilitate planning at the local council level; (b) provide incentives for improved performance; and (c) most importantly develop basis and criteria for equitable distribution of resources in the province. The PFC announces an annual award which shows the basis of allocation and the share of each TMA.

3. **Additional GST:** Before 1998 Octroi (import tax on goods entering a municipality) was the main source of municipal revenues. Octroi was abolished being a regressive tax and restricting free flow of trade. To compensate this loss of revenue, the Federal Government added 2½% to the General Sales Tax (GST) and compensated the municipalities through the OZT[2] Grants made out of this additional 2½%. GST (like Octroi) is a buoyant tax and the revenues from this source show a marked increase each year.

4. **PFC Award:** The PFC distributed this 2½% Additional GST (Rs.10 billion in FY05) to the District Governments, TMAs and UAs as follows: (i) First the historical share (in Octroi, Zila Tax) of each local government was allocated; (ii) a share of Rs.0.6 million per annum was allocated to each UA; (iii) Rs.1.2 million per annum were allocated to each of the 12 new TMAs; (iv) Rs.140 million were allocated for clearing the pension liabilities of Sind Local Government employees; and (v) The remaining amount was distributed among the 102 TMAs on the basis of population, revenue collection and backwardness on the formula of Population (50%), Human Development Index (40%) and Tax Collection (10%). The share allocated by the PFC Award is transferred to the Local Fund of each TMA (A/c IV) through 'One Line Transfers' and can be appropriated according to priorities set by the elected local councils. The share of the six Case Study TMAs on the basis of PFC Award for FY05 is shown in the next Table A9-1.

[1] Section 18(n): Functions of Zila Nazim include "to establish and supervise the working of the Internal Audit Office".
[2] OZT (Octroi / Zila Tax). Octroi was collected by the Municipalities, while the Zila Tax was collected by the District Councils (on export of goods from a district).

Table A9-1: Share of Case Study TMAs in the 2½% Additional GST allocated by the PFC Award

TMA	Distribution on the basis of Multiple Indicators				Historic Share on the basis of Collection	Grand Total (Million Rs.)
	Collection (20%)	Population (50%)	HDI (30%)	Total		
Mirpurkhas	4.711	13.673	4.786	23.170	41.479	64.649
Umerkot	3.039	9.970	8.945	21.954	26.761	48.714
Johi	0.114	6.647	7.235	13.996	1.004	15.000
Sukkur	8.054	11.964	3.133	23.152	70.915	94.067
Larkana	2.887	14.148	4.843	21.878	25.423	47.300
Shikarpur	1.292	7.976	5.241	14.509	11.373	25.882

Source: PFC Award framed in June 2004 for FY05.

5. In addition to the allocations from Provincial Consolidated Fund and 2½% Additional GST, the PFC also decided the allocation of Rs.1.89 billion for FY05 from ADB's Sindh Devolved Social Services Program (S-DSSP) to the district governments. This amount was to be distributed between different district governments and TMAs on the basis of a formula suggested by the Provincial Steering Committee of the S-DSSP based on population (50%), backwardness (30%) and equal share (20%). Another Rs.613 million have been allocated to all the TMAs in Sindh "on account of transfer of functions and to the extent of the transfer of establishment of PHED".

6. **TMA Revenues:** Generally a large percentage of TMA revenues are from its share allocated by the annual Provincial Finance Commission (PFC) Award. However, TMAs (earlier the defunct urban local councils - MC/TC) have substantial own source revenues (OSR) also; e.g. in FY04, about 40% of revenues of TMA Mirpurkhas were from its OSR; in FY04, about 30% of the actual revenues of TMA Digri are from OSR. The major OSR of the TMAs are Taxes (Urban Immovable Property Tax, Tax on Transfer of Immovable Property, User Charges (Water Rates, Water Connection Fee, Cess pool/ sewerage fee), Fees (licence fees, cinema fee, advertisements, cattle pound, slaughter house, etc), and, Rent of municipal properties. A TMA is empowered to levy taxes, fees, rates, rents, tolls, charges, surcharges and levies, however, no such tax could be levied without previous publication of the tax proposal and without inviting and hearing public objections.

7. **WSS Projects:** Though PHED has been devolved yet major projects in WSS/ SWM are included in the provincial PSDP:

   i) In PSDP 2005-06, there are eight on-going 'Special Projects' with approved cost of Rs.1,764 million, expenditure till June 2005 was Rs.413 million, while Rs.441 million were allocated for 2005-06 (including Rs.141 million for schemes against Governor's initiative); and

   ii) The district-wise PSDP 2005-06 of the provincial government includes a number of schemes of WSS and SWM. The total cost of these schemes is Rs.5,909 million, against which Rs.1,321 have been spent till 30th June 2005; and Rs.732 have been allocated for

2005-06. In addition, there is a district-wise block allocation for new schemes (total allocation of Rs.1,512 million).

iii) ADB financed Sindh Devolved Social Services Project (DSSP) is using the system of Conditional Grants for projects of the WSS and SWM.

8. **Conditional Grants:** A very important mechanism is envisaged in the SLGO for conditional grants[3] to the local governments for specific purposes such as "policy support grants" so that the local governments use these grants for implementing the overall policy objectives (such as PRSP, MDGs) of the PGS. Conditional grants linked to the performance of the local governments can be used to (a) implement provincial priorities and sectoral targets and ensure that the local governments pursue national and provincial priorities; (b) create incentives to improve pro-poor service delivery with: better targeting, efficiency, transparency, sustainability; and, reward financial management and fiscal performance; and to (c) address across the board capacity building needs of the local governments In Sindh, new projects, like the Sindh Devolved Social Services Project (DSSP) financed by ADB, are using this mechanism for financing specific projects of education, health and WSS.

2 Institutional and Financial Issues

9. **PFC Award:** PFC Award is not being framed for three years at a time and annual PFC Awards are being announced. The Award for FY06 (for July 2005 to June 2006) is being finalized. Presently, the existing PFC Award for FY05 has been modified (e.g. TMAs are getting 20% more compared to their historical share) so that TMAs can meet the increased budgetary requirements due to salary increments.

10. **Transfers from provincial government to the TMAs:** The share allocated by the PFC Award is transferred in monthly instalments to the local fund (A/c IV) of the TMAs. This is a "one-line transfer" and can be appropriated according to priorities set by the taluka councils – obviously salary is the first priority on the TMA funds as well as a major constraint for budgeting according to the preferences of the TMAs.

11. **Deficiencies in TMA Budgets and Finances**: The SLGO and the Budget Rules framed there under provide a number of formats and requirements, which if seriously adhered to, can greatly improve the financial management of the TMAs. Presently there are a number of deficiencies in the budgets being produced by the TMAs, such as:

a) Incremental Budgets: Presently the budget estimates are incremental, based on the previous year's budget estimates and not on the revised estimates/ supplementary budgets which are more realistic.

b) Justification for Budgeted Receipts and Expenditure: Except Larkana, none of the Case Study TMAs has given any justification/ explanation of the budgeted estimates for receipts (BDR-5). None of the Case Study TMAs has added BDC-8 where justification and basis of budgeted expenditure was to be provided.

c) Salaries consume the major part of TMA budgets: Salary is the first charge on TMA's funds and accounts for the major part of a TMA's

[3] The introduction of special grants to local governments from the Provincial Retained is provided under SLGO 2001 [(Section 111 (5)].

expenditure. In FY04, for example, salary cost was 61% to 89% of the revised budgets of the Case Study TMAs.

d) Estimating salary expenditure: Budgeting for salary expenditure is based on the sanctioned posts and not on filled posts which usually results in savings (due to vacancies) at the year end. This saved amount is then re-appropriated to meet other non-salary expenditure. It appears that the TMAs are not budgeting on some standard norms e.g. in the Case Study TMAs the number of budgeted sanitation staff ranges from 0.97 to 2.3 per 1,000 inhabitants.

e) Vacancies of front-end service providers: The vacancies of front-end service providers, affects efficient service delivery. The following vacant positions of sanitary workers (compared to the budgeted positions) were observed in the Case Study TMAs: Larkana 17%, Umerkot 20%, Shikarpur 32%, Sukkur 40% and Johi 52% of the budgeted posts for sanitary workers are vacant[4].

f) Non-Salary Expenditure Norms: Budgetary allocations for non-salary current expenditure lack allocation norms or yardsticks (such as unit cost of service or non-salary expenditure as a percentage of salary expenditure).and are not based on service delivery standards [5].

g) Linkage of Budgets with Performance: Though required under the Rules[6], presently there is no linkage of budgetary provisions with outputs, outcomes or performance in terms of (i) economic or social objectives; (ii) efforts for poverty reduction in line with the PRSP; (iii) following the medium term development framework (MTDF) of the Government of Pakistan; (iv) moving towards achieving the MDGs, or (v) vision of the Taluka Nazim and directions for overall planning by the zila mushawirat committees.

h) Service Delivery Performance and Facility Status: The Budget Rules provide a number of formats which can help in performance budgeting such as Policies and proposed activities of the TMA (BSF-1), Service Delivery Performance Targets (BSF-2) and service delivery facility status (BSF-3). These have not been included in the budget documents by any of the Case Study TMAs.

i) Working with the Communities: The SLGO stresses the importance of working with the communities and provides for bottom-up planning, however, the requirement of the law to keep 25% of the development budget for development through citizens community boards (CCBs) has generally not being observed by the Case Study TMAs (except Larkana which has kept Rs.2 million for CCBs).

j) Scheduling receipts and recovery of arrears: It has been expected that the TMA receipts from all sources will be collected in equal monthly instalments and in BDR-4 equal amounts have been entered in all the

[4] BDC-3 attached to the TMA budgets

[5] In FY06, for O&M expenditure for water supply, three TMAs have provided less than Rs.0.5 million while Sukkur has provided Rs.5.2 million. For electricity, the budget at Umerkot is Rs.2 million while at Sukkur (with more than five times the pumping requirement) the provision is of only Rs.1 million.

[6] In order to improve efficiency and effectiveness of service delivery, the local government shall provide performance targets along with the financial figures in the budget. The performance targets may be provided for inputs, outputs or outcomes. The performance targets are required to be clear, precise and unambiguous, relevant, and, verifiable. Forms BDO-8 and BDO-9 have been prescribed for preparing service delivery performance targets at the time of budget formulation, and, their status during the year. (Rule 99 of Budget Rules, 2003).

months. The similar form for recovery of arrears (BDR-4) also shows recovery of arrears in equal monthly instalments.

k) Public Accounts of the TMAs: In the Case study TMAs, public accounts are generally not being shown separately[7]. TMA Larkana has provided separate details of each public account to be handled by the TMA in budget FY06 and the total disbursements during the year are over Rs.97 million which is even more than its regular annual budget.

l) Charged Expenditure: Charged expenditures[8] are not being shown separately in the TMA budgets. TMA Mirpur Khas has detailed charged expenditure of Rs.9.9 million while except for a small proportion almost the entire amount should not have been included in charged expenditures.

m) Liabilities and Receivables: The Budget Rules provide Format BDO-5 for outstanding liabilities and loans which have not been attached to the budget documents three of the six Case Study TMAs[9].

12. **Costs and Cost Recovery:** There is no concept of (i) calculating cost of service provision, (ii) calculating unit costs, (iii) moving towards cost recovery, (iv) procedure for calculating user charges/tariff, (v) revising user charges/ tariff that were fixed years ago, and (vi) surveys for checking and regularizing the unauthorized connections. In many TMAs, the budgeted and actual revenue and expenditure on service delivery (e.g. water supply) are not arranged in a way that may facilitate costing[10].

13. **User Charges, Tariff and Recovery:** Presently in most of the TMAs (former urban local councils – or cities/towns) the quality of services provided is low, and, the user charges fixed years ago are low and are inadequate to meet even the salary expenses on service provision. These prices lack any clear rationale. Recovery of user charges compared to billing is poor. For water supply, in most of the Case Study TMAs, billing does not cover even 50% of the total costs and except for one TMA billing does not cover even the wages cost. There are almost no charges for sewerage and SWM.

14. **R&M of Municipal Properties:** Presently there is inadequate provision for R&M of municipal properties to keep them operational. Many of the defunct MCs/TCs owned valuable municipal properties which have been inherited by the TMAs as successors. Verifying the properties owned on

[7] Under Rule 10 of the Budget Rules 2003, every local government has to maintain a Public Account. Under Rule 51(1)(v) the annual budget statement should include the detail of Receipts and Disbursements from the Public Account of the local government .

[8] Under Section 110 (b) of the SLGO, Charged expenditure include expenditure of the taluka council, judgement, degree or award against the TMA, and, interest payments.

[9] Shikarpur has attached BDO-4 and intends to pay Rs.1 million to WAPDA against the liability of Rs.3.2 million. Larkana has shown that electricity bills are payable to WAPPDA but has not shown the amount of liability. Larkana also shows about 20 million payable for pension and commutation liabilities

[10] E.g. in the demand for grants Current Expenditure (BDC-6), in many TMAs separate figures (i) have not been provided for CO Units and rural areas which may help in costing and cost control; and (ii) figures relating to two of the three services (water, sewerage/drainage and SWM) have been combined making it difficult to work out the cost of service provision; (iii) Larkana has budgeted Rs.25.2 million for electricity (without a breakup into water supply, drainage or street lights). It is another thing that last year the revised budget was nil – they did not pay electricity bills for any of the three services!!!; (iv) TMA Sukkur has shown 30% increase in salary during FY06 (amounting to Rs.38 million) as a separate line item (i.e. it has not been included under separate offices and services.

14th August 2001 and their appropriate record, control and safe custody, as required under the law[11] is required.

15. **Strategic Plan for WSS and SWM:** None of the Case Study TMAs has a strategic plan, spatial plan or even network maps for municipal functions (water supply, sewerage/ drainage and solid waste management) for which they are responsible[12]. Under the ADB's S-DSSP an Annual Sector Plan has to be prepared by the TMAs intending to obtain funds under the conditional grants mechanism.

16. **Inventory and Database of Municipal Services:** The TMAs are responsible for various municipal functions (such as water supply schemes). The Case Study TMAs do not have a record/ inventory/ database[13] of the WSS schemes (in the taluka) that are being executed/ implemented under different programs, discretionary grants, elected representatives, provincial and district development budgets, etc. due to which there are chances of duplication in small schemes and not a very clear responsibility for bearing the operating costs. Presently, the TMA is not tracking the rural WSS schemes (being operated by the VDAs) that may be non-functional due to various reasons.

17. Under the ADB's S-DSSP a beginning has been made as detailed quantitative and operational data for different WSS schemes (rural WSS operated by the VDAs, schemes transferred from PHED, IDA assisted as well as built under PSDP, schemes approved by the district government, etc) has to be submitted with the Annual Sector Plan of the TMAs intending to obtain conditional grants. In this connection Umerkot has provided useful details with their Annual Sector Plan which will be a very useful first step in preparing the database. The Budget Rules provide formats for Service Delivery Performance Targets (BSF-2) and service delivery facility status (BSF-3). These would be very valuable for managing the municipal services efficiently, however, these have not been included in the budget documents by any of the Case Study TMAs.

3 WSS and SWM Tariffs in the Case Study TMAs – existing situation:

18. Currently, there is no concept/ practice of (i) calculating cost of service provision, (ii) calculating unit costs, (iii) moving towards cost recovery, (iv) procedure for calculating user charges/tariff, (v) revising user charges/ tariff that were fixed years ago, and (vi) surveys for checking and regularizing the unauthorized connections.

19. Due to unreliability, inefficiency, and, inadequate quantity and quality from public sector WSS, there is an inadequate Willingness to Pay (WTP) of consumers to meet the running costs. Internationally, WTP surveys show that the consumers are willing to pay more in case of reliable and efficient supply of adequate quality and quantity, with the tariff fixed according to

[11] Under Section 123 of the SLGO 2001, it is the responsibility of the district/ taluka Nazim to take physical stock of movable and immovable properties of the concerned local government: on assumption of office and thereafter, once in each year, and submit a report to the concerned council.

[12] Under Section 54(h) (i) to (iv) of SLGO, the functions of the TMA include: to provide, manage, operate, maintain and improve the municipal infrastructure and services, including: (i) water supply and control and development of water sources, other than systems maintained by the Union and Village Councils; (ii) sewerage, sewage and sewage treatment and disposal; (iii) storm water drainage; and (iv) sanitation and solid waste collection and sanitary disposal of solid, liquid, industrial and hospital wastes. Under Section 54(a) of the SLGO TMA's functions include "to prepare spatial plans for the taluka in collaboration with Union Councils, including plans for land use, zoning and functions for which the TMAs is responsible"

[13] Under Section 54(k), a TMA is required to maintain a comprehensive database and information system.

the principles of good governance, financial sustainability, distributive justice, economic efficiency and fair pricing.

20. Presently, the only criteria for fixing user charges is that there should be political acceptance, with the result that these have not been increased since the last many years. The important principles for fixing tariffs are currently not being considered while fixing the user charges:

    i) There is no concept of setting goals of the tariff or using tariff as a tool of public policy;

    ii) For Good Governance, the tariff needs to be simple, transparent and predictable – currently it is much too simple actually a flat rate for all residential consumers – with the richer sections (using more water) benefiting due to low rates that were set keeping in view the poor sections of the society;

    iii) For Financial Sustainability, the cost of operations and maintenance need to be covered, but presently the cost of service provision (that may be used as the starting point for discussion with the stakeholders) are not calculated;

    iv) For Distributive Justice it is necessary that basic needs are subsidized, the subsidies are transparent and accurately targeted to the poor – currently there is a fixed rate and so obviously compared to the poor, the rich also benefit from the subsidy;

    v) For Economic Efficiency the user charge should be equal to the marginal cost of producing the public service – without knowing the unit cost of service provision obviously the rate cannot be fixed for economic efficiency;

    vi) According to ADB's Economic Guidelines tariff should ensure that those who use more pay more and, in general, that those who are better off pay more – due to the flat rate currently this important principle is not taken into consideration.

Table A9-2: Budgeted Expenditures of Case Study TMAs for FY06

	Mirpurkhas		Sukkur		Johi		Umerkot		Shikarpur		Larkana	
	Rupees	%	Rupees	%	Rupees	%	Rupees	%	Rupees	%	Rupees	%
Establishment	43,540,600	33.15	174,288,151	63.20	7,958,869	15.92	22,286,994	36.19	25,663,059	35.29	62,285,728	37.15
Purchase of Durables	380,000	0.29	5,765,000	2.09	595,000	1.19	500,000	0.81	100,000	0.14	455,000	0.27
Repair and Maintenance	8,794,000	6.70	6,060,000	2.20	1,010,000	2.02	3,850,000	6.25	6,295,000	8.66	6,230,000	3.72
Commodities and Services	14,010,000	10.67	22,382,200	8.12	3,282,000	6.56	5,947,000	9.66	8,120,000	11.17	35,510,000	21.18
Others	1,555,000	1.18	235,200	0.09	200,000	0.40	4,085,000	6.63	65,000	0.09	11,075,109	6.61
Current Expenditure	**68,279,600**	**51.98**	**208,730,551**	**75.69**	**13,045,869**	**26.09**	**36,668,994**	**59.54**	**40,243,059**	**55.35**	**115,555,837**	**68.93**
Charged Expenditure	**9,918,000**	**7.55**	**-**		**316,000**	**0.63**	**610,000**	**0.99**	**550,000**	**0.76**	**1,025,000**	**0.61**
Development Expenditure	**36,050,000**	**27.45**	**59,726,151**	**21.66**	**20,375,000**	**40.75**	**7,750,000**	**12.58**	**17,960,000**	**24.70**	**22,850,000**	**13.63**
Other Expenditure												
Repayment of liabilities	8,500,000	6.47	7,310,000	2.65	3,970,000	7.94	16,561,000	26.89	13,960,000	19.60	28,209,222	16.83
Expenditure for S-DSSP	-		-		5,760,000	11.52	-		-		-	
Liabilities of Gratuity	8,600,000	8.55	-		-		-		-		-	
PHE Expenditure	-		-		6,531,400	13.06	-		-		-	
	-		-		-		-		-		-	
TOTAL EXPENDITURE	**131,347,600**	**100**	**275,766,702**	**100**	**49,998,269**	**100**	**61,589,994**	**100**	**72,713,059**	**100**	**167,640,059**	**100**

Source: Consultants Analysis of TMA Budgets.

Table A9-3: Actual Expenditures of Case Study TMAs for FY04

	Mirpurkhas		Sukkur		Johi		Umerkot		Shikarpur		Larkana	
	Rupees	%	Rupees	%	Rupees	%	Rupees	%	Rupees	%	Rupees	%
Establishment			96,652,152	67.35	1,570,563	86.48	15,646,412	47.66	20,792,691	69.58	44,364,722	69.54
Purchase of Durables			346,187	0.24	-	-	-	-	-	-	204,624	0.32
Repair and Maintenance			3,917,166	2.72	26,841	1.48	-	-	1,469,030	4.92	3,397,004	5.33
Commodities and Services			7,772834	5.40	159,423	8.78	9,845,877	29.99	2,949,611	9.87	7,318,945	11.48
Others			1,500	0.00	52,561	2.89	-	-	-	-	1,511,934	2.37
Current Expenditure			**108,989,839**	**75.71**	**1,809,388**	**99.63**	**25,492,289**	**77.66**	**25,211,332**	**84.36**	**56,779,229**	**89.04**
Charged Expenditure			**-**		**6,740**	**0.37**	**-**		**40,000**	**0.13**	**136,344**	**0.21**
Development Expenditure			**11,818,487**	**8.21**	**-**		**4,556,987**	**13.88**	**3,427,461**	**11.47**	**470,223**	**0.74**
Other Expenditure												
Repayment of liabilities			23,140,341	16.08			2,777,592	8.46	1,205,082	4.03	6,385,576	10.01
Expenditure for S-DSSP												
Liabilities of Gratuity												
PHE Expenditure												
TOTAL EXPENDITURE	Not Available		**143,948,667**	**100**	**1,816,128**	**100**	**32,826,868**	**100**	**29,883,875**	**100**	**63,771,372**	**100**

Source: Consultants Analysis of TMA Budgets.

Annexure – 10

Blanks Forms For Developing Strategic Plans

Forms
Used for Developing
Strategic Plan for Taluka

Strategic Planning for Taluka

1 Water supply sewerage/ drainage and solid waste management

1.1 Background

1.2 Overview of Taluka

Graph indicating population projection

2 Water supply

2.1 Urban areas

2.2 Rural areas

3 Sewerage and drainage

3.1 Urban areas

3.2 Rural area

3.3 Solid waste management

3.4 Urban areas

3.5 Rural area

4 Priorities

Nazim to describe here the basis for prioritising activities. It may involve any one or all of: Poverty reduction, Available resources, Legislation, Public health, Public demand, Environmental protection, TMA economic growth etc.

5 Issues

The tables in this section summarise the situation in the TMA for each of the sectors, as well as indicate the issues emerging.

Note: *PRIORITY ISSUES indicated by a* ***bold cell***

5.1 Issues emerging for water supply

	House	Lane	Settlement
Urban Area			
Rural Area			
UC1			
UC2			
UC3			
Environment			
Financial			
Institutional			
Women			
Community participation			
Private sector			
Public awareness			

5.2 Issues emerging for sewerage and drainage

	House	Lane	Settlement
Urban Area			
Rural Area			
UC1			
UC2			
UC3			
Environment			
Financial			
Institutional			
Women			
Community participation			
Private sector			
Public awareness			
Pub Toilets			

5.3 Issues emerging for solid waste management

	House	Lane	Settlement
Urban Area			
Rural areas			
UC1			
UC2			
UC3			
Environment			
Financial			
Institutional			
Women			
Community **participation**			
Private sector			
Public awareness			
Hospitals			
Schools			
Commercial			

6 Strategic plan

6.1 Water supply

6.1.1 Summary of proposals, placing, phasing and financing

Proposals	Placing								Financing
		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	

6.2 Sewerage and drainage

6.2.1 Summary of proposals, placing, phasing and financing

Proposals	Placing								Financing
		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	

6.3 Solid waste management

6.3.1 Summary of proposals, placing, phasing and financing

Proposals	Placing								Financing
		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	

6.4 Other strategic issues

Describe any overarching strategic issues not mentioned in the tables above. For example, organizational change, financial planning.