



SOLID WASTE MANAGEMENT STRATEGY FOR TEHSIL MUNICIPAL ADMINISTRATION BARIKOT



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List of Acronyms

3 Rs	Reduce, Reuse and Recycle
BCC	Behaviour Change Communication
CBO	Community Based Organisation
CMO	Chief Municipal Officer
CSO	Civil Society Organisation
DFID	Department for International Development
EPA	Environmental Protection Agency
EPS	Environmental Protection Society
EW	Environment Workers
FATA	Federally Administered Tribal Areas
FHA	Frontier Highway Authority
IEC	Information, Education and Communication
IEE	Initial Environmental Examination
IFWS	Informal Waste Sector
ISWM	Integrated Solid Waste Management
KP	Khyber Pakhtunkhwa
LG	Local Government
LGE&RDD	Local Government, Elections and Rural Development Department
LGA	Local Government Act
MWM	Medical Waste Management
NEQS	National Environmental Quality Standards
NBP	National Bank of Pakistan
NGO	Non-Governmental Organisation
NHA	National Highway Authority
PARRSA	Provincial Reconstruction, Rehabilitation and Settlement Authority

PC	Primary Collection
PCNA	Post-Crisis Needs Assessment
PDMA	Provincial Disaster Management Authority
PEPA	Pakistan Environmental Protection Act
PEWWRT	Pakistan Environment Welfare and Waste Recycling Trust
PHED	Public Health Engineering Department
PSWM	Participatory Solid Waste Management
SC	Secondary Collection
SEC	School Environment Club
SoPs	Standard Operating Procedures
SWEEP	Solid Waste Management and Environment Enhancement Project
SWM	Solid Waste Management
SWOT	Strengths, Weaknesses, Opportunities, Threats
TMA	Tehsil Municipal Administration
TMO	Tehsil Municipal Officer
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Emergency Fund
USAID	United States Agency for International Development

Executive Summary

Municipalities in the low-income, developing countries spend a major proportion of their municipal revenues on Solid Waste Management (SWM). Yet service levels remain low while most disposals are deemed as unsafe. The situation is likely to worsen due to continuing population growth and urbanisation in these countries.

Like other developing countries, Pakistan too faces serious environmental problems. A large proportion of the municipal waste is either burned, dumped or buried illicitly on vacant land in many towns and even major cities, causing significant environmental damage and threatening human health. Worse, there are no SWM systems in place to deal with potentially hazardous waste; systems dealing with medical waste are particularly inadequate. Therefore solutions are needed urgently.

The Barikot SWM strategy is a step towards providing a practicable and result oriented solution to a long standing predicament affecting almost all municipalities which are constrained by a low resource base coupled with a lack of trained and capable human capital.

The strategy supports and builds upon the successful initiatives of the Tehsil Municipal Administration¹ (TMA) Barikot and attempts to strike a balance between existing ground realities, constraints and capacity limitations faced by TMAs on the one hand, and the need to transform their SWM sector into a viable, competitive industry which is able to provide a high level of services while relying upon a locally generated resource-base.

This document provides a detailed account of the strategy proposed for transforming Barikot's SWM sector and supporting its transition to a fully functioning, integrative and sustainable system with a potential for achieving a waste efficiency of 50% by 2019. This five year strategy is guided by the following principles, a) administrative and institutional changes are vital b) documentation is essential c) peoples' participation - including women and youths - is

imperative d) stakeholder's partnerships need to be developed e) the informal sector needs to be recognised as a vital partner f) 'waste' should not be wasted g) people need affordable solutions h) free services are less sustainable i) lack of financial resources is not the main issue j) SWM must be seen in a wider context and) landfill should be gradually minimised.

The SWM Action Plan is designed to quickly transform public sector SWM functions, operations and implementing institutions while keeping ground realities and local needs in view. Under the plan, by the end of 2019, the SWM system will provide a reliable, sustainable house-to-house municipal waste collection service in Barikot town with an emphasis on (i) waste reduction, at source segregation and return of recyclable material to the waste bank (ii) promoting kitchen gardening (iii) achieving a recycling efficiency of 50 percent (iv) ensuring that all remaining residual waste is transported and disposed of in an environmental safe and socially responsible manner and (v) making progress in initiating and improving the municipal and hazardous SWM systems in conjunction with other implementing stakeholders.

The Barikot SWM strategy will be based on a four-pronged approach; strengthening the institutional capacity of the TMA Barikot to better manage their solid waste problem, engaging major local stakeholders in the implementation of the strategy, utilisation of appropriate technical options to reduce, reuse & recycle waste and finally, the promotion of good governance and utilisation of available legal frameworks.

The SWM Action Plan draws upon and follows the approach and vision of the SWM strategy. It is designed to transform the objectives of the SWM strategy into practicable, time bound activities. It is composed of three phases or time frames for implementation, each leading to a higher level of organisation and service provision by the TMA.

¹The nomenclature of the Tehsil Municipal Administration had been changed to "Municipal Committee" through the Khyber Pakhtunkhwa Local Government Act, 2012 but has been retained by the succeeding Act of 2013.

The action plan has been divided into three distinct phases for ease of management:

Phase 1: Basic Level (Duration: 6 months)

Phase 2: Middle Level (Duration 24 months)

Phase 3: High Level (Duration 30 months)

Each phase will lead towards introducing progressively improving and technically enhanced levels of services to the Barikot township while keeping the exigencies of local resource generation in view.

Finally, the financial strategy outlines the possible mechanism for generating revenue to fund the various stages of the SWM strategy. It provides an overview of the models which can be utilised for meeting the expenses for provision of services by the TMA; namely community contribution, Direct Taxation and Commercial Contract System. It also details the cost estimation for implementing the different phases of the strategy.

CHAPTER

1

INTRODUCTION

Chapter one: Provides general background information and introduces key issues in Solid Waste Management (SWM).

Section 1.1: Solid Waste Management in Pakistan

**Section 1.2: Legal and institutional framework regarding
Solid Waste Management in Pakistan**

1.1 Background and Introduction

The management of solid waste affects quality of life in many ways - not least through environmental pollution - but also by influencing the economy, tourism, property values as well as the social fabric of a community. Consequently, it is deemed as one of the key responsibilities of local governments and one of the most important services provided by a municipality.



The specific local socio-economic context defines the SWM needs of a society as well as the degree to which the users of services identify with, take ownership of, and contribute to its systems and facilities. SWM being a highly visible service with significant effects on the health and social desirability of town segments, consequently affects the community's perception of government functionality and is deemed to have a high political value and potential for local governance. This factor attains a higher significance in localities which are affected by - or prone to - conflict and disasters.

Given the high stakes that are involved, due consideration needs to be given to issues and factors that have substantial influence on the outcome of measures aimed at implementing an effective SWM system. Some of the important factors are explained below:

Key issues in Solid Waste Management

Municipal capacity	<p>Most municipalities have very little experience of SWM systems and few actively manage them. A lack of technical know-how, data, human resources and equipment is compounded by a low revenue base and financial management capacity (e.g. current level of cost recovery and cost accounting system; analysis of future cost increases of waste collection and disposal services).</p> <p>Improvement in the individual capacities of all staff involved in the SWM in areas of technical and managerial expertise is imperative for the successful implementation of SWM strategies.</p>
Political commitment and community awareness	<p>SWM is much more than a technical issue. It has implications for local taxation, employment and regulation. Any changes in these factors need political support to be effective. Unfortunately, it is rarely a priority for political leaders unless there is strong and active public interest.</p> <p>Community involvement and participation is usually negligible due to lack of awareness regarding their own role as well as that of the government. This leads to a situation where compliance with national and environmental requirements is relegated to the back seat.</p>

Financial implications and cost recovery	<p>The development of a functional SWM system requires a major investment and it may be difficult to give it priority over other resource demands.</p>
Institutional roles and legal mandate	<p>The need for funding can make municipalities dependent on development partners or international agencies that apply pressure to reach high, possibly unachievable, standards of disposal. Reliable revenue generation is needed for sustained operations. This is very hard to provide if residents are unwilling to pay taxes for waste disposal.</p>
Location and environmental issues	<p>Institutional roles are dependent on the availability of relevant regulations and their effective implementation. The roles and responsibilities of municipalities need to be clearly defined and accepted by all concerned. Legal and administrative support is usually lacking or deficient in a decentralised and devolved local government system.</p> <p>Topographic and environmental factors are crucial to the success or failure of an SWM strategy and its implementation.</p> <p>Concerns of human health as well as environmental protection are important factors in the site selection for a disposal site, especially under conditions of low resource availability and lack of public incentive to use hygienic methods of disposal.</p>

Planning effective government structures for and sustainable investments in SWM systems requires an understanding of the needs and preferences of a wide range of stakeholders involved in the service delivery, costs, and corresponding environmental and social impacts.

To ensure public ownership and support, the planners of any investment in a new or improved SWM system will need to mobilise, organise and involve all important stakeholders having a role in solid waste generation, collection, re-use, transportation, and/

or disposal. Stakeholder's are also important sources of feedback on issues related to the provision and use of solid waste services including fee setting and fee collection. The government should ensure that investments address users' objectives and expectations. Finally, social safety nets and services (such as health education/awareness) for disadvantaged social groups and neighbourhoods should also be integrated in the overall planning cycle so that these groups are not adversely affected by or excluded from the new or improved solid waste services.

1.2 Solid Waste Management in Pakistan

Most municipalities in developing countries spend a large proportion of their budgets on the collection, transport, and disposal of solid wastes. In most cities in developing countries, municipal SWM costs consume 20-50% of municipal revenues yet collection service levels remain low with only 50-70% of residents receiving service and most disposals being unsafe (Cointreau 1994, p. 41). The situation is likely to worsen due to continuing population growth and urbanisation in developing countries.

Like other developing countries, Pakistan too faces serious environmental problems. Developmental planning in the country has never focussed on the poverty-environment nexus which has resulted in unregulated depletion of natural resources and has led to urbanisation as well as unplanned agricultural and industrial proliferation. The combination of an overloaded local and national coping mechanism with a diminishing resource-base has resulted in a situation of uncontrolled pollution of water and other natural resources.

Unplanned urbanisation, poor sanitation, ill-planned drainage systems, inadequate human and capital resources for collection and disposal of waste, unavailability of official dumping sites, absence of weigh bridges for exact measurement of waste received at these sites, and almost negligible presence of recycling processes have negatively impacted waste management in the country.



Solid waste generation in Pakistan ranges between 0.283 to 0.612 kg per capita per day. Accordingly, a household generates 1.896 kg to 4.29 kg per day while the waste generation growth rate is 2.4% per year.²

Accumulation and improper disposal of solid waste in urban and semi-urban centres plays a major contributing factor in this deteriorating environmental situation in the country. Solid waste collection by government owned and operated services in Pakistan's urban centres currently averages only about 50% of waste quantities generated. However, for cities to be relatively clean, at least 75% of these quantities should be collected.³ The rest of the waste remains uncollected or is disposed of by communities with unconventional and environmentally unsafe methods. The situation is deemed far worse in resource-deprived urban centres such as small towns/tehsil centres.

The following are the main problems regarding solid waste management in small urban centres of Pakistan:

- Citizens are not aware of the relationship between ways of disposing waste and the resulting environmental and public health problems.
- There is no proper waste collection system and most household waste is dumped on the streets or community-designated dump-sites.
- Different types of waste are not collected separately.
- There are no controlled sanitary landfill sites.

1.3 Legal and Institutional Framework regarding Solid Waste Management in Pakistan

Pakistan, like other developing countries, faces serious environmental problems. Rapid population growth has put enormous pressure on the country's natural resource base and significantly increased the levels of pollution. Pakistan has still not addressed the issues of sustainable development and environmental protection in a comprehensive manner and is consequentially facing huge resource gaps in dealing with the situation.

Furthermore, with the advent of the 18th amendment of the constitution of Pakistan, legislation for environmental protection has become a provincial matter and the Pakistan Environmental Protection Act (1997) no longer holds legal status in the provinces. This situation now requires each province to come up with its own laws for protecting the environment; including those for transport and disposal of hazardous and waste materials.

²Ministry of Environment and Urban Affairs Division, Pakistan; study on "Data collection for preparation of national study on privatisation of solid waste management", 1996.

³Pakistan Environmental Protection Agency; Draft guidelines for SWM, 2005.



1.3.1 Currently available legal framework regarding SWM in Pakistan:

Presently the legal rules and institutional framework⁴ dealing with SWM in the country include:

- Pakistan Environmental Protection Act (PEPA) 1997.
- Section 11 of the PEPA 1997 prohibits discharge of waste in an amount or concentration that violates the National Environmental Quality Standards (NEQS).
- Hazardous Substances Rules of 1999.
- Guidelines for Hospital Waste Management since 1998 prepared by the Environmental Health Unit of the Ministry of Health, Government of Pakistan.
- Hospital Waste Management Rules 2005.
- Hazardous Substances Rules 2003.
- National Environment Quality Standards Rules.
- Section 132 of the Cantonment Act 1924 deals with deposits and disposal of rubbish etc.
- The PEPA 1997 Section 12 directs that an Initial Environmental Examination (IEE) and an environmental impact assessment is to be filed with the Environmental Protection Agency (EPA) for review and approval before the initiation of construction at a site where there is the likelihood of causing environmental damage.
- Guidelines for Solid Waste Management (Draft), 2005; Pakistan Environmental Protection Agency.

1.3.2 Institutional framework regarding SWM in Pakistan:

Institutional frameworks are available but need strengthening to deal with the ever increasing burden of SWM; both in the main cities as well as urban centres in rural areas.

At the provincial level, the department of Local Government, Elections and Rural Development (LGE&RDD) has been mandated to support the Town/Tehsil Municipal Administrations (Tehsil Municipal Administrations) in developing their capacities, both institutional as well as human resource wise, to deal with their responsibilities in this regard.

Before promulgation of the local government system, the provincial Public Health Engineering Department (PHED) was responsible for the development and maintenance of water and sanitation services including SWM in all urban centres. Under the recently prevailing system of local government, it is the responsibility of TMAs; however the site selection of disposal facilities is primarily carried out by local councils. Sanitary workers are employed by TMAs to sweep the streets and collect the trash at a specified place from where it is transported to the dumping site by the municipal carrier/vehicle such

⁴“The state of Pakistan’s economy: Third quarterly report”, FY09.

as a dump truck or tractor-trolley. The TMA also employs the services of a qualified civil engineer for infrastructure development and maintenance.

Since most of the TMAs in the smaller towns/tehsils of the province of Khyber Pakhtunkhwa have a low resource-base in financial and human capital (mainly due to revenue generation problems), a high proportion of these TMAs are unable to fulfil these managerial obligations without external assistance.

Maintenance of urban infrastructure is a basic responsibility of the TMAs. The public health engineering is an integral part of the tehsil SWM system and augments the SWM processes and strategies. Additional support mechanisms for SWM are also available for the TMAs in the form of collaborative service provision involving local stakeholders. It is usually advantageous to execute

service provision tasks in partnership with the users of services (participation) and/or with private enterprises (privatisation) but the final responsibility remains that of the government (i.e. the TMA).

Historically, waste management activities in the country have been considered to be the domain of the public sector, however, the private sector has always been active in this regard. The actors of the private sector may be divided into formal and informal categories. The formal sector consists of private organisations and Non-Governmental Organisations (NGOs) but these are relatively few in number. The informal sector, on the other hand, is significant in size and coverage

as it consists of thousands of roaming waste collectors (scavengers) and scrap dealers or traders (called kabaria's or kabari-wallas) spread throughout the cities and towns. These Informal Waste Sector (IFWS) workers are engaged in the collection of waste material - mostly different kinds of recyclables. This sector has arranged itself into a traditional

hierarchy ranging from the scavengers filtering the community and municipal dump sites (or collecting household refuse on donkey-carts), to the kabaria's; collecting or buying household recyclables (kabar=non-usable items) at the doorstep (travelling on foot, by bicycle or donkey cart) and selling their wares to the intermediate kabariwallah shops. These in-turn sell the recyclables to the regional kabariwallah shops. From here these recyclable materials are sorted and sent to industries in large cities for final processing. Household employees such as servants and sweepers (on daily or monthly wages) also play a key role in the management of household waste.

The immense potential to convert waste into an economic resource has recently also been recognised by the formal private sector in Pakistan. In this regard, some NGOs and private firms e.g. Gul Bahao (a Karachi-based NGO) and the Pakistan Environment Welfare and Waste Recycling Trust (PEWWRT) have already stepped into the industry. These organisations collect waste and reprocess it to produce fertiliser, plastic bottles, and tetra packs. Private sector firms such as the Farooq Compost Fertilizer Corporation and Shanghai Shun Gong Environmental Protection Limited have also initiated projects in Karachi; based on organic and in-organic waste management. Organic waste is used to produce organic fertiliser. Inorganic waste is first sorted into paper, plastic, tin, etc., and it is then sold to respective industries where it is recycled to make products such as plastic, wooden and tetra sheets. Inorganic waste is converted into fuel pellets and liquid fertiliser and sold in the open market.

Similarly, the Lahore Compost (Pvt.) Ltd. deals with the organic waste with the cooperation of city district government Lahore, Pakistan. The company is registered with UNFCCC (United Nations Framework Convention on Climate Change).

Recently, ÖZ-Pak (an Ozkartallar group of Turkish companies) has entered into an agreement with the Lahore Waste Management Company for solid waste collection, its transportation, mechanical & manual sweeping and mechanical washing services of the zone-II of Lahore city. The tenure of the agreement is seven years. The Khyber Pakhtunkhwa government too has shown interest in a similar agreement with ÖZ-Pak for SWM in Peshawar.



1.3.3 External support agencies and development assistance

The main thrust of development cooperation in the field of SWM in Pakistan is oriented towards institutional development and management strengthening, with the objective of establishing an effective institutional framework for SWM and strengthening the responsible bodies within this framework.

Support activities of international development partners such as the Asian Development Bank, DFID, GIZ, UN (UNICEF, UNEP, Habitat etc), USAID, World Bank etc. are mainly aimed to build management capacity through the introduction of appropriate methods and techniques for (but not restricted to) the following processes in the context of SWM:

- Strategic planning,
- Operational planning,
- Cost and revenue accounting,
- Budgeting and financial control,
- Monitoring and evaluation, and
- Management information systems.

It cannot be emphasised enough that particular attention should be paid to the process of strategic planning for SWM, and to the establishment of adequate capacity for operating and maintaining existing facilities and equipment. In view of the decentralisation of authority to local governments it is imperative to ensure that local government's powers and capacities are corresponding to its responsibilities.

The German Government, in 2010, identified governance as a new focal area and commissioned the Support to Good Governance Programme in Pakistan. The programme aims to enhance the performance of selected areas of government for effective, transparent and responsive governance at national and sub-national level.

In support of the Khyber Pakhtunkhwa provincial government's Malakand Strategy, and in line with the recommendations of the Post Crisis Needs Assessment (PCNA) study, the newly developed Tehsil of Barikot in Swat was selected to be supported in the improvement of their SWM for a later scaling-up and rollout to other municipalities.

The Support to Good Governance Programme implemented by the LGE&RDD and GIZ is providing support to the Barikot municipality in developing a practicable SWM strategy for TMA Barikot. This document also proposes a strategic intervention for the effective implementation of the strategy.



The TMA has, since inception, made commendable progress and overcome huge challenges in mitigating the effects of rampant destruction to the physical and administrative infrastructure of the tehsil; brought about by the 2010 flood and the preceding conflict. However the need for further improvement in management, financial and technical capacities is still realised.

The SWM Strategy builds upon the successes of the TMA Barikot while delineating measures for addressing identified needs; striving for a balance between the current constraints and capacity limitations on one hand, and the urgency to transform the sector and provide a better level of services on the other. It is guided by the following principles:a) administrative and institutional changes are vital b) documentation is essential c) peoples' participation

- including women and youths - is imperative
d) development of stakeholder's partnerships is necessary
e) the informal sector has to be recognised as a vital partner
f) 'waste' should not be wasted
g) people need affordable solutions
h) free services are less sustainable
i) lack of financial resources is not the main issue
j) The issue is much wider than SWM
and k) landfill should be gradually minimised.

The Barikot SWM model, developed through this strategy, may be used for scale-up or replication in other TMAs after making the necessary modifications according to the ground realities and conditions prevailing in each municipality.

In the context of the TMAs, SWM would include the process of long and short term planning, setting objectives, programming, budgeting, establishing, implementation, operation & maintenance, monitoring & evaluation, cost control and revision of objectives etc. in a cyclical manner. The conceptual framework of SWM is explained in greater detail in the following section.

CHAPTER

2

CONCEPTUAL FRAMEWORK OF SOLID WASTE MANAGEMENT

Chapter two: Provides an overview of the concept of Solid Waste Management (SWM) in the context of urban or semi-urban human habitat.

Section 2.1: Lists the different categories of solid waste and describes its composition.

Section 2.2: Explains and elaborates upon SWM, its generation, handling and processing including sorting & storage, collection, transfer/ transportation and final disposal.

Section 2.3: Clarifies the waste hierarchy process and the principle of 3Rs i.e. reducing/minimising, recycling and reusing of waste.

Section 2.4: Informs and enlightens the reader regarding the benefits of managing solid waste and the hazards that can result from our negligence to do so.

2.1 Solid Waste

Solid waste, in the urban or municipal context, is defined to include refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard/agricultural waste and street sweepings. Debris from construction and demolition is also a category of the urban solid waste but requires separate management procedures.



2.1.2 Composition of solid waste

The solid waste composition varies from region to region and time to time. There are the following different types of waste.

- Biodegradable waste material; such waste is decomposed naturally and includes food and kitchen waste, green waste (agricultural products, branches, leaves and fodder etc.) and paper.
- Recyclable material, i.e. it could be recycled again and again; such as paper, glass, bottles, cans, metals, certain plastics, fabrics, clothes etc.



Semi-solid wastes such as sludge and night-soil are considered to be the responsibility of Liquid Waste Management systems while hazardous industrial and medical wastes are, by definition, not components of municipal/urban solid waste. The liquid and hazardous waste are, however, normally quite difficult to separate from solid waste in the small towns - particularly from small and scattered sources such as private clinics and cottage or small industries such as marble factories, tanneries or slaughter-houses etc. - and are therefore in this context considered as part of the urban solid waste stream.

2.1.1 Categorisation

The most common types of solid waste are:

- Municipal solid waste
- Industrial waste
- Agricultural waste
- Hazardous waste

- Inert waste, i.e. it is not liable to decompose; such as construction and demolition waste, dirt, rocks, debris, aluminium foil etc.
- Waste electrical and electronic equipment (WEEE); such as electrical appliances; electrical wiring, cables, TVs, computers, screens, batteries, telephone sets, light bulbs, fluorescent tubes etc.
- Composite wastes; such as waste clothing, Tetra Packs, waste plastic, etc.
- Commercial & domestic hazardous/toxic waste; such as hospital waste, paints, chemicals, spray cans, fertiliser and pesticide containers, shoe polish, etc.

2.2 Solid Waste Management

Solid Waste Management (SWM) refers to the systematic management of the generation, collection, transfer, treatment, recycling, recovery and disposal of solid waste.

The activities associated with the management of municipal solid waste can be grouped into (a) waste generation; (b) waste handling and sorting, storage, and processing at the source; (c) collection; (d) sorting, processing and transformation; (e) transfer and transport; and (f) disposal.

2.2.1 Waste Generation

Waste generation encompasses activities in which materials no longer considered of value (refuse from households, farms, non-hazardous solid waste from industrial, commercial and institutional

establishments including hospitals, market waste and garden waste as well as street sweepings) are either thrown away or gathered together for disposal.

2.2.2 Waste Handling and Processing at the Source - including Sorting & Storage

These are activities associated with the management of wastes until they are gathered or placed in bags or storage containers for collection. Handling encompasses the movement of the waste or loaded containers and bags to the point of collection. Sorting of waste components is an important step in the handling and storage of solid waste at the source. Separation of saleable items such as newspaper

and cardboard, bottles/glass, plastic ware, electrical appliances, metal parts and pieces, old shoes clothes, bags etc. is carried out prior to their temporary storage and consequent sale or re-use.

Composting of kitchen waste is an example of processing at the point of generation.

2.2.3 Collection

Collection includes the gathering and transport of solid wastes and recyclable materials, by means of vehicle, cart or other facility, to the location where the collection vehicle is emptied. This location may be a transfer station, or a landfill disposal site.

Collection is carried out through two stages:

Primary Collection:

The means by which solid waste is collected from its source (domestic and commercial premises also called Primary Collection Points) and transported to

communal stations, transfer points or disposal sites. Usually primary collection systems are characterised in developing countries by hand carts, bicycles or small vehicles.

Secondary Collection:

The collection of solid waste from a communal collection or transfer point (Secondary Collection Points) and its transport to a transfer station, recycling centre, intermediate treatment facilities or disposal site.

2.2.4 Transfer and Transport

The transfer and transport of solid waste involves two steps: (i) the transfer of wastes from the secondary collection point/vehicle to the larger transport equipment or transfer point and (ii) the subsequent transport of the wastes, usually over long distances, to a processing or disposal site. The transfer usually takes place at a transfer station.

The following terms and processes describe the important elements of this stage of the SWM.

Transfer: The movement of solid waste between different stages in the handling, collection and transportation process.

Transfer Point: A designated point, often at the edge of a neighbourhood, where small collection vehicles (such as hand carts) transfer solid waste to larger vehicles for transport to transfer stations, recycling centres and/or landfill sites.

Transfer Station: A facility at which municipal solid waste from collection vehicles is consolidated into loads that are transported by larger trucks or other means to more distant landfill sites.

Transportation: The physical process of moving waste.

2.2.5 Disposal

Disposal is the process of final placement of solid waste with and/or without previous treatment/processing and/or recycling in a landfill. It can be defined as the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into - or on - land or water.

Land disposal⁵ is defined to include, but not limited to, any placement of waste in a landfill, surface impoundment, waste-pile, injection well, land treatment facility, salt dome formation, or underground mine or cave. It can also consider placement of hazardous wastes in concrete vaults or bunkers intended for disposal purposes as methods of waste management subject to certain restrictions. However, it does not include and permit open burning on land and detonation.

Landfill means a disposal facility or a part of a facility where waste is placed in or on land and is not a land treatment facility.

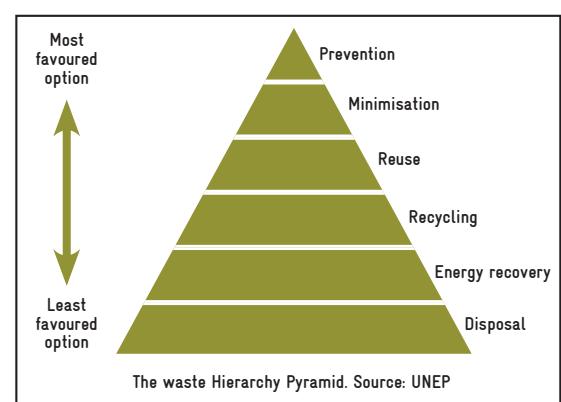
Landfill cell means a discrete volume of a waste landfill that uses a liner to provide isolation of wastes from adjacent cells or wastes. Examples of landfill cells are trenches and pits.

Sanitary Landfill: A term for a disposal site that is located to minimise water pollution from runoff and leaching. Waste is spread in thin layers, compacted, and covered with a fresh layer of soil each day to minimise pest, aesthetic, disease, air pollution, and water pollution problems

Sanitary disposal is an ultimate action by which solid waste is disposed-off in an acceptable scientific manner.

2.3 Waste Hierarchy Process: 3Rs

The waste hierarchy concept was introduced formally for the first time by the European Union's Waste Framework Directive of 1975 (Directive 75/442/EEC) as a SWM policy. It emphasises the importance of waste minimisation, the protection of the environment and human health as priorities.⁶



⁵ Manual on "Municipal Solid Waste Management", S.R. Shukla. 2000.

⁶ "Waste Hierarchy", Waste-to-Energy Research and Technology Council (2009).

The waste management hierarchy indicates an order of preference for action to reduce and manage waste, and is usually presented diagrammatically in the form of a pyramid. The hierarchy captures the progression of a material or product through successive stages of waste management and gives important general guidelines on the relative desirability of the different management options.⁷

The hierarchy usually adopted is (a) waste Prevention (b) minimisation/reduction at source, reuse of material (with recovery of products) (d) recycling,

(e) waste processing (with recovery of resources i.e. energy) or waste transformation (without recovery of resources), and (f) disposal on land (land-filling).

This principle of reducing waste, reusing and recycling resources and products is often called the “3Rs”. Waste minimisation can be achieved in an efficient way by focusing primarily on the first of the 3Rs, “reduce” followed by “reuse” and then “recycle”.

These terms are explained as follows:

2.3.1 Reducing/Minimising

Measures or techniques that reduce the amount of wastes generated during industrial production processes; the term is also applied to recycling and

other efforts to reduce the amount of waste going into the waste management system.⁸

2.3.2 Reusing

Recovering and re-processing useable solid waste that might otherwise end disposed in landfills (aluminium cans, paper, and bottles, etc.). It involves the repeated

use of items or parts of items which still have usable value.

2.3.3 Recycling

The process of separation of waste, either physically or mechanically, by which secondary raw material (paper, metals, glass, plastics /synthetics) is obtained from waste. The process could be accomplished

manually or/and by simple or sophisticated mechanical equipment. In this process waste is considered as a resource.

2.4 Why Manage Solid Waste

The danger of improper solid waste handling and disposal to human health and the environment cannot be over-emphasised. When solid waste is disposed off on land in open dumps or in improperly designed landfills (e.g. in low lying areas), it causes the following impact on the environment.

- Open dumping of wastes creates unsightly and unsanitary conditions within municipalities, and causes unpleasant odours, which attract flies, stray animals, mice and other vectors.

This increases the potential for vector-borne diseases and epidemics. Similarly, gathering of scavenging birds above the waste dump can affect aircraft flights and their safety. Such dumps also lead to pollution of ground and surface water through leachate as well as air through emission of noxious and offensive greenhouse gasses and methane. An increase in the acidity of surrounding soil leads to loss of agricultural potential.

⁷ “Guidelines for National Waste Management Strategies Moving from Challenges to Opportunities”, United Nations Environmental Program (2013).

⁸ Glossary of terms; “Strategic Planning Guide for Municipal Solid Waste Management, World Bank, September 2000.

- Open solid waste dumps in urban localities are a public health risk. Direct contact with refuse can potentially cause infectious diseases such as cholera and dysentery. Scavengers, especially, face a danger of direct exposure to hazardous waste. Fires within the waste dump may spread to surrounding homes and habitat.
- Some categories of solid wastes block permeability of soils and drainage systems, including water courses, open drains and sewers, thus posing difficulties in the functioning and maintenance of such facilities. Inert waste may also cause erosion and stability problems in foundations of buildings, mountain slopes and road sides.

CHAPTER

3

SITUATIONAL AND PROBLEM ANALYSIS

Chapter three: Undertakes to provide the reader with a contextual window through which the process followed by the Tehsil Municipal Administration (TMA) of Barikot can be studied in its endeavour to develop the most essential service of Solid Waste Management (SWM) under difficult conditions and utilizing scant available resources.

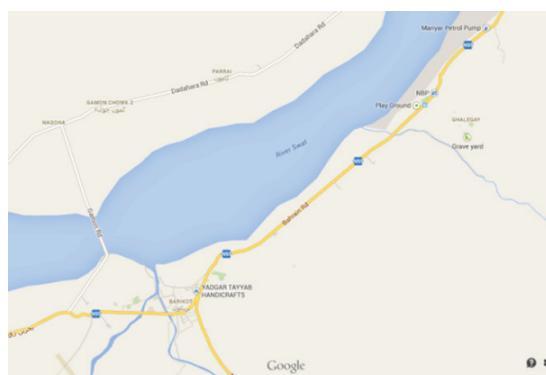
Section 3.1: Contains information regarding the geo-political importance of the Tehsil of Barikot and the influence that man-made and natural disasters had in its establishment and functioning; especially in the context of SWM services.

Section 3.2: Explains the difficult circumstances inherited by the TMA at its nascence and the outcome of an initial effort to assess the various challenges that needed to be resolved to bring back a modicum of control over them.

Section 3.3: Elaborates upon the process followed by the TMA to identify and utilize the various strengths and opportunities which presented themselves to overcome internal weaknesses as well as the challenges that were faced since its inception.

3.1 Geo-Political Context: Tehsil Barikot

Barikot is a town in the Khyber Pakhtunkhwa province of Pakistan, located in the Swat valley region, around 20 kilometres from the main town of Mingora and along the banks of river Swat.



The town is an important commercial hub and serves large population centres such as the union council Shamoza as well as adjoining areas of district Buner. It is strategically located on the main road linking the whole of upper Swat to the rest of the province while the road linking district Buner to Swat (through the Karakar pass) also originates here. Two bridges link Barikot to the areas across the river Swat.

The main town is located about 600 meters from the edge of river Swat and is wedged between the Karakar ravine⁹, the foothills of the Elam mountain range and the river as it stretches northeastwards towards Mingora town.

3.2 TMA Barikot: Identification and Response to Prevailing SWM Challenges and Needs

In November 2010, the municipal administration of Tehsil Barikot established its office as 'Tehsil Headquarters' Barikot. Essential staff was hired out from the TMA of Tehsil Babozai. The TMA Barikot was strengthened with the acquisition of necessary technical and office equipment, donated by international development partners, which further bolstered its capacity in the execution of municipal services.

Barikot was also affected by the socio-religious strife and conflict, afflicting the Malakand region since the late 1980s and culminating with the take-over of Swat valley by the Pakistan army in 2009. The situation was further exacerbated by the flood of 2010 which also affected the infrastructure and human habitat in and around Barikot.

In order to implement the recommendations prescribed in the Malakand Comprehensive Stabilisation Socioeconomic Development Strategy(2009) and Post-Crisis Needs Assessment (2010), the Government of Khyber Pakhtunkhwa created ten new TMAs in Malakand Division, with TMA Barikot being one of them. The purpose of this decision was to introduce administrative restructuring in order to enable the delivery of essential municipal services to the people of these areas.

Under the Local Government Act of 2012, the administrative area of the TMA was reduced from four to two union councils (Barikot and Ghalaigay) comprising of the villages Parrai, Nagohai, Manyar, Goratai and Barikot town. The combined population of these areas is around 80,000 individuals.

Due to the havoc caused by the flood of 2010, the sanitation infrastructure in Barikot was in a dismal condition. It was a common situation that the waste water would flow freely on the Main Mingora-Peshawar Road, obstructing the flow of traffic and the commute of the people to Barikot Bazaar. In addition to causing regular damage to shops and goods stored in them, the waste water also posed health and hygiene risks to the local people.

⁹The Karakar ravine, which originates in the Elam mountains (part of the Hindu Kush range) is dry for most of the year but fills up with rain water and seasonal flash floods. It has a major environmental significance for the town as it is serving as the main outlet for the drainage system of the town.

To control this perilous situation, the TMA requested the provincial LGE&RDD to allow the TMA to hire three sanitary workers on daily wage basis.

In addition an assessment of the ground realities was carried out which brought several crucial factors to light, these were:

- Private and commercial infrastructure was severely damaged as a result of the 2010 floods,
- Water supply systems catering to the majority of households was damaged due to flooding,
- The prevailing sanitation infrastructure was poor in terms of quality and coverage,
- There were no public toilet facilities in the main market area resulting in considerable inconvenience to the public,
- The alleys and paths leading to many localities in Barikot were unpaved,
- Inadequate drainage arrangement for the Barikot bazaar area and the connecting Buner road caused trouble for motorists and pedestrians alike,
- Tehsil Barikot had no slaughterhouse, which poses a serious health and hygiene risk,
- Pedestrians had to face difficulties, while strolling through Barikot bazaar, due to absence of walkways,
- Illegal encroachments by shopkeepers and business owners in Barikot Bazaar caused considerable difficulties for commuters and travellers due to persistent traffic congestion,
- Improved local revenue generation, considered a key towards any TMA's long-term sustainability, was a major concern.

3.3 SWOT Analysis

As mentioned above, the TMA initially had no staff of its own and had to borrow essential staff for initiating basic service provision. Necessary technical and office equipment was not available and assistance was sought from all corners to augment the capacity of the TMA in the execution of municipal services. Incidentally, international help was available due to the flood response and the community was eager and willing to support initiatives in alleviating their own situation.

To effectively cope with the challenges of providing municipal services to the people of Barikot, a detailed analysis on strengths, weaknesses, opportunities, and threats (SWOT) was carried out to assess possible weaknesses and potential threats in the execution of service provision, so as to devise a plan of action to overcome these, utilising present strengths and available opportunities. These are explained in the next sections.



Strengths and opportunities

3.3.1 Drive and Motivation

The Tehsil Municipal Officer (TMO) was the driving force behind the highly motivated and untiring efforts

and services provided by a single Sanitary Inspector and a few sanitary workers with minimum resources.

3.3.2 Availability of Institutional Support

The LGE&RDD sanctioned the appointment of sanitation staff to be hired by the TMA Barikot on daily wage basis. The provision of a tractor to the TMA Barikot further augmented its capabilities and

efforts enabling them to collect, move and dump solid waste with more ease. Sanitation services have continued uninterrupted since the inception of the TMA Barikot.

3.3.3 Community, Civil Society Support and Willingness

The TMA Barikot has generated a lot of support at community level; a fact which is well demonstrated by the hugely successful cleanliness drives and campaigns which the municipality has been able to carry out from time to time with the active participation of community, its elders as well as with the collaboration of public schools and students.

A full scale cleanliness campaign was rolled out for three months with the support of a local NGO having interventions in the area (the Environmental Protection Society - EPS) and with which an agreement was signed to launch a cleanliness and hygiene promotion campaign across the jurisdiction of Tehsil Barikot(carried out between December 2010 and February 2011).

Significant funding was provided for development work (e.g. paving of pathways and drains) by community leaders and legislators belonging to Barikot. Similarly, local Community Based Organisations (CBO) and Non-Governmental Organisations (NGO) as well as international development partners have also been instrumental in the success achieved at the initial stages of the cleanliness drive of the TMA. The media has been appreciative of the efforts of the TMA and has played a significant role in boosting support as well as the image of the SWM staff of the TMA.

Similarly, with the assistance from a development partner, drains have been built around the main road. For the convenience of vehicles and pedestrians, now the waste water from rain and sewerage runs in these drains instead of stagnating on the highway.

With the active help and cooperation of community volunteers, the sanitation staff of the TMA Barikot cleared a number of decade old packed drains and culverts which would swarm the streets and roads. The investment in terms of time and human resources has yielded marked returns in terms of better health and hygiene.

A joint meeting of TMA Barikot staff and local elders was called to streamline an action plan to deal with solid waste dumps in and around the main Mohallahs (neighbourhoods) of Barikot town which were choking drainage systems. Resultantly, these Mohallahs were totally cleared of garbage. The volunteers from the community were also sensitised and educated on the proper methods of discarding solid waste.



3.3.4 Special Cleanliness and Mass Awareness Campaigns during Eid-Ul-Adha

There had been no previous arrangement for the people of Tehsil Barikot to take sacrificial animals to a prearranged place for slaughter during Eid in 2012. As a result, the remains of these animals would be scattered all over the place leaving behind stink and filth. In a first-of-its-kind move, the TMA Barikot staff provided open and accessible spaces for different Mohallahs. The availability of proper places to commemorate their religious obligation also assisted the TMA Barikot staff to clear up the leftovers by as early as the afternoon.

During a one month long cleanliness campaign in October - November, 2013, the Barikot municipality created awareness and motivation in the community by cleaning the community areas; it also identified suitable places for secondary collection points in some areas. Furthermore it was an exercise for the municipality to assess its capacity to manage all town waste.

3.3.5 Proper Arrangements for Burial of Dead Animals carried out

In the past, people of the Tehsil Barikot would not follow any procedure to deal with the corpses of their animals. The decomposed bodies of the dead animals, in addition to polluting the environment with foul smell, threatened to contaminate water supply channels. The TMA Barikot made arrangements to bury the deceased animals away from residential

areas. Furthermore, people were informed through loud speakers and written notices to abstain from leaving behind the bodies of their dead animals without properly disposing of them. Ever since the notification, no such case of negligence has been reported or observed.

3.3.6 Pavement of Streets and Footpaths

The TMA Barikot together with a development partner undertook the pavement and levelling of paths in selected Mohallas of Barikot. In spite of a lack of funds, the resolve of the TMA Barikot to serve the people encouraged them to utilise all available options and successfully carry out the pavement plan.

The TMA Barikot addressed this issue without most priority by involving different stakeholders including local shopkeepers, district administration, military authorities, social workers and political activists. After mutual consultations, it was jointly agreed that footpaths would be constructed to cover up the drains in order to improve sanitation and facilitate the flocking of people to Barikot Bazaar.



3.3.7 Custom Designed Waste Bins installed at Barikot Bazaar

To collect garbage from the market, the municipality was supported in the planning and installation of 140 waste bins at appropriate places in the market. These waste bins have been donated by different organisations and the local shopkeepers' union as well as individuals including elites of the area. Not only has this facility improved the visual appeal of the main market, these waste bins have also

ascertained proper removal of solid waste material. On an average, one waste bin can cater to the waste generated by five shops. The TMO handed over the responsibility for the management and maintenance as well as security of these bins to owners of these shops. Accordingly they are kept inside the shops at night to guard them against theft and pilferage.

Challenges and Constraints

Barikot currently generates about 32 tons of municipal solid waste daily, or about 11,520 tons per year.¹⁰ About 60 percent of household waste is food and organic waste. This is followed by plastics and paper, glass, leather, wood, metals and other wastes. According to the TMA, there is little variation in the composition of waste from Barikot's high, medium and low income residential communities. Although the composition of municipal wastes from commercial and institutional establishments is more

difficult to estimate, experience indicates that they are also high in organic and food waste.

While the TMA has very commendably undertaken a huge responsibility and carried out a tremendous job with just a few resources at hand, yet still, Barikot is constrained to work in an environment characterised by a lack of resources, institutional neglect and a general dearth of capacities. These constraints are elaborated below:

3.3.8 Institutional situation

The political environment in Pakistan has been rife with accusations of nepotism and favouritism. The media has reported instances where such allegations have also been found to be substantiated in government departments. In such an environment, the continuation and sustainability of processes which rely heavily on the personal motivation of one or a small number of individuals becomes difficult. Strong institutionalisation of the SWM processes is a need of the hour since frequent and arbitrary transfers of staff can cause serious disruption to the functioning of a municipality.

In Barikot the municipality does not have a specified SWM department/section, the responsibility for Barikot's solid waste collection, transfer and disposal

rests with a small team of 5 sanitary workers headed by a sanitary inspector. These sanitary workers, in addition to their regular daily routine of sanitation, also help out with octroi (toll-tax) collection and other services of the TMA. The sanitary inspector, with this small team, implements the overall SWM operations and also monitors the daily performance of the sanitary workers. There are two drivers amongst the staff but one driver is on emergency duty with the fire-fighting vehicle and therefore only one tractor (out of the available two) is utilised for garbage collection.

Accordingly, the municipality is managing solid waste, sanitation and provision of other services with the following meagre resources in hand:

Description of Resources			
Machines and Equipment		Human Resources	
Fire-fighting Vehicle	01	Sanitary Inspectors	01
Tractor with trolley	01	Sanitary Workers	05
Tractor Shovel	01	Driver for Tractors	01
Small tractor with trolley	01	Driver for Fire Truck	01
Hand carts	60		
Waste bins (one for five shops)	140		

¹⁰ On average, about 4 kg of waste is produced per household thus:
0.40 (Waste produced per capita per day in kg)
x 80,000 (Population of UC Ghalaigai and Barikot)

= 32,000 (Total solid waste produced per day (in kgs) in TMA Barikot)
/ 1,000 (=1 ton)

= 32 Tons (Total solid waste produced per day (in tons) in TMA Barikot)

The municipality claims that it lacks financial and human resources to address solid waste issues effectively. While this claim needs careful study and analysis there is undoubtedly a human resource issue that is affecting the efficiency and effectiveness of the SWM team of the municipality. None of the staff involved in SWM has had any training in the management of solid waste.

The issue is compounded by the lack of an integrative national strategy regarding the management and protection of the environment, which includes the management of all types of waste generated at the provincial and sub-provincial levels. While an Environment Protection Act exists in Pakistan along with standards which have been devised for industrial effluents and hospital as well as hazardous waste, the implementation of these laws and rules has not been very successful. The advent of the 18th amendment of the constitution of Pakistan has further complicated the matter as it requires each province to enact its own environment protection law and SWM policy. The Khyber Pakhtunkhwa province has, till date, not developed a provincial policy or legal document regarding SWM which would guide the municipalities in this matter.

The TMAs current approach to a SWM system is conventional. Its stress is on the collection only from commercial area on regular basis and not on door to door collection from residential areas. Municipal

staff and the community have no awareness regarding their roles in or contemporary SWM methodology (e.g. 3Rs: reduce, recycle and reuse) of waste management. This lack of knowledge does not encourage the residents to enter into any obligatory social partnership with the municipal SWM effort. 'We dump – They collect' is the general attitude that has been cultivated among the residents by this approach over a long period. SWM is not their concern. It is a municipal responsibility.

Under these circumstances, the municipalities have had very little opportunity to expand their knowledge horizons and enhance the technical know-how. Burning of waste is still considered to be an appropriate method to reduce volume of waste and it is practiced within the residential areas. While Barikot has made considerable progress in SWM it lacks a strategic approach and resources as well as information.

Other local authorities, like Barikot municipality, are handicapped by a blistering array of problems which are insurmountable in the short term without adequate financial and technical support from the international development partners and/or provincial governments. A one month long cleanliness campaign, launched by the provincial government in October – November, 2013, is one significant example of this.

3.3.9 Lack of database and record keeping for accurate planning

The municipality does not have a functional data base on waste generation, composition of waste, recycling potential and record keeping method to assess the village-wise and street-wise volumes of

waste handled by the municipality. Without adequate information and realistic databases it is difficult to improve the quality of planning and delivery of basic services in the town.

3.3.10 Inefficient SWM system

While the TMA has made good progress in providing basic SWM services to the community of Barikot, it is still constrained by a weak institutional capacity and a small and untrained workforce. This has led to a situation where many of the essential tasks are not completed on a day to day, organised and planned manner but the staff works on an ad-hoc basis. Some of the deficiencies arising from such an arrangement are listed below.

a. Collection

There is no primary collection system existing, as there is no door to door collection due to limited resources. The community throws its household waste outside their homes or on empty plots nearby around twice a day at irregular intervals.

The community is not motivated to provide land for the development of designated secondary collection points and is also not consistent in using its own designated places for the dumping of waste.

In a few areas, the municipality has designated secondary collection points for storage of household waste. However, in most other areas, they do not exist. Therefore a regular secondary collection system is not in place. The sanitation workers clean these un designated dumps occasionally, mostly during special cleanliness campaigns.

The municipality collects 20-25% of waste generated at the household level. Every day around 2-3 trolleys of waste is collected from the road side and drains (approximately 8tons). The remaining waste (around 24 tons) goes unattended every day.

b. Waste disposal and non-availability of land for development of landfill sites

Like all other municipalities in Khyber Pakhtunkhwa, the Barikot municipality has been struggling to find a suitable location for sanitary land filling and waste disposal.

Sometime the waste collected is used to fill ditches and depressions on the sides of roads and drain; an environment unfriendly practice. Formal or informal burning of waste is a common practice to reduce the volume of waste.

A large part of the Barikot's territory consists of hilly area and urbanised regions. Therefore, adequate landfill sites are not available within the town. Waste collected by the TMA was previously dumped in a plot located in a densely populated area of the town without treating it properly. Since 2013 this land is not available anymore, so the municipality has been dumping the collected waste mostly in a water-filled ditch in an agricultural plot next to the river. This increases the risk of contaminating the river with hazardous waste material dumped in the ditch, thus causing irreparable damage to the river ecology on the one hand but also makes the river water unsuitable for

use by the communities living downstream.

Although the paving of pathways, alleys and streets is taking place in addition to the paving of old and new water channels, public negligence and non-participation means that waste keeps getting generated and dumped in these drains and ultimately ends up in the river.

In view of this difficulty, the TMA has identified a land-fill site, located around seven kilometres on the route towards Buner, away from the town and the river, on a piece of flat land next to the hills. A proposal has been submitted (PC1¹¹) to the LGE&RDD for its acquisition.

c. Commercial Waste

Presently, the waste management services are provided mostly to the Barikot market place, situated on the two main roads. A primary waste collection system is in place in commercial areas where the municipality has installed waste collection bins with the help of financial assistance. These bins are maintained by the shopkeepers, where from sanitary workers collect this waste on daily basis and dump it in landfills/ditches.

The Municipality is making optimum use of its meagre resources to ensure cleaning of around 08 km main road and the road side drains, connecting the town with Saidu Sharif and Buner Districts. The TMA Barikot does not have the required resources to extend services to other areas and collect household waste.

d. Hazardous Waste

There is no separate system for collection and disposal of hazardous waste generated from one public hospital (Tehsil Headquarter Hospital), 20 clinics, maternity homes, and laboratories. Incineration is not in practice in the town due to non-availability of a proper incinerator. The main public hospital collects its hazardous and non-hazardous waste in a metal trash container and burns it regularly. The residue is collected every 10 days by the municipality and dumped in the same manner as normal waste.

¹¹ Planning Commission (document) #1. A government approved planning and reporting format for project planning, monitoring and completion. Part of a compendium of four reports: PC1 - PC4.

e. Building Waste

There is no regulation for the management of building waste with the result that building waste is also included in house hold waste and contributes to the clogging of drains and sewage lines.

3.3.11 Lack of Slaughterhouse and Meat Market

The town has no facility of a slaughterhouse and/ or meat market for the provision of healthy beef, mutton and poultry to the town population and nearby communities; Slaughter of larger animals takes place in certain locations predetermined by the butchers. These are situated on the hill slopes or next

to the river and have become sources of untreated waste generation from slaughter and dismemberment of animals. Similarly, chicken are bled and cleaned in poultry shops scattered around the bazaar. The lack of a dedicated meat market means that there is also no proper system for poultry waste disposal.

3.3.12 Lack of Public Latrines

Barikot acts as an economic centre for the surrounding areas and daily more than 25,000 people visit the town and contribute in waste generation. However not a single facility of a public toilet exists in the town. The absence of public toilets is especially

inconvenient for female commuters and customers since men often use the toilets of several mosques whereas women are generally not encouraged to do so.

3.3.13 Public Littering

Littering is a common habit, especially after school time most of the students eat commercially packed potato chips and other snacks. The rappers as well as other litter can be seen everywhere in town. So far, no mechanism to manage the littering in town has been developed other than the placement of the

waste bins in front of certain shops. The municipality has tasked one of the sanitary workers to pick up such litter and place it in the bins manually. This however constitutes a gross misuse of resources in a TMA operating with only five sanitary workers.

3.3.14 Non-recognition of the role of the informal service sector

The informal sector service providers such as the scavengers can potentially remove a considerable quantum of daily waste from the town streets. Together, they can make an enormous contribution to urban SWM in the towns where they operate. Involving the informal waste sector can have multiple advantages such as creating livelihoods, reducing poverty, increasing grass-root investment by the poorest section of society, reducing collection and transportation costs for the TMA, reducing residual waste and protecting the environment, amongst others.

At present, the TMA has not utilised the informal waste sector's potential to augment its own capacity. There is no formal system in place for at-source

segregation and recycling in Barikot. People segregate and sell/reuse small quantities of valuables such as card-board cartons, tin, plastic bottles, rubber products (old shoes/sandals), metal parts and wood etc. Since the amount of recyclable material is quite low in house hold and commercial refuse, scavenging is limited in the town and there are only 6 shops of scrap dealers who buy such recyclable material from the mobile kabarias and sell these onwards to industries in Peshawar, Gujranwala and Lahore. Most of these recyclables are not locally generated but are rather collected from districts Dir and Buner or bigger towns of Swat such as Mingora. Similarly, commercial composting of organic waste is not in demand in Barikot as it has not been introduced amongst the local farmers.

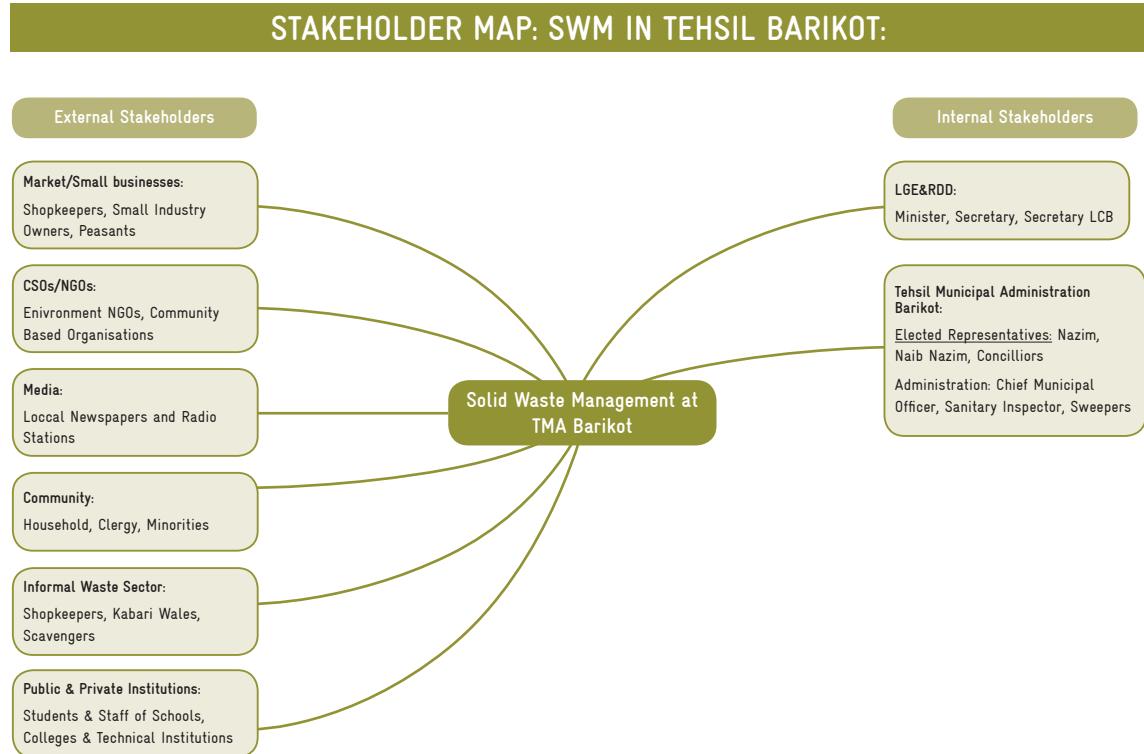
3.3.15 Non-participatory SWM system at community and municipality level

The average resident views SWM as a municipal responsibility. The general public carries a negative perception of the role played by the TMA mainly because of the conspicuous quantities of waste lying uncollected, on community dumps, for days. While people are aware about the health issues due to the unattended waste, this has not led to a change of behaviours and practices. Citizens still throw waste in drains, in the streets outside their own house or at the corner of their streets. Empty plots are turned into community dumps and soon get recognised as designated secondary collection points.

This lack of civic awareness and public cooperation has always plagued the municipal efforts to keep the town clean. The partnership between civil society organisations or groups of stakeholders and the municipality, which is essential to develop an effective participatory SWM system, is still in its nascent stage. The municipality has not formally engaged the services of any organisation/community group to assist it with solid waste collection and disposal to augment the capacity of the TMA and achieve better results.

Community participation has, however, improved due to the current leadership of the TMA Barikot, leading to a one month cleanliness campaign and successful demonstration of proper collection of market waste. However, the town administration does not have adequate institutional mechanisms to engage the residents, traders associations, community organisations and other stakeholders on a regular basis to assist in decision making and program implementation. The role that these stakeholders can play in educating the masses and mobilising their communities has not been adequately recognised. The community/stakeholders, especially women, children and elders are not actively involved in designing and the execution of the system. The extent of their role as an important component of SWM generation is not recognised and therefore the existing SWM system lacks depth and is non-participatory.

The following figure shows the various stakeholders whose participation is essential for improving SWM in Barikot.



A summary of the key constraints in the implementation of a participatory and integrative SWM initiative in the Tehsil Barikot is presented in the table below.

THREATS: KEY CONSTRAINTS AND CHALLENGES	
Institutional Capacity	<p>The SWM team of TMA Barikot is insufficiently resourced and cannot meet all its responsibilities. It is significantly understaffed in the management and skilled labour categories. There have been no attempts to improve the skill and knowledge base of the key staff. The Tehsil's budget allocation is only sufficient to cover salaries and operation of basic equipment for an estimated 25% of municipal waste demand.</p> <p>Basic management tools such as job descriptions of staff, maps, duty rosters and a database are missing. Local revenue generation is not sufficient to sustain an operational SWM system.</p>
Community Participation, Stakeholder Involvement & External Support	<p>Stakeholder and community involvement has been one of the success factors in the early stages of the Barikot SWM story. However, after the exhaustion of international interest in the post 2010 flood period, the TMA did not make proactive efforts to garner support from local or international development partners.</p> <p>Community involvement and participation is still available to some extent and can be utilised towards generating support for initiating a 'fee for service' or community taxation to support the TMA in the provision of services.</p>
Waste Management System	<p>There is no Integrated Solid Waste Management (ISWM) system in Barikot. Insufficient resources are stretched to their limits in an effort to keep the public face of the town moderately clean. Hazardous medical waste is being coming led and dumped in the same manner as municipal waste.</p> <p>All municipal waste is dumped on vacant lots, flood plains, drainage channels, river banks and other open areas throughout the town. The waste ultimately ends up polluting the river and surrounding aquifer; causing significant environmental damage and threatening the health and safety of nearby communities.</p>
Reduction, Recycling, Reuse	Valuable recycled materials are being thrown away due to the lack of a coordinated, sustainable approach to primary segregation and recycling while employment opportunities are being lost, especially for lower income, marginalised groups.
Public Awareness & Gender issues	Public awareness of environmental and SWM issues is low. The involvement of households in primary segregation of recyclable materials is largely undeveloped. This requires a robust initiative to involve members of households. A special focus should be on housewives who generally play a vital role in the waste chain.
Regulation	While a national framework for environmental protection (The Pakistan Environment Protection Act 1997) as well as a provincial law - LGA 2013; is in place, implementation of these rules and regulations is still a major challenge due to legal stumbling blocks.
<p>The above problems and drawbacks call for formulation of a forward-looking, integrative, waste management strategy for the town. SWM of the town has been considered primarily as a responsibility of the municipality. Resultantly, cleaning and transportation of waste was the only solution when using conventional methods. Any future strategy to streamline SWM in the town will be effective only if it can directly address these drawbacks. The strategy proposed here is an attempt in that direction.</p>	

CHAPTER

4

PROPOSED STRATEGY

Chapter four: Provides a detailed account of the strategy proposed for transforming Barikot's Solid Waste Management (SWM) sector and supporting its transition to a fully functioning an integrative and sustainable system with a potential for achieving a waste efficiency of 50% by 2019. The strategy is to be implemented in a time frame of five years divided into three phases for ease of management.

Section 4.1: Describes the broad vision of developing a sustainable, environment friendly, integrative SWM system for Barikot while improving and utilising the requisite capacities and skills but also through involvement of relevant stakeholders and appropriate techniques.

Section 4.2: Lists the possible objectives to be achieved through the implementation of the strategy in line with the propagated vision.

Section 4.3: Clarifies the time frame for the strategy and the associated action plan. The strategy is to be implemented in three distinct phases of six, twenty-four and thirty months each. The Tehsil Municipal Administration (TMA) develops a progressively enhanced system of SWM in each phase through improving institutional capacities and mechanisms.

Section 4.4: Elucidates upon the guiding principles of the strategy which refer to and strengthen the aims and objectives of the SWM strategy.

Section 4.5: Finally provides a detailed anatomy of the proposed strategy and explains how the objectives will be achieved by following the four components of the strategy namely.

The SWM strategy supports and builds upon the successful initiatives of the TMA Barikot and attempts to strike a balance between existing ground realities, constraints and capacity limitations on the

one hand, and the need to transform the sector into a viable, competitive industry which is able to provide a high level of services while relying upon a locally generated resource-base.

4.1 Vision

The municipality of Barikot follows a strategic approach with clearly defined objectives and requisite capacities to sustainably improve and upgrade SWM in its area of jurisdiction. It aims to achieve the required skills and involve stakeholders

to develop an environment friendly, integrative SWM system, capable of dispensing with all municipal and hazardous solid wastes in a scientific, practicable and achievable manner by 2019.

4.2 Objectives of the Strategy

According to the developed vision, the following strategic objectives are to be achieved:

- i. The TMA attains the required institutional and human capacity and the amount of waste is reduced by 50% by 2019 in an efficient, coordinated, integrated and transparent manner.
- ii. A comprehensive and sustainable approach towards improving waste collection, storage, transfer, disposal and treatment, including hazardous waste is implemented in the shape of an Action Plan.
- iii. Costs and needs of SWM are known and reflected in annual development plans and budgets, which respond to demands of stakeholders and citizens.
- iv. An effective regulatory framework is implemented for the environmentally safe and healthy management of all municipal and hazardous solid wastes generated in Barikot.
- v. A regularised and equitable house-to-house waste collection, community storage and transfer system is achieved using appropriate tools and vehicles.
- vi. A vibrant and sustainable recycling system is in place, building (with a possible private sector/ community group involvement) on primary source segregation, where the recycling of wastes is maximised within a healthy and safe working environment.
- vii. An enabling environment is created which supports the involvement of the private sector/ community/groups in the segregation, recycling, collection, transfer, treatment and disposal of wastes.
- viii. An educated, involved and environmentally-aware Barikot public has been developed. Citizens have a clear understanding of their rights and responsibilities regarding SWM, comply with waste collection requirements, pay for SWM services, help to improve community health conditions, and help eliminate illicit waste dumping.

4.3 Timeframe

The strategy and associated action plan, spread over a period of five years, has three distinct phases of six, twenty-four and thirty months, respectively. The spatial breakup of the strategy ensures a smooth and manageable transition into the next phase and also allows the management to plan ahead for the financial requirements of the upcoming phase. Each phase will lead towards introducing progressively improved

and technically enhanced levels of services to the Barikot township while evolving its implementation in view of changing ground realities.

Phase 0 - Basic Level (Jan 2015 to Jun 2015)

Phase I - Middle Level (Jul 2015 to Jun 2017)

Phase 2 - High Level (Jul 2017 to Dec 2019)

4.4 The Guiding Principles

The Barikot municipality “Solid Waste Management Strategy” is anchored on the premise that SWM covers all activities pertaining to organisation, community mobilisation, primary collection and secondary storage as well as secondary collection, transfer, transport, processing, reuse, recycling and final disposal of residual solid waste in accordance with best principles and practices of public health, economics, engineering, conservation and aesthetics. Its scope must include attendant administrative, financial, legal, planning and engineering functions.

The Strategy is guided by the following key principles.

- **Administrative and institutional changes are vital.**

A cautious review of the existing administrative and institutional arrangements is recommended while planning to implement a new strategy. Due care needs to be given to concomitant resource allocations which will be required and the revisions need to be kept to the minimum in order not to upset the existing arrangements too much.

- **Documentation is important.**

The municipal records and information database are essential for providing the vital input required by the administrators and planners to understand the village-specific and lane-specific needs and requirements for implementing a robust SWM system. Staff job descriptions, duty rosters and maps (either printed or hand-made) are ‘must-haves’ in any TMA. Records or a database can assist to categorise the types and volumes of different waste generators and help planners determine the different management processes that can be used to cater to each situation. It also provides leading information to plan the allocation of resources e.g. staff and vehicle deployment etc. effectively.

- **Peoples’ participation - especially of women and youths- is imperative.**

Social mobilisation for environmental care is an important element of SWM. It recognises public education through Behaviour Change Communication (BCC) campaigns as an important corollary in the context of current

socio-economic pressures and complexities. It also envisages creating institutional mechanisms to engage the town residents in municipal planning and decision making. Communities, especially women, youths, elders and children may be mobilised and organised by formation of special groups e.g. SWM Committees or School Environment Societies/Clubs as partners in this regard. Influential persons/groups such as the clergy, local politicians, traditional leaders (maliks) or community elders can be involved.

- **Stakeholder’s partnerships need to be developed.**

Institutional mechanisms to promote sustainable partnerships with different stakeholders such as the residents, civil society organisations and the private sector are at the core of an integrated SWM system. Local CBOs such as the ‘Tanzeeeme Tahafuz e Mahauliat’ (organisation for environmental protection) in Barikot as well as the Mingora based Environmental Protection Society (EPS) can play a vital and sustained role in mobilising and garnering community participation and buy-in for the strategy under consideration.

- **The informal sector needs to be recognised as a vital partner.**

The urban informal sector is a critical part of the whole waste management system of the urban centres and towns. It is therefore imperative to recognise the presence and ability of the informal sector to assist and facilitate the operations of the municipal SWM.

- **‘Waste’ should not be wasted.**

Waste is a valuable commodity which can be utilised for economic gain or recovery of expenses. It does not make economic sense to waste this “useable waste”. The 3R principle (Reduce, Reuse, and Recycle) needs to be proactively advocated for and supported both at the policy level as well as programme (planning and implementation) levels.

At source segregation of organic and inorganic waste and home level composting appears to be

an effective primary mode to meet this challenge. Composting alone can prevent a major part of the household waste from being a municipal problem and, instead, convert it into an environmental asset. Demand-creation activities amongst residents and other waste generators need to be promoted so that they are ready to support municipal SWM efforts and seek municipal guidance and follow-up in this respect.

- **People need affordable solutions.**

The society seeks easy solutions which are convenient to and affordable for the individual and family. Changing their attitude and habits is a formidable task. Previously tested and accepted methods can be modified and implemented with very little effort. In addition, introducing innovative solutions calls for measures that do not require households to go out of their way and routine. The strategy needs to balance the municipality's need for cost recovery with the community's perception of equitability.

- **Free services are less sustainable.**

Local authorities can no more provide waste collection services free of charge. In addition to being financially unsustainable, free services permit careless and unrestrained anti-social behaviour which is also a moral hazard. The proposed strategy needs to be based on the premise that generators of waste must share the costs of waste management. A number of service-charging arrangements are available and can be tried e.g. community or municipality-designated and paid door-to-door 'Jamadars' (sweepers or waste collectors), community model of fee-for service, taxation (collected by TMA or out sourced) etc.

- **Lack of financial resources is not the main issue.**

Globally, a considerable percentage of annual local government budgets are utilised for the management of solid waste. The amount spent daily is substantial. The reason for inadequate management is more a problem of planning and management than a lack of finances. The strategy will focus on relying upon revenue

generated locally. Dependence on provincial grants, financial assistance from development partners and NGOs would be de-prioritised as a backup facility; to be utilised when local revenue generation is insufficient.

- **Landfill should be gradually minimised.**

The landfill approach for disposal of waste is generally being replaced globally with alternative techniques to reduce, reuse and recycle the quantum of waste generated within a locality. The strategy will promote a gradual shifting of focus from this approach while keeping local realities and requirements in view.

- **SWM must be seen in a wider context.**

The strategy acknowledges that SWM is no more a limited public health engineering responsibility. It is a much wider task and, therefore, must be seen in the context of comprehensive, integrated, planning and management of the total town environment. It requires the municipality to coordinate with and integrate all the major stakeholders at the local level including, amongst others: a) the community and its representatives, b) local civil society/CBOs, INGOs/NGOs, c) informal waste sector workers (IFWS) d) business and commercial sections of the community, e) public and private groups/associations related to the agricultural/farming sector, agencies & organisations working on environmental issues, health sector, tourism, communications and works department etc.

4.5 The Strategy

This strategy gives a priority listing to the waste management options available with the active involvement of all stakeholders. Institutional capacity of the municipality will be improved by streamlining SWM as part of the municipality's overall approach to environment planning and management. Institutionally, SWM will not be perceived as an isolated task. It will be brought into the mainstream of municipal planning and administration. Necessary institutional changes will be made to achieve this shift of emphasis and positioning.

Participatory institutional mechanisms will be introduced to engage partnerships and public participation and to search for innovative technical solutions to SWM problems. Human resource development too will receive due attention. The staff will receive due orientation to the new approach of waste reduction and recycling as well as collection and disposal.

The promotion of waste minimisation at source, which aims at reducing the amount of the waste produced, is part of the strategic shift in policy as it is the most effective way to reduce the quantity of disposable waste, the cost associated with its handling and its adverse environmental impacts. Reuse, recycling and composting technologies will be advocated for as moderately suitable technologies. Land-filling will be gradually de-emphasised as the last option of the system hierarchy

This strategy aims at helping the Barikot municipality implement the national guidelines for SWM in a manner that suits the local conditions. It derives power from the Khyber Pakhtunkhwa Local Government Act 2013 and the Hospital Waste Management Act; 2005.

The Barikot SWM strategy will be based on a four-pronged approach; strengthening the institutional capacity of the TMA Barikot to better manage their solid waste problem, engaging major local stakeholders in the implementation of the strategy, utilisation of appropriate technical options to reduce, reuse & recycle waste and finally, the promotion of good governance and utilisation of available legal frameworks.

The details are as follows:

a. Strengthening SWM institutional capacity of Barikot municipality

The municipality will pursue the following measures to improve its institutional capacity to address SWM issues.

- Re-designing of institutional arrangements & municipal operations
- Capacity building for SWM staff
- Update and follow up of an implementation plan for the SWM strategy
- Regular process documentation
- Improved management & monitoring

b. Instituting an affordable mix of appropriate technical options to reduce, reuse & recycle.

The municipality will emphasise the use of an affordable mix of appropriate technical options and thus will cease to depend solely on the conventional collection and disposal method and work towards the creation of an environment friendly town:

The proposed mix of options is:

- Development of basic data on waste generation and disposal
- Promotion of waste reduction at the source of generation
- Separation of waste at source of generation
- Door to door collection of household waste managed by community
- Return of recyclable material to the waste bank
- Composting & kitchen-gardening
- Scientific and technically sound handling of clinical and hazardous waste
- Set up polluter pay system for special wastes like demolition waste, some hazardous wastes, poultry waste, slaughterhouse waste etc.
- Sanitary landfill as the last resort

c. Engaging the major stakeholders in the implementation

Stakeholder participation is the fulcrum of the new strategy. The strategy is built on the premise that SWM is not a simple public health engineering exercise. It requires the participation of all stakeholders including residents which are the users of town facilities. The Barikot municipality will use the following approaches to mobilise their cooperation and support.

- Creation of institutional mechanisms such as a Consultative Committee on SWM representing all stakeholders at municipality level,
- Engagement and facilitation of NGOs and CBOs with a mandate to work on environmental issues,
- Recognition and facilitation of the private/informal waste sector (IFWS),
- Design and implement community-based civic education programmes and a Behaviour Change Communication campaign,
- Formation of school/college environment clubs to educate students for their involvement in reduction, segregation at household level and reduction in littering at town level and to act as catalyst in the social mobilisation process,
- Publication and dissemination of waste collection schedules (primary collection & secondary collection),
- Development of a monitoring system for secondary collection that involves stakeholders,
- Promoting multiple partnerships,
- Continued engagement of the private and informal waste sector to involve in recycling business,
- Encourage community groups and associations such as CSOs/CBOs and agricultural societies etc,
- Strict appraisal of construction plans to reduce building waste.

d. Promotion of good governance and utilisation of the legal framework

- Improved citizen participation and feedback,
- Improved public image for the municipality,
- Transparent and accountable governance,
- Commitment to available laws on environmental protection/SWM etc.

The chapters below provide a detailed explanation on steps to be taken in the thematic areas of the SWM strategy mentioned above from A-D.

4.5.1 Strengthening of SWM institutional capacity

Redesigning of institutional mechanisms & municipal operations

The SWM system in Barikot is represented by a hierarchical structure headed by the Sanitary Inspector. Changes in the present institutional structure e.g. more staff, more supervisors, more inspectors, higher mobility and visibility, comprehensive mapping/zoning, duty rosters, generation of waste database, generation of volume and composition of waste in various zones, stakeholder mapping, involvement and participation of the community, regular meetings of SWM Committees etc., the incorporation of all these factors in the planning and daily routine of the TMA is called redesigning of operations and psyche.

The municipality will create the necessary institutional mechanisms to hold regular consultations of SWM Consultative Committees at village and town levels to enlist regular involvement of main stakeholders in the implementation of this strategy. Members of the committee will be chosen from the influential segments of the community e.g. community elders, clergy, teachers/headmasters, head of trade union, members of the informal waste collector system.

Capacity building for SWM

The Barikot municipality will take measures for institutional strengthening through induction of professionals, human resource development planning and training of staff on technical and management issues linked to SWM.

The new staff will be given due orientation to the new strategy and will be constantly exposed to new information on the subject. Training and exposure of staff will receive special attention. A training manual on the SWM system and a handbook will be compiled and distributed among all staff members and partners in SWM detailing the guidelines and rules on (a) primary collection, (b) segregation, (c) secondary storage, (d) secondary collection & transportation, (e) processing and disposal of solid waste. Both documents will be developed in Urdu language.

Update and follow-up of an implementation plan

The SWM Action Plan will derive from and follow the approach/vision of the SWM strategy. It is designed to positively transform the SWM functions, operations and implementing institutions, provide a reliable, sustainable house-to-house municipal waste collection service to every waste generator in the town of Barikot, achieve a recycling efficiency of 50% by 2019, ensure that all residual waste is transported and disposed of in an environmental safe and socially responsible manner, and in conjunction with other stakeholders, make progress in initiating and improving the town's medical SWM systems.

4.5.2 Engaging an affordable mix of appropriate technical options to reduce, reuse & recycle

Public education to enhance environmental awareness

The municipality, in collaboration with schools, other related agencies and NGOs, will develop and conduct town wide, periodic, social mobilisation campaigns to raise the environmental awareness level of the public and the town residents in order to obtain their cooperation towards implementing the SWM strategy and make the town "environment-friendly". The municipality will organise competitions and rewards to recognise the services of environment friendly residents and institutions in collaboration with the private sectors and NGOs.

Primary collection of household waste

The town will gradually move to a individual household collection system while encouraging segregation and recycling which will bring monetary incentives to the families and/or scavengers. Use of compost bins or compost beds will be promoted as part of the recycling effort. Door to door collection

Regular process-documentation

The local authority will consider documentation of process and progress as an integral part of the administration and decision making process. Necessary mechanisms will be put in place to obtain regular reports and datasheets on SWM issues.

Management and monitoring

The monitoring of implementation of this strategy for SWM in the Barikot municipality will be coordinated by a consultative working group based within the TMA Barikot.

The SWM consultative working group will continuously review the implementation progress. They will also promote and monitor household level compliance with the 3R principle and will also keep the TMA functionaries informed of non-arrival of sanitation staff or delay in service provision.

will be paid by the households. Accordingly the municipality will offer door to door collection and remain responsible for secondary collection and disposal of waste.

Organising door-to-door collection of waste shall be an irreversible strategic approach. This is the only way to prevent residents from dumping their garbage out. With the popularisation of home-based composting, it is assumed that the frequency of waste collection will reduce considerably. Under the door-to-door policy, the tehsil municipal administration will plan and synchronise the meeting of primary (handcarts, wheelbarrows) and secondary vehicles (trucks, trolleys) at appointed times and place. Adjustment of timing of primary and secondary collection will be done in an appropriate way, to reduce the storage time of waste at secondary collection points.

The informal workers/scavengers, while not considered as employees of the local authority, can be regarded as important associates of the SWM

system in the town and should be involved to the extent that municipal resources would permit. They may be provided with wheelbarrows/handcarts, basic implements, uniforms, identity cards and their services utilised for sorting of waste at the secondary collection points or landfill sites in lieu of rights for collecting and sale of reusable waste.

Secondary Collection

The municipality will designate secondary collection points within the community and construct walled enclosures (where possible) to manage the storage properly. The community should be involved for allocating appropriate spaces/land for secondary collection points. The schedule of collection should be notified at these points so as to facilitate timely collection of waste by the municipality. The municipality will develop a town map as well as a proper route plan with time estimations to facilitate its own staff.

Creation of an environment friendly town

The TMA will be responsible for developing innovative approaches to involve the community in environmental sanitation. It will promote local level discourse around this issue by arranging walks, cleanliness drives, public gatherings, discussions, seminars and competitive field activities and sports events.

SWM must be seen as a comprehensive allied task. Road sweeping is integral to SWM too, though road cleaning is generally perceived as a separate work realm with many responsible parties. Depending on the available resources, all public roads and lanes will be swept regularly, preferably daily, under the supervision of the municipality. They may work in the early hours of the morning and again in the early afternoons to keep the town streets clean for the morning and evening traffic peaks. Priority areas and timelines will be defined by the municipality if not all roads can be swept daily.

The municipality will provide litter-bins for pedestrians and commuters on busy roads, bus stations, slaughter points and main village lanes. An average of one litter bin for every 100 meters of road length will be adopted as the planning norm. In crowded areas such as market place and bus stands, the frequency will be increased to 50 meters at the

minimum.

Promotion of waste reduction at the source of generation

Awareness-creation and an education programme will be organised in public places and schools to educate and mobilise the residents to apply the basic principles of 3Rs (reduce, reuse and recycle) and by that minimise waste and particularly discourage the excessive use of polythene and plastic products by replacing it with cloth bags.

Guidelines are to be developed for shops and institutions to reduce waste generation through reuse and recycling of packaging materials. Where possible, the users will be encouraged to re-use polythene and paper. The use of material and products such as plastic and paper plates and cups will be discouraged through public campaigns. Instead, the use of conventional and more permanent material like ceramics crockery and cloth napkins will be promoted. The restaurants, hotels and institutions will be encouraged to use re-usable material to the best possible extent.

Proper disposal and reusing of construction rubble will be an important aspect of the new strategy. Currently, huge volumes of this waste go to the drains and thereby do not only mean 'wasting' the valuable waste but also a blocking of drains.

Separation of waste at the source of generation

Segregation of waste at the point of origin i.e. house, office, school or institution, will be a non-negotiable and critical element of the strategy in a second phase. As a deterrent, a special fine may be collected from households that dump mixed waste. The Barikot municipality will direct the households, shops and institutions not to mix recyclable waste with biodegradable waste and will encourage them to keep the biodegradable and non-biodegradable, recyclable and non-recyclable waste in separate containers or bags for collection by the informal sector recyclers or by the approved SWM staff by municipality.

Regular education and public awareness sessions will be organised in each locality with the help of local CBOs/NGOs. Through such sessions, a 'No separation-No collection' policy must be

communicated and adopted using participatory techniques. Citizens will also be informed on how to compost the kitchen waste and how to separate the non-compostable waste for municipal collection or direct sale.

Return of recyclable material to the waste bank

The municipality will recognise the services provided by the private informal sector groups. Therefore, as an integral part of the SWM strategy, the municipality will facilitate its operations through existing mechanisms such as (a) registration of these service providers (b) regular consultation with them (c) issuing an identity card system to provide recognition and legal protection to the group.

The municipality will also facilitate the development of waste banks for purchase of recyclables directly from residents through discharge points and/or permanent shops provided by the municipality.

In the second phase the municipality will encourage recycling as a livelihood through area-based waste recycling enterprises as well as coordination with different recyclers. It will also facilitate, recognise and build networks with interested CBO's, IFWS or community level waste recycling and purchasing agents and further encourage the entry of CBOs in the recycling business.

Composting

Composting of the bio-degradable portion of generated waste will be promoted. Bio-degradable waste from residences and small scale generators will be composted at the point of origin using composting bins and other appropriate and low-cost technologies. Home composting will be encouraged by promoting methods such as micro credit schemes for purchase of compost bins.

Bio-degradable waste from large scale generators (hotels, restaurants, hospitals, markets etc.) and residences where home composting is not practical will be composted in municipality supervised composting plants (disposal sites) with simple technologies like windrowing, etc. for which a reasonable fee will be levied to commercial entities.

All households will be encouraged to purchase and use compost bins. As part of the strategy, the municipality will provide market information, negotiate with the suppliers and arrange for higher purchase systems. An appropriate subsidy system will be developed for the poorer sections of the town to obtain the bins.

The Barikot municipality will adopt a selective methodology for subsidies to cover only the poorest groups that cannot afford to buy the compost bin. Schemes such as micro-credit or pay-by instalments will be introduced for the purchase of compost bins by these community groups/individuals.

Scientific handling of clinical, chemical and hazardous waste

The producers of bio-medical and other hazardous waste that can threaten public health will be made primarily responsible for disposing such waste under the supervision and care of the municipal authorities. For this, special guidelines will be developed and issued by the municipality following the rules issued for the same by the Ministry of Health. Biomedical and pathological waste including body parts of humans will be disposed of through methods that conform to safety standards stipulated by the government and will be incinerated under supervision of the municipality. The municipality will insist on placing special containers at sorting stations, recyclable collecting centres or other public places for the deposit of hazardous waste.

The municipality will take suitable steps to encourage the households to store their household hazardous waste (batteries, aerosol cans, razor blades, bulbs, and tube lights) separately for discharge on publicised days in different areas of the town.

Sanitary landfill as the last resort

Landfill site will be used sparingly and only as a last resort. It will help increase the longevity of the sites in the context of dwindling land supply. Maximum effort will be made to reduce organic material and recyclables being land filled.

Suitable disposal sites will be located with the help of local people or the consultative working group on SWM of the TMA. The LGE&RDD will be approached and approval solicited to make contact with the owners of potential sites. The necessary amount may be budgeted in the annual development plans. This can also be processed on a shared basis with other nearby municipalities if resources are limited. Better emissions control systems and post-fill monitoring mechanism will be introduced to minimise possible contaminations.

Scientifically appropriate disposal sites will be designed and will have up to four separate processing areas,

- i. Composting yard,
- ii. Recycling area,
- iii. Incinerator, and a
- iv. Landfill site.

In the second phase, after the development of proper disposal sites, the weigh bridge at the refill site will be installed to direct the dump trucks to the compost yards. The bio-degradable items will be composted and only the non-degradable balance will go for landfill. For this to happen, the responsibility of managing the land fill site must rest with separately trained staff.

Landfill sites will be lined with fences and will follow standard land-fill management and monitoring procedures related to daily covers, leachate treatment and gas treatment facilities etc. Waste will be fully covered during the entire period of transport between the point of origin and the final landfill.

Environmental approval for construction plans

New plans for construction of houses, business, commercial and manufacturing premises as well as large public institutions will be rigorously examined by the municipality to ensure that they have adequate provisions for treatment and reuse of their waste, both solid and liquid.

4.5.3 Engaging the major stakeholders in implementation

Presently, the primary collection and transfer to secondary collection points (community-designated dumping sites) is done mostly by the community itself. Waste hawkers and rag-pickers also play a minor role through door to door collection and scavenging respectively. Various community groups and institutions are also playing their role. Chief amongst these are the business community, education sector, local CSOs, media, politicians and community leaders such as the clergy etc. The following are important steps in the integrative management of town waste.

Stakeholder mapping and analysis

Stakeholder mapping is a process to determine a key list of stakeholders who have a significant impact or role in the solid waste management strategy.

The process can be broken down into four steps:

- i. Identifying: listing relevant groups, organisations, and people,
- ii. Analysing: understanding the stakeholders, ranking/categorising stakeholders by relevance and identifying issues,
- iii. Planning and managing stakeholder communications,
- iv. Engaging with the stakeholders.

The following is a sketch of the most potential stakeholders for the SWM strategy in Barikot.

SWM STAKEHOLDERS' MAP: TEHSIL MUNICIPAL ADMINISTRATION BARIKOT:

Stakeholders	Categorisation			Preferred communication method	Management strategy
External	Position	Interest	Influence		
Community: Household, politicians, clergy	Key	Low	High	Daily interaction with sweepers/ sanitary workers, hand-outs, brochures, feedback surveys	Keep actively involved
Informal waste sector: Shopkeepers, scrap dealers, scavengers	Primary	High	Low	Regular meeting	Keep involved through regular visits for sharing strategies and taking feedback
Public and private institutions: students and staff of schools, colleges and technical institutions	Secondary	Medium	Medium	Lectures are key events	Involve in key events, essay competitions, home assignments
Market/small businesses: shop keepers, small industry owners, peasants	Primary	High	Medium	Regular meeting	Regular (monthly) coordination meeting, best performance awards, custody of waste bins
CSOs/NGOs: e.g. Environment Protection Society(Swat), Anjuman-i-Tahafuz-i-Mahaulit (Barikot)	Secondary	High	Medium	Regular reporting	Involvement/role in SWM strategy, regular monitoring and feedback meetings (monthly)
Media: local newspapers, radio stations	Secondary	High	High	Regular (monthly) reporting	Regular involvement in key events, press statements by TMA, regular monitoring and feedback meetings
Internal					
LGE&RDD: Minister, Secretary, Secretary LCB	Primary	High	Enabler/ blocker	Regular (monthly) reporting	Keep involved
Tehsil Municipal Administration: Tehsil Council, Nazim, Chief Municipal Officer, Sanitary Inspector, Sweepers	Key stakeholder	High	Main driver of SWM strategy	Daily reporting and feedback	Keep all stakeholders involved

Creation of institutional mechanisms

Consultative Committees on SWM and regular town consultations will be encouraged to involve the stakeholders collectively. Such committees will act as an advisory board and provide the TMA with feedback and recommendations regarding the existing waste collection, disposal and processing facilities and network them into a single system with private sector, informal sector and the community as active partners. The municipality will continually review the progress of the strategy, assisted by the Consultative Committee on SWM, which will meet on a regular basis.

Continued engagement of the private sector

The municipality will continue to mobilise all stakeholders including the private sector for maintaining town hygiene and sanitation. As a strategic option, the Barikot municipality will engage more than one such partner to promote healthy competition and self-assessment. The municipality will restructure the present SWM system to involve these stakeholders in a formal manner i.e. the private sector, rag-pickers, waste hawkers and recyclers into a comprehensive solid waste management system.

Engaging CBOs & NGOs

Civil society organisations working within the town on environment issues will be part of the Consultative Committee on SWM and advise and assist the municipality regarding the implementation of the strategy. Municipality will engage and facilitate NGOs and CBOs to involve themselves in SWM. Where such organisations do not exist, the municipality will identify community members for the committee. Women participation and membership will be promoted.

4.5.4 Promotion of good governance and utilisation of the legal framework

Promoting dialogue and improving feedback mechanisms

The importance of promoting a positive engagement and dialogue process between the community and government structures is one of the central pillars of the governments' reconciliation policy for the Malakand region in an effort to improve the people's trust and confidence in the latter's ability to provide quality services.

Conduction of community-based BCC programmes

Barikot Municipality will organise regular town wide behaviour change communication (BCC) campaigns to educate the residents, commercial establishments and public institutions on the new SWM strategy, rules and guidelines with the view to engage their active support and participation in its implementation. Door-to-door education by official teams is the most effective way of public education, sensitisation and awareness-raising as proven by the SWEEP project of the Rawalpindi Tehsil Municipal Administration. The School Environment Clubs will be a strong partner in this effort.

Formation of School Environment Clubs

Town schools and colleges will be encouraged to form School Environment Clubs as part of the SWM strategy to promote a litter free school/college environment, segregation of waste both at school and home and to take the message of making Barikot an environment friendly and clean town to their neighbourhoods and communities.

Primary and secondary level students should be mobilised through School Environment Clubs to perform public awareness raising functions. The municipality, in collaboration with local NGOs, the Ministries of Environment and of Education and development partners have potentials to train and assist these clubs to play a more proactive role in environment promotion work.

Publication of waste collection schedules

The municipality will notify the waste collection schedule & times on a regular basis in each village by putting up appropriate sign-boards on the bins/ collection points.

SWM provides a valuable opportunity to develop a feedback forum for receiving the citizen's feedback and rapid alleviation of grievances. At the same time the forum can also be utilised by the municipality to promote its own agenda for change, to educate the public regarding the rules and regulations it is expected to follow as well as to propagate its erstwhile achievements in the SWM field.

Various channels need to be explored for appropriateness as mediums of dialogue and discourse. Mass media (including print media), cell and landline based systems, the internet (facebook/twitter) as well as various direct dialogue forums are amongst these.

Placement of 'complaint boxes' is a time tested method of receiving feedback. But the comments or complaints need to be given serious consideration and religious follow up for this method to be perceived as an effective channel.

Strict enforcement of laws and policy

The LGE&RDD will assess the existing legal and administrative provisions that govern SWM in the LGA 2013; specifically schedule 5 (list of offences which are punishable by law) and consider appropriate revisions to make the framework more efficient, speedy, resident-friendly, and pro-poor. It will review the available environmental and hazardous material related laws in an effort to adapt these to local conditions for implementation after giving wide publicity, followed by community level public education.

The Barkot municipality will assess and list its requirements in terms of new rules and regulations and communicate these to the appropriate authorities for carrying out the legal processes for their promulgation. Consequently, the TMA will enforce effective disciplinary actions as prevention, preceded by a time-bound phase of public education, domestic sensitisation and social mobilisation to help enforce laws and policy.

The new legal code should acknowledge that SWM is a shared responsibility between the municipal SWM committee, residents, and the formal and informal sectors. It will prescribe to the following regimens, amongst others:

- i. The residents hold responsibility for the separation and composting of waste at household level, they are socially responsible for disposal of residual waste at collection points designated by the TMA and also for monitoring of the cleaning of their streets and lanes.
- ii. The municipality will mainly focus on collection and final disposal of the residual waste, promotion and facilitation of optimal reuse and recycling, productive engagement of the private sector - both formal and informal - as SWM partners as well as the enforcement of laws and the prevention of violations. The municipality will strictly enforce the environment-related laws to ensure effective management of solid waste in the town.
- iii. The current practice of indiscriminate and un-supervised burying and burning of waste in the town can cause health hazards and threaten the ground water quality. Therefore, the local authority will establish an authorisation procedure for waste processing and disposal facilities.
- iv. Construction material (demolition debris) should be transported daily at owners cost to designated plots where recycling facilities are available. Municipal trucks should not be provided for such transport. The town will not permit throwing waste on public places including streets, lanes, and drains. Owners of all premises and buildings are made responsible for separation of solid and dry waste in different bags or containers before handing them over to collector. The municipality should be empowered with discretionary powers not to accept non-separated waste.

An effective punitive action process will be enforced as a deterrent, preceded by a time-bound phase of public education, domestic sensitisation and social mobilisation. Where garbage and litter bins are an absolute necessity for social and other reasons, the municipality will ensure that such interim storage depots will have proper covers and the ground is kept litter-free through regular cleaning.

CHAPTER

5

ACTION PLAN

Section five: Explains the details regarding the implementation of the strategy and the steps involved in the plan of action. The action plan is divided into 03 phases spread over a time period of 05 years.

Each phase covers a specific time line and delineates a progressively increasing level of service provision.

Section 5.1: Provides the reader with an outline of the steps to be undertaken in each phase of the action plan.

Section 5.2: Offers a detailed perspective of the activities of each phase as well as a review of the extra resources needed for each level of improvement.

The SWM Action Plan draws upon and follows the approach and vision of the SWM strategy. It is designed to transform the objectives of the SWM strategy into practicable, time bound activities. It is composed of three phases or time frames for implementation each leading to a higher level of

organisation of and service provision by the TMA. The total duration of the action plan is five years from the initiation of activities, and corresponds to the SWM strategy's stated goal of achieving a recycling efficiency of 50% by 2019. The plan is further elaborated below.

5.1 Outline of the Plan

Phase 0: Basic Level; 06 months

- i. Collection of basic data, development of a baseline, benchmarking, and updating of maps, drawing up of route maps.
- ii. Collection of waste from the dumps within community, roadside and empty plots on regular basis.

- iii. Cleaning of big dumps.
- iv. Proper disposal of collected waste with mud covering in nearby trenches.

Phase 1: Middle Level; 24 months

- i. Carrying out of a needs assessment followed by the initiation of capacity building measures for municipal officers and other stakeholders, the reorganising of institutional arrangements, the clarifying of roles, responsibilities, job descriptions and duty roster.
- ii. Development of a databank containing, amongst other parameters, information on demographic distribution and seasonal changes of waste generation and composition, vulnerable population, taxation and statistics, details of disposal of various categories of waste etc.
- iii. Development of an action plan for providing basic SWM services to residents including primary collection, disposal at designated secondary collection points, regular emptying of secondary collection points by the municipality, and agreement on service charges. Involvement of stakeholders and citizens in the development.
- iv. Development of a waste collection schedule that outlines garbage collection according to the site map. Notification of collection times at secondary collection points.

- v. Formation of consultative working committees in order to develop an institutionalised mechanism for SWM.
- vi. Development and implementation of a communication and social mobilisation programme in order to promote public awareness regarding responsibilities of the state and the community in environmental issues including rules and regulations (Behaviour Change Communication - BCC).
- vii. Development of basic infrastructure (secondary collection points, drains, culverts and pathways) based on the databank and utilising the area maps.
- viii. Acquisition of land for disposal sites and initiation of sanitary landfill measures.
- ix. Organisation of the IFWS and segregation at secondary collection points by the IFWS.

Phase 2: High Level; 30 months

- i. Construction and operation of the sanitary disposal sites including composting facility, recycling, incineration and landfill.
- ii. Further support for recycling through involvement of the IFWS and public awareness initiatives.

- iii. Further capacity development for municipal SWM.
- iv. Emphasis on waste reduction through (i) at source segregation and return of recyclable material to the waste bank, (ii) composting.
- v. Scientific handling of clinical, chemical and hazardous waste.
- vi. Promoting Private-Municipal Partnerships.
- vii. Strict enforcement of Laws & Policy.

5.2 Detailed Activities of the Action Plan

The activities listed under each phase of the action plan are detailed in the sections below.

Phase 0: Basic Level; July 2014 to December 2014

Details of Activities of Phase 0

- Cleanliness campaign for the cleanliness of dumps and drains within the town.
- System development (Development of Maps, route planning, time scheduling and duty roster of employees) for regular collection of waste from designated and un designated dumps.

- Development of different route plans for five tractor trolleys.
- Awareness campaign regarding the environmental and health hazards of waste burning.
- Display awareness messages regarding waste burning as offense.
- Identification of land near the town for dumping of collected waste with mud cover.

Extra resources needed for basic level improvement

The following resources are needed to augment the existing capacity of the TMA Barikot and prepare it for undertaking the improvements needed at the basic level of the SWM strategy.

Required number of workers	Equipment	Recycling	Resources needed
15 Sanitary Workers (2 with each trolley + 2 at dumping site)	3 tractor trolleys tractor 1 shovel for dumping site	25 % at dumping site by scavengers before mud cover	Salary of staff according to local government (LG) rules
3 Tractor Drivers			Fuel cost (depends on distance of dumping site) for 16 trips
1 Shovel Driver	1 motorbike for the Sanitary Inspector		*Detailed expenses are given below

* Cost for

- Purchase of a motorbike.
- Salary of extra sanitary workers.
- Fuel costs.

- Development of an awareness programme and printing of IEC material.
- Rehabilitation/construction of trenches for dumping.

Phase I: Middle Level; Jan 2015 to Dec 2017

This phase includes the following components and activities;

- Formation of a Consultative Working Group and creation of institutional mechanisms.

- Development and implementation of a BCC programme in order to promote public awareness, mobilisation and a door to door collection system paid by the community, a proper storage system for secondary collection and regular secondary collection by the municipality.

- Segregation by sanitary workers at secondary collection points.
- Capacity building of municipality employees, restructuring of institutional arrangements, optimum decentralisation of municipal operations.
- Separate collection of hazardous waste.
- Acquisition of land for disposal sites.
- Development of drains, culverts and causeways as well as pavement of pathways.

First Six Months of Phase 1: Jan 2015 to June 2015

Detail of Activities of Phase 1

- Formation of a Consultative Working Group representing all stakeholders.
- Sharing of the SWM strategy and the Action Plan with the Consultative Working Group.
- Mapping of the town and route planning with time estimations.
- Basic detailed study on quantities and qualities of waste in different areas and development of a data bank.
- Designing and sharing of a basic SWM system for providing services to all residents.
- Designing of a community-based BCC programmes and preparation for its implementation.
- Restructuring of institutional arrangements.
- Developing and submitting a 'Statement of New

Expenditures (SNE)' detailing extra staff needs and resources.

Primary and Secondary Collection

- Development of SWM Coordination Committee ToRs, selection of members and provision of identity cards.
- Orientation of relevant TMA staff and SWM Coordination Committee members.
- Development of a door to door collection system; paid, supervised and monitored by the community.
- Finalisation of the selection of secondary collection points within the community, and motivation of people to dump waste there in a specific time.
- Daily waste collection from the secondary collection points at a given time.

Remaining Six Months of Phase 1: July 2015 to Dec 2017

Social Mobilisation

- Implementation of community-based BCC programmes.

Organisation

- Optimum community involvement in SWM operations:
 - Mobilise and involve existing community groups in SWM.
 - Formation of Mohallah/village level SWM committees in each village under the leadership of the elders.
 - Introduction of a door to door collection system.

- Formation of Environment Clubs in schools and college (SECs), especially at girl's schools and colleges, to involve youths and women in the process.
- Formation of SWM committees of traders.
- Facilitation of the involvement of NGOs and CBOs in SWM.
- Development of written guidelines on the SWM system for all staff members and partners in SWM, detailing information on: primary collection, (b) segregation, (c) secondary storage, (d) secondary collection and transportation, (e) recycling, processing and disposal of solid waste. Documents will be developed in Urdu language.

- Development of drains, culverts and causeways as well as the paving of pathways.

Secondary Collection

- Construct walled enclosure (where possible) around designated secondary collection points and write number and timing of secondary collection on it.
- Purchase of appropriate vehicles for secondary collection.
- Printing and dissemination of the waste collection schedules.
- Adjustment of timing of primary and secondary collection to reduce the storage time of waste at these points.
- Development of a participatory monitoring system by selecting responsible volunteers from the community; preferably the elder living or having a shop near a secondary collection point.
- Installation of a toll free number, as a complaint redress system, for information by the community regarding timely secondary collection on regular basis.

Recycling

- Recognition and facilitation of the private informal sector workers/scavengers.
- Provision of facilities (where possible) to Environment Workers (EWs) for the segregation of recyclables at secondary collection points to reduce the volume of waste for secondary collection.

Disposal

- Identification and acquisition of land for safe disposal of waste.
- Development of better emissions control systems and post-fill monitoring mechanism to minimise possible contaminations.
- Arrangement of fully covered vehicles during the entire period of transport between the point of origin and the final landfill.

Creation of an environment friendly town

- Cleanliness of the main roads, and display of boards on entrance, stating “Barikot – A town of Environment Friendly People”.
- Initiation of social incentives by introducing Environment Friendly use/Mohallah/Street/Shop/Class/School of the month awards.

Scientific handling of clinical, chemical and hazardous waste

- Registration and mapping of institutions, industry, hospitals, clinics, nursing homes, laboratories producing hazardous waste.
- Issuance of special guidelines following the rules issued for the same by the Ministry of Health for management of biomedical and pathological waste, including body parts of humans, through methods that conform to safety standards stipulated by the government.
- Training of polluters on hazardous waste management.
- Separate collection and safe transportation of hazardous waste to nearby place for incarnation.

Environmental approval for construction plans

- System development for rigorous examination and approval of new plans for construction of houses, business, commercial and manufacturing premises as well as large public institutions to ensure that they have adequate provisions for storage, disposal and treatment of their waste, both solid and liquid.

Strict enforcement of Laws & Policy

- Public notification of legislation regarding SWM.
- A time-bound phase of public education, domestic sensitisation and social mobilisation to help enforce laws and policy.
- Fixing of responsibility and penalty for polluters regarding house hold, commercial, hospital and construction material (demolition debris).

EXTRA RESOURCES REQUIRED FOR PHASE 1

Required number of workers	Equipment	Recycling	Resources needed
18 Sanitary Workers for door to door collection + 2 at dumping site (each will cover 100 - 150 houses) 1 Sanitary Inspector 2 Tractor Drivers 1 Shovel Driver 1 Shahzor Truck Driver	2 tractor trolleys 1 Shahzor Truck 1 tractor 1 Motorbike for the Sanitary Inspector 1 Shovel for the dumping site	Segregation of 80 % at secondary collection points by municipality workers before transfer to disposal site	Salary of staff according to LG rules Fuel cost (depends on distance of dumping site) for 16 trips *Detailed expenses are given below

* Cost for

- Salary of extra sanitary workers.
- Fuel costs.
- Human resources.
- Hiring of vehicles and purchase of equipment & motorbike.
- Uniforms of TMA staff.

- Rehabilitation/construction of secondary collection points.
- Capacity building of staff and SWM Coordination Committee members.
- Acquisition of land for disposal site.
- Competitions and rewards.
- Development BCC programme and printing of IEC material.

Phase 2 – High Level; Jan 2017 – June 2019

This phase includes the following components and activities;

- Non-negotiable emphasis on waste reduction:
 - Awareness-creation and education programme in public places and schools to educate and mobilise the citizens to apply the basic principles of 3Rs and minimise waste and particularly to discourage the excessive use of polythene and plastic products by replacing it with cloth bags.
 - Encouragement of segregation and recycling at source.
 - Promotion of use of compost bins or compost beds as part of the recycling effort.
 - Reduction in the frequency of waste collection (primary collection) with the popularisation of home-based composting.
 - Issuance of guidelines for shops and institutions to reduce waste generation through reuse/recycling of packaging materials.

- Encouragement of users to re-use polythene and paper and use conventional and more permanent material like ceramics crockery and cloth napkins.
- Encouragement of restaurants, hotels and institutions to use re-usable material.
- Separation of waste at the source of generation.
- Motivate and enforce, by order, for households, shops and institutions (i) not to mix recyclable waste with biodegradable waste, (ii) store biodegradable and non bio-degradable, recyclable and non-recyclable waste in separate containers or bags for collection by the informal sector recyclers or by the approved SWM staff by municipality.
- System development for return of recyclable material to the Waste Bank:
- Recognition of the services provided by the private informal sector/community groups for organising the recycling of town waste.

- Facilitation to maintain recycling operations through strengthening existing mechanisms such as (a) registration of these service providers, (b) regular consultation with them, (c) collaborating with NGOs working with rag-picker (d) issuing an identity card system to provide recognition and legal protection to the group.
- Facilitation of NGOs / service provider/ community groups to develop Waste banks for purchase of recyclables directly from residents through mobile banks and/or permanent shops provided by municipality.
- Encouragement of composting of bio-degradable waste:
 - Composting of bio-degradable matter from residences and small scale generators at the point of origin using composting bins and other appropriate and low-cost technologies.
 - Encouragement of home composting methods such as micro credit schemes for purchase of compost bins.
 - Setting up facilities for composting at disposal site for the composting of biodegradable waste from large scale generators (some hotels, restaurants, hospitals, markets etc) and residences where home composting is not practical with simple technologies like windrowing, etc.
 - Introduction of a selective methodology for subsidies to cover only the poorest groups that cannot afford to buy the bin.
 - Introduction of micro-credit or pay-by-instalments schemes through CBOs for the purchase of compost bins.
- Encouragement of Kitchen Gardening:
 - Arrangement of training for Mohallah/Village level EMCs and lane managers on “Kitchen Gardening”.
 - Encouragement of residents to spare adequate land space to do home gardening. Composting organic waste could then become an important input as growing media or soil conditioner.
 - Setting up a seed shop with the help of the Agriculture Department for the timely provision of seasonal seeds to the residents.
- Scientific handling of clinical, chemical and hazardous waste:
- Development of a management system for hazardous waste management including penalty measures for polluters.
- Installation of incinerator on disposal sites.
- Separate collection and safe transportation of hazardous waste.
- Placing of special containers at sorting stations, recyclables collecting centres or other public places for the deposit of hazardous waste.
- Public education to encourage the households to store their household hazardous waste (batteries, aerosol cans, razor blades and tube lights) separately for discharge on publicised days in different areas of the town.
- Establishment of an authorisation procedure for waste processing and disposal facilities.
- Development of sanitary landfill:
 - Reduction of organic material and recyclables being land filled.
 - Development of suitable disposal sites probably on shared basis with other local authorities nearby. Better emissions control systems and post-fill monitoring mechanism will be introduced to minimise possible contaminations.
 - Development of Disposal sites with four components, (a) composting yard (b) recycling (c) incinerator and (d) landfill.
 - Installation of the weigh bridge at the refill site to direct the wet trucks to the compost yards.
 - Hiring and training of separate staff to manage landfill operation.
- Strict enforcement of laws and policy:
 - Strict Enforcement of laws to prevent violations.
 - Fining for throwing waste on public places including streets, lanes and drains.
 - Development of a mechanism for the daily transportation of construction material (demolition debris) at owners cost to designated plots where recycling facilities are available.

- Making owners of all premises and buildings responsible for separation of solid and dry waste in different bags or containers before handing them over to collectors.
- Empowerment of municipality with discretionary powers not to accept non-separated waste.
- Introducing burning of waste as offense.
- Development of a dedicated slaughterhouse and meat market:
 - Construction of slaughterhouses and meat markets.
- Development of proper system for disposal of slaughterhouse and poultry waste.
- Public Latrines:
 - Construct of well publicised public toilets at major intersections, bus stands and female-centered businesses. Arrangements for their maintenance must be ensured.

EXTRA RESOURCES REQUIRED FOR PHASE 2

Required number of workers	Equipment	Recycling	Resources needed
15 Sanitary Workers (2 with each trolley + 2 with waste bank + 13 for door to door collection (each will cover 100 - 150 houses)	2 tractor trolleys 2 Shahzor Truck Equipment for waste bank 20 Hand Carts	Segregation of 80 % at source by residents Segregation of remaining 20 % at secondary collection points by municipality workers before transfer to disposal site	Salary of staff according to LG rules Fuel cost (depends on distance of dumping site) for 16 trips
1 Sanitary Inspector	Equipment for landfill	Household composting of organic waste	*Detailed expenses are given below
10 Community Mobilisers	01 motorbike for the Sanitary Inspector		
10 staff members for landfill (10)			
2 Tractor Driver			
2 Shahzor Truck Driver			

* Cost for

- Development of a BCC programme and printing of IEC material to apply the basic principles of 3Rs through capacity building of staff and volunteers.
- Competitions and rewards.
- Purchase of appropriate vehicle for separate collection and transportation of recyclables.
- Purchase of compost bins.
- Seed money for establishment of waste banks.
- Research and development purposes and set

up of sites for experimentation of alternative technologies to recycle different types of waste.

- Encouragement of composting of biodegradable.
- Setting up a seed shop.
- Construction of a sanitary landfill system with four components, (a) composting yard (b) recycling (c) incinerator and (d) landfill.
- Installation of a weigh bridge.
- Construction of a Slaughterhouse.
- Construction of public toilets.

CHAPTER

6

FINANCIAL STRATEGY

Chapter six: The financial strategy outlines the possible mechanism for generating revenue to fund the various stages of the Solid Waste Management (SWM) strategy.

Section 6.1: Provides an overview of the models which can be utilised to meet the expenses for provision of services by the TMA; namely: Community Contribution, Direct Taxation and Commercial Contract System).

Section 6.2: Details the cost estimation for implementing the different phases of the strategy.

A separate budget or a financial mechanism to generate money for SWM is not included in the budget of most small municipalities. SWM expenses are managed from the different sources of income, like provincial development grants, budget allocations, local revenue generation from taxation e.g. immovable property tax, toll tax, services fees, cattle fair fees etc. which the TMA generates or receives. Additionally, the Tehsil Council is legally authorised to impose an SWM tax under the third schedule (part iii) of the LGA 2013.

6.1 Proposed models of payment by waste generators

The municipality cannot sustain the expenses accrued through the provision of services for the collection and ultimate disposal of waste. The public therefore needs to participate in some sort of equity based sharing of the expenses involved. The community has the choice to either fund part of the services, e.g. primary collection, through their own resources such as the hiring of sweepers or allow the municipality to

There are further ways of resource generation from polluters (residents, shopkeepers, clinics etc.) using the legal framework provided by the LGA 2013. These are:

- Community Voluntary Contribution
- Taxation - Polluter pay system

All three options are explained below:

arrange for such services and pay all or part of the expenses to the TMA.

Various models of payment for the waste management services are elaborated below along with the proposed financial outlay involved with each model.

Community Model

In the community model, residents or owners of a small neighbourhood shoppay a fixed amount e.g. Rs. 5 a day, for the collection of waste from their door step. The municipality arranges for the services of 'community sweepers' (locally called Bhangees or Jamadaars) and ensures the provision of regular services for these individuals. The sweepers collect

their monthly payments directly from the residents or commercial entities.

Shops in the commercial areas, hospitals/clinics, meat and poultry shops and small industries can be charged a bigger amount according to the volume of their generated waste.

Taxation Model

The taxation model operates along the principles of the 'polluter pays principle'¹² and taxes the whole community uniformly for the SWM system which the municipality puts in place. Safety nets are, however, put in place to cater to the needs of the vulnerable and extremely poor sections of the community. The model is further sub-divided according to the financial mechanism of management of these models.

A. Direct Taxation Model

The municipality may impose a SWM tax to the amount of which is determined after computing all public sector expenses on the service and distributing it amongst the main waste generators.

The resultant amount (e.g. Rs. 150 – 200) per household per month is collected through a regular collection mechanism such as monthly billing. Expected income of the municipality will be Rs. 750,000 - 10,00,000 per month (calculation based on 5000 households). The amount of taxation can also be computed and enhanced according to the volume or average daily weight of the waste generated through commercial institutions.

B. Commercial Contract Model

In this system the municipality contracts out (out-sources) part or whole of the SWM chain - from

¹²The 'polluter pays principle' states that "whoever is responsible for damage to the environment should bear the costs associated with it." (Taking Action, The United Nations Environmental Programme).

collection and transportation of waste to final disposal - to a private party/ contractor, either through a public auction or competitive bidding process using a fixed, pre-determined formula. The municipality has the responsibility of regulating the process to defend the rights of both the consumers as well as the contractor against

misuse and non-compliance of the conditions of the contract. The model has the advantage of freeing up human resource that can be re-allocated to perform other revenue generation activities such as octroi collection, sanitation and regulation or the enforcement of laws.

6.2 Cost estimation for different phases

Following are activities and a rough estimation of costs during each phase of implementation:

Phase 0: Basic Level to Six months

EXTRA RESOURCES NEEDED FOR BASIC LEVEL IMPROVEMENT

Activities	One time Cost
Cleanliness campaign for the cleaning of dumps and drains within the town	Rs. 50,000
Cost for development and printing of awareness material regarding the environmental and health hazards of waste burning	Rs. 10,000
Purchase of a motorbike (for daily monitoring visits)	Rs. 50,000
Recurrent monthly expenses	
Salary of extra sanitary workers	15 x 10,000 = 150,000
Rental cost for 3 tractors	150,000
Fuel costs (16 trips per day)	100,000

Phase 1: Middle Level to 24 Months

EXTRA RESOURCES REQUIRED FOR PHASE 1

Required number of workers	Equipment	Recycling	Resources needed
18 Sanitary Workers + 2 at dumping site (each will cover 100 -150 houses)	2 Tractor Trolleys 1 Shahzor(Hyundai) 2-ton pickup Truck	Segregation of 80 % at secondary collection points by municipality workers before transfer to disposal site	Monthly salary of staff Fuel cost (depends on distance of dumping site) for 16 trips
1 Sanitary Inspector	1 Tractor		
2 Tractor Drivers	1 motorbike for the Sanitary Inspector		
1 Shovel Driver	1 Shovel for the dumping site		
1 Shahzor Truck Driver			*Detailed expenditures are given below

*EXPENDITURE FOR FIRST SIX MONTHS OF PHASE 1

Activities	Recurrent monthly Costs
Salary of extra Sanitary Workers	20 x 10,000 = 200,000
Rental cost for 3 tractors +1 Shahzor (Hyundai) 2 ton pickup Truck	200,000
Fuel costs (16 trips per day)	100,000
Rental of land for disposal site	100,000
One time Cost	
Rehabilitation of community dumps (as secondary collection points)	200,000

EXPENDITURE FOR REMAINING SIX MONTHS OF PHASE 1

Activities	Recurrent monthly Costs
Salary of extra Sanitary Workers	20 x 10,000 = 200,000
Rental Cost for 3 tractors +1 Shahzor 2 ton pickup Truck	200,000
Fuel costs (16 trips per day)	100,000
Rental of land for disposal site	100,000
One time Cost	
Construction of new secondary collection points	200,000
Purchase of 1 motorbike	50,000
Competitions and rewards	200,000
Development BCC programme and printing of IEC material	50,000
Uniforms for Sanitary Workers	16,000

Phase 2, High Level - 30 Months

EXTRA RESOURCES REQUIRED FOR PHASE 2

Required number of workers	Equipment	Recycling	Resources needed
15 sanitary Workers 2 for waste bank + 13 for door to door collection (each will cover 100 - 150 houses)	2 Tractor Trolleys 2 Shahzor Trucks Equipment for waste bank	Segregation of 80 % at source by residents Segregation of remaining 20 % at secondary collection points by municipality workers before transfer to disposal site	Salary of staff according to LG rules Fuel cost (depends on distance of dumping site) for 16 trips
1 Sanitary Inspector	20 Hand Carts		
10 Community Mobilisers	Equipment for Landfill		
10 Staff members for Landfill	1 motorbike for the Sanitary Inspector	Household composting of organic waste	
2 Tractor Drivers			
2 Drivers for Shahzor Trucks			*Details expenditures are given below

*EXPENDITURE FOR PHASE 2

Activities	Recurrent monthly Costs
Salary of extra Sanitary Workers	15 x 10,000 = 150,000
Monthly rental cost for 2 tractors + 2 Shahzor 2 ton pickup Truck	240,000
Fuel costs (16 trips per day)	100,000
	One time Cost
Construction of new secondary collection points	300,000
Purchase of motorbike	50,000
Uniforms for Sanitary Workers	16,000
Competitions and rewards	200,000
Awareness campaign for waste reduction, at-source segregation and collection of recyclable material, promoting composting and kitchen gardening for homes	50,000
Purchase of land for disposal sites	700,000
Development of Comprehensive Waste Disposal System	5000,000

Extra resources needed in Phase 2:

- Construction and operation of a professionally designed disposal site including composting facility, recycling, incineration and landfill including installation of the weigh bridge at landfill.
- Further capacity-building for decentralised SWM.
- Awareness campaign for (i) waste reduction, at source segregation and return of recyclable material to the waste bank, (ii) composting, (iv) promoting kitchen gardening.
- Development of system for scientific handling of clinical, chemical and hazardous waste.
- Purchase of separate vehicles for collection and transportation of recyclables.
- Purchase of compost bins for home use.
- Seed money for establishment of waste banks.
- Setting up of sites for research & development purposes and experimentation of alternative technologies to recycle different types of waste.
- Training of separate staff to manage landfill operation.
- Construction of a slaughterhouse.
- Construction of public toilets.

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