

PART 1

GENERAL INFORMATION ABOUT THIS STUDY

1- PURPOSE OF STUDY

Following are the main purpose of the study.

- (i) To research the current problems related to environmental affairs of urbanization, which are related to social circumstances and development plan.
- (ii) To understand the efforts of Central, Provincial as well as District governments in solving the environmental problems.
- (iii) To carry out site investigation in Hayatabad township (a study area) to grasp the actual contaminated conditions caused by waste water discharges from industrial, domestic and human waste.
- (iv) To investigate the solid waste Management conditions in Hayatabad and to measure the quantity of dumped waste by applying the topographic survey on landfill site.
- (v) To determine the chemical and biological characteristics of the leachate sample and wastewater samples collected from pre- selected sites.
- (vi) To investigate the water demand from the usage and distribution system of the city water.
- (vii) To investigate the quality and quantity of Solid waste picked from different categories of homes, collection points and disposal site and also find out the recycle route and value.

2- BACKGROUND OF PESHAWAR CITY

The Peshawar valley appears first in history as forming part of the ancient kingdom of Gandahra. In 16th Century, the Emperor Babar had invaded Peshawar and took this route on his march down into subcontinent.

Peshawar is the Provincial Capital of the North West Frontier Province (NWFP). Peshawar is a frontier town, the meeting place of the sub-continent and central Asia. It is also a place where ancient traditions mix with those of today, where the bazaar in the old city has changed little in the past hundred years. Until the mid fifties Peshawar was enclosed with in a city wall and sixteen gates. Of the old city gates the most famous was the Kabuli Gate but only the name remain now. Across the railway line was built the new modern Peshawar, the cantonment, like the ones which the British built near every major city for their administrative offices, military barracks, residences, parks and shops.

The Peshawar “Sadder” (Cantonment) is a spaciouly laid out neat and clean township. The Peshawar of the British Period (1849 to 1947) is the Cantonment but the Peshawar of independent Pakistan is the vast extension of the city west and east. Westward, on the road to the Khyber Pass, stretches a long line of educational and research institutions.

The main features of Peshawar city are summarized as:

- 1. The walled city:**
The area within the wall constructed in 1840.
- 2. The Cantonment:**
The area including the military establishment, low density residential areas, the government enclosures and the Saddar and regional area bazaars.
- 3. Areas around the Walled City:**
In the early twentieth century, expansion of the areas around the walled city includes Sikandar Pura, Nishatarabad, Gulbahar, in the north east and Dabgari gardens in the west.
- 4. The Traditional Villages:**
Including Hassan Garhi, Nothia, Dheri Baghbanan, Nawan Killi, Tehkal Payan, Tehkal Bala and Pawake.
- 5. University Town:**
The low density residential area created for the elites.
- 6. Hayatabad:**
The satellite town developed by the Peshawar Development Authority (PDA), having all the modern services, infrastructures and facilities for its inhabitants.
- 7. Kacha Garhi Camp:**
The largest Afghan Refuges camp within the limits of the metropolitan. The city is now 25 Km from East to West and further expansion is not possible on this direction as it has reached the boundary of the tribal areas other than the Planned expansion at Hayatabad in the west unplanned and haphazard expansion is occurring in the various directions i.e., towards Dalazak road etc.
- 8. Regi Model Town:**
Regi Model township scheme is in progress. More than double in size of Hyatabad, Containing modern facilities developed by the City Development and Municipal Department (CD & MD) in the best interest of the government servants of the Province. The development work is in progress but it will take another 10 years for the town to be fully inhabited.

9. Population of Peshawar:

TABLE-1

POPULATION OF URBAN AND RURAL AREAS OF PESHAWAR, 1981 AND 1998 CENSUSES.

1981			1998			% change in population % age	Sex ratio (males per 100 females)	
Total	Urban	Rural	Total	Urban	Rural		1981	1998
1084347	566248	518099	2019118	982816	1036302	53.7	112	111

Source: Population Census Organization, Govt. of Pakistan, Islamabad.

TABLE-2

PESHAWAR MID YEAR ESTIMATED POPULATION BY SEX, 1997-98 TO 2002-2003

(In Thousands)

1997-98			1998-99			1999-2000			2000-2001			2001-2002			2002-2003		
Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female
2007	1055	952	2079	1093	986	2153	1131	1022	2229	1171	1058	2309	1213	1096	2391	1257	1134

Source: 1998 District census reports of NWFP, Population Census organization, Govt. of Pakistan.

10. Mean Temperature and Rainfall:

The altitude of Peshawar is 352 meters from Mean Sea Level (MSL). The mean maximum and mean minimum temperature of Peshawar are 31°C and 16°C respectively. The monthly mean rainfall in Peshawar is 40 millimeter (mm).

3- IMPLEMENTATION OF PAK-EPA AND NWFP-EPA

3.1 Organization on this study

Figure-1 shows the organization chart of this study. This study was carried out with total management and overall Planning by Pak-EPA. Pak-EPA with collaboration of NWFP-EPA conducted survey on urbanization, water environment, solid waste management and topographic survey of dumping site to find out the total dumped volume of the solid waste.

Japanese Ministry of Environment asked OECC to dispatch the study team to Pakistan to examine the Japan's assistance to Pakistan for its environment and sustainable development in the early 21st century.

Six members OECC study mission headed by Katsuhiko YAMAMOTO and Hironori KUROKI Visited Pakistan w.e.f. October 6, 2003 to October 19, 2003 to hold meetings with Pakistan Ministry of Environment, Director General Pak-EPA and Other related agencies/organizations. They also visited the study area (Hayatabad, Peshawar) and physically examined the environmental related problems over there and hold meetings with civic agencies, institutions and NWFP government officials. A memorandum of agreement was signed between head of OECC mission and Director General, Pak-EPA to research on the field survey for urban environmental problems in Pakistan (A case study of water environment in Hayatabad, Peshawar).

3-2 Location of the Study Area

i) Project Offices:

Main at Pak-EPA, coordination with NWFP-EPA in conducting the survey on water pollution, solid waste management and topographic survey of solid waste dumping site.

ii) Study Area Location:

Hayatabad township is situated approximately 15 Km south-west of the main center. The scheme is spread over an area of more than three thousands acres of land containing 22503 residential and about 300 commercial plots.

3-3 Scope of the Study

The survey executed on the following categories in Hayatabad as a model area in Peshawar city.

1- Urbanization

- 2- Water condition (volume and quality)
To collect the water samples from the pre-selected points (Leachate, Point-1 to Point-7) and analyzed for pre-determined parameters.
- 3- Hydro-geological characteristics
To collect the data on geomorphic surface and borehole logs on several tube wells in Peshawar
- 4- Current-water use
To investigate the water demand from the usage, distribution system of city water and well points.
- 5- Solid Waste Management
 - To investigate the volume and quality of solid waste through the process of collection, transportation and disposal
 - Topographic survey of dumping site to find out the dumped volume over the years.
 - Recycle route and value.

3-4 Terms of Study

Pak-EPA to complete the investigation, compile a report and submit it to OECC.

3-5 Others

Any dispute related to the implementation of this survey will be settled amicably between OECC and Pak-EPA.

4- IMPLEMENTED SCHEDULE.

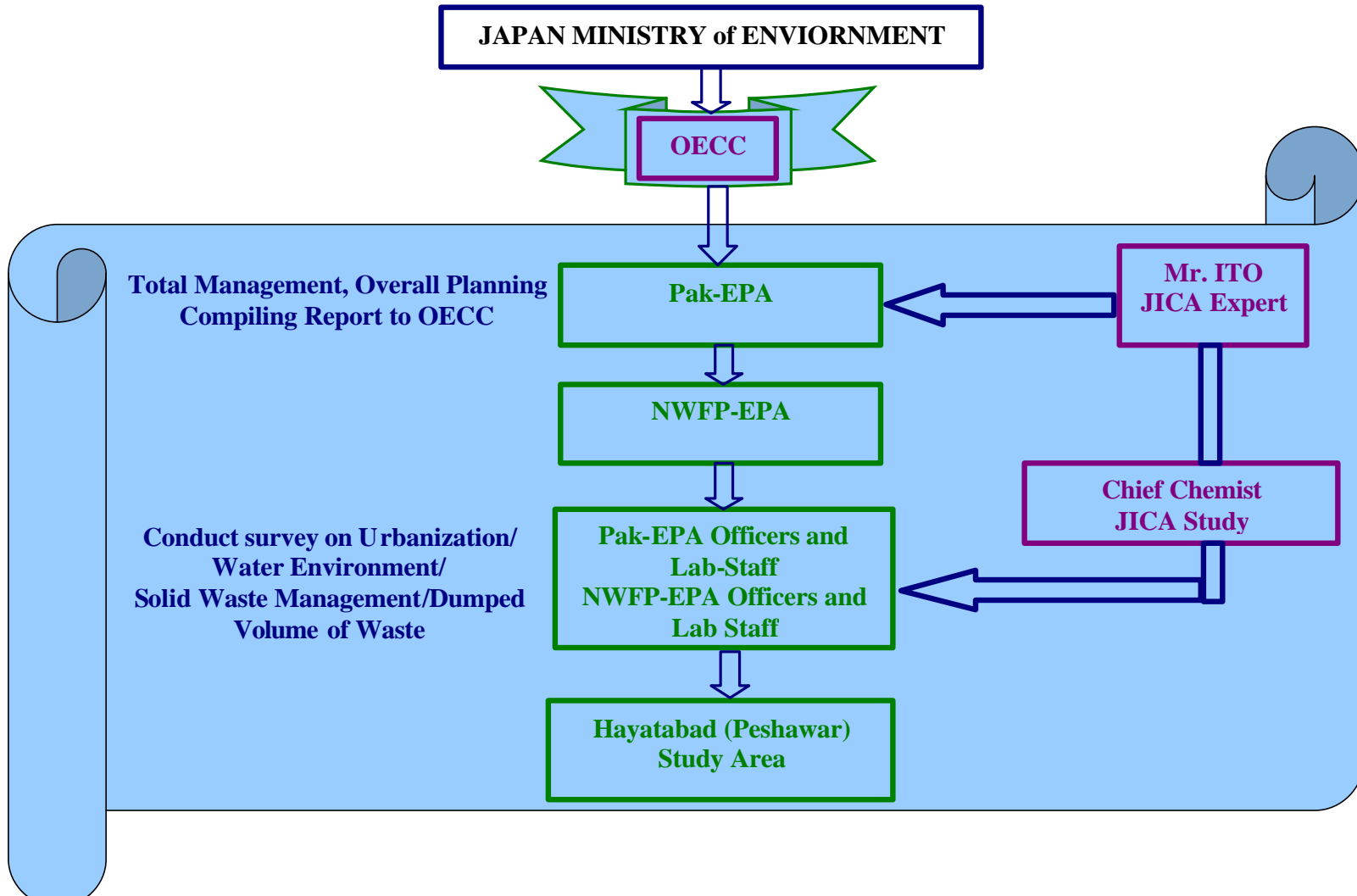
Table-3 shows the time schedule on this investigation. Actual implementation plan was little delayed due to pressing engagements of Pak-EPA Officers in Islamabad due to SARC Summit and visit of foreign delegation at Pak-EPA.

OECC study team visited Pakistan from October 5th, 2003 to October 8th, 2003 to conduct the preliminary study on urban environment especially the case study area, Peshawar and had meetings with different government departments to know the actual environmental problems in Pakistan.

Pak-EPA Officers comprising Mr. Zia-Ul-Islam, Director, EIA/Monitoring and Mr. Ahsan Rafi Kiani, Deputy Director along with Dr. Zulfiqar H. Lodhi, Chief Chemist/JICA study conducted the pre-investigation visit to Peshawar w.e.f December 8th, 2003. They visited the study area and chalked out the actual study implementation program. During their stay in Peshawar, they have detailed meetings with the then Director General, NWFP-EPA about their role in this study and cooperation in data collection and survey on Solid waste management. Pre-investigation team also held meetings with the Chairman, Department of Environmental Sciences, University of Peshawar and Officials of City Development and Municipal Department (CD & MD) about their cooperation and participation in this study.

FIGURE-1

ORGANIZATION CHART OF IMPLEMENTED INVESTIGATION



*Urban Environmental Problems in Pakistan
(A Case Study for Urban Environment in Hayatabad, Peshawar)*

TABLE-3

IMPLEMENTED SCHEDULE

S. No.	Items of activity	Year 2003			Year 2004		
		Oct.	Nov.	Dec.	Jan.	Feb.	March
1.	Visit of OECC study team to Pakistan to conduct preliminary study on urban environment	↔					
2	Signing of memorandum of agreement for this study	●					
3	Pre-investigation visit to Peshawar by Pak-EPA Officers and Chief Chemist/JICA to chalk out the survey implementation program and conduct meetings with concerned agencies/departments			↔			
4	Collection of data from different agencies/departments regarding urbanization, water cycle, hydrogeological characteristics etc.		↔				
5	Sampling and spot testing of water samples from the pre-selected sampling points (point 1 to point 7) and Leachate sample				↔		
6	Laboratory analysis of water samples for different parameters				↔		
7	Solid waste survey to investigate the volume and quality				↔		
8	Topographic survey of dumping site			↔			
9	Compilation of draft report				↔		
10	Final report printing and submission to OECC						↔

NWFP-EPA started their part of assignment from mid November, 2003 to early January 2004 for collection of data on Urbanization, water cycle and solid characteristics.

Pak-EPA study team comprising Mr. Zia-Ul-Islam, Director, EIA/Monitoring, Mr Ahsan Rafi Kiani, Deputy Director and three staff members from the Pak-EPA laboratory along with Dr. Zulfiqar H. Lodhi, Chief Chemist/JICA study launched the actual implementation study on water sampling and analysis and also extended cooperation to NWFP-EPA on their part of study on solid waste management. Spot testing was performed for certain parameters, those tend to change significantly with passage of time.

Portable equipment was used for in situ testing. For laboratory analysis, samples were preserved by the addition of certain chemicals to stabilize the parameters of concern.

Topographic survey was conducted by the surveyor from CD & MD under the supervision of Director General, NWFP-EPA.

Draft report submitted to OECC by the end of February, 2004, while the final report after the approval of OECC submitted.

5- ACTUAL ACTIVITY ON HAYATABAD

5-1 General Information of Hyatabad

Housing is a basic need and thousand families are struggling to have a roof over their heads. Rapid population growth, scarcity of government resources, urbanization and the developing imbalances between urban and rural areas has compounded the housing problem.

Due to imbalance supply and demand of housing, the housing backlog is increasing rapidly. The yearly addition to housing stock hardly caters to the 40 % of the population increase. The worsening supply & demand position manifests itself in overcrowding, deteriorating housing stock formation, katchi abadies, slums and encroachments.

To meet the challenge “Shelter for each”, the Peshawar Development Authority played its role and developed Hayatabad Satellite Township. The initial planning of the township was completed and developmental work was completed in 7 phases. The latest phase Ie phase VII was announced in 1992 and housing construction has very recently started in this last phase.

5-2 Data Collection

Data generated in this study was collected from different departments. The list of those departments who extended help during this study is given below in Table-4.

TABLE-4

LIST OF THE DEPARTMENTS WHO EXTENDED HELP IN THE INVESTIGATION

	Survey Items	Departments
1	Urbanization (land use, vegetation, impermeable area, etc)	City Development & Municipal Department (CD & MD)
2	Urban Population	Population Census Organization, Govt. of Pakistan
3	Production amount of factories at Hayatabad	Sarhad Development Authority
4	Urban Planning	Planning & Development Department, Govt. of NWFP
5	Monthly rainfall in Peshawar	Pakistan Meteorological Department
6	Water quality	Pak-EPA
7	Solid waste management	Chief Officer, Town Municipal Administration, Hayatabad
8	Solid Waste Quantity and Quality	NWFP-EPA

5-3 Field Survey on river water

Field survey on river water on pre-selected sampling points were undertaken by Pak-EPA Officers and laboratory staff.

Table- 5 shows water survey point with brief description of location.

TABLE-5

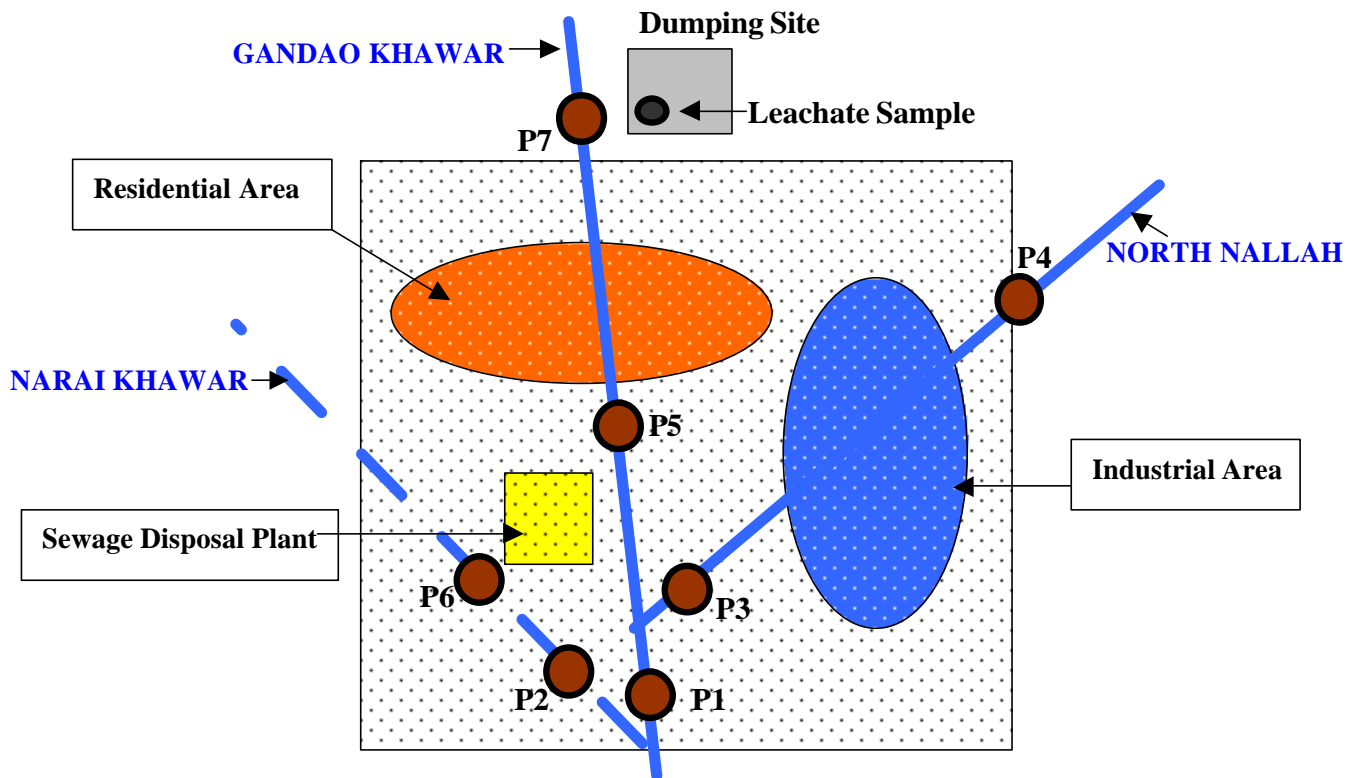
WATER SURVEY POINTS AND LOCATION

Survey Points	Location
P1	On Gandoa Khawar after leaving Hayatabad area before mixing with Narai Khawar
P2	On Narai Khawar after leaving Hayatabad area
P3	Industrial waste water coming through North Nallah before joining main stream
P4	North Nallah before entering industrial estate
P5	Mid stream point on Gandao Khawar
P6	Domestic/Municipal waste water coming from sewage Plant without any treatment
P7	Next to solid waste dumping site on Gandao Khawar

Schematic diagram of survey points on river water are shown in Figure-2.

FIGURE-2

SURVEY POINTS OF WATER CHANNELS IN HAYATABAD AREA



Dumping site in Phase-VII is not a proper landfill site. Therefore to collect the leachate sample from this site was a matter of great concern. After thorough visit of the dumping area by Pak-EPA officers, a site was selected in the depression, where still more solid waste dumping required. A hole of 0.5 meter wide and 1.5 meter deep was dug for this purpose. Soon after digging, a hole was filled with leachate and the sample was collected for analysis.

PHOTO-1

LEACHATE SAMPLE IS BEING COLLECTED FOR LAB ANALYSIS



Gandao Khawar (storm water channel) coming from upstream of Hayatabad passes through the Hayatabad area and next to the solid waste dumping site. A water sample from P7 sampling point was taken to see the quality of water coming from upstream.

Hayatabad area, a water sample was collected at P5 sampling point. The purpose of sampling at this point was to see the pollution load at mid stream. On the same channel, water sample was collected at sampling point P1 to see the pollution load at down stream.

Narai Khawar (another storm water channel) passes close to Hayatabad area. Sewage treatment plant (it's no more functional) is discharging sewage water of Hayatabad in this channel. To know the quality of sewage water, a water sample at sampling point P6 was taken for laboratory analysis. Another sample was taken at sampling point P2 on the same channel, when it leaves the Hayatabad area to know the impact of pollution on this channel.

Industrial estate is situated on the south-west of Hayatabad. To observe the impact of water pollution by the industrial estate in Hayatabad area, two water samples were collected. One on the North Nallah before entering the Industrial area at P4 sampling point and the other sample on the same Nallah, when it leaves the industrial area at P3 sampling point.

Besides surveying the surface water in Hayatabad, two drinking water samples were also collected from two different sources. One sample of the drinking water was collected from the public point at Phase-VII sector from the Municipal water supply. The other drinking water sample was collected from the private bore hole.

PHOTO-2

**DRINKING WATER SAMPLE IS BEING COLLECTED FROM
PUBLIC POINT FROM THE MUNICIPAL WATER SUPPLY**



5-4 Field Survey on Solid Waste

Field survey on solid waste was conducted with the collaboration of NWFP-EPA. The original survey was based around four components of the waste stream:

- Total quantity of discharged waste
- Total quantity of collected waste
- Total quantity of the waste carried to landfill site (disposal site)
- Total quantity of dumped waste (assumed from the topographic survey)

Not only the quantity of waste was determined at different stages, the quality of waste was also characterized accordingly.

TABLE-6

WASTE CLASSIFICATION

Primary Classification	Secondary Classification (Examples)
1- PAPER	<ul style="list-style-type: none"> - Newspaper - Magazines - Printed materials - Paper board - Photocopy paper
2- TEXTILE	<ul style="list-style-type: none"> - Non leather - Carpet - Curtain cloth - Clothes
3- PLASTIC RUBBER	<ul style="list-style-type: none"> - Soft drink bottles - Milk bottles - Retail carry bags - PVC - Tyres - Rubber products - Rubber pipes
4- METAL	<ul style="list-style-type: none"> - Ferrous (steel cans, steel pipes, electrical appliances etc.) - Non-ferrous (aluminum cans, copper pipes, aluminum windows soft drink cans)
5- GLASS	<ul style="list-style-type: none"> - Glass bottles - Jars - Jam jars - Window glass
6- BOXES	<ul style="list-style-type: none"> - Boxes from edible meat
7- WOOD	<ul style="list-style-type: none"> - Wood pieces - Wood pieces from furniture - Plywood - Sheets - Tree clippings
8- BREAD	<ul style="list-style-type: none"> - Traditional wheat bread baked at Tandoor (Oven) - Bakery bread - Home made bread (chapatti)
9- NAPPIES & SANITARY	<ul style="list-style-type: none"> - Disposable nappies - Sanitary nappies - Pampers
10- TEA LEAVES	<ul style="list-style-type: none"> - Used tea bags - Used tea leaves
11- KITCHEN WASTE	<ul style="list-style-type: none"> - Vegetables - Fruits - Food scraps

The purpose of this survey was to obtain a quantitative estimate of the composition of solid waste from domestic premises within the survey area. Sampling at “Source” (at the individual household level) has the advantage of allowing statistics on waste generation per household to be derived. Sampling methodologies and detail will be discussed in Part 2 (Implementation of the study). Sampling at source is also more likely to give representative results.

In Hayatabad study area, there is no discrimination between the municipal solid waste generated from residential, commercial, institutional sources and hazardous waste generated from the hospitals and industrial sources. Therefore all types of waste generated from any source falls in the category of municipal solid waste.

For transportation purposes, no mechanical equipment or vehicle are used from collection points to dumping sites. Donkey carts are being used for this purpose. 38 donkey carts are actually hired by the TMA for this purpose but many unregistered donkey carts are also collecting the solid waste for their livelihood.

Dumping site is situated in Phase-7, Hayatabad. Due to complaints and immense pressure from the people residing in nearby houses, NWFP-EPA sends the notice to TMA to close this dumping site. Now no more dumping is taking place at this site since December 2003.