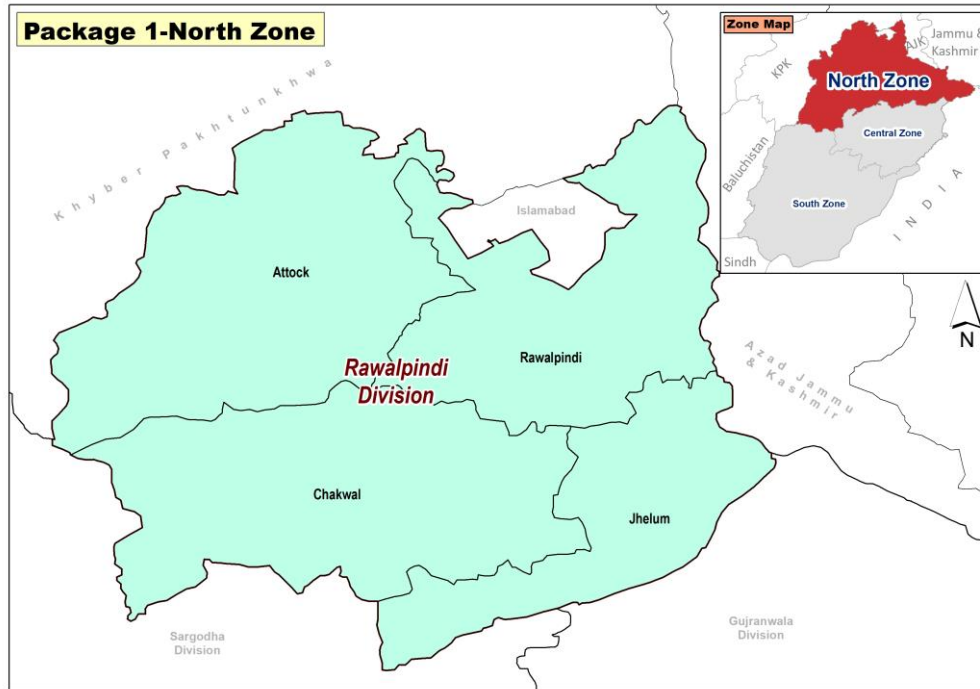




**PUNJAB AAB-E-PAK AUTHORITY
GOVERNMENT OF PUNJAB**



**Provision of Clean Drinking Water by
Punjab Aab-e-Pak Authority (Phase-I)
NORTH ZONE**



**Environment Impact Assessment
(EIA) REPORT - PACKAGE 1
May 2023**



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EXECUTIVE SUMMARY

This executive summary presents overview of the main findings of Environmental Impact Assessment (EIA) Report for the “Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase - I (Package 1)”. The EIA for the proposed project is conducted by Jers Consultancy Pvt Ltd and JV partner Associates in Development AiD Pvt (Ltd). The proponent of the project is Punjab Aab-e-Pak Authority. Environment Impact Assessment (EIA) Study of aforesaid project has been conducted to accord Environment Approval / NOC from Environmental Protection Agency (EPA) under Punjab Environmental Protection Act, 1997 (Amended 2017) and IEE & EIA regulation, 2000 (Amended 2022). The process for conducting environmental Assessments and the results of EIA Study are described in detail in this documents.

As per directions of Punjab Environmental Protection Act 1997 (Amended 2017), IEE and EIA Regulations, 2000 (Amended 2022) the instant project of “Supply Construction, Installation of Water Filtration Plants in Rawalpindi Division Phase -I (Package 1) falls under Category F (Water Supply Schemes and Treatment Plants). It requires an EIA Study. Thus, an EIA Study has been conducted and report has been prepared for duly submission in EPA to accord Environmental Approval/NOC.

The main purpose of the EIA study is to ensure that:

- Any major adverse impact on the environment (physical and ecological) during different stages viz. pre-construction, construction and operation are identified.
- Negative impacts, if any, are appropriately addressed and adequate mitigation measures are suggested for incorporation in the design, construction procedures and operations of project.
- Assess the existing environmental and socio economic conditions at and around the project site, particularly identify any environmental and social sensitivity areas.
- Propose appropriate mitigation and monitoring measures that can be incorporated into the design of the proposed activities to minimize any damaging effects or lasting adverse consequences identified by the assessment body.

- To provide opportunity to the public for smooth implementation of the suggested mitigation measures and their environment in the context of sustainable development.

Safe drinking-water, is vital to human health and well-being. Safe water is not only a prerequisite to health, but contributes to livelihoods, and helps to create resilient community living in healthy environments. Drinking unsafe water impairs health through illnesses such as diarrhea. Chemical contamination of water continues to pose a health burden, whether natural in origin such as arsenic and fluoride, or anthropogenic such as nitrate.

In the first phase of the project, it has been intended to serve about 4.7 Million people of the targeted areas of the Punjab province falling in designated Central, North and South Zones of the Punjab. Successful implementation of this project will result in provision of contamination free potable water to underserved areas in Punjab and consequently eliminate water-borne diseases to improve public health. The purpose of the project is to provide potable water to the inhabitants of the Punjab complying with prescribed standards. That may include multiple solutions which may be adopted as per local solution depending upon the source and quality of water, area and urgency for providing potable water, difficulty faced by the residents to fetch clean drinking water which may include water disinfection options.

In view of this situation, the Government of the Punjab, through the Punjab Aab-e-Pak Authority, start a project titled "Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase - I (Package 1)".

This report encompasses screening of potential Environmental impacts of the project and the proposed mitigation measures in order to eliminate or reduce the negative impacts to an acceptable level, describes the institutional requirements and provides an Environmental Management and Monitoring Plan. The EIA is based on the information collected through review of previous reports available with Punjab Aab-e-Pak Authority and the other public sector agencies and Consultants survey in this regard. Overall, the proposed project is an environmental improvement project aimed to facilitate sustainable urban development in Rawalpindi Division, but some negative Environmental and Social impacts may emerge, if proper mitigation measures for the said project are not adopted.

Salient Features of the Project

Project Name	"Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase - I (Package 1)"
Location	Rawalpindi Division, Pakistan
Proponent Name	Punjab Aab-e-Pak Authority
Cost for installation of filtration plants in Rawalpindi Division (Package 1)	338.88 Million (PKR)
Project Area	Rawalpindi Division (22255 Km²)
Total No of Reverse Osmosis Plants	38
Total No of Pre-filtration Plants	78
Consultant Name	Jers Consultancy Pvt. Ltd
JV Member	Associate in Development (AiD) Pvt.Ltd
Purpose	The government of the Punjab, through the Punjab Aab-e-Pak Authority, has intended to serve about 4.7 Million people of the targeted areas of the Punjab Province falling in designation Central, North and South Zones of the Punjab. Successful implementation of this project will result in provision of contamination free potable water to the underserved areas in Punjab and consequently eliminate water borne diseases to improve public health.
Nature of the Area	Residential, Commercial, and Agricultural areas

The study has taken into consideration all the relevant provincial legislation, followed by the site visits and details of construction and operational activities of the proposed project. The Environmental Impact Assessment is based on simple comparative evaluation approach. Initially, the baseline or profile of the project area was developed by gathering data, records and information on existing physical, ecological and socioeconomic environment. The same data is then projected or modelled for different phases of the project, i.e. design construction and operation stages. The changes expected in the critical environmental aspects for example in the environmental parameters that may be significant were also identified. This led to identification and mitigation of the major impacts, for which corresponding effective mitigation measures are projected. The Environmental Management Plan (EMP) & The Environmental Monitoring Plan, which will be implemented during the construction and operational phases of the project are framed.

Discussions were also held with the primary and secondary stakeholders of the project. They were briefed about the project and their views, concerns and suggestions were recorded. Major areas covered in the impact analysis of the project including, air emissions, wastewater, solid waste, occupational safety, socioeconomic factors and traffic management.

Affected Environment

The affected environment was assessed based on physical, biological and socio-economic attributes of the project's area of influence. The physical attributes include geology & soil, topography, land-use, climate, natural hazards, surface water resources, ground water resources, wastewater quality, ambient air and noise. The biological environment was studied under the headings of flora, fauna and agriculture. The socio-economic environment was assessed under the categories of administrative setup, social characteristics, demographic characteristics of the respondents, religious & ethnic composition of the population, housing pattern & family structure and other socio-economic features. Air, water and noise monitoring was carried out to determine the base line condition of the area.

Major Impacts and Mitigation Measures

Following impacts are likely to occur during constructional and operational phase of aforesaid project:

- **Construction Phase**

Anticipated impacts associated with the construction & installation phase includes; noise (machine/equipment noise and vehicular noise), air emissions from earthwork, construction machinery, vehicles and soil contamination due to leakage from or accidents of the construction or transportation vehicles or during on-site refueling, solid waste from construction activities, municipal water and safety of the workers and employment conflicts as the major adverse environmental impacts. Since the project is to be commenced on a reserved area and no human settlement exists within safe radius of selected site, construction related impacts are not expected to extend to the community.

Mitigation measures recommended to be incorporated into the project include running the machines and vehicles on good quality low-sulfur fuels in good working order ensuring regular maintenance, tuning and servicing, and providing them with emission control devices, such as; mufflers and silencers, etc. Water suppression and covered transportation and storage of the construction materials and slow driving on unpaved roads will control dust emission. Regular testing for leakage detection will also be ensured. Solid waste of construction activities will be used for flooring, while the remaining solid waste will be managed as per practices in the area. For community safety, irrelevant persons will not be allowed inside. Safety of the workers will be ensured by developing SOPs for all jobs, training the workers to follow SOPs, discouraging any careless attitude of workers and providing the workers with, and encouraging them to use PPEs.

- **Operational Phase**

As it is the project of clean water, it will not create any significant adverse environmental impacts during its operational phase. This phase includes operating of pre-filtration plants and reverse osmosis plants so it will not cause any harmful environmental impact which has to be tackled. This phase intends for safe drinking water supply to under-served rural semi-urban and peri-urban population using localized and customized solutions with regard to source, treatment technologies and supply options. This phase also intended to promote O&M models with community engagement and participation. So it does

not require any mitigation measures. Local awareness among the residents of the aforesaid project must be practiced on regular basis to ensure the successful working of RO & filtration plants.

Proposed Monitoring

During construction, ambient air quality for dust level in particular, vehicle and equipment exhaust, noise level, solid waste management and soil contamination, and community and workers' safety (visual) need to be monitored on regular basis. During operation, ambient air quality for dust level in particular, noise level, solid waste management and soil contamination, and community & workers safety need to be monitored on quarterly basis. Monitoring Plan has been included in this EIA report.

Conclusions & Recommendations

The Environmental Impact Assessment Study contains description of the project, baseline conditions, potential environmental impacts (project specific) and suggested mitigation measures. An implementation mechanism for mitigation measures in the form of an Environmental Management Plan is included in this study. While the objectives of this study have been to describe the projects and its environmental impact, it also identifies adverse environmental factors associated with the aforesaid project. Appropriate mitigation measures as explained in the environmental study should reduce, if not eliminate, these impacts so that these are within the acceptable limits. It is further concluded that all potential environmental concerns associated with the project have been adequately addressed, and no further study is required in this context. The Supply Construction, Installation of Water Filtration & Direct Supply Plant in Rawalpindi Division will be beneficial for the residents of the Rawalpindi Divisions as potable drinking water free of contaminants will be provided to the residents. And it will improve the overall environment and health status of the area. This will have positive potential impacts on the environment. Potential adverse impacts are anticipated to occur at the construction stage which can be mitigated by applying Best Management Practices (BMPs)/Best Engineering Practices (BEPs). EMMP should be the part of the contract document and should be thoroughly implemented.

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List of Abbreviations

AC	Activated Carbon
AOI	Area of Influence
AWWA	American Water Works Association
BAP	Biodiversity Action Plan
BDL	Below detection level
BOD	Bio-chemical Oxygen Demand
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CC	Construction Contractor
dB	Decibel
DCR	District Census Report
DG	Director General
Dia	Diameter
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
Ft	Feet
Fig	Figure
GOP	Government of Pakistan
HSE	Health & Safety Engineer
IEE	Initial Environmental Examination
Km	kilometer
Km/h	kilometer per hour
LGO	Local Government Ordinance
RE	Resident Engineer
RCC	Reinforced Cement Concrete
SDO	Sub Divisional Officer
PAPA	Punjab Aab-e-Pak Authority
PEPC	Pakistan Environmental Protection Council
PEQS	Punjab Environmental Quality Standards
PC-1	Planning Commission – 1
PEPA	Punjab Environment Protection Act
PSDWQ	Pakistan Standard Drinking Water Quality
MD	Managing Director
NCS	National Conservation Strategy
NSL	Natural Surface Level

NEAP	National Environmental Action Plan
NOC	No Objection Certificate
°C	Degree Centigrade
OSHA	Occupational Safety and Health Administration
PD	Project Director
P & D	Planning and Development Department
PM	Particulate Matter
PNCS	Pakistan National Conservation Strategy
SC	Supervision Consultant
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TMA	Town Municipal Administration
TF	Trickling Filters
TOR	Terms of references
UC`s	Union Councils
PAPA	Punjab Aab-e-Pak Authority
PF	Pre-Filtration
RO	Reverse Osmosis
JV	Joint Venture
WHO	World Health Organization

1 INTRODUCTION

1.1 General

For any development project to be initiated in Punjab, it is mandatory to accord Environmental Approval from EPA Punjab under Section-12 of Punjab Environmental Protection (Amendment) Act, by filing an IEE or EIA before EPA Punjab, as may be defined in Review of IEE/EIA Regulations, 2000 (Amended 2022) or recommended by EPA Punjab. This Report represents the Environmental Impact Assessment (EIA) Study for the “Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase - I (Package 1)”. For this purpose, the proponent engaged environmental consultants; M/S Jers Consultancy (Pvt) Limited to conduct EIA Study. The purpose of this study is to identify the environmental baseline i.e. physical, biological and socio-economic/cultural conditions and assess all possible impacts arising during the Installation and operation phase of project and to find out appropriate measures for their mitigation, to either eliminate those impacts or to bring them to acceptable level and formulation of Environmental Management Plan (EMP) for implementation of the project in environment friendly manner.

This EIA report is prepared by critical examining environmental factors which might be affected due to installation of said project. The purpose of this study is to analyze impacts associated with Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase - I (Package 1). This EIA Report provides relevant information, as required under the officially approved format, to help the decision makers i.e. EPA Punjab before issuing for the Environmental Approval / NOC.

1.2 Project Background

In Pakistan, access to safe drinking water is one of the major public health problems, as the country is facing water quality and quantity issues, being documented in various studies. The large proportion of drinking water, almost 70%, comes from ground water aquifers within the country. In Pakistan, water resources, specifically ground water, are under severe threat both in terms of quantity and quality. The ground water is stored in the pores of the soil through the infiltration of surface water. In case, where there is excessive use of groundwater for agricultural and all other purposes, sweet water zones are depleted causing the intrusion of saline/brackish water from saline zones. For provision of safe and healthy drinking water to the residents of Rawalpindi Division,

Government of Pakistan has decided to install RO Plants, Pre-Filtration plants and direct water supply schemes in the mentioned divisions of Punjab province. This will eliminate the occurrence of excessive health problems such as hepatitis, typhoid, and diarrhea etc. as well as water shortage problems will also be catered and the future water demand of these areas will be meeting due to the aforesaid initiative taken by the Government. Punjab Aab-e-Pak Authority is the responsible authority for the successful implementation of the filtration plants in the Rawalpindi Division.

This report encompasses screening of potential Environmental impacts of the project and the proposed mitigation measures in order to eliminate or reduce the negative impacts to an acceptable level, describes the institutional requirements and provides an Environmental Management and Monitoring Plan. The EIA is based on the information collected through review of previous reports available with PAPA and the other public sector agencies and Consultants survey in this regard. Overall, the proposed project is an environmental improvement project aimed to facilitate sustainable urban development in Rawalpindi Divisions, but some negative Environmental and Social impacts may emerge, if proper mitigation measures for the said project are not adopted.

1.3 Project Screening and Categorization

As per directions of Punjab Environmental Protection Act 2012, IEE and EIA Regulations, 2000 (Amended 2022) the instant project of “Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase I (Package 1)” falls under Category F (Water Supply Schemes and Treatment Plants). It requires an EIA Study. Thus, an EIA Study has been conducted and report has been prepared for duly submission in EPA to accord Environmental Approval / NOC.

1.4 The Proponent

Punjab Aab-e- Pak Authority is the proponent of the aforesaid project. Punjab Aab-e-Pak Authority (PAPA) was established under act, initially passed by Provincial Assembly in March, 2019 and later on, amended in August, 2019. The main objective for the establishment of this Authority is to provide safe and clean drinking water in 36 districts of Punjab province mainly in rural, semi-urban and peri-urban areas.

1.5 Nature and Size of the Project

In first phase of the project, it has been intended to serve about 4.7 Million people of the targeted areas of the Punjab province falling in designated Central, North and South zones of the Punjab. Successful implementation of this project will result in provision of contamination free potable water to the underserved areas in Punjab and consequently eliminate water-borne diseases to improve public health. The purpose of the project is to provide potable water to the inhabitants of Punjab complying with prescribed standards. That may include multiple solutions which may be adopted as per local situation depending upon the source and quality of water, area and urgency for providing potable water, difficulty faced by the residents to fetch clean drinking water which may include water disinfection options.

The project will provide potable water living in division of Rawalpindi. Markaz-e-Aab will be constructed in 116 villages, from where residents can fetch the water for drinking purposes. Water supply schemes / villages in division of Rawalpindi supplied with potable drinking water are summarized below:

Table 1-1: Design Summary of Water Filtration Plants & Supply Schemes of Package 1

Sr. No.	Type of Plant	No. of Plant
Filtration Plants		
1	Reverse Osmosis Plant	38
2	Pre-filtration plant	78
Total		116

The total project area which encompasses the villages of Rawalpindi division under Package 1 is 22,255 km² (5499330.3 acres).

1.6 Purpose of the EIA Study

The fundamental purpose of the EIA study is to ascertain the possible beneficial and adverse environmental impacts during the project planning and implementation as currently foreseen and propose the applicable mitigation measures to be implemented

in order to minimize the negative impacts and preparation of Environmental Management Plan (EMP) and Monitoring Plan during initial and construction phases of the project. The purpose of this EIA Study is to:

- Assess the existing environmental and socio economic conditions at and around the project site, particularly identify any environmental and social sensitivity areas.
- Identify the likely impacts of the proposed project on the natural and socioeconomic environment, predict and evaluate these quantitatively wherever possible and determine their significance in the light of technical and regulatory concerns, as well as those related to public perceptions.
- Propose appropriate mitigation and monitoring measures that can be incorporated into the design of the proposed activities to minimize any damaging effects or lasting adverse consequences identified by the assessment body.
- To provide assistance to the proponent for planning, designing and implementing the project in a way that would eliminate or minimize the negative impact on the biophysical and socio-economic environment and maximizing the benefits to all parties in the cost-effective manner.
- To provide opportunity to the public for smooth implementation of the suggested mitigation measures and their environment in the context of sustainable development.
- To prepare an EIA report for submission to EPA, Punjab for Environmental Approval (NOC).

1.7 Scope of Study

EIA is fundamentally considered as a planning tool utilized in the decision making by identifying probable consequences on environment due to the project execution. This study covers assessment of physical, biological and socioeconomic impacts of construction and post development phases of the project.

A profound analysis of the project components is made explaining total area of the proposed site, built area, source of power and water consumption, connectivity to the city centre, type of construction & installation materials used, existing conditions of the project area. The land resources such as topography and soil conditions are addressed adequately. Air, Noise, water, biological, waste management, mitigation measures, health and safety plan, energy conservation all are catered for in the study.

1.8 Objectives of EIA Study

The main objective of the EIA study is to highlight anticipated impacts of the proposed project covering environmental, social, occupational health and safety issues and to suggest mitigation measures to eliminate or reduce the foreseen negative impacts to an acceptable level. The specific objectives of the EIA Study are as follows:

- Determine pre-project environment conditions to assess post-project conditions if they have changed for better or worse;
- Document all the environmental impacts likely to occur due to the implementation of the proposed project;
- Determine the social impacts of the proposed project including impacts on individuals, assets, infrastructure, livelihood, public utilities and cultural and religious properties;
- Provide maximum information to the proponent and other stakeholders about the existing environmental conditions and the implications of the proposed project;
- Allow planners to alleviate potential impacts of the proposed project on different environmental conditions such as physical environment, biological environment and socio-economic environment.
- To provide opportunity to the public for understanding the project and its impacts on the community and their environment in the context of sustainable development.
- Aid decision makers to take informed decisions.

1.9 Location of Project

The aforesaid project is located in the Rawalpindi division. RO plants and Pre-Filtration plants are proposed to be installed in different villages of the said divisions of Punjab province. The location map of the project area is shown as below:



Figure 1-1: Location Map of Aforesaid Project (Package 1)

1.10 Consultant's Details

The proponent has engaged M/s Jers Consultancy (Pvt) Ltd to conduct the EIA Study for the establishment and enhancement of aforesaid project in accordance with Punjab-EPA guidelines. For this purpose, Jers Consultancy (Pvt) Ltd has engaged the group of professionals which comprises of environmental specialists and environmental engineers. The details of the consultants are given below:

Table 1-2: Consultant's Details

Sr. No.	Consultant Details	
1	Consultant	Jers Consultancy (Pvt) Limited
2	Address	24 Civic Center St, Township Commercial Area Lahore
3	Contact No.	042-35113125, 35113124

The JV partners for the aforesaid project is AiD (Associate in Development) Pvt.Ltd. The details of JV partners are given below:

Table 1-3: JV Members Details

Sr. No	Joint Venture Partners	
1	JV Partners	Associate in Development (AiD) Pvt Ltd
2	Address	AiD Executive Center 22, SCHS, Sector E-1/2-3 Markaz, Islamabad, Pakistan
3	Contact No.	051-2304979,051-230497980

1.11 EIA Team

To prepare report of the respective project, the team list of experts is presented as follows:

Table 1-4: Team list of experts

Sr. No.	Name	Position	Qualification	Tasks Assignment
1	Dr.Sajjad Haydar	Chief Environmental Specialist	-PhD. In Environmental Engineering -M.Sc. in Environmental Engineering -B.Sc. in Civil Engineering	Assign work to the other team members. Participate in the performance of EIA process. Guide and steered the team members to evaluate and quantify the impacts and to reach proper mitigation measures. Prepared the EIA report
2	Mudasar Arbi	Sr. Environmental Specialist	-M.Sc. in Environmental Engineering -B.Sc. in Civil Engineering	Conduct literature review/desk studies regarding the environmental impact of the project. Study environmental impacts of the project and suggest mitigation measures to reduce the negative impact. Participated in formation of EIA report in the light of relevant guidelines. Heads public consultation.
3	Tauseef Ahmad	Environmental Engineer	B.Sc. in Environmental Engineering	Conduct field visits to collect base line data related to environment. Participated in formation of EIA report
4	Taha Rahim	Environmental Engineer	B.Sc. in Environmental Engineering	Conduct field visits to collect base line data related to environment. Participated in formation of EIA report
5	M. Babar Ali	Civil Engineer	M.Sc. in Civil Engineering	Conduct site visits and collected data from the project area. Participate in the process of public consultations
6	Athar Siraj	GIS Expert	-MSc Geography -MS Remote Sensing and GIS	Collect satellite images and maps where required for the study. Help the team in finding the location of project components.

1.12 Study Approach

The study is conducted in accordance with Punjab Environmental Protection Act (PEPA), the study is based on both primary and secondary data and information. The primary data includes data collected from field observations and secondary data includes review of the District Census Reports (DCRs) and relevant information from Government Departments. Discussions were held with stakeholders including government officials, community representatives and a wide range of road users and roadside dwellers near road. The main purpose of this approach was to know the people's perceptions of the project and its environmental impacts.

1.13 Methodology

The following methodology was adopted for carrying out the EIA Study of the proposed project.

1.13.1 Orientation

Meetings and discussions were held among the members of the EIA Consulting Team. This activity was aimed at achieving a common ground of understanding of various issues of the study.

1.13.2 Data Collection and Planning

After the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the EIA Consulting Team. The plan included identification of specific data requirements and their sources; determined time schedules and responsibilities for their collection; and indicated the logistics and other supporting needs for the execution of the data acquisition plan.

1.13.3 Data Collection

In this step, primary and secondary data were collected through field observations, environmental monitoring in the field, concerned departments and published materials to establish baseline profile for physical, biological and socio-economic environmental conditions. Following activities were performed for data collection:

- Site Reconnaissance
- Analysis of Maps and Plans
- Literature Review

- Desk Research
- Public Consultation
- Field Observations & Studies

1.14 Components of the Report

This EIA Report has been prepared following the Pakistan Environmental Protection Agency (PEPA) Guidelines for Environmental Assessment. The format of the report consists of the following chapters:

- **Chapter 1: Introduction**

This chapter represents an introduction of the EIA Report. It contains the scope of study and overview of the project. The chapter also includes the project categorization as per PEPA guidelines.

- **Chapter 2: Policy, Legal and Administrative Framework**

This chapter comprises policy, guidelines, statutory obligations and roles of institutions concerning EIA study of the proposed project.

- **Chapter 3: Description of the Project**

In this chapter, salient features of the project are presented. It furnishes information about the location, cost and size of the project, its major components including Geometric Design Standards and its benefits to the public.

- **Chapter 4: Analysis of Alternates**

This chapter provides the analysis and discussion of different possible alternates to the proposed project while considering other practicable strategies that will promote the elimination of negative environmental impacts identified.

- **Chapter 5: Description of the Environment**

It provides an overview of the present environmental baseline of the project area. It discusses physical, biological, socio-Economic and cultural environment. This chapter also consists of the information based on public consultation and information disclosure to them about the project. It comprises of the identification of the main stakeholders, details of scoping sessions and stakeholders' concerns.

- **Chapter 6: Public Consultation**

This chapter provides the important tools for evaluating the social aspects of proposed project as well as the environmental and social assessment process.

- **Chapter 7: Anticipated Environmental Impacts and Mitigation Measures**

This chapter provides the information on the environmental impacts and proposed mitigation measures at pre-construction/design phase, construction phase and operation phase.

- **Chapter 8: Environmental Management & Monitoring Plan**

This chapter describes the measures suggested for executing the environmental management plan (EMP) at the project site. It elaborates the objectives of EMP, role of functionaries and specific implementation responsibilities; environmental management plan (in matrix), environmental monitoring and training plan and its costs.

- **Chapter 9: Conclusions & Recommendations**

This chapter presents the outcomes of the whole study. It explains the identification of the main issues and concerns; proposed mitigation measures, benefits of the project.

2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 General

This section deals with the relevant policy, legal and administrative framework instituted by the Government of Pakistan for the protection of environment. All the relevant provisions of these policy and legal frameworks have been duly considered in this EIA study. In addition to this, the roles and responsibilities of the proponent as well as the Environmental Protection Agency (EPA), Punjab have been mentioned in this section.

2.2 Policy Framework

The Ministry of Climate Change is the responsible authority for policy making on environmental protection in Pakistan. The proposed project will be financed by Client, which requires compliance to the National Policy and Guidelines, so it is obligatory on the part of the Proponent to follow these for environmental assessment.

2.2.1 National Environmental Policy, 2005

The National Environmental Policy (2005) provides an overarching framework for addressing the environmental issues (particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification etc.) confronting Pakistan. It recognizes the goals and objectives of the Pakistan National Conservation Strategy (PNCS, 1992), National Environmental Action Plans, and other existing environment related national policies, strategies, and action plans. It also provides broad guidelines to the federal government, provincial governments, federally administered territories and local governments to address their environmental concerns and to ensure effective management of their environmental resources.

2.2.2 National Conservative Strategy

Before the approval of NEP, the National Conservation Strategy (NCS) was considered as the Government's primary policy document on national environmental issues. At the moment this strategy just exists as a national conservation program. The NCS identifies 14 core areas including conservation of biodiversity; pollution prevention and abatement; soil and water conservation; and preservation of cultural heritage, and

recommends immediate attention to these core areas in order to preserve the country's environment.

2.2.3 The Biodiversity Action Plan

The Biodiversity Action Plan (BAP), which has been designed to complement the NCS and the proposed provincial conservation strategies, identifies the causes of biodiversity loss in Pakistan and suggests a series of proposals for action to conserve biodiversity in the country. The BAP recognizes that an EIA is used as a tool at a project level to identify environmental effects of a proposed project and to plan for reducing adverse effects. The BAP further stipulates that an EIA needs to be initiated at an early stage of project development and that public participation in the review of potential effects is important.

2.3 Legal Framework

The Government of Pakistan (GOP) has promulgated laws/acts, regulations and standards for the protection, conservation, rehabilitation and improvement of the environment. In addition to this, they have also developed environmental assessment procedures governing developmental projects. Following are the excerpts of these laws and procedures relevant to the proposed project.

2.3.1 Pakistan Environmental Protection Act, 1997 (PEPA-97) Amended 2017

The Act was enacted on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance (1983). It provides the framework for implementation of the PNCS-1992, establishment of provincial sustainable development funds, protection and conservation of species, conservation of renewable resources, and establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examination (IEE), and Environmental Impact Assessment (EIA). A copy of PEPA-97 (Amended 2017) is attached as **(Annex-I)**.

Section 12 of the Act stresses the need to carry out environmental assessment study prior to construction or operation of a project.

2.3.2 EPA (Review of IEE and EIA) Regulations, 2000 (Amended 2022)

These regulation provide list of the projects requiring IEE and EIA **(Annex-II)**. They also briefly describe the preparation and review of environmental reports.

2.3.3 Pakistan Environmental Assessment Procedure, 1997

Pakistan Environmental Assessment Procedures (1997) is, in fact, a package which contains the following sets of information relevant to the proposed Project:

a) Policy and Procedures for Filing, Review and Approval of Environmental Assessment Reports

It describes environmental policy and administrative procedures to be followed for filing of environmental assessment reports by the proponents and its review and approval by the concerned environmental protection agency/department.

b) Guidelines for the Preparation and Review of Environmental Reports

These guidelines are developed to facilitate both the proponents and decision makers to prepare reports (inclusive of all the information contained therein) and carry out their review so as to take informed decisions.

c) National Environmental Quality Standards, 2000

The Pakistan Environmental Protection Council first approved these standards in 1993. They were later revised in 1995 and 2000. They furnish information on the permissible limits for discharges of municipal and industrial effluent parameters and industrial gaseous emissions in order to control environmental pollution.

d) Other Relevant Laws

- **Land Acquisition Act (1894):** Projects may require government procurement of privately owned land and the displacement of land users. Land may be acquired through:
 1. Expropriation (Compulsory Acquisition)
 2. Voluntary negotiation with the owners for sale of land
 3. Donation from the land owners

The Land Acquisition Act (1894) deals with the government acquisition of private properties for public purposes including large development projects. There are 55 sections in this Act mainly dealing with area notifications, surveys, acquisition, compensation, apportionment awards, disputes resolution, penalties and exemptions.

- **Canal Drainage Act, 1873:** This Act entails provisions for the prevention of pollution of natural or man-made water bodies.
- **Cutting of trees (Prohibition) Act, 1975:** This Act prohibits cutting or chopping of trees without permission of the Forest Department.

- **Punjab Local Government Ordinance, 2001:** Environmental protection is devolving subject under Punjab Local Government Ordinance (LGO), 2001. Notwithstanding any specific provisions, every local government may perform functions conferred by or under the Punjab Local Government Ordinance, 2001 and in performance of such functions may exercise such powers, which are necessary and appropriate. Until different provisions, rules, regulations or byelaws are made, the local governments may exercise such powers as are specified in the Sixth Schedule of Punjab LGO, 2001. Environmental protection is at serial 48 of the Sixth Schedule.
- **The Punjab Plantation and Maintenance of Trees Act, 1974:** This Act defines rules and regulations for plantation and maintenance of trees in the Province of the Punjab.
- **Punjab Wildlife Act, 1974:** This Act defines rules and regulations for the protection, preservation, conservation and management of wildlife in the Province of the Punjab.
- **The Punjab Soil Reclamation Act, 1952:** This Act defines rules and regulations for the speedy reclamation and improvement of the areas damaged by salinity and water logging (for preventing further damage and for maximizing agricultural production).
- **The West Pakistan Fisheries Ordinance, 1961:** This Ordinance defines rules and regulations for the catching of fishes in Punjab. It provides information about their types and the period (in each year) when taking of the fishes is prohibited.
- **Pakistan Penal Code, 1860:** This Act defines the penalties for violations concerning pollution of air, water bodies and land.
- **The Antiquities Act, 1975:** Archaeological sites and monuments are specifically protected by this Act.

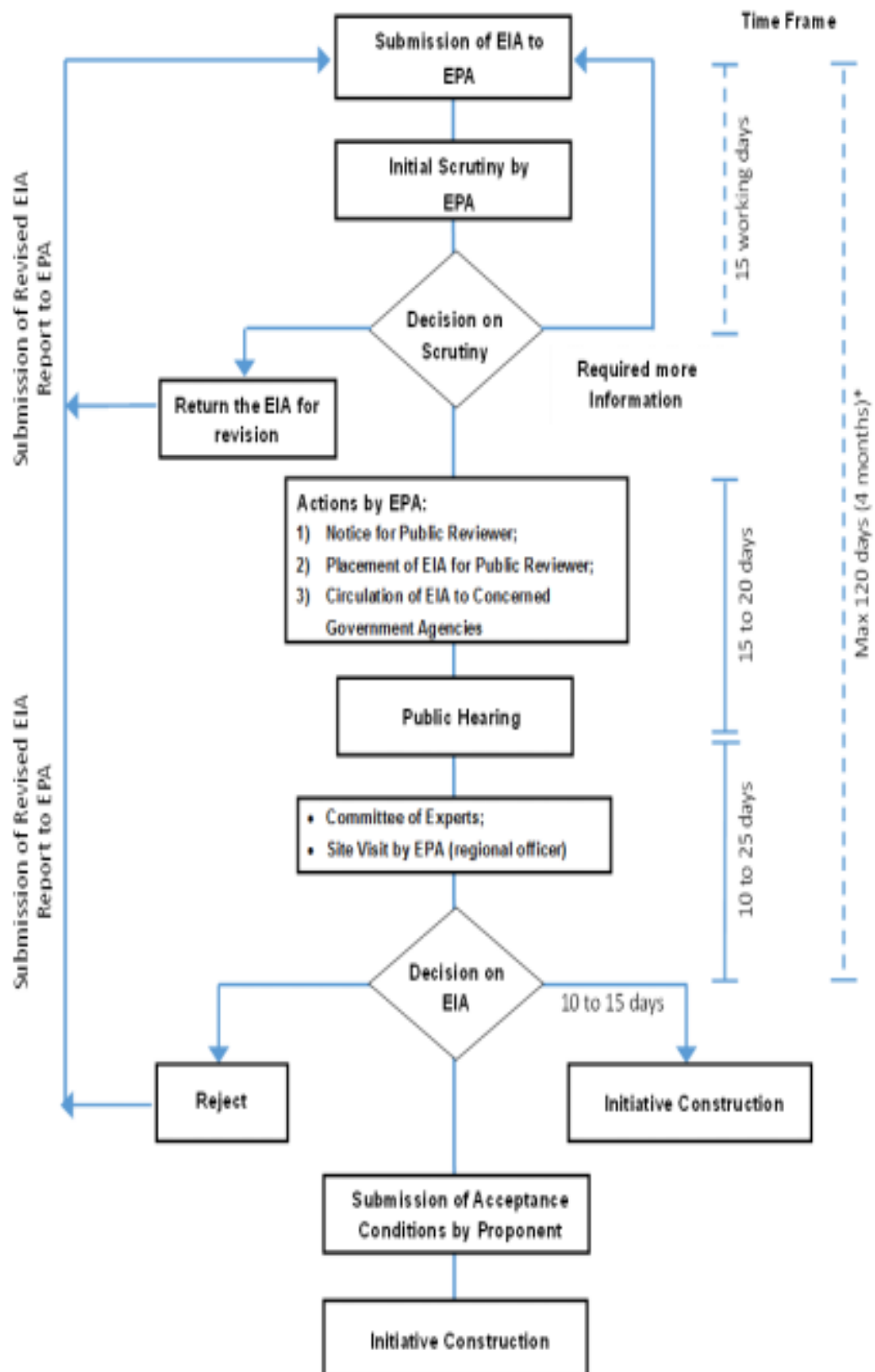


Figure 2-1: EIA Review and Approval Procedure

2.4 Punjab Environmental Quality Standards for Drinking Water

The Environmental Protection Council has approved the following as the Punjab Environmental Quality Standards for Drinking Water.

Table 2-1: Punjab Environmental Quality Standards for Drinking Water

Properties/Parameters	Standard Values	WHO Standards	Remarks
All water intended for drinking(E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Most Asian countries also follow WHO standards

Physical			
Color	≤15 TCU	≤15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non objectionable/Acceptable	Non objectionable/Acceptable	
Turbidity	< 5 NTU	< 5 NTU	
Total hardness as CaCO ₃	< 500 mg/l	----	
TDS	< 1000	< 1000	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
Essential Inorganic	mg/Litre	mg/Litre	
Aluminium (Al) mg/l	<0.2	0.2	
Antimony (Sb)	<0.005 (P)	0.02	
Arsenic (As)	< 0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian

			developin g countries
Chloride (Cl)	<250	250	
Chromium (Cr)	<0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	mg/Litre	mg/Litre	
Cyanide (CN)	<0.05	0.07	Standard for Pakistan similar to Asian developin g countries
Fluoride (F)*	<1.5	1.5	
Lead (Pb)	<0.05	0.01	Standard for Pakistan similar to most Asian developin g countries
Manganese (Mn)	< 0.5	0.5	
Mercury (Hg)	<0.001	0.001	
Nickel (Ni)	<0.02	0.02	
Nitrate (NO3)*	<50	50	
Nitrite (NO2)*	<3 (P)	3	
Selenium (Se)	0.01(P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source	--	
Zinc (Zn)	5.0	3	Standard for Pakistan

			similar to most Asian developing countries
Organic			
Pesticides mg/L			PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20- 58 may be consulted. ***
Phenolic compounds (as Phenols) mg/L		< 0.002	
Polynuclear aromatic hydrocarbons (as PAH) g/L		0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

2.5 Institutional and Administrative Framework

The proposed project falls under the following Institutional and Administrative Framework.

a) Punjab Aab-e-Pak Authority

Punjab Aab-e-Pak Authority (PAPA) was established under act, initially passed by Provincial Assembly in March, 2019 and later on, amended in August, 2019. The main objective for the establishment of this Authority is to provide safe and clean drinking water in 36 districts of Punjab province mainly in rural, semi-urban and peri-urban areas.

b) Environmental Protection Agency, Punjab

The Pakistan Environmental Protection Agency (Pak-EPA) is meant for the enforcement of environmental laws in Pakistan. They have delegated powers to provincial environmental protection departments/agencies for review, approval and monitoring of environmental assessment projects. As regards the proposed project, the EPA Punjab will be responsible for reviewing the report, issuing Environmental Approval and overall/broad based monitoring of the proposed project activities to ensure compliance with the Environmental Management Plan.

Under the Punjab Local Government Ordinance, 2001, District Officers (Environment) are responsible to deal with environmental issues at the district level. National Reconstruction Bureau has formulated the following rules of business for district environment offices:

- To regulate motor vehicles subject to the provisions of the Pakistan Environmental Protection Act, 1997 and the rules and regulations made there-under;
- To ensure, guide and assist the proponents of new projects in submission of Initial Environmental Examination (IEE)/ Environmental Impact Assessment (EIA) to the D.G, EPA for approval;
- To ensure implementation of environmental protection and preservation measures in all development projects at the district level and to sensitize government agencies on environmental issues;
- To identify the needs for legislation in various sectors of the environmental matters;
- To provide information and guidance to the public on environment;
- To encourage the formation and working of non-governmental organizations, to prevent and combat pollution and promote sustainable development; and
- To undertake regular monitoring of projects and to submit progress reports to the DG, EPA for publication in the annual Report.

2.6 Environmental Management Framework in Pakistan

The approach taken for the protection of the environment in Pakistan is laid down in the Environmental Conservation Strategy of 1992 and its review in 2000. For specific rules and regulations, "The Environmental Protection Act" was enacted in 1997 and it provides the backbone and framework for environmental legislation in Pakistan. This

act establishes the Pakistan Environmental Protection Council, the highest decision-making body in environmental issues, the Pakistan Environmental protection Agency (Pak EPA) and Environmental Tribunals.

The Pakistan Environmental Protection Council (PEPC) shall, among other duties, co-ordinate and approve comprehensive national environmental policies and approve National Environmental Quality Standards.

The act further defines the functions of institutions, providing a broad mandate to for enacting rules, procedures and technical standards in different areas of environmental protection. The Act requires Pak EPA to co-ordinate environmental policies and programs nationally and internationally, initiates legislation, establish surveys, manage monitoring and auditing schemes and promote research as well as education and awareness in the field of the environment.

The Environmental Protection Act does further require the provincial authorities to establish Provincial Environmental Protection Agencies for carrying out functions delegated to the provinces.

The Government of Pakistan has recently elaborated its further action in-line with the finding of the review of the National Conservation Strategy in the form of the National Environmental Action Plan, NEAP (as approved by PEPC in 2001).

3 PROJECT DESCRIPTION

This section of the study enshrines the details about the project, its components and all the associated works and construction materials intended for utilization during its execution phase. Also, it contains information regarding implementation procedures, construction time and estimated cost of the project. However, all the details furnished in this section are established based on preliminary design report and Construction drawings provided by the Client & Consultant.

3.1 General

This section covers the project comprehensively. It holds salient features including; location, project site layout, objectives, process employed, site alternatives, cost and magnitude of operation and various phases.

This chapter majorly describes in detail the proposed project of supply construction, installation of water filtration plants in Rawalpindi Divisions Phase I (Package 1).

3.2 Screening / Type and Category of Project

For the prediction and mitigation of impacts of development at an early stage, it is pre-requisite under the environmental laws to undertake Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Study as the case may be. Based on its nature, size and related impacts, the project under consideration has been categorized for EIA Study as stated in Regulation 03 of Statutory Notification (S.R.O 339(1)/2001). As per the statutory notification of Review of IEE and EIA Regulations, 2000 (Amended 2022) made under Section 12 of Punjab Environmental Protection Act, 1997 (Amended 2017), states;

“No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be or where the project is likely to cause an adverse environmental effects an Environmental Impact Assessment (EIA) and has obtained from the Government Agency approval in respect thereof.”

The aforesaid project i.e. “Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase I (Package 1)” falls under Category F

(Water Supply Schemes and Treatment Plants). It requires an EIA Study. Thus, an EIA Study has been conducted and report has been prepared for duly submission in EPA to accord Environmental Approval/NOC.

3.3 Project Objectives

The objective of this project is to install PF-plants, RO filtration plants and supply schemes. The objectives under this project are listed below:

- To install water supply schemes, PF plants, RO filtration Plants.
- To provide contamination free potable drinking water in Rawalpindi Divisions.
- Improvement in the quality of living of urban residents and reduction of poverty in the low income and slum areas.
- Improvement of urban environmental conditions
- The proposed project is itself a value addition project to the health sector.
- Socio-economic uplift of the project vicinity.
- Creation of new job opportunities and promoting income prospects for those engaged in the allied activities associated with operation of project is considered as indirect objectives of the project.

3.4 Project Location

The aforesaid project is located in the Rawalpindi Division. RO plants and Pre-Filtration plants are proposed to be installed in different villages of the said divisions of Punjab province. The location map of the project area is shown as below:

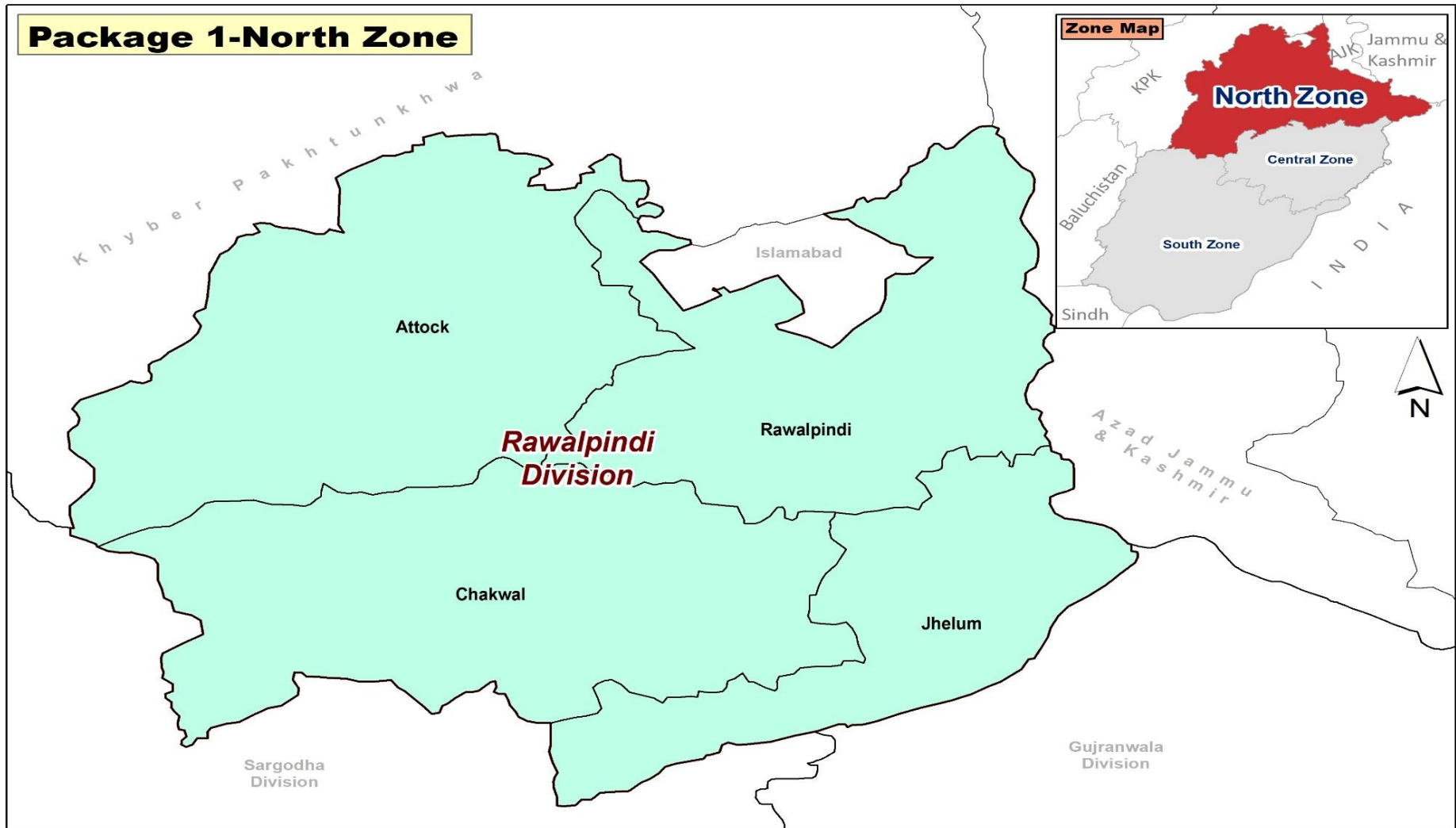


Figure 3-1: Project Area (Package-1)-North Zone, Clean Drinking Water Punjab Aab-e-Pak Authority

The Project area consist of Rawalpindi Division. Detail of each Village is given in table below:

Table 3-1: List of Villages with Coordinates and type of plants being installed in Rawalpindi Division

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
1	Chakwal	Chak Malook	Chakwal	32°57'33"N	72°57'0"E	RO
2	Chakwal	Warwal	Chakwal	33°8'25"N	72°31'21"E	RO
3	Chakwal	Joya Mair	Chakwal	33°0'32"N	72°48'43"E	RO
4	Chakwal	Amir Pur Mangan	Chakwal	32°58'5"N	73°0'45"E	S/AC
5	Chakwal	Ghugh	Chakwal	33°7'51"N	72°44'51"E	RO
6	Chakwal	Bagwal	Chakwal	33°4'30"N	72°35'44"E	RO
7	Chakwal	Panjain	Chakwal	32°55'32"N	73°0'40"E	RO
8	Kallar Kahar	Mahra	Chakwal	32°44'42"N	73°04'31"E	S/AC
9	Chakwal	Panjain	Chakwal	32°55'32"N	73°0'40"E	RO
10	Chakwal	bullay bala	Chakwal	32°58'43"N	72°45'45"E	RO
11	Chakwal	maingan	Chakwal	32°57'45"N	72°44'42"E	RO
12	Chakwal	chak koka	Chakwal	33°11'24"N	72°41'7"E	RO
13	Chakwal	chak umra	Chakwal	32°59'53"N	72°57'36"E	RO
14	Chakwal	khara	Chakwal	33°5'15"N	72°38'17"E	RO
15	Pind Dadan Khan	Dolatpur	Jehlum	32°41'16"N	73°17'51"E	RO
16	Pind Dadan Khan	Kot Kacha	Jehlum	32°32'20"N	72°55'60"E	RO
17	Gujar Khan	Mastala	Rawalpindi	33°8'49"N	73°9'14"E	S/AC
18	Gujar Khan	Panjhgran Kalan	Rawalpindi	33°9'12"N	73°14'9"E	RO
19	Gujar Khan	Changa Bagyal	Rawalpindi	33°18'29"N	73°23'19"E	S/AC
20	Kallar Sayyedan	Dhok Makh Bukahri	Rawalpindi	33°24'54"N	73°21'58"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
21	Gujar Khan	Padehana	Rawalpindi	33°17'30"N	73°21'39"E	RO
22	Attock	Haji Shah II	Attock	33°54'10"N	72°19'56"E	S/AC
23	Attock	Gondal	Attock	33°54'10"N	72°20'6"E	S/AC
24	Attock	Dakhnair	Attock	33°50'32"N	72°16'26"E	S/AC
25	Attock	Surag Mongiwali	Attock	33°43'12"N	72°15'38"E	S/AC
26	Fateh Jang	Malal	Attock	33°24'20"N	72°37'55"E	S/AC
27	Fateh Jang	Gadda	Attock	33°28'17"N	72°32'16"E	S/AC
28	Fateh Jang	Gulial	Attock	33°30'28"N	72°31'14"E	S/AC
29	Hassan Abdal	Kohlia	Attock	33°50'45"N	72°38'0"E	S/AC
30	Jand	Basal	Attock	33°33'15"N	72°15'26"E	RO
31	Jand	Thatta	Attock	33°34'34"N	72°13'10"E	RO
32	Jand	Kot Chajji	Attock	33°32'5"N	72°4'50"E	RO
33	Jand	Marmaki Jandial	Attock	33°31'17"N	72°17'34"E	RO
34	Pindi Gheb	Khour	Attock	33°14'59"N	72°27'21"E	S/AC
35	Pindi Gheb	Khour Company	Attock	33°15'46"N	72°27'35"E	S/AC
36	Pindi Gheb	Kasran	Attock	33°29'4"N	72°16'39"E	RO
37	Pindi Gheb	Kanat	Attock	33°19'59"N	72°13'17"E	RO
38	Pindi Gheb	Kamrial	Attock	33°17'28"N	72°34'38"E	RO
39	Pindi Gheb	Ahmdal	Attock	33°17'29"N	72°29'47"E	RO
40	Pindi Gheb	Nosherah	Attock	33°17'29"N	72°29'47"E	RO
41	Pindi Gheb	Kharppa	Attock	33°16'46"N	72°11'28"E	RO
42	Chakwal	RWSS Odherwal	Chakwal	32°56'15"N	72°48'50"E	S/AC
43	Chakwal	RWSS Balkassar	Chakwal	32°56'40"N	72°38'39"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
44	Chakwal	RWSS Thoa Bahadur	Chakwal	32°56'13"N	72°42'33"E	S/AC
45	Chakwal	RWSS Dheedwal	Chakwal	32°51'35"N	72°56'34"E	S/AC
46	Choa Saiden Shah	RWSS Dandoot	Chakwal	32°39'32"N	72°57'34"E	S/AC
47	Choa Saiden Shah	RWSS Dalwal	Chakwal	32°42'9"N	72°53'16"E	RO
48	Choa Saiden Shah	RWSS Wahula	Chakwal	32°42'56"N	72°54'17"E	S/AC
49	Choa Saiden Shah	RWSS Dulmial	Chakwal	32°44'13"N	72°55'38"E	S/AC
50	kallar kahar	RWSS Bhoun	Chakwal	32°57'30"N	72°45'23"E	S/AC
51	kallar kahar	RWSS Buchal Kalan	Chakwal	32°40'24"N	72°38'0"E	S/AC
52	kallar kahar	RWSS Jhamra	Chakwal	32°42'41"N	72°37'6"E	S/AC
53	kallar kahar	RWSS Sarkalan	Chakwal	32°38'42"N	72°38'43"E	S/AC
54	kallar kahar	RWSS Khairpur	Chakwal	32°44'1"N	72°47'26"E	S/AC
55	kallar kahar	RWSS Munara	Chakwal	32°40'6"N	72°30'51"E	S/AC
56	Lawa	RWSS Lawa	Chakwal	32°41'51"N	71°55'59"E	S/AC
57	Talagang	WSS Tamman	Chakwal	33°0'15"N	72°6'33"E	S/AC
58	Talagang	RWSS Dhurnal	Chakwal	32°48'22"N	72°6'41"E	S/AC
59	Talagang	RWSS jhatla	Chakwal	32°49'23"N	72°22'59"E	S/AC
60	Talagang	WSS Akwal	Chakwal	32°55'47"N	72°22'4"E	S/AC
61	Talagang	RWSS Nakka Kahut	Chakwal	32°56'32"N	72°28'41"E	S/AC
62	Talagang	RWSS Bhilomar	Chakwal	32°43'38"N	72°26'16"E	RO
63	Dina	Pindori	Jehlum	33°5'42"N	73°37'6"E	S/AC
64	P.D Khan	Lilla Thal	Jehlum	32°33'45"N	72°44'33"E	S/AC
65	P.D Khan	Kandwal	Jehlum	32°32'56"N	72°39'21"E	S/AC
66	P.D Khan	Peer Khara	Jehlum	32°38'40"N	72°44'50"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
67	P.D Khan	Jalal pur sharif	Jehlum	32°39'38"N	73°24'11"E	S/AC
68	P.D Khan	Gole pur Kora chorn	Jehlum	32°35'30"N	72°56'0"E	S/AC
69	P.D Khan	Tobah	Jehlum	32°34'43"N	72°49'1"E	S/AC
70	P.D Khan	Haran Pur	Jehlum	32°36'29"N	73°9'13"E	S/AC
71	P.D Khan	Saroba	Jehlum	32°34'7"N	72°52'8"E	S/AC
72	P.D Khan	Dharyala Jalib	Jehlum	32°38'60"N	73°13'23"E	S/AC
73	P.D Khan	Ather	Jehlum	32°33'21"N	72°49'57"E	S/AC
74	P.D Khan	Sodi Gujar	Jehlum	32°37'20"N	73°3'44"E	S/AC
75	P.D Khan	Jotana	Jehlum	32°43'5"N	73°9'24"E	S/AC
76	P.D Khan	Bilowal	Jehlum	32°35'42"N	72°52'33"E	S/AC
77	P.D Khan	Dhudi Phaphra	Jehlum	32°38'29"N	73°6'44"E	RO
78	Sohawa	Domeli	Jehlum	33°0'38"N	73°21'11"E	S/AC
79	Gujar Khan	Rural Water Supply Scheme Khuramb Kaswal.	Rawalpindi	33°15'23"N	73°14'25"E	S/AC
80	Gujar Khan	Rural Water Supply Scheme Sukho.	Rawalpindi	33°16'43"N	73°15'16"E	S/AC
81	Gujar Khan	Rural Water Supply Scheme Hamid Jhangi UC Jhangi Jalal.	Rawalpindi	33°15'23"N	73°14'18"E	RO
82	Gujar Khan	Rural Water Supply Scheme Karyala UC Punjgran.	Rawalpindi	33°15'14"N	73°10'56"E	RO
83	Kahuta	Rural Water Supply Scheme Thoa Khalsa UC Thoa Khalsa.	Rawalpindi	33°30'35"N	73°25'53"E	S/AC
84	Kallar Syedan	Urban Water Supply Scheme Kallar Syedan MC Kallar Syedan	Rawalpindi	33°25'0"N	73°22'50"E	RO

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
85	Kallar Syedan	Rural Water Supply Scheme Dubaran Kalan UC Dubaran	Rawalpindi	33°26'55"N	73°30'11"E	S/AC
86	Kallar Syedan	Rural Water Supply Scheme Pind Bainso UC Nallah Musalmanan	Rawalpindi	33.47383704180054N	73.51664587614918 E	S/AC
87	Murree	Rural Water Supply Scheme Parhanna UC Ban.	Rawalpindi	33°50'57"N	73°27'41"E	S/AC
88	Murree	Rural Water Supply Scheme Dhanda UC Ghel.	Rawalpindi	33°54'13"N	73°30'36"E	S/AC
89	Murree	Rural Water Supply Scheme Manga UC Tret.	Rawalpindi	33°50'58"N	73°27'41"E	S/AC
90	Rawalpindi	Rural Water Supply Dhoke Chudriyan	Rawalpindi	33°35'56"N	73°6'33"E	S/AC
91	Rawalpindi	Rural Water Supply Defence Colony	Rawalpindi	33°37'26"N	73°6'31"E	S/AC
92	Rawalpindi	Rural Water Supply Scheme Basali UC Basali	Rawalpindi	33°23'39"N	73°8'20"E	S/AC
93	Rawalpindi	Rural Water Supply Scheme Chahan UC Chahan	Rawalpindi	33°25'9"N	72°52'17"E	S/AC
94	Rawalpindi	Rural Water Supply Nai Abadi	Rawalpindi	33°37'11"N	73°6'42"E	S/AC
95	Rawalpindi	Rural Water Supply Madni Mohallah	Rawalpindi	33°34'23"N	73°2'43"E	RO
96	Rawalpindi	Rural Water Supply Scheme Chak Beli Khan UC Chak Beli Khan.	Rawalpindi	33°16'45"N	72°54'52"E	RO
97	Rawalpindi	Rural Water Supply Schem Mir Haider Colony (Rehab.)	Rawalpindi	33°34'54"N	73°0'45"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
98	Rawalpindi	Rural Water Supply Scheme Kali Parri	Rawalpindi	33°16'56"N	72°54'35"E	S/AC
99	Rawalpindi	Rural Water Supply Scheme Sagri UC Sagri	Rawalpindi	33°27'37"N	73°15'53"E	RO
100	Rawalpindi	Rural Water Supply Dhoke Lalyal	Rawalpindi	33°37'11"N	73°6'45"E	S/AC
101	Rawalpindi	Rural Water Supply Al-Noor Colony	Rawalpindi	33°37'39"N	73°6'17"E	S/AC
102	Rawalpindi	Rural Water Supply Scheme Salmoon UC Chontra	Rawalpindi	33.30557008601798 N	72.91353428679749 E	S/AC
103	Rawalpindi	Rural Water Supply Scheme Chontra UC Chontra	Rawalpindi	33°21'17"N	72°55'52"E	S/AC
104	Rawalpindi	Rural Water Supply Scheme Rajar UC Chahan	Rawalpindi	33°24'1"N	72°50'7"E	S/AC
105	Rawalpindi	Rural Water Supply Malik Colony Nai Abadi	Rawalpindi	33°34'6"N	73°07'4"E	S/AC
106	Rawalpindi	Rural Water Supply Scheme Adiala UC Adyala	Rawalpindi	33°33'34"N	73°1'45"E	S/AC
107	Rawalpindi	Rural Water Supply Scheme Kurrar UC Parial	Rawalpindi	33°12'56"N	72°45'44"E	S/AC
108	Rawalpindi	Rural Water Supply Scheme Chakri UC Chakri	Rawalpindi	33°17'43"N	72°46'11"E	S/AC
109	Rawalpindi	Rural Water Supply Scheme Afzal Abad	Rawalpindi	33°35'25"N	73°5'53"E	RO
110	Rawalpindi	Rural Water Supply Scheme Mial UC Parial	Rawalpindi	33°13'25"N	72°47'25"E	S/AC
111	Rawalpindi	Rural Water Supply Scheme Dheri UC Chontra	Rawalpindi	33°16'49"N	72°47'0"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
112	Rawalpindi	Rural Water Supply Shaheen Colony	Rawalpindi	33°38'0"N	73°5'50"E	S/AC
113	Rawalpindi	Rural Water Supply Lala Ruka, Lakhani	Rawalpindi	33°33'38"N	73°0'39"E	RO
114	Taxila	Urban Water Supply Scheme Taxila MC Taxila. (Phase-II)	Rawalpindi	33°45'0"N	72°48'53"E	S/AC
115	Taxila	Rural Water Supply Scheme Thatta Khalil UC Thatta Khalil.	Rawalpindi	33.665740752319365 N	72.75640292648129 E	RO
116	Taxila	Rural Water Supply Scheme Rehbar Colony UC Usman Khattar.	Rawalpindi	33°46'38"N	72°49'15"E	S/AC

The visual representation of some of the proposed site in Rawalpindi division for installation of water supply schemes and filtration plants are **Annexed** in this report.

3.5 Site Description

3.5.1 Land Ownership

Land for all the PF filtration plant, RO filtration plant and water supply scheme will be acquired by client Punjab Aab-e-Pak Authority (PAPA).

3.5.2 Government Approvals

Punjab Aab-e-Pak Authority (PAPA), has applied for environmental approval. They will apply for local government approvals after getting Environmental Approval from EPA.

3.5.3 Land Use on Site

Most of the sites of the filtration plants are rural areas comprising of agricultural lands and land parcels of barren land. Most of the lands are Government lands and few are private lands.

3.6 Vegetation Features

Agricultural crops, bushes and wild grasses are present in the nearby surroundings of project area. During operation phase, green belts will be developed, and it will serve as a useful buffer to contain the menace of pollution from different sources. Various local plants will be grown at the project site in the open areas, and along the boundary. During the said proposed activity, no major loss of vegetation will be observed, and more trees and plants of required species will be grown to enhance the aesthetics of the project vicinity.

3.7 Cost and Magnitude of Proposed Project

Total area for the construction of PF filtration plants, RO filtration plants and water supply scheme required is 2 to 2.5 Marlas. Manpower required for (civil works, electrical, mechanical and instrumental works) during the construction phases is estimated to be 125 – 150 persons during the peak time. The total estimated cost for the aforesaid project is **338.88 Million PKR**.

Budget will be allocated for purchase and maintenance of standardized PPEs for workers and environmental enhancement. Despite these costs, this project was found to be financially feasible in the feasibility report.

3.8 Project Phases / Implementation Schedule

The installation of the filtration plants will be completed in the span of 2 years (24 months). The detailed implementation schedule of the aforesaid project is annexed as **Annex – III** in this report.

3.9 Relocation and Rehabilitation Plan

There exists no human settlement within selected project site to be displaced owing to the commencement of the Proposed Project. No structure of any significance

stands at the site to be relocated or dismantled, no relocation and rehabilitation is required.

3.10 Project Description

The aforesaid Project is “Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division Phase - I (Package 1)”. The Government of Punjab through Punjab Aab-e-Pak Authority (PAPA), has intended to serve about 4.7 Million People of the targeted areas of the Punjab Province falling in designation Central, North and South Zones of the Punjab. Successful implementation of this project will result provisions of the contamination free potable drinking water to underserved areas in Punjab especially in Rawalpindi Division and consequently eliminate water borne diseases to improve public health.

There are very limited water supply facilities available in Rural Areas of Punjab. Pakistan Living Standards Measurement Survey (PLSM) 2018-19 depicts that:

- Overall 18% of households use tap water as main drinking water source.
- In Punjab only 12 % of the households use tap water as main drinking water Source, which is the lowest among all provinces.

In Punjab 69.62 million population lives in rural areas out of which only 14.98 million is served with clean drinking water. Rest 54.64 million is un-served population. So only 21.51% population living in rural areas have access to safe drinking water.

Water sources in Punjab are given as follows:

- Motorized Pump= 44%
- Hand Pump = 23%
- Filtration Plants = 15%
- Tap Water = 12%
- Tanker/ Truck= 4%
- Bottled water = 1%

3.10.1 Need for Aforesaid Project

As mentioned above in Punjab, there is high dependence on ground water, whereas indicators show improvement in accessibility to water, the quality of water still remains problematic. Widespread use of hand pump and pit latrines is responsible for fecal contamination of the drinking water. This contaminated water is being used for drinking purposes and cooking mostly without any treatment, resulting in water borne diseases. Therefore, there is need to provide safe and clean drinking water as top priority to such areas.

3.10.2 Project Objectives

- The objective of the project is to provide clean drinking water facility based on minimum requirement set by World Health Organization, ensuring provision of potable water to rural households in Punjab.
- To provide sustainable supply of clean drinking water to each and every individual.
- To undertake or engage in such activities as are necessary for sustainable efficient and affordable clean drinking water.
- To conduct surveys, studies and research.
- To devise strategy, plan and actionable parameters for survey of water contamination and for provision of clean drinking water by installation of water filtration and purification plants.
- To reduce, suspend or disconnect the water supply in the event of contravention of the provisions of the Act or the rules or regulations made there under.
- To design, fabricate, construct, install, build, commission, test, operate and maintain schemes and water filtration plants for drinking water.
- To develop or cause to develop an infrastructure as needed to provide drinking water, including setting up of bottling plants, and testing laboratories.
- To safeguard human health including reduction in the mortality rate associated with lack of access of safe drinking water, inadequate sanitation and poor hygiene by improving the quality and access to clean drinking water which shall lead to reduction of water borne diseases.
- To educate and involve the community in the development of filtration plants and water supply schemes to devise suitable arrangements for improving access to clean drinking water.

- To carry out improvements, management, administration, supervision, execution and control of works and projects for providing clean drinking water.
- To devise and develop a model of designing, supervision, monitoring and evaluation of the execution of clean drinking water projects and their quality assurance system.

3.10.3 Purpose of the Aforesaid Project

The government of the Punjab, through the Punjab Aab-e-Pak Authority, has intended to serve about 4.7 Million people of the targeted areas of the Punjab Province falling in designation Central, North and South Zones of the Punjab. Successful implementation of this project will result in provision of contamination free potable water to the underserved areas in Punjab and consequently eliminate water borne diseases to improve public health.

3.10.4 Population / Area details of Different Districts of Rawalpindi (Package – 1)

3.10.4.1 Rawalpindi Division

Rawalpindi Division is an administrative division of Punjab Province, Pakistan. Rawalpindi city is the capital of the division. According to the 2017 Census of Pakistan, the total population of division was 10 million. Divisions are the third tier of government below the federal and provincial levels.

In 2000, local government reforms abolished administrative divisions and raised the districts to become the new third tier of government.[2] But in 2008, the division system was restored again.

Table 3-2: Area and Population detail of Districts in Rawalpindi Division

District	Area (km ²)	Population
Rawalpindi	5,286	5,405,633
Attock	6,858	1,883,556
Chakwal	6,524	1,495,982

Jhelum	3,587	1,222,650
Total	22,255	10,007,821

District Rawalpindi

Rawalpindi District, is a district located in the northernmost part of the Punjab province of Pakistan. Parts of the district form part of the Islamabad Rawalpindi metropolitan area. Rawalpindi city is the district capital.

The district has an area of 5,286 km² (2,041 sq mi). Originally, its area was 6,192 km² (2,391 sq mi) until the 1960s when Islamabad Capital Territory was carved out of the district, giving away an area of 906 km² (350 sq mi). It is situated on the southern slopes of the north-western extremities of the Himalayas, including large mountain tracts with rich valleys traversed by mountain and rivers. The chief rivers are the Indus and the Jhelum, and it is noted for its milder climate and abundant rainfall due to its proximity to the foothills.

The district is divided into following Tehsils:

- Rawalpindi
- Texila
- Gujar Khan
- Kallar Syedan
- Kahuta
- Kotli Sattian
- Murree

District Attock

Attock District is a district in Pothohar Plateau of the Punjab Province of Pakistan. Its capital is Attock city.

The district was created in April 1904 by the merging of tehsils of nearby districts. Its former name was Campbellpur.

It is located in the north of the Punjab province, bordered by Chakwal to the south, Mianwali to the southwest, Rawalpindi to the east, Kohat to the west, Nowshera to the northwest, and Swabi and Haripur to the north.

The district has following 6 Tehsils:

- Attock
- Fateh Jang
- HasanAbdal
- Hazro
- Jand
- Pindi Gheb

District Chakwal

Chakwal District is in Pothohar Plateau of Punjab, Pakistan. It is located in the north of the Punjab province, Chakwal district is bordered by Khushab to its south, Rawalpindi to its north east, Jhelum to its east, Mianwali to its west and Attock to its north west. The district was created out of parts of Jhelum and Attock in 1985, these are:

- Chakwal
- Kallar Kahar
- Chao Saidan Shah
- Talagang
- Lawa

District Jhelum

Jhelum District is in Pothohar Plateau of the Punjab province of Pakistan. Jhelum is one of the oldest districts of Punjab. It was established on 23 March 1849. According to the 1998 census, the district had a population of 936,957, of which 31.48% were urban. Jhelum District has a diverse population of 1,103,000 (2006). Jhelum is known for providing many soldiers to the British and later to the Pakistan armed forces due to which it is also known as city of soldiers or land of martyrs and warriors. The district of Jhelum stretches from the river Jhelum almost to the Indus. Salt is quarried at the Mayo mine in the Salt Range. There are two coal mines in the district from which the North-Western railway obtains parts of its supply. These are the only coal mines in Punjab province which are in working condition. The chief center of the salt trade is Pind Dadan Khan. The district is crossed by the main line of the North-Western railway and also traversed along the south by a branch line. It is located in the north of the Punjab province, Jhelum district is bordered by Sargodha and Mandi Bahauddin to its south, Khushab to its southwest, Jhelum River to its south and east, Gujrat to its east, Chakwal to its west, Mirpur to its northeast, and Rawalpindi to its north.

Following are tehsils of Jhelum District:

- Jhelum
- Sohawa

- Pind Dadan Khan
- Dina

3.10.4.2 Criteria for Selection of Technology in different Villages

After analysis of the Water quality of ground water, the plant with appropriate treatment technology will be selected and installed at the identified villages of Rawalpindi Division.

Table 3-3: Criteria for Selection of Technology

Type of Plant	Criteria
RO Plant	• Groundwater TDS>1000 mg/l • Groundwater TDS>1000 mg/l with other contaminants like Arsenic, Fluoride or Nitrate. • Significant Population
Direct Supply to Markaz-e-Aab	• Sweet water zone, Groundwater TDS<900 mg/l • Other contaminants like Arsenic, Fluoride or Nitrate and Biological Contamination

Plant size will be selected on the basis of the population of the serving area/village. The governing body of PAPA has decided to select villages which have significant population. The short listing of villages has been based on the data from HUD & PHE Department. The areas where there are no existing facilities, having high TDS & contaminants. The areas where there are no existing facilities, having high TDS & contaminants and having significant population have been given priority in each district of Punjab during the first phase of the project. Design Horizon for the filtration plants will be 20 years.

3.10.4.3 Operation time of Filtration Plants

Filtration Plant will be designed for the next 20 years and will be served at the rate of 08 operational hours depending on the everyday water requirement of the village. PAPA may serve more population by increasing operational hours.

3.10.4.4 Design Period of Project Components

3.10.4.4.1 Design Period for Tube-well

Experience reveals that majority of drinking water tube-wells installed in the province, about 15 to 20 years back, are still in satisfactory working condition. For optimal utilization of resources it is advisable to adopt for a design period of 15 years as far as tube-wells are concerned.

3.10.4.4.2 Design period of pumping machinery

The design period of pumping machinery to be provided on the water supply system shall be 10 years, however, repair or replacement of the pumping sets may be necessary after 10 years of operation, or as and when required.

3.10.5 Water Source Selection

3.10.5.1 Ground Water

For communities where water supply scheme is nonfunctional and ground water is sweet but having other contaminations (Arsenic, Fluoride, Nitrate and E-Coli), the option of providing drinking water by pumping groundwater and treating it through Pre-filtration (Sand & Activated Filter) plants will be installed.

3.10.5.2 Installation of Tube-well

Tube-well will be installed on the sites identified by the Client and verified by the Consultants on the basis of water quality analysis and survey. The tube-wells will be designed to meet the Maximum Day Demand of the community they are serving.

3.10.5.3 Capacity of the Tube-well

Tube-wells will be designed to meet maximum daily demand. For site specific water supply solutions i.e. RO, or Package Plants, design capacity of the tube well bore will be as required to meet demand of 2 m³/hr. (2000 L/hr.) for eight working hours.

1. Tube-well Casing

Diameter of the Tube-well casing will be 6 inches. Reason for providing a relatively large diameter is that if during maintenance, a large diameter line shaft pump is required to be installed then a 4 inches (100 mm) diameter housing pipe will easily accommodate it.

2. Filter Casing

Slotted casing will be installed against water yielding formations. Diameter of the PVC strainer will be 3 inches (75 mm) depending upon the capacity and yield of the aquifer. The entrance velocity (velocity of groundwater flowing through the slotted casing slot) will be kept below 0.05 ft/s (0.01524 m/s). Length of the slotted casing will be maximized to reduce drawdown. Open area of the slotted casing will be about 10 percent. Slot size will depend upon grain size distribution of the aquifer material. Normally it will range from 1.0 to 1.5 mm.

3. Housing Pipe

The diameter of housing pipe will be based on the discharge of tube-well.

3.10.6 Water Treatment

3.10.6.1 Plant Capacity

Sand/ Activated Carbon Filter Plants of 2000 liter/hour capacity will be installed.

3.10.6.2 Existing Water Supply

If there exist a direct water supply schemes in the vicinity, Consultant will analyze the water quality of the source and line will be laid from the water source to the Markaz-e-Aab. After proper treatment of the water, it will be delivered to the people through the taps in Markaz-e-Aab.

3.10.6.3 Disinfection Chlorination

Chlorination is the addition of chlorine in the water to kill the bacteria. Chlorination is very widely adopted in all developing countries for treatment of water for public supply. Chlorine is available in gas, liquid or solid form (bleaching powder).

Advantages of Chlorine

- Chlorine is manufactured easily by electrolytes of common salts (NaCl).
- It is powerful oxidant and can penetrate the cell wall of organism and its contents.
- Dosage can be controlled precisely.
- Can be easily detected by simple orthotolidine test.
- It does not form harmful constituents on reaction with organics or inorganics in water.
- Leaves required residue in water to neutralize recontamination later.

Disadvantages of Chlorine

- Taste and odor may be unacceptable to some users.
- Relatively low protection against protozoa.
- Lower disinfection effectiveness in turbid waters so requires clear water to be most effective.
- Must ensure quality control of solution.
- Potential long-term effects of chlorination by-products.

3.10.7 Filtration Plant / Direct Supply

Pretreatment shall be provided for removal of suspended chemical impurities. Pretreatment shall also reduce those contaminants that would adversely affect [i.e. reduce] the life of downstream. Following types and capacities of the filtration plants shall be considered.

1. Pre-filtration Plant 2,000 liters/hr
2. Reverse Osmosis Plant 2000 Liter/hr

Pre-Filtration plants will be installed at non-brackish sites where Total Dissolved Solids are below 1000 mg/L and feed water is contaminated with chemical and biological impurities. These plants shall comprise of those processes that shall produce product water as per the WHO standards. These processes can include but not be limited to pre-filtration, Arsenic/ Fluoride/ Nitrate removal filter. An activated carbon filter shall be installed for the removal of taste and odor compounds as well as other organic impurities. Reverse Osmosis plant will be installed where TDS is more than 1000 and less than 5000 mg/l. More details on these processes are given below:

3.10.7.1 Design Criteria

These plants shall be powered grid energy as primary source.

The design methodology for all Pre-Filtration Plants shall be rendered to the Engineer for approval.

3.10.7.2 Pre-filtration / Sand Filter

Pre filtration shall be provided for the removal of the suspended solids / colloids which are present in the water. Pre-filtration will also reduce the load on Reverse Osmosis and protect the membrane from being damaged, thus increasing the membrane life. The silica sand shall conform to AWWA B100, including acid solubility requirement, except as modified or supplemented herein. The specification shall include the following:

- Filter media : Silica Sand
- Vessel material : FRP
- Suspended solid removal : > 20 micron
- Acid solubility : Less than 5 percent
- Specific gravity : $2.60 \geq 2.65$
- Effective size for sand : 0.5 to 0.8 mm
- Uniformity Coefficient : <1.4
- Backwash : Automatic, Time based/ Controller

3.10.7.3 Activated Carbon filtration

The media used in this filter, shall meet the following minimum requirements.

- Raw material : coconut shells
- Bulk density : 440-540 kg/cm³
- Hardness No. : 80
- Iodine No. : 850-1000
- Ash content : 5 %
- Surface area : 900 m²/g
- Certification : NSF

3.10.7.4 Cartridge Filters

Cartridge filter of 05 µm shall be added before the RO unit.

3.10.7.5 FRP Vessels for Sand, Activated Carbon and Chemical Reduction Filtration:

FRP Vessels shall meet the following minimum requirements:

- Material : polyester or vinyl ester
- Maximum Operating Pressure : up to 06 Brag
- Maximum Operating Temperature: 45 °C
- Certification : NSF
- For filtration speed : 5-15 m/h

3.10.7.6 Stainless Steel Skid

The Stainless Steel Skid shall meet but not limited to the following specification:

- Stainless Steel Grade : SS 304
- Minimum Size : As per proposed design

3.10.7.7 Chemical Reduction Filters

These filter(s) shall be installed to treat the specified chemical contamination as according the design parameters found in the feed water. It is observed that feed water may be contaminated with any of the following chemical pollutants:

- Arsenic
- Fluoride
- Nitrate

3.10.7.8 Arsenic removal filters shall be installed with the main plant confronting to the following requirement

- Filter Vessel : FRP
- For filtration speed : 8-10 m/h
- Filter media : Granular Ferric Hydroxide (compliant with
- BS EN 15029:2012 standard / equivalent OR
- Activated Alumina compliant with BS EN
- 13753:2009 standard / equivalent
- Certification : NSF
- Time-clock control programmer : by Controller Time Based system

3.10.7.9 Fluoride removal Filter

The fluoride shall be removed from the water by Activated Alumina or other to meet the product water quality. This shall be used as adsorbent for the removal and shall meet the following minimum requirements.

3.10.7.10 Nitrate Removal Filter

If the feed water contains nitrate and the total dissolved solids are less than 1000 mg/liter, nitrate shall be removed through ion-exchange process. For this purpose, strong base anionic resins shall be used, with the following minimum design parameters.

- Feed water loading rate: < 300 L/ minute. m³
- Depth of resin bed : > 0.6 m
- Time-clock control programmer : by Controller Time Based system
- Certification : NSF

3.10.7.11 Flow Meter

A variable area flow meter/ Rota meters shall be installed to measure the flow of feed/ permeate water. Flow meter shall be of transparent acrylic material with Stainless Steel float with graduations on them to show proper flow. Flow meter shall be capable of covering the full range of flow. Glass should be acrylic and capable to deal Maximum flow rate 06 m³/hr. Calibration on the scale should be enable for 0.5 m³/hr minimum.

3.10.7.12 Water Meter

Water meter shall be of multi jet/turbine type with a pulse generator with a maximum frequency of 1pulse/ 10Liters. Body of water meter shall be of Cast iron with threaded connections and a minimum pressure rating of PN10. Water meter shall have a totalizer installed on permeate line.

3.10.7.13 Pressure Gauge

All installed pressure gauges shall be bourdon spring type with Stainless Steel (SS), 304 casing and a minimum diameter of 2.5". All gauges shall be damping fluid filled having back connection and border for easy fitting on the panel.

For addition of various chemicals like acid, anti-scalant, etc.

- Dosing Pumps Qty : As required
- Flow Rate : as required
- Resistance Pressure : as system requirement
- Diaphragm : PTFE-EPDM/ PVDF Composite
- Enclosure : IP65 (NEMA 4X)
- Insulation Class : B
- Electric Connections : 240V/50Hz
- Material: Suction, Injection Valves, Foot Valve etc.

3.10.7.14 Product Water Tank

The Polyethylene water storage tank shall meet but not limited to the following specification:

- Material : Food Grade, Polyethylene
- Ambient Temperature : 45 C
- Wall Thickness : Approx. 4 to 5.0 mm Minimum

3.10.7.15 Filtration Plants

The specification of these plants and their possible components are given in the paragraphs Described here-over.

A. Filtration units using sand filter and activated carbon Filter, Capacity 2000 L/h

Table 3-4: Specifications of Filters

Sand Filter	
Mounting	FRP Vessel Skid
Filtration Rate	15 m/h
Backwash rate	25-35 m / h
Empty Bed Contact Time (EBCT)	03 Minutes Minimum
Backwashing Time	Adjustable by Local Timer
Sand Effective Size	0.5 - 0.8 mm UC 1.4 - 1.7 Height 800 mm minimum SG ≥ 2.63 0.5 - 0.8
Vessel	FRP
Feed pump	Centrifugal type, eff > 60%
Piping for units	PE or PVC/PPRC/UPVC/HDPE
Activated Carbon Filter	
Filtration Rate	12 m/h
Empty Bed Contact Time (EBCT)	04-05 Minutes
Backwash Rate	40 m/h
Base Material	Coconut shell
Effective Size	1.2 -1.6 mm
Uniformity Coefficient	≤ 1.9
Surface Area	900 m ² /g
Bulk density	440-540 kg/m ³
Hardness No.	80 min
Ash Content Max 5%	Ash Content Max 5%
Vessel Material	FRP
Clean water storage tank	08 hours of a day Max

3.10.7.16 Granular Ferric Hydroxide for Arsenic Removal

Waterborne arsenic is a major cause of disease and has been found in abundant quantity in many part of the Punjab as identified by water quality analysis and testing. It is the only contaminant that has been shown to be the cause of human cancers following exposure through drinking water. Besides cancer of the skin, lung and bladder and probably liver, arsenic is responsible for a range of adverse effects, including hyperkeratosis and peripheral vascular disease.

Granular ferric hydroxide is used widely for removal of arsenic removal from drinking water. Arsenic removal shall be done in case necessary as pre-treatment, conforming to the following requirement using granular ferric hydroxide as removal media. Arsenic removal shall be done in case necessary as pre-treatment.

B. Arsenic Removal Filter

Parameters	Range of Typical Values
Mounting	FRP Vessel Pad
Media Size	0.32 – 2.0 mm
Grain Density	1.19 g/cm ³
Bulk Density	1100 g/l
EBCT	05 min
Absorption Capacity	15 g/kg (GEH)
Backwash speed	20 – 25 m/h (50% expansion)
pH range	7 – 8
Specific Surface Area	250 – 300 m ² /g (Dry Weight)
Filter Vessel	FRP
Diameter / height	Minimum 600 mm / 1600 mm
Oxidation of As(III) to As(V)	with Chlorine, ClO ₂ / KMnO ₄
Filter media:	Granular Ferric Hydroxide, (compliant with BS EN 15029:2012 for drinking water treatment) or Activated Alumina (compliant with BS EN 13753 :2009 for drinking water treatment)
Certification	NSF

3.10.7.17 ACTIVATED ALUMINA (AA) ABSORBENT FOR FLUORIDE REMOVAL

High intakes of fluoride can give rise to dental fluorosis, an unsightly brown mottling of teeth, but higher intakes result in skeletal fluorosis, a condition arising from increasing bone density and which can eventually lead to fractures and crippling skeletal deformity.

This is a major cause of morbidity and can manifest itself at a relatively early age with the result that affected individuals cannot work properly and may be economically as well as physically disadvantaged for life. Many factors appear to influence the risk of such adverse effects, including volume of drinking water, nutritional status and, particularly, fluoride intake from other sources.

The fluoride shall be removed from the water by Activated Alumina (AA) or other to meet the Product water quality. This shall be used as adsorbent for the removal and shall meet the following minimum requirements.

Parameters	Range of Typical Values
Mounting	FRP Vessel Pad
Empty Bed Contact Time (EBCT)	5 Min (Minimum)
Fluoride Capacity of AA	8 g /kg
Media Size	0.5 - 3 mm
Grain Density	3.97 g/cm ³
Bulk Density	700 kg/m ³
Specific Surface Area	300 -350 m ² /g (Dry Weight)
Bed Depth	0.9 - 1.85 m
Backwashing	20 m/h for 50 % bed expansion
Backwashing Time	10 -15 Minutes
Vessel Material	Fiber Reinforced Plastic (FRP)
Filter media:	Activated Alumina (compliant with BS EN 13753 :2009 for drinking water treatment)
Process Control	PLC/ Adjustable by Local Timer
Certification	NSF

3.10.8 Reverse Osmosis Plant

Pretreatment shall be provided for removal of suspended solids, turbidity and biological contaminant material. Sand filters followed Flocculation tank of surface water will be used as

a pretreatment section of RO plant. Following types and capacities of the filtration plants shall be considered.

- a. RO Plant 2,000 liters/hr.

3.10.8.1 Design Criteria

The criteria used for the design of RO plants shall be as follows:

- This type of Reverse Osmosis (RO) plants shall be powered grid energy as prime energy source.
- RO design must be based on feed water with total dissolved solids (TDS) for brackish waters up to 5000ppm
- An allowance should be made (a 50% safety factor) for an increase in TDS in the source water as it is harvested.
- Re-mineralization of RO product water will be carried out by blending an appropriate fraction of pretreated raw water and/or chemicals to bring up the TDS, alkalinity and hardness to an acceptable level for human consumption. The product water shall be consistent with the Prescribed Standards and the WHO Safe Drinking Water.
- The RO plant shall be installed with more than 50% recovery of permeate. The vendor must
- submit the projection/simulation based on complete feed water analysis before installation of
- Plant.
- The Bidder shall take into account the following criteria:
- Reduced energy consumption by using Low energy membranes with standard size of 4" x 40" or 08" x 40"
- Reduced chemical usage
- Increased life span of critical replacements such as membranes and filter parts
- Small foot print area.

3.10.8.2 Equipment

This section covers the reverse osmosis (RO) treatment plant for the Punjab Aab E Pak Project (PAPA). The RO system at designated site shall consist of pretreatment, chemical addition systems (Anti-Scalant), cartridge filtration, RO membranes with pressure vessels, complete with High pressure feed pump, Pretreated filters water from Sand and activated Carbon filters for blending / mixing arrangement passing through UV system, interconnecting piping, valves controls and instrumentation.

The CONTRACTOR shall furnish all labor, materials, equipment and incidentals necessary to fabricate, ship to the site, install, startup, performance test, and demonstration test the RO systems as shown on the Drawings and as specified herein.

The equipment furnished under this specification shall be made and fabricated from new materials. The use of used or refurbished materials is unacceptable.

3.10.8.3 Pre-filtration Pressure Filter

Pre filtration will be done by using multimedia filters for RO Plant.

3.10.8.4 FRP Vessel for Sand & Activated Carbon Filter

FRP vessels will be done by using multimedia filters for RO Plant.

3.10.8.5 Reverse Osmosis Section

The RO sections of the plant include high pressure pump, cartridge filters membrane housings, Reverse Osmosis membranes and instrumentation. This section shall be manufactured by NSF certified OEM manufacturer as per guidelines of the design projections. Plant assembled and tested in Pakistan with all its components assembled at place of manufacture. The pre-treatment and post-treatment arrangements shall be performed by bidder to be tested to ensure compliancy with the main plant.

I. High Section Pump

HP multistage pump centrifugal pump and motor shall be of reputed manufacturers among Europe/ USA/ Germany/ Equivalent and efficiency above 60% are acceptable.

II. Reverse Osmosis Membrane

Proven and reliable high rejection thin film membrane elements shall be selected to give optimum performance. They shall have an operating range of 3-11 PH. They shall be high flow fiberglass wrapped for maximum durability.

- Membrane Type : Spiral wound
- Membrane element Size : 4" x 40" / 08" x 40"
- Maximum Applied Pressure : 250 psi
- Stable Salt rejection : 99%
- pH range, short term cleaning : 1-13

- pH range, continuous operation : 2-11

III. Membrane Vessels

Heavy duty reverse osmosis pressure vessel housings shall be made of fiberglass, tested and certified by the American Society of Mechanical Engineers (**ASME**) and the boiler association of the USA as per ASME's Boiler and Pressure Vessel Code (BPVC):2013. Enamel coated white. Easy membrane removal, inspection, and installation should be allowed.

- Housing Material : PVC/ FRP along with all port connections
- Housing Size : 4" x 40" / 8" x 40"

IV. Reverse Osmosis Control System

The reverse osmosis water filtration plants shall be controlled by a Reverse Osmosis PLC manufactured with US / EU/ Germany/ equivalent microprocessor chip featuring a 2-line X 20- character, alphanumeric backlit LCD or process mimic to display operating conditions, and provides adjustable time delays and set points to accommodate varying field conditions. SCADA system for future.

The controller shall display the permeate TDS/Conductivity, water temperature, and operating hours along with the operating status of the RO unit. Low and high pressure switches, tank levels, and pretreatment equipment shall be monitored through a controller.

Controller shall be providing relay outputs for the RO high pressure pump, inlet solenoid valve,

Membrane flush solenoid valve, and optional relays for permeate divert or remote alarm and auxiliary output.

The treatment plant automation system shall be established with Standard functions of the microprocessor controller for monitoring and/or control of:

- RO high pressure pump motor
- Inlet solenoid valve
- Automatic flush solenoid valve
- Low feed pressure switch
- High pressure pump switch
- RO storage tank level switches

- Permeate TDS/Conductivity
- Water Temperature
- Operating hours

The microprocessor-controlled system shall be used to monitor pressure and level Switches, TDS / Conductivity monitor/controller with programmable Set points must be an integral part of the controller. The controller shall display the system status and sensor and switch input status on an easy to read backlit display. User programmable Set points to be provided for fast and easy adjustment of system parameters.

- Power : 240 VAC -15+10%, 50Hz, 25 Watts
- Enclosure : 8" X 6" X 4" (203mm X 152mm X 102mm) NEMA 4X
- Display : 2 line X 20 character, alphanumeric backlit LCD
Or Process Mimic Display
- Front Panel : Overlay with LCD window, alarm lamp, 7 key
Membrane switch, Switch Inputs,
- Dry Contact : Pressure fault, pretreat lockout Permeate Storage Tank full
Feed Storage Tank empty
- Relay Outputs : RO pump relay 240VAC, Inlet valve relay 240VAC, 5A
Flush valve relay 240VAC, 5A, Relays supply same output voltage as
board power (240 VAC)
- Regulatory Standards: Reverse Osmosis Controller system shall be new
and shall be designed with microprocessor chip manufactured in countries
of origin as Europe, USA, Germany/ equivalent only.

V. Frame/Skid:

Stainless steel shall be used for Reverse Osmosis Skid meeting minimum following specification can also be used:

- Stainless steel grade : SS304
- Minimum Size : As per adjustment

VI. Flow Meter

A variable area flow meter/ Rota meters shall be installed to measure the flow of feed/ permeate water. Flow meter shall be of transparent acrylic material with Stainless Steel float with graduations on them to show proper flow. Flow meter shall be capable of covering the full range of flow. Glass should be acrylic and capable to deal Maximum flow rate 06 m³/hr. Calibration on the scale should be enable for 0.5 m³/hr minimum.

VII. Water Meter

Water meter shall be of multi jet/turbine/ Gear type. Body of water meter shall be of Cast iron while wetted part should be bronze/ SS-304 with threaded connections and a minimum pressure rating of PN10.

VIII. Pressure Gauge

All installed pressure gauges shall be bourdon spring type with Stainless Steel (SS), 304 casing and a minimum diameter of 2.5"-3". All gauges shall be damping fluid filled having back connection and border for easy fitting on the panel.

IX. Automatic Chemical injection systems with 70-liter tanks:

For addition of various chemicals like acid/ anti-scalant, etc.

- Dosing Pumps Qty : One
- Flow Rate : as required
- Resistance Pressure : as system requirement
- Diaphragm : PTFE-EPDM Composite
- Enclosure : IP65 (NEMA 4X)
- Insulation Class : B
- Electric Connections : 230V/50 Hz
- Material: Suction, Injection Valves, Foot Valve level controller etc.

X. Power Water Tank

- Material : Polyethylene,
- Material Class : Food Grade
- Working Temperature : up to 45C

- Capacity : 2000 Liter (minimum two tanks at each plant) as per plant capacity
- Wall Thickness : Approx. 4.5 to 5.0 mm
- Volume : 2m³ as per plant capacity
- Working Pressure : atmospheric
- Standard : ASTM D1998 – 13

3.10.9 Design of filtration Plant

3.10.9.1 Design Methodology

Pre-filtration treatment and Reverse Osmosis Plants option are proposed for this package on basis of ground water quality. The design process for are described below:

3.10.9.1.1 Design Process of Filtration

Pre-filtration plant is proposed in this package and water source will be ground water present in the area. The total dissolved solids (TDS) of the water supply is less than 900 mg/l, however, there are some contaminants, i.e. bacteria, viruses, Arsenic, Nitrate and fluoride which are present in water above maximum allowable limit, which shall be removed with following methods:

I. Microbiological Contaminants

Purification of drinking water containing pathogenic microorganisms requires specific treatment called disinfection. Pakistan Standard for Drinking Water Quality (PSDWQ) maximum allowable limit for microbiological contamination. A number of treatment methods can be adopted for removal/treatment of microbiological contamination but we are using Chlorine as disinfectant.

II. Bacteriological / Virus Removal by Chlorination

Chlorination is the process of adding chlorine Cl₂ gas or hypochlorite to water. This method is used to kill certain bacteria and other microbes in tap water as chlorine is highly toxic. In particular, chlorination is used to prevent the spread of waterborne diseases such as cholera, dysentery, jaundice, typhoid etc. Chlorine readily combines with chemicals dissolved in water, microorganisms, small animals, plant material, tastes, odors, and colors. These components "use up" chlorine and comprise the chlorine demand of the treatment system. It is important to add sufficient chlorine to the water to meet the chlorine demand and provide residual disinfection. The chlorine that does not combine with other components in the water

is free (residual) chlorine, and the breakpoint is the point at which free chlorine is available for continuous disinfection. An ideal system supplies free chlorine at a concentration of 0.3-0.5 ppm.

III. Fluoride Removal

High intakes of fluoride can give rise to dental fluorosis, i.e. brown mottling of teeth. Higher intakes result in skeletal fluorosis, a condition arising from increasing bone density and which can eventually lead to fractures and crippling skeletal deformity.

This is a major cause of morbidity and can manifest itself at a relatively early age with the result that

Affected individuals cannot work properly. Many factors influence the risk of such adverse effects, including volume of drinking water, nutritional status and, particularly, fluoride intake from other sources. NSDWQ and WHO has set 1.5 ppm fluoride level for safe drinking water quality.

Activated alumina is widely used to remove fluoride from drinking water. Activated alumina filters can easily reduce fluoride levels from 0.5 ppm to less than 0.1 ppm. Activated alumina, when used as a fluoride filter, can be regenerated by a solution of sodium hydroxide (NaOH), sulfuric acid (H₂SO₄), or alum [KAl (SO₄)₂.12H₂O]. The fluoride uptake capacity (FUC) of activated alumina can be up to 5000 mg/kg.

3.10.9.2 Pre-filtration Plants (Sand & Activated Carbon Filter)

In this treatment scheme pressure sand filter, chlorination and activated carbon filter are used to remove bacteriological, viral or suspended impurities. Function of pressure sand filter is to remove the suspended impurities while activated carbon filter is used to remove color, odor and natural organic matter from the raw water stream. Activated carbon filter is provided after sand filter and acts as an adsorptive medium to remove harmful chlorine disinfection by products that can pose health risk to the users. Treated water from the treatment facility will be pumped to Sahulat Centers of respective cluster.

In this scheme pressure sand filter and AC filter are used as pre filtration treatment while fluoride removal filters are optional and site specific filter column will be added as per requirement for chemical contaminant removal.

In treatment scheme pressure sand filter and AC filter are used as pre filtration treatment while fluoride removal filter is optional and site specific filter column will be added as per requirement for chemical contaminant removal. Chlorination is used for removal of

microbiological contamination. Additional chlorine will be added if water is pumped to the remote locations instead of standalone or site specific solutions.

The figure below illustrates the process diagram of pre-filtration plants.

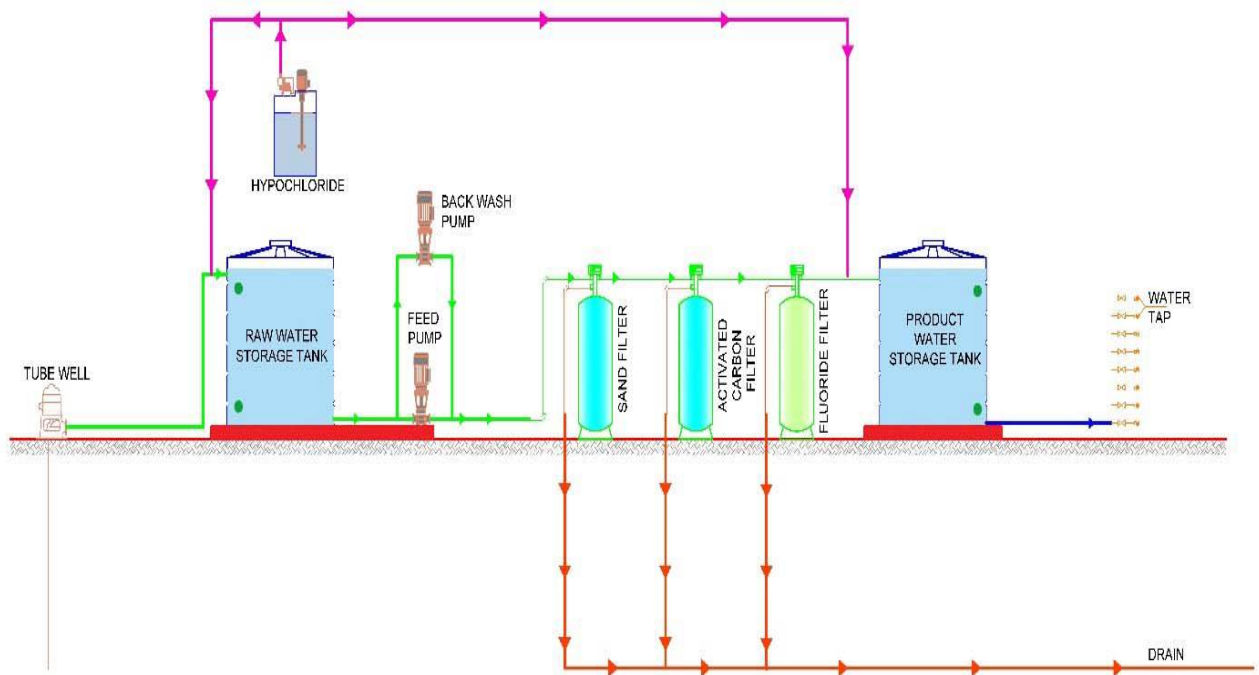


Figure 3-2: Process Flow Diagram of Pre-Filtration Plant

3.10.9.3 Design of Sand / Activated Carbon Filter Plants (Pre-Filtration Plants)

Pre-filtration plants which include both sand filtration (SF) and activated carbon units (AC) are designed in villages where water supply scheme have TDS value less than 900 mg/l. If contaminants like arsenic, fluoride & nitrate exist in water source, additional removal units for these impurities are appended to Pre-filtration Plants. The capacity of the plant will be of 2000 liter/hour. The water source of the plants will be water supply scheme already working in the village. In the village where water supply schemes are nonfunctional, the source of the filtration plant will be ground water.

Design of Pre-Filtration Plant is given in table below:

Table 3-5: Design of Pre-Filtration Plants

Parameters	Values	Units
Flow Rate	2	m3/hr
Plant Operational time	8SS	h/d
Daily Flow Rate	16	m3/day
Sand FILTER		
FILTER DESIGN		
Flow Rate	2	m3/hr
Velocity	15	m3/hr. m2
Area of the bed	0.1334	m ²
Dia of the bed	16	Inch
Bed Depth From EBCT	3-5	Min
Volume of the Media	0.09	m ³
BACKWASH		
Backwash flow rate	40	m3/hr. m2
Free Board Area of total	50	%
Total Height of the Vessel	65	Inch
Head Loss During Service Flow		
Service Flow rate	6	GPM/ft2
Pressure Drop	0.29	Psi/ft of bed
Safety Factor	15	%
Pressure Drop through media	1.337	Psi
Sizes		
Dia (say)	16	Inches
Height (say)	65	Inches
ACTIVATED CARBON FILTER		
ACTIVATED CARBON FILTER		
Flow Rate	02	m3/hr
Velocity	12	m3/hr. m2
Area of the bed	0.167	m2
Dia of the bed	460	mm
Bed Depth From EBCT	3-5	Min
Volume of the Media	0.09	m3
BACKWASH		
Backwash flow rate	40	m3/hr. m2
Free Board Area of total	50	%
Total Height of the Vessel	65	Inches
Head Loss During Service Flow		
Service Flow rate	6	GPM/ft2
Pressure Drop	0.29	Psi/ft of bed

Parameters	Values	Units
Safety Factor	15	%
Pressure Drop through media	1.337	Psi
Sizes		
Dia (say)	18	Inches
Height (say)	65	Inches
Chlorination		
Dosing rate	02 + 03	Ppm
Flow rate of water	2	m3/hr
Consumption of chlorine per liter	.005	ml/liter
Consumption per hour	10	ml/hr
Consumption per day	80	ml/day
Plant flow rate	2	m3/hr
HRT	2	Hr
Volume of Raw water storage	2	m3/hr
Material	HDPE	
Pressure Gauges		
Make		
Origin	EUROPE/USA/GERMAN	
Operating Pressure	0-6 Barg	
Material and dial	SS 304	
Wetted material	Brass	
Lens	Acrylic	
Water Meter (Totalizer)		
Make		
Number		
Origin	EUROPE/USA/GERMAN	
Type of meter	Dial type	
Water Flow Meter		
Make		
Number		
Origin	EUROPE/USA/GERMAN	
Type of meter	Rotameter/ Float type	
Material	Acrylic	
Ball valve		
Make		
Numbers		
Origin	EUROPE/USA/GERMAN	
Material of seat	SS-304/ SS-316 L/UPVC	
Operating Pressure	Up to 17 Barg	
Ambient Temperature	Upto 45°C	

Parameters	Values	Units
Non returning valve		
Make		
Numbers		
Origin	EUROPE/USA/GERMAN	
Material of seat	SS-304/ SS-316 L/UPVC	
Operating Pressure	Up to 06 Barg	
Ambient Temperature	Upto 45°C	
Gate Valve		
Manufacturer		
Numbers		
Make		
Origin	EUROPE/USA/GERMAN	
Material of sheet	SS-304/ SS-316 L/UPVC	
Operating Pressure	Upto 17 Barg	
Ambient Temperature	Upto 45°C	
Level Meter/Float Valve & Switch		
Make		
Number	02	
Origin	EUROPE/USA/GERMAN	
Storage Tanks for Raw and		
Number	01 Raw + 01 Product	
Capacity	2000L each	
Material	PE- Food Grade	

3.10.9.4 Design of Reverse Osmosis Plants

Through water quality surveys it has been investigated that there are many areas in Package-9 where ground water TDS level is more than 1000 ppm. These areas are marked as saline areas. Reverse Osmosis is adopted as a solution for removal of dissolved solids and other impurities from the raw water stream.

Reverse osmosis (RO) is a membrane treatment process used to separate dissolved solutes from water. It includes any pressure-driven membrane that uses preferential diffusion for separation. A typical RO membrane is made of synthetic semi permeable material, which is defined as a material that is permeable to some components in the feed stream and impermeable to targeted solutes and has an overall thickness of less than 1 mm. Water is pumped at high pressure across the surface of the membrane, causing a portion of the water to pass through the membrane, as shown schematically on **Fig** below: Water passing

through the membrane, called permeate, is relatively free of targeted solutes, while the remaining water, called concentrate (also commonly called retentate, reject water, or brine), exits at the far end of the pressure vessel.

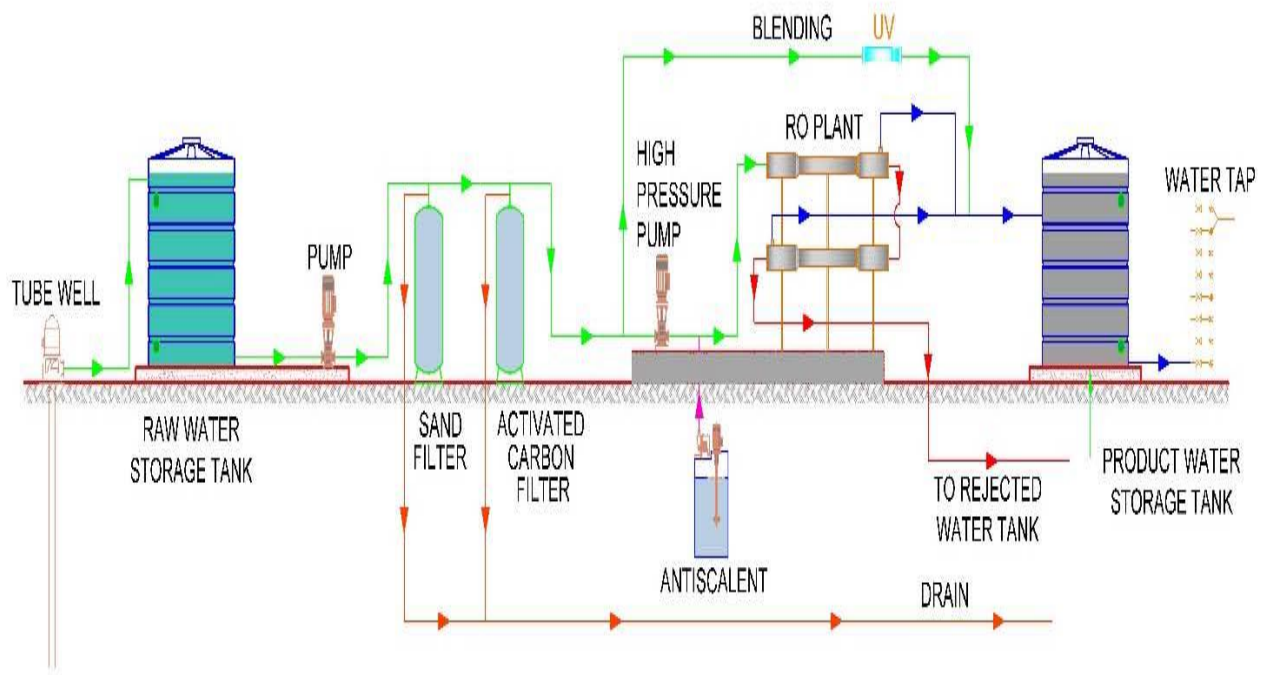


Figure 3-3: Reverse Osmosis Process Flow Diagram

In this scheme, a combination of pressure sand filter and ultrafiltration membrane are used as pretreatment to Reverse Osmosis membrane. Ultrafiltration membrane will not only decrease the load on Reverse Osmosis membrane but it will also provide blending to maintain TDS level in the product water stream.

As RO permeate water contains little amount of minerals which are necessary to maintain human health, and taste, thus re-mineralization is required. Other option is to blend the RO permeate with raw water stream after passing it through the UF membrane. With this option no chemicals for Remineralization are required and we are using this method.

Table 3-6: Design Requirements for Reverse Osmosis filtration Plants

S. No.	Description	Design Requirements
1	ENERGY SOURCE	WAPDA
2	PUMPS AND MOTORS	
2.1	Bore Pump	
	Make	
	Numbers	
	Origin	EUROPE/USA/GERMAN/Pakistan or EQUIVALENT
	Pump Type	Submersible
	Impeller material	SS304
	Housing material	As per manufacturer
	Discharge	Required as per the capacity of the plants (4000 LPH)
	Operating Head	Up to 40 m
	Pump efficiency	>60%
	Motor Manufacturer	as selected by plant manufacturer
	Motor Power rating, kw	as selected by plant manufacturer
2.2	Feed Pump	
	Make	
	Numbers	01
	Origin	EUROPE/USA/GERMAN/Pakistan or EQUIVALENT
	Pump Type	Vertical/ horizontal Low-Pressure Pump
	Impeller material	SS304
	Housing material	As per manufacturer
	Discharge	Required as per the capacity of the plants (4,000 LPH)
	Operating Head	Up to 06 Barg
	Pump efficiency	>60%
	Motor Manufacturer	as selected by plant manufacturer
	Motor Power rating, kw	as selected by plant manufacturer

S. No.	Description	Design Requirements
2.3	High Pressure Pump	
	Make	
	Numbers	01
	Origin	EUROPE/USA/GERMAN/ or EQUIVALENT
	Pump Type	Vertical/ horizontal High-Pressure Pump
	Impeller material	SS304
	Housing material	As per manufacturer
	Discharge	Required as per the capacity of the plants (4,000 LPH)
	Operating Head	Up to 17 Barg
	Pump efficiency	>60%
	Motor Manufacturer	as selected by plant manufacturer
	Motor Power rating, kw	as selected by plant manufacturer
	Motor Temperature class	45°C
3	PRE-FILTRATION	
3.1	Sand Filter	
	Make	
	Number	01
	Origin	EUROPE/USA/GERMAN or EQUIVALENT
	Material	FRP
	Certification / Stander	NSF
	Service Loading Rate	Max 15 m/hr
	EBCT	Min 03
	Sand Bed height	Min 800mm
	Bed Expansion	40%
	Free Board Area Above Expanded Bed	50%
	Back Wash velocity	25-35 m/hr
	Operating Pressure Max	Up to 6 Barg
	Design burst pressure	>40 Barg

S. No.	Description	Design Requirements
3.1.1	Filter media Sand	
	Make	
	Material	Quartz Silica Sand
	Origin	EUROPE/USA/GERMAN/PAKISTAN or EQUIVALENT
	Size of Media	0.6 to 0.8 mm
	Cleaning Process	Automatic, through PLC / Time Controller MPV
3.2	Activated Carbon Filter	
	Make	
	Number	01
	Origin	EUROPE/USA/GERMAN or EQUIVALENT
	Material	FRP
	Certification / Stander	NSF
	Service Loading Rate	Maximum 12 m/hr
	EBCT	04-05 min (Minimum)
	Sand Bed height	>800mm
	Bed Expansion	40%
	Free Board Area Above Expanded Bed	50%
	Back Wash velocity	Maximum 30 m/hr
	Operating Pressure Max	Up to 6 Barg
	Design burst pressure	>40 Barg
3.2.1	Filter media Carbon	
	Origin	EUROPE/USA/GERMAN/ASIA or EQUIVALENT
	Certification / Stander	NSF
	Material /Make	Coconut shells
	Iodine No	850 to 1000
	Size of Media	1.2 -1.6 mm
	Surface Area	900m2/g
	Bulk Density	440-540kg/m3

S. No.	Description	Design Requirements
	Hardness No.	80
	Ash Contents	5%
	Height of Gravel	200mm
4	Dosing Pump	
	Make	
	Numbers	01 + 01S
	Origin	EUROPE/USA/GERMAN or EQUIVALENT
	Material to be handle	Anti Scalent
	Pump Capacity (Dimensions)	02 to 5 LPH
	Pressure	05-07 barg
	Material	PVDF
	Ambient Temperature	Upto 45°C
5	Control Panel	HMI Display 10" with touch screen
	PLC Make	SCADA enabled
	Number	01
	PLC Origin	EUROPE/USA/GERMAN or EQUIVALENT
6	Pressure Gauges	
	Make	
	Origin	EUROPE/USA/GERMAN or EQUIVALENT
	Operating Pressure	Up to 17 Barg
	Material and dial	SS 304
	Wetted material	Brass
	Lens	Acrylic
7	Water Meter (Totalizer)	
	Make	
	Number	
	Origin	EUROPE/USA/GERMAN or EQUIVALENT
	Type of meter	Dial type
8	Water Flow Meter	

S. No.	Description	Design Requirements
	Make	
	Number	
	Origin	EUROPE/USA/GERMAN or EQUIVALENT
	Type of meter	Rotameter/ Float type
	Material	Acrylic
9	Ball valve	
	Make	
	Numbers	
	Origin	EUROPE/USA/GERMAN/Pakistan or EQUIVALENT
	Material of seat	SS-304/ SS-316 L/UPVC
	Operating Pressure	17 Barg
	Ambient Temperature	Upto 45°C
10	Non returning valve	
	Make	
	Numbers	
	Origin	EUROPE/USA/GERMAN/Pakistan or EQUIVALENT
	Material of seat	SS-304/ SS-316 L/UPVC
	Ambient Temperature	Upto 45°C
11	Gate Valve	
	Manufacturer	
	Numbers	
	Make	
	Origin	EUROPE/USA/GERMAN/Pakistan or EQUIVALENT
	Material of seet	SS-304/ SS-316 L/UPVC
	Operating Pressure	17 Barg
	Ambient Temperature	Upto 45°C
12	Level Meter/FloatValve/ Switch	

S. No.	Description	Design Requirements
	Make	
	Number	02
	Origin	EUROPE/USA/GERMAN/Pakistan or EQUIVALENT
13	Membrane Section	
13.1	RO Plant Design / Origin	
	Manufacturer	
	Ambient Temperature	Upto 45°C
	Design Salinity	Upto 5000 mg/L
	Permeate Recovery	>50%
	Country Make	EUROPE/USA/GERMAN or EQUIVALENT
	No. of Stages	Up to 4 / As per projection of manufacturer
	Reverse Osmosis Membranes	Low Energy Poly amide
	No. of Membranes	Up to 08
	Stable Salt Rejection	99%
	Array Installation	1-2 membrane in each/ / As per projection of manufacturer
	Life of RO Membrane	Minimum 03 years
	Pressure Vessels	As per required
	Pressure rating	Up to 17 barg
	Certification	NSF/ANSI
13.2	Cartridge Filters	
	Material	Melt Blown PE
	No of filters	As per flow of 04m3/hr
	Size	As per flow of 04m3/hr
14	Storage Tanks for Raw and Product water	
	Number	01 Raw + 01 Product
	Capacity	2000L each
	Material	PE- Food Grade
15	UV Lamps on Blend bypass line	

S. No.	Description	Design Requirements
	Manufacturer	
	Numbers	
	Make	
	Origin	EUROPE/USA/GERMAN/ or EQUIVALENT
	Material of casing	SS-304/ SS-316 L/UPVC
	Operating Pressure	up to 06 Bar
	Ambient Temperature	Upto 45°C

3.10.9.5 Summary of Design

The project will provide potable water to the people living in Division Rawalpindi. Markaze-Aab will be constructed in 116 villages from where people can fetch the water for drinking purposes. Water supply schemes/Villages in Division Rawalpindi supplied with drinking water are summarized below:

Table 3-7: Summary of Design

Sr. No.	Type of Plant	No. of Plant
Filtration Plants		
1	Reverse Osmosis Plant	38
2	Pre-filtration plant	78
Total		116

3.11 Required Utilities of aforesaid Project

3.11.1 Construction Camps

Camp sites will be selected keeping in view the availability of adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to local markets, and an appropriate distance from sensitive areas in the vicinity. The Camp site has been proposed in the GIS map at the site keeping in view all the contributing factors oriented to environment friendly and workmanship feasibility. The area requirement for construction camps will depend upon the deployed manpower, type and quantity of machinery mobilized. Also, due consideration will be observed in the selection of the camp area to cause minimum disturbance to the ecological environment.

3.12 Cost Estimate

This section provides the cost estimate of the proposed project. The cost of various components have been taken from Punjab Government MRS of Rawalpindi Division.

3.12.1 Cost abstract

The cost abstract of the Supply construction, installation of filtration plants in Rawalpindi division (package 1) are given in tables as under:

Description	Detailed Cost Estimate Amount (Rs.)
Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division	239M (PKR)
Sub Total Capital Cost : -	PKR 238,613,652.04
O&M charges for 1 Year inclusive of 16% PRA WH	PKR 52,479,773.44
Total Capital Cost	PKR 291,093,425.48
Contingencies & Petty Charges 2%	PKR 4,772,273
Green Punjab Charges 1%	PKR 2,386,137
PRA Charges 5%	PKR 11,930,683

Description	Detailed Cost Estimate Amount (Rs.)
Resident Supervision 1.5%	PKR 3,579,205
Design Charges 1.5%	PKR 3,579,205
Media Campaign 0.25%	PKR 596,534
Electric bill Charges for 1 Year	PKR 18,040,320
New Electric Connection Charges	PKR 2,900,000
Total	PKR 338,877,781
Say: in Millions	338.88M (PKR)

The detailed cost estimate for the construction / installation of RO plants and Pre – Filtration plants in the Rawalpindi division (Package – 1) is annexed as **Annexure IV** in this EIA report.

4 ANALYSIS OF ALTERNATIVES

The discussion and analysis of alternatives in Environmental Impact Assessment (EIA) should consider other practicable strategies that will promote the elimination of negative environmental impacts identified. This section is helpful in consideration of ideal development with minimal environmental disturbance. This report has identified the major environmental impacts noted by scientific experts. The findings of these impacts were utilized to analyze possible options for the final development. The following alternatives have been identified and are discussed in further detail below:

4.1 No Project Option

The “no action” alternative is required to ensure the consideration of the original environment without any development. This is necessary for the decision-makers in considering all possibilities. The development will have a minimal effect on the physical environment. This project is a welcomed initiative by the Government and locals as it aims to focus on economic uplift with guaranteed impact, therefore it will lead to an overall improvement of potable drinking water quality by construction of supply schemes and installation of PF and RO filtration plants in Rawalpindi Division along with improved aesthetics of the Divisions will lead to improvement in socioeconomic conditions of the said Division and country as well. Therefore, a no project alternative will be a major loss for country.

4.2 Site Alternatives

The aforesaid project area boundary zone wise is ideal from the point of view of compatibility with other land uses within the area. The total project area is also spacious enough to accommodate the proposed facilities and their infrastructures. After, the aforesaid project existing infrastructural facilities will be utilized. Due to existing infra-structure and its strategic location, it is our considered view that the aforesaid project area is ideal and suitable for aforesaid development. Moreover, the proponent is very concerned and conscious about the quality and equally about the environmental protection and resource conservation.

Various sites in each village were assessed before the selection of final Project site. The site selection criteria were based on a number of parameters as indicated below:

- Availability of land
- Availability of water
- Number of users in the area
- Access to WTP
- Environmental Issues
- Social Issues

4.2.1 Availability of Land

The existing land use (agricultural, commercial, barren and residential) and availability of land bear is important for selection of a site. It is envisaged that small piece of land varying to 2 to 2.5 marlas will be required at each location for construction of housing unit and for erect of water treatment plants and allied facilities. Priority will be given to conduct Project activities on Government lands. But if it is not available then private land will be acquired by;

- Voluntary negotiation with the owners for sale of land
- Donation from the land lord owners who would not have any negative impact on their housing and business activities.

In case of compulsory acquisition and purchase of land; the affected individuals will be compensated immediately for their loss of property or land to avoid any complications in future.

4.2.2 Availability of Water

Availability of required flow of water is of utmost importance. It has been considered while analyzing alternatives that water source is perennial in case of use of surface water which is very rare. However, ground water will be used mostly as it is available in abandoned.

4.2.3 Number of Users in the area

While selecting site for Water Treatment Plants (WTP), it has been highly taken in to consideration that WTP is installed in the areas with a population of at least 2,000 persons. This way, maximum people can utilize the facility.

4.2.4 Access to WTP

Public access to Water Treatment Plant is very important. Availability of approach roads for carriage of construction machinery, construction material etc. is pre-requisite. Each alternative site was therefore ranked according to the availability of access routes for construction and public ease to access clean water. It has been taken into consideration that WTP should be available within a radius of 1 km.

4.2.5 Environmental Issues

Due consideration has to be given to the sensitive issues related to the environment, forest, wet lands, wildlife reserves, agricultural land, etc. while assessing the alternative sites for development of the Water Treatment Plants. No environmentally sensitive site is located in the selected project sites.

4.2.6 Social Issues

Social issues form an important element in the assessment criteria. Different socially sensitive elements like graveyards, mosques, playgrounds, which can create social issues were given due consideration while selecting the sites for WTP.

4.3 Location Alternatives

Location alternatives are not possible by considering the fact of consistent increasing of boundaries of Rawalpindi Division by process of urban sprawl.

4.4 Technology Alternatives in Terms of Filtration Plants

Pre filtration and Reverse Osmosis (RO) technologies have been nominated by Punjab Aab-e-Pak Authority (PAPA). UF & RO both are used for treatment of water. UF is used to provide disinfection to sweet water sources. UF will not work alone but in combination with pre- treatments, determined by what contamination need to be removed from water source. RO is used to remove salts from brackish source waters.

According to WHO “Guidelines for Drinking Water Quality” palatability of water with Total Dissolve solids (TS) less than about 600 mg/l is generally considered to be good but increasingly unpalatable at TDS levels greater than about 1000 mg/l. The design of Pre filtration (PF) and Reverse Osmosis Treatment System (RO) is based on existing raw water quality and desired drinking water quality in the districts of Rawalpindi division.

RO plant is an effective treatment system for long term successful operation of Brackish Water. It will be provided in the areas where Total Dissolve Solids is greater than 1,000 mg/l (TDS > 1000mg/l). With proper operation and maintenance; RO system can reach a life of up to five years. Another benefit of RO treatment is that there is no need for additional treatment facilities in case of presence of metals.

PF system in combination with other treatment facilities will be used in case where Total Dissolve Solids level in groundwater is less than 1,000 mg/l (TDS < 1000 mg/l). UF system is also effective in reducing organics, pathogens and disinfectant by products to desired levels. It also improves Odour and taste of the water.

Other treatment facilities will be used with PF in case of the presence of metals such as Fluoride, Iron, Manganese, Nitrite and Nitrate. Such metals will be removed by oxidation. In case of presence of Arsenic, chemical treatment (coagulation) will be done.

4.4.1 Conclusion

Both PF and RO has compact footprint that would fit into less operating area with simple and practical design for operation and maintenance. Both treatment facilities are effective, sustainable and economically viable. Hence these are best options available.

4.5 Energy Alternatives

The following three energy sources have been considered for the project:

- Solar Energy
- Power from WAPDA
- Standby Generator

4.5.1 Solar Energy

Solar energy facility if installed separately for each plant. Installation of solar facility with each will not only reduce the overall electric load on the National Grid but it will also lessen the burden on the village peoples who are paying for electric bill and making such schemes successful. Solar energy is considered as primary source of power for plants with approximately 2 to 4 hours battery backup. Each plant will be operated for maximum eight hours while it is assumed that plant shall be run for at least six hours on solar system power.

4.5.2 Power from WAPDA / Grid

For plants power from grid is considered as secondary source of energy. Plant will run maximum two hours on Grid.

4.5.3 Standby Generators

Power supply from generator is an easily and readily available source. In case of grid failure generators will be standby source of energy.

5 DESCRIPTION OF THE ENVIRONMENT

5.1 General

An environmental baseline study is intended to establish a data base against which potential impacts can be predicted and managed later. The existing environmental conditions around the proposed project have been considered with respect to physical, biological and socio-economic aspects. A site visit was conducted to survey the field area and to collect environmental data on physical, biological and socioeconomic parameters. Further, interviews were held with the general public and stakeholders of the areas adjacent to the project area in order to seek the public opinion on the implementation of the proposed action.

A review is made of locally existing resources that are inclusive and those which are exclusive to the probability of getting affected by the execution of the project. Much of the information on the topography and land use, geophysical, climate and water resources came from published literature and previously conducted studies. The information given in the sections on air, sound, soil, and water quality is the result of detailed surveys conducted specifically for this EIA.

5.2 Methodology

The methodology employed to collect the baseline data and information regarding the social structure and various related parameters as discussed in sub-sections below:

5.2.1 Data Collection

The primary data was collected by visiting the project area and its nearby communities. The secondary data regarding physical parameters (topography, geology, seismology, and climate) was obtained by visiting relevant various government departments and their official websites. The biological parameters such as flora and fauna were studied by preparing a floristic list based on visual observation and fauna was studied by using opportunities approach. The species were recorded with reference to their existence in the project area. Information on wildlife fauna specie (mammals, amphibians, reptiles, birds, etc.) in the assessment area was compiled based on opportunistic observation, gathering the existing information and

consultation with local experts, community members, government and Non-Government Organizations (NGOs). The socio- economic aspects were studied and analyzed by conducting socio-economic surveys.

5.2.2 Social Surveys

The purpose of social survey was to record the socio – economic conditions of people residing in the study area and to assess the expected project impacts on their life, subsistence systems and socio – cultural values. Prior to conducting the field surveys, the following steps were taken:

- Clear boundaries of the project area were identified.
- The sampling procedure in order to draw a representative sample size of the target population and households were designed.
- The tools for data collection i.e. questionnaires to access the socio-economic status of the area were developed.

5.2.3 Sampling Design

Social baseline data of the persons residing in the study area has been estimated and collected through random sampling by using pre-developed questionnaires.

5.2.4 Questionnaires

In order to test the validity and reliability of the proposed questionnaires, they were reviewed to assess whether questions needed to be clarified, changed or re-sequenced and then a final editing of questionnaires was conducted prior to their application in the project area.

5.2.5 Data Editing and Analysis

The filled questionnaires and recorded information were compiled by the same field investigators who were involved in the data collection. This was done immediately after completing the field investigations and the data sets were processed accordingly. Analysis of the data and preparation of conclusions in the minimum possible time was done using statistical techniques of data analysis.

5.3 Physical Environment (Baseline Conditions)

Baseline conditions refer to the existing physical, environmental and socio-economic status of project and study area. Based on baseline information, the project interventions are assessed, and mitigation measures are proposed accordingly. The baseline information also helps to indicate the specific issues to be monitored during renovation & installation and operational phases of project development. The baseline data (physical, biological and socio-economic parameters) related to project and study area is described in sub-sections below. Information provided is based on primary and secondary data collected by site visits, desk studies and consultation with locals respectively. This section gives the overview of the topology, geology, seismology and meteorological conditions whereas, it gives detailed information about following; surface water, ground water (if present in the project area vicinity) and air quality of project area. The detail of each parameter is discussed in sub-sections below.

The physical environment consists of existing land use at the project site including geology, hydrology, meteorology and climatology. The pre-project condition (i.e. baseline) of these components of the physical environment is described in detail. To identify the potential impacts on the physical, biological and socio-economic environment that is likely to arise from the project activities.

5.3.1 Topography

The Rawalpindi division lies in potohar plateau, with undulating terrain. The division is covered by mainly two rivers Jhelum and Indus. Most of the hills and rivers are bordered by dissected ravine belts. The kala chitta mountainous range from Attock towards eastward of district towards Rawalpindi. The western area of Attock is hilly, dissected plains and few flood plains. The division is a barani in Chakwal area and the terrain is mainly hilly, covered with scrub forest in the southwest, and levelled plains interspaced with dry rocky patches in the north and northeast.

North of the Salt Range in district Jhelum the area extends upwards in an elevated plateau, diversified by countless ravines and fissures, until it loses itself in tangled masses of Rawalpindi Mountains.

The following figure depicts the districts in the Rawalpindi Division:

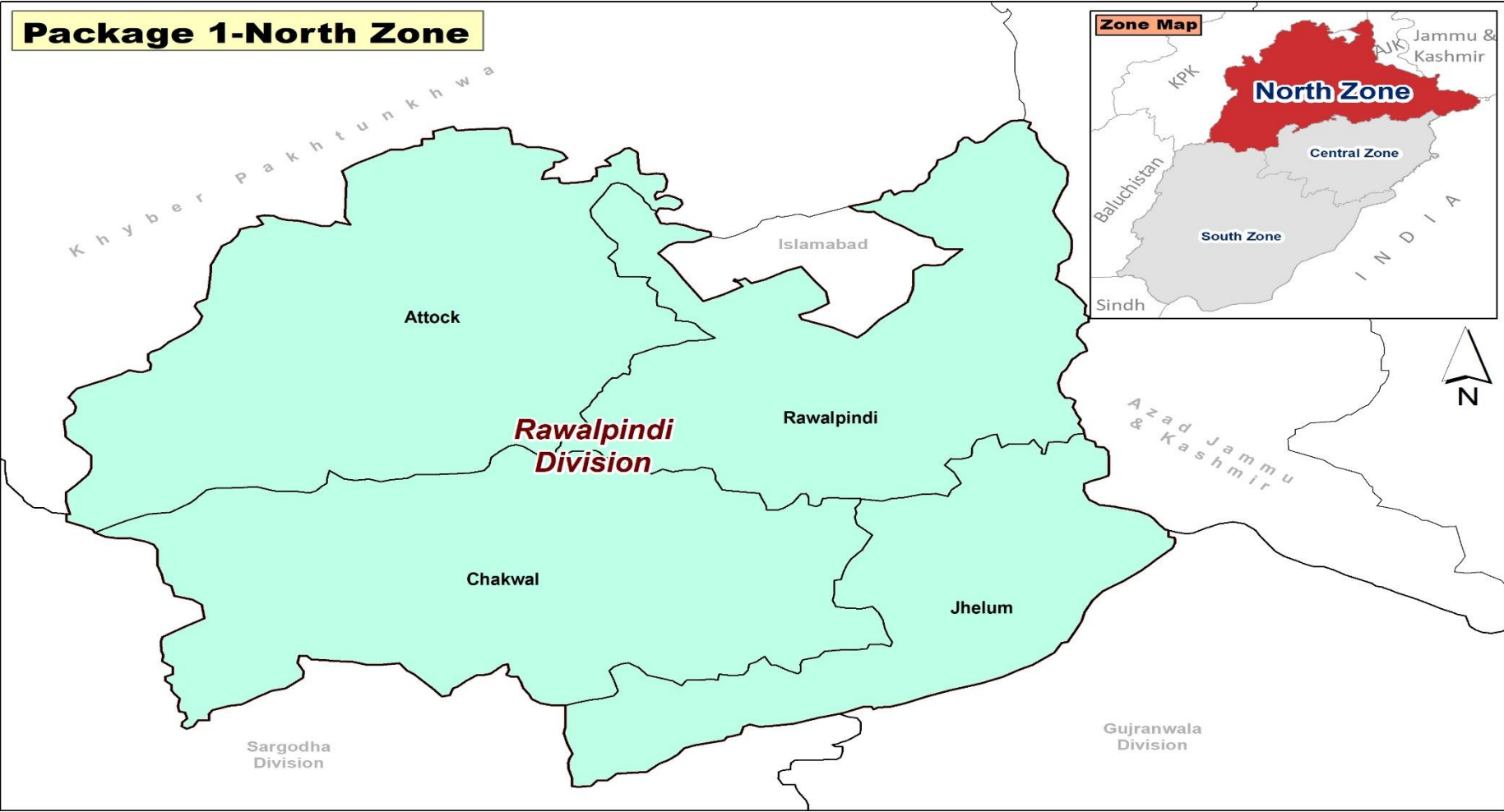


Figure 5-1: Map of Rawalpindi Division

5.3.2 Geology

Rawalpindi District

The high hills of Murree and Kahuta Tehsils are composed of tertiary sandstones limestone and alluvial deposits. These sandstones apparently belong to the Sirmur and Siwalik series of the sub-Himalayan system.

Some of the strata yield excellent building material. Limestone is found in the Margalla hills along the northern outskirt of Federal Capital of Islamabad. The alluvial deposits occur chiefly in the lower portions of Kahuta Tehsil. In Rawalpindi Tehsil, limestone is found everywhere along the low hills, while in the plains kankar deposits are common. The pebble ridges, described as alluvial deposits in the Kahuta hills are the remarkable structural feature of Kahuta and Rawalpindi Tehsils. Large isolated boulders in many places seem to point to a glacial epoch in the Pothwar plain. Formations belonging to different geological periods can be traced in the district. Some rocks in the Margalla hills belong to the cretaceous period the oldest geological period. The main constituents of the deposits of this period are dark colored sandstones and limestone. Most of the Margalla hills belong to the Eocene division of the tertiary period. The rock formation of this division consists of grey or dark-colored limestone with layers of shale containing fossils. The Murree hills belong to the Miocene division of the tertiary period. The rock formation of this period is composed of red and purple sandstones and shale. The Pothwar plains were formed mainly during quaternary period. These are composed of alluvium (clay or silt) and gravel caps. The clay of the district shows five distinct layers.

Lower layers are of coarse pebbles with sand or clay. The next strata is that of alluvium deposit by older system of the Soan basin over the pebble bed. During this period the Soan was a mighty river-bigger than the Indus of today. The next upper layer consists of the alluvium deposit of the present river system. Then comes the air-borne top layer of silt or clay called Loess, and at the top is the gravely conglomerate and loose gravel caps deposit, pebbles, pebble beds, pebble mounds and pebble ridges form a conspicuous feature of the landscape. Large isolated boulders rising in many places also point to a glacial epoch in the Pothwar plains.

Chakwal District

The area of Chakwal can be classified into mountains, hills, rocks, plains, weather-rocked plains, piedmont plains, loess plains and river plains. The soil of the area has developed from wind and water transported materials consisting of loess alluvial deposits, mountain outwash and recent stream valley deposits. A part of the soil has also been derived from shales and sand stones.

Jehlum District

The greater part of this district lies on the sandstones and conglomerates of the Siwalik series, but towards the south, the southern scarp of the Salt Range affords sections of sedimentary beds ranging from Cambrian upwards. The lowest bed is the salt material and rock salt, which affords the material for an extensive mining industry. Coal occurs in the lower territory beds at Dandot Baghanwala.

Kallar-shor (salts) appear all over the district in the form of barren patches in otherwise fertile fields; but is a serious evil only in Pind Dadan Khan plain where it renders strips of land uncultured-able and practically useless for any purpose.

5.3.3 Seismicity

According to seismic zoning of Pakistan, the project area lies in minor to moderate damage prone area. Distant earthquakes may cause damage to structures with fundamental period greater than 7 second corresponds to "Intensity V and VI of the M.M scale" (National Disaster Management Authority). The seismic zoning of Pakistan is given in figure below:

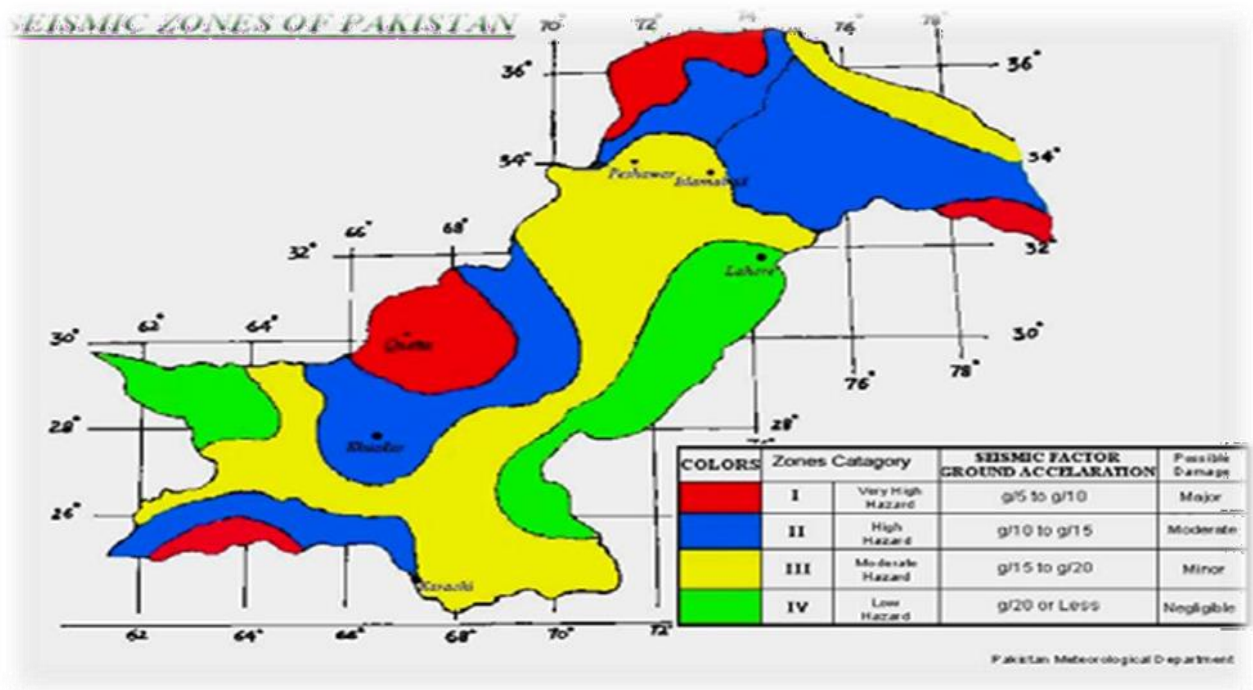


Figure 5-2: Seismic Zoning of Pakistan

5.3.4 Geography

Rawalpindi District

The district takes its name from its headquarters town Rawalpindi. In Tuzk-e-Jehangiri, it has been recorded that the name Rawalpindi consists of two parts, viz., Ravial arid Pinell. The Rawals, a Jogi tribe, founded a village Rawal at the site where we have the Rawal Dam today. When Jhanda Khan, a Ghakkhar chief founded a new town at the site of an old town known as Fatehpur Baori, he named it Rawalpindi.

The district lies between 33°-08' to 34°-10' north latitudes and 72°0 -53' to 73°-36' east longitudes. It is bounded in the north by Abbottabad and Haripur Tehsils of Hazara District, in the east by the river Jhelum, in the south by Chakwal and Jhelum Tehsils of Jhelum District, in the west, by Campbellpur and Fatehjang Tehsils of Campbell pur District. Due to transfer of 368 square miles of area from Fatehjang Tehsil (Campbell pur District) to Rawalpindi District and of 350 square miles from Rawalpindi District to Federal Capital of Islamabad, the total area of the district new stands at 2,041 square miles.

Attock District

The district is divided into two portions i.e., one to the north and north-west of the Kala Chitta range and the other to the south and east of it. The former includes Attock and Hasanabdal tehsils and the latter Fatehjang, Pindigheb and part of Jand tehsil.

The district for the most part is in the 'Pothwar'. The rocks which underlie the 'Pothwar' are the soft grey sand-stones and orange to bright red shales of the Siwalik system. The district is a renowned collecting ground for the animal fossils so characteristics of this rock group.

The Strata dip northwards at low and variable angles from the Salt range to the Soan river which occupy a structural trough. To the north of the Soan river influence of the mountain building movements, connected with up-throw of the Himalayas becomes increasingly evident in greater complexity of rock structure, until at about fifteen to twenty miles north of the Soan, the strata every-where dip steeply and are frequently vertical or overturned.

Chakwal District

Geographically placed in the salt Range and the Popular plateau, the physical features of Chakwal are typical of the region. The south and south-east is mountainous and rocky covered with scrub forest, interspaced with flat lying plains; the north and north east consist of softly undulating plains area with patches of rocky areas, known as Khuddar in the local dialect, ravines and gorges and some desert areas.

The plains of the district are being cultivated, even those which lie in the regions, and a considerable area is covered by forests.

Jehlum District

It is bounded on the north by Rawalpindi district, on the south by Gujrat and Sargodha districts, on the east by Kashmir territory, and on the west by Mianwali district.

The area of the district according to the Survey of Pakistan records is, 2,772 square miles/17,71,257 acres. Its position in respect to the area in Pakistan is 43rd and 35th in West Pakistan.

5.3.5 Climate & Rainfall

Rawalpindi District

The district is noted for its salubrious climate. The climate is cold in winter and hot in summer in the plains but cool in the hills. The coldest month is January. The highest temperature is reached in June when mercury rises to 115°F. In the hills summer is cool and pleasant. During the months of December and January there is snowfall on the hills. The maximum and minimum mean temperature in summer is 97.6° F and 74.4° F whereas in winter it is 74.5° F and 44.6° F respectively.

The rainfall is regular and sufficient throughout the district. The summer rains begin abrupt the second week in July and end about the beginning of September. In winter, rains start, in January and last till the beginning of March. The eastern half of the district gets more rains than the western. The mean annual rainfall is about 27 inches in summer and about 9 inches in winter. There are, generally no wind storms and cyclones except in the Muree hills, thunder storms during the rainy season are common. The district lies in the active seismic region, but there is no incidence of any major earthquake during the last 160 years.

Attock District

The climate of the district is extreme. The area South of the Kala Chitta is an upland plateau. It is intensely hot in summer while in winter a chilly north wind prevails.

The extreme of hot and cold weathers are very severe. The high upland plateau which forms the whole of the district south of the Kala Chitta range is baked under a hot sun in the summer, and in winter an iced wind prevails, the cold being often intense. In Attock tehsil the summer is short and cold weather long and severe. The climate is more variable than that of the ordinary western Punjab districts; being affected by storms which in spring are apt to pass from Iran into Balochistan. Thus though one anticipates the end of the cold weather to come in April and the thermometer to rise thenceforward till the monsoons breaks in July, storms, or their aftermath, nor infrequent keep the district cooler through the end of April and the beginning of May than it was during the preceding month. In the second half of May it begins to strike up again. It is optimistic to expect the monsoons before the third week in July. Even in the worst months it is unusual to have succession of really bad nights.

With the coming of rains the temperature falls considerably through the damp heat which follows any cessation of the monsoon for more than a week or ten days is often severe. In the western portion of the district, among the rocks of Attack, the sandy slopes of Jandal, and the low hills of Nara and Makhad, summer heat is of the most intense description, and is found almost unbearable even by the native of the tract. The wells and tanks dry up, hot winds blow, and glare of the sun is intense reflected as it is by white sand and almost red hot rocks.

The breaks in the rains are much longer, and even in August sometimes the country appears quite dry and resembles a furnace. The inhabitants are nevertheless a fine robust race. The rains generally come to an end about the beginning of September. Towards the end of that month the nights begin to be cooler and the beginning of the cold weather soon follows about the middle of October, though the heat in the sun remains considerable for some weeks longer. The end of September and the beginning of October after the cessation of the rains and sometimes feverish. The latter half of October and November are generally the most delightful part of the year. There is little rain, and the air is cool with bright sun-shine.

Through the winter months the district enjoys almost perfect weather with bright days and cold clear nights with generally some frost in the two coldest months, interrupted at more or less frequent intervals by spells of cold weather due to the winter rains. Towards the end of March the sun again becomes powerful. East winds, which are very tire are often prevalent in the cold weather. The months from April to August are notably best for health. Pneumonia and bronchitis at other seasons prevail but are less rife and fever is less severe, too. Climate of the district on the whole is good for health.

Probably in Attack there is more rain in the out-scurts than in Attack itself, but appearances are deceitful, and Attack, in the hot weather, even after a thorough soaking, never obstruct this fact. Contrary to it, of Pindigheb, it may be said that nowhere in the tehsil is the rainfall greater than at Pindigheb itself. General rain over the whole tehsil is uncommon, one village or one tract getting a soaking while the adjoining country gets little or nothing. The Makhad hills are often left without any rain at all when the rest of the tehsil is doing well. The further tracts lies westwards from the Himalayas the less rain, as a rule, it gets. The rainfall of the whole district is much less than in the adjoining tehsils Rawalpindi and Gujar Khan of Rawalpindi District.

But broken nature of the country and many ridges and hills which start up cause local exceptions to this rule. Overshadowing hills seem in some parts to attract rain, in other to repel it. The rainfall seems also to follow the river valleys in a curious manner. The valleys on the Soan banks get much more rain than those a few kilometres distant from it.

For the district as a whole rainfall is somewhat scanty and very uncertain, varying greatly from year to year. The rainfall for the last six years in Attock is as under:

Table 5-1: Rainfall data of Attock District

Year	Rain (mm)
1993	725.5
1994	856.5
1995	846.3
1996	706.5
1997	854.0
1998	711.0
Average per year	783.3

Chakwal District

Chakwal lies in the sub-tropical regions and its climate is typical of the area, with the exception that it varies a little on the cooler side, owing to its elevation, from central Punjab. Winter temperatures normally range between 4 to 25 degree centigrade and summer temperatures average between 15 to 40 degree centigrade. Temperature sometimes goes to 50 degree centigrade.

Month wise data on mean maximum and mean minimum temperatures with precipitation is given in the table below:

Table 5-2: Month-Wise data of Temperature, Rainfall & Relative Humidity of Attock District

Month	Mean temperature °C		Precipitation	Relative Humidity
	Maximum	Minimum	mm	%
January	19.7	5.0	33.8	66.2
February	21.6	7.7	50.0	60.2
March	26.6	12.5	60.5	53.8
April	33.0	17.7	36.5	41.9
May	38.1	22.0	31.8	32.5
June	40.5	25.8	51.9	37.2
July	35.7	25.8	237.3	62.3
August	34.4	25.3	221.2	70.8
September	35.0	23.0	77.7	65.5
October	33.1	16.6	12.2	55.6
November	27.6	9.9	9.9	62.9
December	21.5	5.7	30.4	68.9
Annual	30.6	16.4	853.2	56.2

Jehlum District

The table below shows the seasonal temperature variation of Jehlum district:

Table 5-3: Seasonal Variation in temperature of Jehlum District

Season	Maximum Mean	Minimum Mean	Average
Summer	100.2	78.8	89.5
Winter	67.0	43.4	53.7
Spring	91.7	63.9	77.8

The arid Thal in the plains west of Pind Dadan Khan is amongst the hottest regions. Throughout the year the temperature is higher than in the rest of the district. The cold weather too is perceptibly shorter in these hot tracts, and heat persists even in the middle of November and starts as early as end of February. In the hills, however, the climate is more temperate, and the heat is never too severe as in the central part of the former Punjab. The winters are cold and a bitter north wind prevails making the cold often very severe. The cold weather comes to an end in April, about the middle

of which month the temperature begins to be uncomfortably high and continues to rise through May and June, the hottest months, until the monsoon breaks, usually in the last week of June or in the first week of July. With the breaking of the rains, the temperature falls considerably, though the damp heat which follows after the cessation of the monsoon for more than a week or ten days is rather oppressive.

The annual rainfall in the district is on an average about 24 inches. Generally the rainfall months are from July to September during summer and January to March in winter. For the district as a whole the rainfall is scanty varying greatly from year to year.

5.4 Land Use Pattern

The land use pattern of the Districts of Rawalpindi Division is characterized by residential, industrial and commercial activities in majority of the central area while institutional, industrial and commercial activities are located along main roads of the District. Open spaces are also frequently seen in the District. The project area is located outside the District in its boundaries where most of the areas are agricultural lands.

5.5 Ground and Surface Water Resources

Rawalpindi District

River Jhelum skirts the district from its northern most point near the village Dewal to its southern boundary, a distance of about 70 miles. Throughout this length it flows between lofty mountains and precipitous rocks. It is interrupted by numerous rapids which render it incapable of navigation. The Soan river takes its rise from within a few miles of the Muree hills. It flows down deep valleys for the first ten miles of its course till it reaches the plains near the old ruined fortress of Pharwala (about 18 miles from Islamabad) where it takes a south-westerly course. It flows close to Rawalpindi city, and finally joins the Indus ten miles below Makhad. From geological point of view the Soan river commands particular importance. It is believed that in the Gondwana age when the Indo-Gangetic plain was still to be formed, the Indus, the Ganges and the Brahmaputra had a common course, and this ancient river known as the Siwalik or the Indo-Brahm followed at one stage the course which is at present the bed of the Soan. The Haro river rises near Dunga Gali in Hazara District. It enters Rawalpindi

District near village Bhallar-top. It cuts across a small portion of Rawalpindi Tehsil, and then enters Campbellpur Tehsil. The Kurang river rises near Ghora Gali. It flows along the Muree-Rawalpindi road. Its waters has been dammed at Rawat It joins river Soan near Sihala.

Leh stream rises from the Saidpur hills, passes through Rawalpindi city and then joins the Soan. Kanshi stream rises from the Kahuta hills, drains the Gujar Khan Tehsil and joins riv'er Jhelum near village Bagham. Ling nullah rises from the Lehtrar hills, passes close to Kahuta town, and then joins the Soan. The Sarin nullah rises from the Kahuta hill,s and then joins the Kanshi stream. Ghamlan nullah .,rises from the Panjar hills, passes close to Rawalpindi, and joins the Ling. Tamrah nullah rises from the Margalla hills, passes through Taxila and ultimately joins the Haro. This nullah was at one time referred to as the Tiger of the East.

The most important marsh in the district is at Khanna Dhak. It extends over 70 acres and is a paradise for sportsmen. Another marsh about 20 acres in area is near the Sohan village. A small marsh extending over an area pf 8 acres is near village Gangal.

Chakwal District

No river passes through Chakwal district except Soan. The Soan river enters Chakwal district from Pindi Gheb area, passes through Hasli-Warwal into Talagang sub-division, flow across Tamman and finally falls into the Indus on the border of Mianwali-Kohat district. During the summer and rainy season, there is heavy flow of water in the river but in winter it takes the shape of a rivulet.

A number of Nullahs cross through Chakwal district, the more important ogf which are Nullah Soj, Nullah Wahan, Nullah Gabbir, Nullah Tarapi, Nullah Dharabi and Nullah Banhaa.

Jhelum District

The only river of importance is Jhelum, which rising far away in Kashmir, forms the Eastern and southern boundaries and skirts the district for about 120 miles. It stretches from Pandori, in Jhelum Tehsil to Kandwal in Tehsil Pind Dadan Khan. The riverain is a broad alluvial plain. Its average breadth is about 8 miles but is subject to great variation for, Jhile near Jalalpur the plain is a mere thread, to the north, by Dullal it spreads into .a broad mass which pushes down a limb along the reverse side of the

mountains, so as to fill up the area left vacant by the lateral displacement of the Lehri hills from the general line of Mount Tilla.

5.6 Agriculture and Cropping Pattern

Rawalpindi District

It is a district of small holdings. . About 31 percent of holdings are under one acre and 43 percent are one to five acres. There are generally two crops in a year, except in ' the hilly areas. A rabi crop is followed by a kharif crop. Wheat, bajra maiz, jawar, and pulses are the main crops. Groundnuts are also grown. In Murree Tehsil, due to uneven terrain there are hardly any large tracts of flat land and cultivation is generally possible with terraced fields. Maize is the staple crop of the Rawalpindi district.

Attock District

Fifty per cent of the total labor force in the district is engaged in agriculture. The average produce is however very low and rural incomes are nearly stagnant. Inadequate water for agricultural purpose and chronic land erosion in the district are the major obstacles in way of agricultural development. In order to boost agricultural production, the Government has initiated scheme of mini dams and small dams in the district. So far 26 mini dams with the irrigation capacity of 1675 acres and 10 small dams with irrigation capacity of 16,268 acres have been completed at a cost of four and half crore rupees. Shah pur Dam has recently been completed at a cost of Rs 2.93 crores but has not been commissioned.

Chakwal District

Farming is the main occupation of the people of Chakwal. With the exception of a few large land-holders in sub-division Talagang, holdings are small in the district and farming is conventional though new techniques and methods are being introduced by the Barani agricultural Institute. Thoa Bhaclur, Chakwal. The farmers have also begun to use fertilizers and pesticide and capital intensive time saving input like tractors and harvesters are being used ever since their introduction in the country.

Jehlum District

The mainstay of the people of this district is agriculture but unfortunately it is less remunerative as the district is sub-mountainous, salinity stricken and highly eroded. Besides, land holdings are small and scattered. The total area of the district is 17,71,257 acres with a cultivated area of 7,18,139 acres and uncultivated area of 10,53,118 acres out of which 1.83.972 acres are culture able waste.

The major crops grown in the district during the Rabi season are Wheat, Barley, Gram and Oil-seeds. Wheat is grown in about one-half of the total cultivated area of the district and being a valuable crop is more important than all others put together.

The chief Kharif crops are Bajra, Maize, Jowar and Cotton. Bajra is by far the most important of the Kharif crops. It is grown on all soils but principally on the better unirrigated land. It covers the greatest area during Kharif season, and sown usually after the first heavy monsoon rains.

5.7 Biological Environment

The biological environment consists of flora and fauna present in study as well as project area. The detail of each parameter is given below:

5.7.1 Flora

Rawalpindi District

The district is rich in the variety of its flora differing in character at different elevations. In the upper reaches of the Murree hills the main trees are deodar (*oedrus deodara*), biar (*pinus excelsa*), paludar (*abes smithiana*), oorxingi (*quercus l.assiflora*), etc. The chil (*pinus longifolia*) covers the lower hills from 3,000 upto 6,000 feet. In the lower hills common trees are the lao (wild olive), phalia (*acacia modest*), tun (*oedra la toona*), drek (*melia sempervirens*), sinetta (*dodona burmanniana*), etc. They grow for the most part in scattered clumps and are usually thick in the gorges and hill sides. Further down, and in the plains, the trees most frequently met with are the shisham (*dalbergia sissoo*), tut morus alba), drrik (*melia sempervirens*), phtulai (*acacia modesta*), ber (*zizyphus jujaba*), pipal (*ficus religiosa*), kikar (*acacia arbica*), etc. A conspicuous species of grass is dab. Some of the wild products of the plains include

flower buds of the kachenar wild pomegranate seeds, blackberries, raspberries, cranberries and wild pears.

Attock District

The flora of the district is not much significant. The only forest at all worth to name in the district is that on the Kala Chitta range. There are various preserved areas, however, elsewhere in the district as on the Kherimar, Kawagar, Khari Moorat hills and in the Nara tract. All the large land-owners make their own 'rakhs', in which they carefully preserve the grass and wood, and allow no one to trespass. But in general the district is bare. The vegetation is poor and sparse and the country is thinly wooded. The most common tree is 'phulahi'.

'Kikar' and 'Shisham' are found along the roads and in the cultivated fields. In Soan valley there are some fine groves of 'Kikar' planted and carefully preserved. Its timber is hard and durable and good for ploughs and well-wheels, for cart making and a variety of other purposes, while it is also useful for burning. The bark and pods are valuable tanning agents. Wild olive and fig shrubs are found in some parts of the district.

'Shisham' is fairly common in the richer parts of Attock and Hasanabdal tehsils. The grasses of the district are of importance as in many places there is very little fodder to be had for the cattle. Hill grasses, 'Chitta' and 'Phalwar' are the most valuable grasses. Of all is perhaps the 'Sarut' which occurs chiefly near the beds of torrents, and is generally self-sown.

Chakwal District

There is a very wide range of plant and animal species in the district.

Amongst plants, the species which are most abundant in the district are Kau or wild olive (*Olea cuspidata*), Phulai (*Acacia modesta*), Sanath a (*Dodones viscosa*), Gurgura (*Monothea buxifolia*), and Pataki (*Gymnosporia royleana*).

The general vegetation consists of dry deciduous scrub. The grass species which are dominant in the area are Sarilala (*Heteropogon contortus*), Khawi (*Cymbopogon jwarancusa*), Mesquite (*Prosopis juliflora*), and Karir (*Capparis aphylla*). All these plant species are found throughout the district.

Jhelum District

The flora is not very different from other districts, but owing to the difference in altitudes, it varies a good deal from place to place. Large trees are only to be met within the riverain tract. Shisham (*Daiberia Sisso*) is common round Jhelum and also occurs frequently in other parts of the plain country. The other trees in the district are Kikar • (*Acacia Arabica*), Ber (*Zizyphus jujuba*), Phulalzi (*Acacia Modesta*), Kan (*Olea europala*), Bohar (*Ficus Indica*), Pipal (*Ficus religiosa*), Tut (*Morns Alba*), Farash (*Tamarix articulate*), Kanger {*Pistacia integerrima*), Karil (*Capparis ~phylla*), Lana (*Salsola*) and Akk (*Calotripis gigantea*).

5.7.2 Fauna

Rawalpindi District

Jackals, foxes, wild bears, hares and grey partridges are quite common. ~r and wild goats are sometimes met within the lower Murree hills, Chickores are found on the hills down to the low spurs while ducks are found along the ravines and marshes. Quail comes in great numbers in the spring and autumn. However with the un-controlled shooting a lot of animals and birds have either been killed or disappeared.

Attock District

The largest wild animal found in the district is the leopard, which is sometimes, but rarely, met with in the Kala Chitta. The jackal also occurs in the hills. The urial affords the best large game in the Kala Chitta range and outlying spurs, in the Narrara hills, in a good deal of the ravine country at its base. The chinkara or ravine deer generally called hiran, occurs in the maira of tehsil Attack and the ravines in some parts of the Pindigheb plateau, but is not common. Partridges, Sisi and Chikor are frequent in the hills.

Chakwal District

Apart from the very common bird and animal species which are in more or less evenly distributed throughout Punjab, exist in various areas of Chakwal district.

These are Gray partridge, black partridge, Chakore see partridge, quail, houbara bustard common crane, ducks, peacock.

Jehlum District

Of wild animals, an occasional Hyaena may be met within the whole of the Salt Range, but only rarely. The jackal is more commonly seen and constantly heard, in all parts of the tract. The other animals of sport are Urial and Chinkara.

Wild pigs are found in the Salt Range only, here and there in large numbers, where they do much damage to the crops. Wolves, foxes and wild cats are sometimes found, but hare is fairly common.

5.7.3 Endangered Species

There is no floral or fauna species inhabiting the project area that are included in the Red Data Book of IUCN. The populations of birds is reported to be reduced over time due to the conversion of open land into built up areas, excessive pesticide sprays in agricultural crops and loss of habitat.

5.8 Environmental Monitoring Through Laboratory

M/s Green Engineering Consultant was engaged to carry out environmental monitoring of ambient air quality, ground water quality, ambient noise level and particulate matter concentration in the project area. Laboratory analysis reports of water quality are annexed as **(Annex –V)**.

5.8.1 Sampling Location of each Village of Rawalpindi Divisions

The proposed project consists of 36 Districts of Punjab with distribution of zones as north zone, south zone and central zone. The zone covered in this report is north zone which covers Rawalpindi Division:

Table 5-4: Sample Sites along with Coordinates

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
1	Chakwal	Chak Malook	Chakwal	32°57'33"N	72°57'0"E	RO
2	Chakwal	Warwal	Chakwal	33°8'25"N	72°31'21"E	RO
3	Chakwal	Joya Mair	Chakwal	33°0'32"N	72°48'43"E	RO
4	Chakwal	Amir Pur Mangan	Chakwal	32°58'5"N	73°0'45"E	S/AC
5	Chakwal	Ghugh	Chakwal	33°7'51"N	72°44'51"E	RO
6	Chakwal	Bagwal	Chakwal	33°4'30"N	72°35'44"E	RO
7	Chakwal	Panjain	Chakwal	32°55'32"N	73°0'40"E	RO
8	Kallar Kahar	Mahra	Chakwal	32°44'42"N	73°04'31"E	S/AC
9	Chakwal	Panjain	Chakwal	32°55'32"N	73°0'40"E	RO
10	Chakwal	bullay bala	Chakwal	32°58'43"N	72°45'45"E	RO
11	Chakwal	maingan	Chakwal	32°57'45"N	72°44'42"E	RO
12	Chakwal	chak koka	Chakwal	33°11'24"N	72°41'7"E	RO
13	Chakwal	chak umra	Chakwal	32°59'53"N	72°57'36"E	RO
14	Chakwal	khara	Chakwal	33°5'15"N	72°38'17"E	RO
15	Pind Dadan Khan	Dolatpur	Jhelum	32°41'16"N	73°17'51"E	RO
16	Pind Dadan Khan	Kot Kacha	Jhelum	32°32'20"N	72°55'60"E	RO
17	Gujar Khan	Mastala	Rawalpindi	33°8'49"N	73°9'14"E	S/AC
18	Gujar Khan	Panjhgran Kalan	Rawalpindi	33°9'12"N	73°14'9"E	RO
19	Gujar Khan	Changa Bagyal	Rawalpindi	33°18'29"N	73°23'19"E	S/AC
20	Kallar Sayyedan	Dhok Makh Bukahri	Rawalpindi	33°24'54"N	73°21'58"E	S/AC
21	Gujar Khan	Padehana	Rawalpindi	33°17'30"N	73°21'39"E	RO
22	Attock	Haji Shah II	Attock	33°54'10"N	72°19'56"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
23	Attock	Gondal	Attock	33°54'10"N	72°20'6"E	S/AC
24	Attock	Dakhnair	Attock	33°50'32"N	72°16'26"E	S/AC
25	Attock	Surag Mongiwali	Attock	33°43'12"N	72°15'38"E	S/AC
26	Fateh Jang	Malal	Attock	33°24'20"N	72°37'55"E	S/AC
27	Fateh Jang	Gadda	Attock	33°28'17"N	72°32'16"E	S/AC
28	Fateh Jang	Gulial	Attock	33°30'28"N	72°31'14"E	S/AC
29	Hassan Abdal	Kohlia	Attock	33°50'45"N	72°38'0"E	S/AC
30	Jand	Basal	Attock	33°33'15"N	72°15'26"E	RO
31	Jand	Thatta	Attock	33°34'34"N	72°13'10"E	RO
32	Jand	Kot Chajji	Attock	33°32'5"N	72°4'50"E	RO
33	Jand	Marmaki Jandial	Attock	33°31'17"N	72°17'34"E	RO
34	Pindi Gheb	Khour	Attock	33°14'59"N	72°27'21"E	S/AC
35	Pindi Gheb	Khour Company	Attock	33°15'46"N	72°27'35"E	S/AC
36	Pindi Gheb	Kasran	Attock	33°29'4"N	72°16'39"E	RO
37	Pindi Gheb	Kanat	Attock	33°19'59"N	72°13'17"E	RO
38	Pindi Gheb	Kamrial	Attock	33°17'28"N	72°34'38"E	RO
39	Pindi Gheb	Ahmdal	Attock	33°17'29"N	72°29'47"E	RO
40	Pindi Gheb	Nosherah	Attock	33°17'29"N	72°29'47"E	RO
41	Pindi Gheb	Kharppa	Attock	33°16'46"N	72°11'28"E	RO
42	Chakwal	RWSS Odherwal	Chakwal	32°56'15"N	72°48'50"E	S/AC
43	Chakwal	RWSS Balkassar	Chakwal	32°56'40"N	72°38'39"E	S/AC
44	Chakwal	RWSS Thoa Bahadur	Chakwal	32°56'13"N	72°42'33"E	S/AC
45	Chakwal	RWSS Dheedwal	Chakwal	32°51'35"N	72°56'34"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
46	Choa Saiden Shah	RWSS Dandoot	Chakwal	32°39'32"N	72°57'34"E	S/AC
47	Choa Saiden Shah	RWSS Dalwal	Chakwal	32°42'9"N	72°53'16"E	RO
48	Choa Saiden Shah	RWSS Wahula	Chakwal	32°42'56"N	72°54'17"E	S/AC
49	Choa Saiden Shah	RWSS Dulmial	Chakwal	32°44'13"N	72°55'38"E	S/AC
50	kallar kahar	RWSS Bhoun	Chakwal	32°57'30"N	72°45'23"E	S/AC
51	kallar kahar	RWSS Buchal Kalan	Chakwal	32°40'24"N	72°38'0"E	S/AC
52	kallar kahar	RWSS Jhamra	Chakwal	32°42'41"N	72°37'6"E	S/AC
53	kallar kahar	RWSS Sarkalan	Chakwal	32°38'42"N	72°38'43"E	S/AC
54	kallar kahar	RWSS Khairpur	Chakwal	32°44'1"N	72°47'26"E	S/AC
55	kallar kahar	RWSS Munara	Chakwal	32°40'6"N	72°30'51"E	S/AC
56	Lawa	RWSS Lawa	Chakwal	32°41'51"N	71°55'59"E	S/AC
57	Talagang	WSS Tamman	Chakwal	33°0'15"N	72°6'33"E	S/AC
58	Talagang	RWSS Dhurnal	Chakwal	32°48'22"N	72°6'41"E	S/AC
59	Talagang	RWSS jhatla	Chakwal	32°49'23"N	72°22'59"E	S/AC
60	Talagang	WSS Akwal	Chakwal	32°55'47"N	72°22'4"E	S/AC
61	Talagang	RWSS Nakka Kahut	Chakwal	32°56'32"N	72°28'41"E	S/AC
62	Talagang	RWSS Bhilomar	Chakwal	32°43'38"N	72°26'16"E	RO
63	Dina	Pindori	Jehlum	33°5'42"N	73°37'6"E	S/AC
64	P.D Khan	Lilla Thal	Jehlum	32°33'45"N	72°44'33"E	S/AC
65	P.D Khan	Kandwal	Jehlum	32°32'56"N	72°39'21"E	S/AC
66	P.D Khan	Peer Khara	Jehlum	32°38'40"N	72°44'50"E	S/AC
67	P.D Khan	Jalal pur sharif	Jehlum	32°39'38"N	73°24'11"E	S/AC
68	P.D Khan	Gole pur Kora chorn	Jehlum	32°35'30"N	72°56'0"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
69	P.D Khan	Tobah	Jehlum	32°34'43"N	72°49'1"E	S/AC
70	P.D Khan	Haran Pur	Jehlum	32°36'29"N	73°9'13"E	S/AC
71	P.D Khan	Saroba	Jehlum	32°34'7"N	72°52'8"E	S/AC
72	P.D Khan	Dharyala Jalib	Jehlum	32°38'60"N	73°13'23"E	S/AC
73	P.D Khan	Ather	Jehlum	32°33'21"N	72°49'57"E	S/AC
74	P.D Khan	Sodi Gujar	Jehlum	32°37'20"N	73°3'44"E	S/AC
75	P.D Khan	Jotana	Jehlum	32°43'5"N	73°9'24"E	S/AC
76	P.D Khan	Bilowal	Jehlum	32°35'42"N	72°52'33"E	S/AC
77	P.D Khan	Dhudi Phaphra	Jehlum	32°38'29"N	73°6'44"E	RO
78	Sohawa	Domeli	Jehlum	33°0'38"N	73°21'11"E	S/AC
79	Gujar Khan	Rural Water Supply Scheme Khuramb Kaswal.	Rawalpindi	33°15'23"N	73°14'25"E	S/AC
80	Gujar Khan	Rural Water Supply Scheme Sukho.	Rawalpindi	33°16'43"N	73°15'16"E	S/AC
81	Gujar Khan	Rural Water Supply Scheme Hamid Jhangi UC Jhangi Jalal.	Rawalpindi	33°15'23"N	73°14'18"E	RO
82	Gujar Khan	Rural Water Supply Scheme Karyala UC Punjgran.	Rawalpindi	33°15'14"N	73°10'56"E	RO
83	Kahuta	Rural Water Supply Scheme Thoa Khalsa UC Thoa Khalsa.	Rawalpindi	33°30'35"N	73°25'53"E	S/AC
84	Kallar Syedan	Urban Water Supply Scheme Kallar Syedan MC Kallar Syedan	Rawalpindi	33°25'0"N	73°22'50"E	RO
85	Kallar Syedan	Rural Water Supply Scheme Dubaran Kalan UC Dubaran	Rawalpindi	33°26'55"N	73°30'11"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
86	Kallar Syedan	Rural Water Supply Scheme Pind Bainso UC Nallah Musalmanan	Rawalpindi	33.47383704180054N	73.51664587614918 E	S/AC
87	Murree	Rural Water Supply Scheme Parhanna UC Ban.	Rawalpindi	33°50'57"N	73°27'41"E	S/AC
88	Murree	Rural Water Supply Scheme Dhanda UC Ghel.	Rawalpindi	33°54'13"N	73°30'36"E	S/AC
89	Murree	Rural Water Supply Scheme Manga UC Tret.	Rawalpindi	33°50'58"N	73°27'41"E	S/AC
90	Rawalpindi	Rural Water Supply Dhoke Chudriyan	Rawalpindi	33°35'56"N	73°6'33"E	S/AC
91	Rawalpindi	Rural Water Supply Defence Colony	Rawalpindi	33°37'26"N	73°6'31"E	S/AC
92	Rawalpindi	Rural Water Supply Scheme Basali UC Basali	Rawalpindi	33°23'39"N	73°8'20"E	S/AC
93	Rawalpindi	Rural Water Supply Scheme Chahan UC Chahan	Rawalpindi	33°25'9"N	72°52'17"E	S/AC
94	Rawalpindi	Rural Water Supply Nai Abadi	Rawalpindi	33°37'11"N	73°6'42"E	S/AC
95	Rawalpindi	Rural Water Supply Madni Mohallah	Rawalpindi	33°34'23"N	73°2'43"E	RO
96	Rawalpindi	Rural Water Supply Scheme Chak Beli Khan UC Chak Beli Khan.	Rawalpindi	33°16'45"N	72°54'52"E	RO
97	Rawalpindi	Rural Water Supply Schem Mir Haider Colony (Rehab.)	Rawalpindi	33°34'54"N	73°0'45"E	S/AC
98	Rawalpindi	Rural Water Supply Scheme Kali Parri	Rawalpindi	33°16'56"N	72°54'35"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
99	Rawalpindi	Rural Water Supply Scheme Sagri UC Sagri	Rawalpindi	33°27'37"N	73°15'53"E	RO
100	Rawalpindi	Rural Water Supply Dhoke Lalyal	Rawalpindi	33°37'11"N	73°6'45"E	S/AC
101	Rawalpindi	Rural Water Supply Al-Noor Colony	Rawalpindi	33°37'39"N	73°6'17"E	S/AC
102	Rawalpindi	Rural Water Supply Scheme Salmoon UC Chontra	Rawalpindi	33.30557008601798 N	72.91353428679749 E	S/AC
103	Rawalpindi	Rural Water Supply Scheme Chontra UC Chontra	Rawalpindi	33°21'17"N	72°55'52"E	S/AC
104	Rawalpindi	Rural Water Supply Scheme Rajar UC Chahan	Rawalpindi	33°24'1"N	72°50'7"E	S/AC
105	Rawalpindi	Rural Water Supply Malik Colony Nai Abadi	Rawalpindi	33°34'6"N	73°07'4"E	S/AC
106	Rawalpindi	Rural Water Supply Scheme Adiala UC Adyala	Rawalpindi	33°33'34"N	73°1'45"E	S/AC
107	Rawalpindi	Rural Water Supply Scheme Kurrar UC Parial	Rawalpindi	33°12'56"N	72°45'44"E	S/AC
108	Rawalpindi	Rural Water Supply Scheme Chakri UC Chakri	Rawalpindi	33°17'43"N	72°46'11"E	S/AC
109	Rawalpindi	Rural Water Supply Scheme Afzal Abad	Rawalpindi	33°35'25"N	73°5'53"E	RO
110	Rawalpindi	Rural Water Supply Scheme Mial UC Parial	Rawalpindi	33°13'25"N	72°47'25"E	S/AC
111	Rawalpindi	Rural Water Supply Scheme Dheri UC Chontra	Rawalpindi	33°16'49"N	72°47'0"E	S/AC
112	Rawalpindi	Rural Water Supply Shaheen Colony	Rawalpindi	33°38'0"N	73°5'50"E	S/AC

S.No.	Tehsil	Names of Villages	District	Latitude of Village	Longitude of Village	Type of Plant to be installed as per water quality test report
113	Rawalpindi	Rural Water Supply Lala Ruka, Lakhani	Rawalpindi	33°33'38"N	73°0'39"E	RO
114	Taxila	Urban Water Supply Scheme Taxila MC Taxila. (Phase-II)	Rawalpindi	33°45'0"N	72°48'53"E	S/AC
115	Taxila	Rural Water Supply Scheme Thatta Khalil UC Thatta Khalil.	Rawalpindi	33.665740752319365 N	72.75640292648129 E	RO
116	Taxila	Rural Water Supply Scheme Rehbar Colony UC Usman Khattar.	Rawalpindi	33°46'38"N	72°49'15"E	S/AC

5.8.2 Water Quality Analysis

Following are the parameters being considered for the water quality analysis in the different villages of Rawalpindi Divisions. The considered parameters for testing are as follows:

Table 5-5: Physical Parameter Analysis

Parameter	Unit	PEQS	WHO Standers	Reference Method
Turbidity	NTU	< 5	< 5	APHA-2130 B
Total hardness as CaCO ₃	mg/l	<500	----	APHA-2340 C
TDS	mg/l	<1000	<1000	APHA-2540 C
TSS	mg/l	-	---	APHA-2540

Odour	-	Acceptable / Non- objectionable	Acceptable / Non- objectionable	In-House
Tste	-	Acceptable / Non- objectionable	Acceptable / Non- objectionable	In-House
Color	TCU	15	15	ASTM D 1209
pH	-	6.5-8.5	6.5-8.5	APHA-4500H+ B

Table 5-6: Chemical parameter Analysis

Parameter	Unit	PEQS	WHO	Method	Reference Method
Arsenic	mg/l	< 0.05	0.01	AAS	APHA-3111B
Fluoride	mg/l	<1.5	1.5	Spectrophotometric	APHA-4500 F-/C
Nitrate	mg/l	<50	50	Spectrophotometric	-

Table 5-7: Microbiological Parameter Analysis

Parameter	Unit	PEQS	WHO	Reference
Coli Form	CFU/100ml	Must not be detectable	Must not be detectable	APHA-9222 B
Feacal Coli Form	CFU/100ml	Must not be detectable	Must not be detectable	APHA-9222 D

E Coli	CFU/100ml	Must not be detectable	Must not be detectable	APHA-9222
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The detailed lab results of water quality analysis of Rawalpindi Division are attached as **Annex- V**.

5.8.3 Noise and Ambient Air Monitoring

Noise level and Ambient Air Monitoring were conducted at the project sites using digital sound level meter and Haz-Scanner respectively and the results were found satisfactorily.

5.9 Socio-Economic Environment

The project area is adjacent to the residential, commercial and agricultural area. Aforesaid project area is accessible through metaled road network such as Main Grand Trunk (GT) road which also connects to the other parts of the city. The socio – economic survey was conducted in the project area and the **Social Profile / Results of Survey** is being discussed here under:

5.9.1 Employment Status

The respondents were asked about their employment status. According to the socio-economy survey majority of the respondents were employed. It is being envisaged that around **75%** of the respondents were working in various private and government sectors. Around **44%** of respondents were found employed in private sector, **18%** of responded were running their own business at small scale such as; shops, selling various essential goods, working as labors, etc. Only **22%** respondents according to the socio-economic survey were un-employed. Only **16 %** of the respondent were working as government employees. This reflects that overall maximum individuals are employed in settlements near the project area.

5.9.2 Favor for the aforesaid Project

Respondents were inquired about their views regarding the proposed project. Almost **92%** respondents were in favor of the proposed project whereas **08%** of respondents showed no concern for the establishment aforesaid project.

5.9.3 Common Diseases

Respondents were asked about the common diseases prevailing within their area. Most respondents suffered from eater borne diseases such as typhoid, Jaundice and diarrhea; whereas a smaller number of individuals was suffering from diabetes and hepatitis. People were mostly affected by diseases due to drinking contaminated water.

5.9.4 Community Issues

Community residents were asked about the burning issues they are facing. The majority of respondents complained about the improper and inefficient supply of safe drinking water which emphasizes the need of the aforesaid project in order to provide potable water to the individuals of Rawalpindi districts and few of respondents were interested in the expansion of the market for the selling of their goods.

5.9.5 Quality of Life Values

Most of the respondents had the basic facilities of life such as; health and education facilities as well as basic amenities such as electricity, gas, water supply and transportation to sustain life. Most of the respondents were working with the various private sector companies. Primary & Secondary Schools, College and Universities are present in the vicinity of project area. People of the nearby residents enjoy basis amenities of life.

5.9.6 Population

5.9.6.1 Rawalpindi Division

Rawalpindi Division is an administrative division of Punjab province, Pakistan. The division, Headquartered at the city of Rawalpindi, covers an area of 17,206 km². According to the 2017 census, the population is 16,123,984. The District wise population of Rawalpindi is given in table as under:

Table 5-8: Population of Rawalpindi District

District	Population (2017)
Rawalpindi	5,014,196
Sialkot	3,893,672
Gujarat	2,756,110
Narowal	1,709,757
Mandi Bahaudin	1,593,292
Hafizabad	1,156,957
Total	16,123,984

5.9.7 Demographic Profile of Rawalpindi Divisions

The Demographical profile of Rawalpindi Divisions are as follows:

Table 5-9: Population and Intercensal increase and Growth Rates

Division	Description	1951	1961	1972	1981	1998
Rawalpindi	Population in (1000`s)	795	100	161	210	340
	Intercensal Increase (%)	-	25.8	61.6	30.4	61.3
	Average Annual Growth Rate (Percent)	-	2.3	4.2	3.2	2.8

- **Religion**

Rawalpindi District

The population of the Divisions is predominantly Muslims. The next higher percentage is of Ahmadis with followed by Christians. While other minorities like Hindu (Jati), Schedule Castes etc. are very small in number.

The percentages of religions in Rawalpindi Division are as under:

Table 5-10: Percentage of religions of Rawalpindi District of rural & urban areas

Religion	Rawalpindi District		
	All Areas	Rural	Urban
Muslims	95.41	94.01	96.78
Christians	4.38	5.71	3.07
Hindus	*	*	*
Ahmadis	0.20	0.26	0.14
Schedule Caste	*	*	*
Others	*	*	*

*Refers to a very small number

Source: DCR, Rawalpindi Division 1998

Attock District

About 99.2 per cent of the population were Muslims. Followed by Christians who constituted 0.7 per cent of the total population. The remaining 0.1 per cent were Hindus including scheduled castes, Qadianis, etc.

The percentages of religion in Attock District are listed in table below:

Table 5-11: Percentages of Religion of Attock District

Religion	Attock District		
	All Areas	Rural	Urban
Muslim	99.24	99.60	97.93
Christian	0.67	0.33	1.90
Hindu (Jati)	0.01	*	0.04
Ahmadi	0.07	0.06	0.08
Scheduled Caste	*	*	0.01
Others	0.01	0.01	0.02

Chakwal District

As emerged from 1998 Census the population of district is predominant!) Muslims i.e. 99.2 percent. The next higher percentage is of Christians with 0.5 point followed by Ahmadis 0.2 percent. While other minorities like Hindu (Jati). Scheduled Castes etc. are very small in number. The population of Muslims is higher in rural areas, 93.3 percent as compared to their counterparts in urban areas. 98.4 percent. Christians are mostly living urban areas representing 1.5 percent as compared to just 0.4 per cent in rural areas. Ahmad is are more in rural as compared to their proportion in urban areas. The following table gives percentage of population b) religion in rural and urban areas in 1998.

Table 5-12: Percentages of Religions of Chakwal District in rural & urban areas

Religion	Chakwal District		
	All Areas	Rural	Urban
Muslim	99.2	99.3	98.4
Christian	0.5	0.4	1.5
Hindu (Jati)	*	*	*
Ahmadi	0.2	0.2	0.1
Scheduled castes	*	*	*
Others	*	*	*

Jehlum District

The religion of the majority of the people of this district is Islam but there are a few Hindus still living in some villages. Broadly there are two sects: Shias and Sunnis, the latter being in majority. The religious fervour is mostly manifested in the month of Ramzan and at the Friday prayers at which large congregations assemble in the mosques. A very powerful symbol of religious sentiment exists in the form of Pirs which is a very popular institution in this district. The main Pirs are at Jalalpur, Mustafa Abad, Dheri, Pir Khara, Choa Saidan Shah in Pind Dadan Khan tehsil, Karsal in Chakwal tehsil, Rathian, Tahlianwala, Sangohi and Miana Mohra in Jhelum tehsil. The Pirs of some of the above mentioned places are living persons while at other places they have died long ago, but Gaddi Nashins manage the shrines. Most of the Pirs have very large followers particularly from the illiterate sect. ions. Some of these Gaddis have now been

taken over by the Auqaf Department which has slightly changed the configuration of the activities on the shrine itself, and lessened the enthusiasms of the people. The illiterate people believe that the only way to salvation lies through the predication of some Pir, and the desires and wishes of the Pir are often given greater consideration than the basic principles of religion. This belief is maintained by building up the reputation which has developed round a particular shrine or Pir as his characteristic miracle. For instance, the Pir of Dheri is famous for the healing power in case of snake bites and the shrine of Pir Khara is known for the effective and immediate cure of chronic renal colic. Annual Urs is held at each shrine or Pir's headquarter, where the people offer Nazranas and take some conditional vows. The influence of Pirs to Murshuds is, however, on the decline now.

- **Tribes of Rawalpindi Division**

According to the census of 1901, the population of the main tribes were: Awan (38,768), Dhund Abbasis (23,462), Gakhars (13,328), Gujjars (25,953), Janjua Rajputs (7,557), Jats (34,556), Khattar (1,014). Miscellaneous Dhanyal(3,991), Satti (5,343) and Sayyid (12,508).

5.9.8 Languages

The mother tongue refers to the language used for communication between parents and their children in any household. Punjabi is the predominant language being spoken in both Rawalpindi Division by majority of the population of followed by Urdu, Pushto and Siraiki etc.

5.9.9 Literacy Rate and Education Level

The literacy rate of Rawalpindi Division is 94 %. Rawalpindi is Pakistan's moderate producer of professionals in the fields of science, technology, law, IT, engineering, medicine, nuclear sciences, pharmacology, telecommunication, biotechnology, microelectronics and nanotechnology.

There are 2,442 educational institutions working in the district. There are 16 Degree and Inter-mediate Colleges for male and females, 233 High schools, 260 Middle Schools, and 1630 Primary Schools are working in the district.

5.9.10 Civic Amenities

Respondents were inquired about the civic amenities available in the respective areas during socio-economic survey of project area. Most of the respondents had the basic amenities to sustain life such as; electricity, water supply services, sewerage collection system, and transport facilities. Adequate educational and healthcare facilities were also present in the area.

5.9.10.1 Health Care Facilities

Rawalpindi Division

Rawalpindi Division has many government and private hospitals to address and maintain the health standards. Some of the health care units available in the project area vicinity are shown as follows:



Figure 5-3: Health care facilities of Rawalpindi Division

6 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

6.1 General

Public Consultation refers to the process by which the concerns of the various stakeholders and local community who have a plausible stake in the environmental management and associated impacts of the project or activity are ascertained with a view to taking into account all the design and construction concerns in the project activity as appropriate. According to the IEE and EIA Review Regulations 2000 (Amended 2022) public consultation is mandatory for any socio-economic environmental study for the commencement of any project. The objectives of this process were to:

- Share information with stakeholders on the construction of the aforesaid water supply schemes, filtration plants & RO plants and expected impacts on the physical, biological and socio-economic environment of the project area.
- Understand Stakeholder's concerns regarding various aspects of the project, including construction and installation of the project components and the likely impacts of the construction related activities and operation of the project.
- Understand the perceptions, assessment of social impacts and concerns of local residents of the Rawalpindi division.
- Disclose information about contact offices/ officers for any complaints/queries.
- Provide an opportunity to the public to provide valuable suggestions in the project design in a positive manner; and
- Reduce the chances of the conflicts through the early identification of controversial issues and consult them to find acceptable solutions.

This EIA Report includes all the comments, which were taken into account during the social survey and preparing the definitive development concept for the installation and operation of aforesaid project.

6.2 Methodology

On the basis of the project location a survey plan was developed in order to gather details of the current socio-economic norms and activities. The survey plan was developed under the supervision of Environmental Expert.

6.3 Identification of Stakeholders

All the people who are directly or indirectly affected or concerned with the project are stakeholders. Besides the living population of the surrounding areas, some other stakeholders were identified and contacted which are enlisted below. They are the key players including; residential community, labors present in the study area in the vicinity of the proposed project area, public and government offices, schools, universities, hospitals, hotels, international agencies and the NGO's. Not only published material, brief or other literature were obtained on request, but also noted their views and the concerns, in an official capacity as well as on the personal basis. Project Affected Persons (PAP's); includes the settled families, shopkeepers, vendors etc.) And employees of the commercial entities. PAP's are of two types, for instance:

6.3.1 Direct Stakeholders

Direct impact will occur on the local community due to the installation of filtration plants at the proposed locations, land use and resettlement plan will be implemented during the construction phase of the project in order to mitigate the aforesaid short term impact effectively.

6.3.2 Indirect Stakeholders

Indirect impact will occur on those who are living or doing business within a Project Area of Influence (AOI). In the case of aforesaid project, the citizens of Rawalpindi division will get opportunities of being employed. So, in the early development stages and during the operational phase the people will be benefited. Indirect respondents include:

- Government agencies responsible to deal and supervise the project related activities.
- Government agencies directly, indirectly or widely involved in the execution and monitoring of the aforesaid project.
- Government Departments such as; Field Office Environment (Rawalpindi) division, Public Health and Engineering Department (PHED), Local Government Bodies had been consulted and considered as indirect stakeholders.
- Workers of political, cultural, religious or social scientific bodies, directly or indirectly are related to the project.

6.4 Public Disclosure

Public disclosure is the outcome of all such activities where the public is involved at least in the information sharing process. This is an integral part of the process. So, before the proponent applies for NOC to the Punjab-EPA. This disclosure will be distributed properly among all stakeholders. It is the responsibility of the proponent and the consultants to display a public disclosure document in prominent places where community has easy access.

6.5 Consultation Process

Information disclosure, public consultation and discussion regarding the various aspects of the project with the people of the area are necessary. This process is intensified during the EIA Studies and rounds of Public Consultation were held with local community and various government departments as listed below. Surveys were carried out in order to investigate physical, biological and socio-economic resources falling within the immediate AOI of the project. Primary data collection included:

- Data collection regarding the socio-economic condition of study area.
- Pre-testing of socio-economic survey tools in the field.
- To consult the locals for collection of information on biological environment.

Various meeting with the stakeholders were held in order to fulfill the following objectives:

- Share information with stakeholders on the proposed project and expected impacts on community in the vicinity of the project.
- Understand Stakeholder's concerns regarding various aspects of the project, including the existing condition of the upgrading requirements, and the likely impact of construction & installation and operational activities.
- Provide opportunity to the public to influence the project design in a positive manner.
- Obtain local and traditional knowledge, before decision making.
- Increase public confidence about the proponent, reviewers and decision makers.
- Reduce conflict through the early identification of controversial issues and work through them to find acceptable solutions.
- Dissemination of information through discussions, education and liaison.
- Documentation of information narrated by the stakeholders and mitigation measures proposed by the stakeholders.
- Incorporating the public concerns and their address in the EIA and eliciting their comments and feedback.
- Create a sense of ownership of the proposal in the mind of the stakeholders.

6.6 Consultation with Officials

Following offices of government departments were consulted by the socio-environmental team of the consultants and concerned details about the project were noted down through personnel interviews, group meetings, etc. in their offices, for instance see table 6.1 below:

Table 6-1: Views of Government Officials about aforesaid Project

Sr.No	Participant	Designation	Concerns/Remarks
Punjab Aab-e-Pak Authority			
1.	Mr. Jamil	Deputy Director (PAPA)	Following recommendations were suggested by the PAPA • Energy Consumption must be limited up to the extent

Sr.No	Participant	Designation	Concerns/Remarks
			for the operation of filtration plants. • Usage of Solar panels and other renewable sources will be effective in terms of energy conservation for the said project. • Assistance at the site will also be provided by the PAPA.
Public Health Engineering Dept. (Attock)			
2.	Mr. Jahanzaib	Community Based Motivator (CBM)	Following measures should be adopted while designing the proposed project. • Solid waste should be managed properly during the construction of filtration plants. • Mechanical equipment's should be serviced and monitored on monthly basis. • The social concerns should be addressed accordingly, if any.

Sr.No	Participant	Designation	Concerns/Remarks
Public Health Engineering Department (Attock)			
3.	Mr. Uzair	Community Based Motivator (CBM)	Following measures should be adopted while designing the proposed project: • Solid waste should be managed properly from the filtration plants. • Pipes should be used of adequate strength to avoid leakage. • Air pollution should be controlled from the generators. • Traffic should be diverted properly to avoid blockages and • Dust should be controlled due to excavation during construction activities by sprinkling of water on daily basis.
Public Health Engineering Department (Rawalpindi)			
4.	Mr. Azim	Community Based Motivator (CBM)	• The maintenance of the filtration plants must be the main focus of the authority for the long term provision of potable water to the residents of Rawalpindi division.

6.7 Consultation with Beneficiaries

In addition, to the use of direct methods to evidence the response of the various stakeholders in the targeted population residing in study area was ascertained by conducting a sample survey, through specially formatted questionnaires (attached in the Annex- of this EIA report). Questions posed to the public were related to creation of possible impacts, adverse impacts and beneficial impacts, including; employment opportunities, income generation activities, change in living standards and provision of the basic amenity.

Personnel views of the respondents on the installation of the filtration plants and water supply schemes by Punjab Aab-e-Pak Authority (PAPA) were noted. Possible disturbance to the residents near the AOI and infringement of their privacy were also recorded. The various rounds of public meetings and consultations were arranged in project and study area. The objectives of consultation with the affected persons are given as follows:

- To disclose the proponent plan for the construction of the proposed facilities.
- To share information on the design and specifications of project work.
- To analyze the expected impact on the socio-economic environment.
- To understand their concerns regarding various aspects of project commencement.

6.8 Views, Concerns and Suggestions of Various Stakeholders

The major socio-economic concerns and problems of the affected persons of various communities along with their main concerns and remarks were noted.

Pictorial view of Public Consultation is as follows:



Consultation with Deputy Director PAPA Mr. Jamil



Public Consultation near filtration plant site in WSS Dhurnal Talagamg Chakwal, Pakistan



Consultation with Government Official Mr. Jahanzib CBM PHED Attock



Consultation with Local Residents Regarding Aforesaid Project Bully Bala Chakwal



Consultation with Government Official Mr. Azim CBM PHED Rawalpindi, Pakistan



Consultation with Government Official Mr. Uzair CBM PHED Attock, Pakistan



Pictorial Assessment of site visit



Consultation at Project Site

6.9 Addressing Public Concerns

The best mechanism of effective communication between the community and the proponent is by the nomination of the Company Representative and all the issues/concerns of the community must be for future reference. This representative may be the member of the Grievances Redressed Committee (GRC).

6.9.1 Grievances Addressed Committee

Grievances Redressed Committee (GRC) will be formulated by the proponent to address to address the concerns of the locals during the construction as well as during operational phase. The main role of the GRC will be to resolve the issues of the community associated with aforesaid project, if any.

7 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MASURES

This section presents the screening process that identifies the environmental aspects and makes assessment of impact of different activities during the pre-construction, construction and operation phases of the proposed installation of water filtration plants in the mentioned villages of the Rawalpindi division. The screening process has been a thorough review of literature, primary as well as secondary baseline data, and expert judgment, made assessment of the potential impacts of the said activities on the physical, biological and socioeconomic environment of the project. Mitigation measures have been proposed to reduce, minimize or compensate for the identified potential negative impacts.

The proposed project will involve the construction and operation phase impacts associated with the activities of the project at the proposed site. The environmental impacts of the project is identified situation analysis which are based on the following:

- Physical environment, particularly siting of the project
- Biological environment and
- Socio- economic environment

This section of the EIA report presents an evaluation of the screening process and identifies the existence, if any, of significant environmental impacts during the different phases of the project and provides, if necessary, the mitigation measures that may have to be adopted in order to reduce and minimize the negative impacts.

7.1 Impact Assessment Methodology

Potential environmental impacts of the proposed project on different features of micro and macro- environment pertain to installation of water filtration plants. The screening process proceeds by identifying the potential environmental impacts at pre-construction, construction and operational stages of the project and identifying the residual impacts after adoption of mitigation measures that may be needed at the outset of activities. The impacts on environmental resources from the proposed project will be short-term and temporary in nature.

Environmental impact of a project is worked out using various factors, so that an environmental management plan can be evolved to take mitigation measures.

A systematic strategy was developed to provide an assessment of the likely impacts on the micro and macro environment of the project site. The strategy includes:

- Review of general guidelines;
- Identification of potential environmental impacts by conducting survey, public consultation and using checklists;
- Assessment of the intensity and significance of potential impacts by obtaining expert opinion and carrying out environmental analysis;
- Defining mitigation measures to reduce impacts to as low as practicable;
- Predicting any residual impacts, including all long-term and short-term, direct and indirect and beneficial / adverse impacts.
- Monitoring of residual impacts.

7.2 Objectives of Screening

The objective of screening is identification of the adverse as well as beneficial impacts and then mitigating the effect of adverse impacts up to acceptable limits or within PEQ's. Following are the objectives of screening out all significant environmental and social impacts:

- To find different alternatives and ways of carrying out the project activities;
- To enhance the environmental and social benefits of the project;
- To avoid, minimize and remediate adverse impacts and
- To ensure that residual adverse impacts are kept within acceptable limits.

7.3 Magnitude

The magnitude of the adverse impacts associated with the establishment of the aforesaid project includes; the type of impacts project commencement will cause to its immediate environment and social structure. It could be direct, indirect and cumulative.

7.3.1 Immediacy

Immediacy of the impact focuses on the following parameters:

- Temporal extent (during installation and operation of filtration plants)
- Spatial extent (local or widespread)

7.3.2 Sustainability and Reversibility

Sustainability and Reversibility of the impact focuses on the following parameters:

- Implementation of mitigations (Fully / Partially)
- Monitoring (Fully / Partially)

7.4 Purpose of Mitigation Measures

The basic purpose of mitigation measures is to reduce the impacts associated with the socio – economic environment up to maximum possible extent for construction / installation of the RO plants, Pre-filtration plants and water supply schemes in the Rawalpindi division. The mitigation measures are suggested based on the following parameters:

7.4.1 What is the Problem?

By the commencement of the aforesaid project, the ever-increasing water demand in the mentioned villages of Rawalpindi division needs to be catered in the near future along with provision of potable water to the community. The study area is commercial and residential in nature and is located at adequate distance from various sensitive receptors. In addition, to the noise and fugitive dust emissions anticipated to be generated during the construction phase, solid waste management and disposal issues may arise at the project site.

7.4.2 When problem will occur and when it should be addressed?

The impacts from the aforesaid project activities will occur during the installation and operational phase due to the civil works involved and the people residing in the project area. These issues include; noise generation, fugitive dust emission, solid waste management, construction debris management, top-soil removal, health and safety issues and change in the geometric features of area. These all problems should be

addressed on-site where they are being generated, to avoid the residual or adverse impacts.

7.4.3 Where problem should be addressed?

The problem will be generated from site development and operation of aforesaid project activities. So, it should be addressed on source i.e. site at within the same time frame.

7.4.4 How the problem should be addressed?

Proper mitigation measures will be provided according to the nature of the impacts / problems. For example, against dust emissions sprinkling of water may be done on regular basis, for solid waste proper solid waste management and disposal practices may be adopted and to manage the construction debris from the aforesaid project activities.

7.4.5 Ways of achieving mitigation measures

- The proposed project design will follow the principle of sustainable development;
- Improved management and monitoring practices;
- By providing adequate mitigation measures for air, noise and land pollution during constructional and operational phases of the project and
- Replacement / Relocation / Rehabilitation

7.4.5.1 Changing in Planning Design

The proposed project is being constructed in Rawalpindi division of Pakistan and no sensitive area, or preserved natural resource is present which could impacted due to the commencement of aforesaid project as it is located in commercial area and residential area. No replacement, relocation and rehabilitation will be required for the commencement of the aforesaid project.

There is no endangered and threatened species has been reported in the project & study area. Moreover, there is not any settlement or infra-structure present on-site that will be dislocated or dismantled due to the establishment of aforesaid project. Hence, there is no need to change the location of the project.

The anticipated impacts had been reduced significantly by adopting better management activities, as it will be carried out for betterment of the society.

7.4.5.2 Compensation in Monetary Terms

Due to the establishment of the aforesaid project at the proposed locations, some of the vegetation will be removed during the construction activities. No impact on the geography / landscape of area will be envisaged due to the installation of aforesaid project. However, there is no protected or environmentally sensitive area present within 5.0 Km vicinity of the project area periphery that could be impacted. Hence, no compensation in the monetary terms will be required. However for the removal of one tree from the project area, 2-3 trees will be planted as the compensation.

7.4.5.3 Replacement, Relocation and Rehabilitation

The proposed project is being constructed at the proposed location in Rawalpindi division, and no sensitive area, human population or preserved natural resource is present which could be impacted due to the commencement of aforesaid project as it is located in commercial and residential area and the purpose of project is to provide potable (safe drinking) water to the residents of the mentioned districts. Therefore, no major replacement, relocation and rehabilitation will be required for the commencement of the aforesaid project activity.

7.4.5.4 Improved Monitoring and Management Practices

In order to mitigate negative impacts envisaged due to the aforesaid project will require adaptation of some improved monitoring and management practices which are covered in detail in the given EMP plan in this EIA report.

7.5 Evaluation of Residual Impacts

Incorporation of suggested mitigation measures may reduce the magnitude of the environmental impacts of abovementioned project but sometimes, it may fail in bringing them within the acceptable limits. This step refers to the identification of the anticipated remaining impacts after mitigation measures have been applied. It can be concluded in view of these reasons that the selected site is best suited for implementation of aforesaid project and the practices adopted for completion of the aforesaid project activities. The said project will pose not any adverse impact or threat

on any component of the environment. The impact assessment criteria are given below along with their impacts:

Table 7-1: Impact Screening Criteria

Impact	Criteria
No Impact	When the proposed activity will have no impact on biotic and abiotic factors.
Long Term	When the impact is of high intensity with high spread and high duration or of high intensity with medium spread and medium duration
Moderate	When the impact is of moderate intensity with high spread and high duration or of high intensity with low / moderate spread and low duration.
Short Term	When the impact is of low intensity but with moderate spread and moderate duration or of moderate intensity.
Insignificant	When the impact is of low intensity, low spread and low duration.

The evaluation of impacts has been carried out on the basis of developing impact matrix, in which impacts have been rated on the basis of their significance. For rating impact significance, the following criterion has been developed.

The following scale has been used for the evaluation of impacts:

LA = Low Adverse (low / short-term damage to the environment)

MA = Medium Adverse (Moderate damage to the environment)

HA = High Adverse (severe damage to the environment)

LB = Low Beneficial (Less beneficial to the environment)

MB = Medium Beneficial (Moderately beneficial to the environment)

HB = High Beneficial (Highly beneficial to the environment)

N / A = Not Applicable

Table 7-2: Environmental Impacts Evaluation Matrix: Installation Phase of Filtration Plants

Sr. No.		Physical Environment							Biological Environment			Socioeconomic Environment								
	Environmental Components Project Activities	Topography	Soil Erosion/Contamination	Landscape	Air Quality	Hydrology and Drainage	Surface Water Quality	Groundwater Quality	Habitat Change	Vegetation	Fauna Movement	Public Health & Safety	Disruption of Public Utilities	Employment	Population Disturbance	Social Disorder	Cultural/Religious Values	Noise & Vibration	Local Economy/Benefits to Community	Traffic Management
1	Vegetation Clearing	O	LA	LA	LA	O	O	O	LA	LA	O	O	O	MB	LA	O	O	LA	O	LA
2	Construction camps	O	LA	LA	LA	O	O	O	O	LA	LA	LA	LA	O	LB	LA	LA	O	LA	LB
3	Excavation operations	LA	LA	LA	LA	LA	LA	LA	LA	LA	LA	LA	LA	MB	LA	O	LA	MA	LB	LA
4	Transportation of construction materials	O	LA	O	MA	O	LA	O	O	O	LA	MA	O	MB	O	LA	O	MA	LB	MA
5	Use of construction materials etc.	O	LA	O	LA	O	LA	LA	O	O	O	LA	LA	O	O	O	O	LA	LB	O
6	Earthwork/concretework operations	O	LA	LA	LA	LA	LA	O	LA	O	LA	LA	O	MB	O	O	O	MA	MB	O
7	Solid Waste Management	O	LA	O	LA	O	LA	LA	O	O	O	LA	O	MB	O	LA	O	O	O	O

Legend:

O-Insignificant/No Impact, NA – Not Applicable, LA- Low Adverse, MA-Medium Adverse, LA – Low Beneficial, MB- Medium Beneficial

Table 7-3: Environmental Impacts Evaluation Matrix: Operational Phase of Filtration Plants

Sr. No.		Physical Environment							Biological Environment			Socioeconomic Environment								
	Environmental Components Project Activities	Hydrology / Drainage	Soil Erosion/ Quality	Surface Runoff	Air Quality	Landscape	Surface Water Quality	Groundwater Quality	Habitat Change	Vegetation	Fauna Movement	Public Health & Safety	Land Use	Employment	Community Development	Economic Activity	Communication System	Noise & Vibration	Local Economy/Benefits to Community	Traffic Management
1	Energy Conservation	O	O	O	LA	O	LA	O	O	LA	O	HB	O	HB	MB	MB	HB	LA	HB	LA
2	Impact of Backwash water	O	O	O	LA	O	LA	O	O	O	LA	MB	O	HB	MB	HB	HB	LA	HB	O
3	Air Emissions	LA	O	LA	LA	O	LA	O	O	O	LA	LA	O	HB	O	LA	LA	LA	NA	LA
4	Maintenance of equipment's & machinery	O	O	O	LA	O	LA	O	O	O	LA	MB	O	HB	M	HB	HB	LA	HB	O
5	Leakage from installed pipes	LA	O	LA	LA	O	LA	O	O	O	LA	LA	O	HB	O	LA	LA	LA	NA	LA

Legend:

O-Insignificant/No Impact, NA – Not Applicable, LA- Low Adverse, MA-Medium Adverse, LA – Low Beneficial, MB- Medium Beneficial.

7.5.1 Impact Screening Checklist

The impact screening checklist is developed to screen out potentially insignificant environmental and social impacts from potentially significant adverse environmental and social impacts during planning & designing, construction & installation and operational phases of the project. The objective of impact screening process is to assess the significance of issues related to the air, water, noise, soil, transportation, civil work, communication, the hazards and external constraints. The beneficial and adverse impacts of project during planning & designing, renovation & installation and operational phases are identified based on their duration, location, frequency, extent, significance and reversibility. The impact of each activity on various environmental parameters is given below:

Sr.No	Environmental Component	Impact Characteristics												
		Duration		Location		Frequency		Extent		Significance			Reversibility	
		Long	Short	Direct	Indirect	Cont.	Intermittent	Wide	Local	Large	Moderate	Minor	Rev.	Irrev.
Beneficial Impacts														
1	Employment Opportunity	☑		☑		☑		☑			☑		☑	
2	Economic Uplift in Country	☑		☑			☑	☑			☑			☑
3	Tree Plantation	☑		☑		☑			☑		☑		☑	
4	Water Quality	☑		☑		☑		☑		☑			☑	
5	Infrastructure development	☑		☑		☑			☑	☑				☑
Adverse Impacts														
1	Air Pollution		●	●			●		●			●	●	
2	Wastewater		●	●		●			●			●		●
3	Solid Waste/Construction Debris		●	●		●			●		●			●
4	Health and Safety		●		●		●		●			●		●
5	Energy Consumption		●	●			●		●		●			●

7.6 Impact and Mitigation Management

Purpose of mitigation is to evade, reduce or balance the expected antagonistic effects in suitable way and to integrate these for devising environmental management strategy or plan. At every stage of project, mitigation plan for all the adverse impacts should be predicted to find out the best alternative. The objectives of mitigation are to:

- Invent of best situation, better alternatives and ways to reduce the adverse environmental and social impacts in immediate surroundings.
- To improve the environmental and societal payback of project.
- To prevaricate, remedy / reduce and pro – vocative impacts.
- To certify that remaining negative influences are kept within permissible limits.

In this part of EIA Report several complications may occur which will include; cleanliness, environmental health & safety, societal & environmental managing, inspection, tools & apparatuses, etc. During operational activities, influx of workers and impacts of operational activities have been deeply elaborated.

7.7 Approaches for Mitigation Measures

Following approaches may be used to mitigate the impacts of the project:

Table 7-4: Approaches for Mitigation Measures

Avoid: Change of route or site details, to avoid damage to important ecological or Archaeological features.
Replace: Regenerate similar habitat of equivalent ecological value in different location.
Reduce: Filters, noise barriers, dust, enclosures, visual screening, wildlife corridors and changed time of activities to reduce the impact.
Restore: Site restoration at the end of the operational activities.
Compensate: Relocation of displaced communities, facilities for the affected communities, financial compensation for the affected individuals, etc.

7.8 Expected Positive Impacts of Aforesaid Project

The major positive impacts of project are given as under:

- Direct employment of approximately 150 to 200 local people during construction phase and direct employment of approximately 100 to 125 employees is anticipated during the operational phase. The development will also generate indirect employment. This represents a significant and positive, both direct and indirect, long term impact.
- Other than providing direct & indirect employment and revenue source, the development shall lead to an improvement of infrastructure of the town area. These are important direct and lasting positive impacts on the community.
- Socioeconomic conditions of the area will be enhanced along with the overall boost to the environment of the project area.
- The project activity will fulfill the growing demand of potable drinking water in Rawalpindi division of Pakistan.
- This project is directly beneficial for the Residents of Rawalpindi division as potable drinking water will reduce the chances of pathogenic diseases such as typhoid, dysentery, hepatitis etc.
- At the end of the construction phase, 02 – 03 times of removed trees will be planted in the designated green areas, this will enhance the aesthetic beauty of the plot areas.
- Availability of water at the designated times in the filtration plants will reduce the unnecessary loss of water in these division.
- Due to aforesaid project sustainable development goals in Pakistan will be achieved on a minor scale with the passage of time.
- With the construction of the proposed project and subsequent development of infrastructure in the area, the lifestyle of the community will be improved. This is considered a positive impact.

7.9 Adverse Environmental Impacts and Mitigation Measures

This section identifies the potentially significant and in-significant adverse environmental and social impacts anticipated during the planning & designing, construction & installation and operation phases for establishment of aforesaid project. Appropriate mitigation and management measures, where applicable, have

also been suggested to reduce the severity of anticipated impact up to the extent possible.

7.9.1 Impacts and Mitigation Measures during (Design / Pre – Construction Phase)

1) Inadequate Design

Inadequate design may affect the proposed project due to deficiencies like improper estimation, pumping equipment and accessories, selection of improper pipe material and accessories vulnerable to leakages. At the design stage, correct water demand by considering population corresponding to the Project Area will be calculated. The selection of machinery will be for at least 15 years for smooth functioning of the filtration plants.

Nature of Impact

The nature of proposed impact will be direct, low, long-term and hence significant.

Mitigation Measures

The leakages will be controlled by appropriate selection of materials for pipe and accessories suitable for local conditions and provision of optimum pipe sizes. Life time of machinery will be 15 years for proper functioning of filtration plants in the long run.

2) Inadequate design of Tube well components

Design of tube-well components must be appropriate for the proper functioning of the water supply schemes in the mentioned districts.

Nature of Impact

The impact is moderate, adverse and permanent in nature.

Mitigation Measures

Design of the strainer of the tube well must be accurate to ensure the proper functioning of the tube well and water supply schemes. Depletion of water table must also be accounted in this respect.

3) Inadequate Buffer Zone

Inadequate buffer zone around the filtration plants may cause inconvenience to the local population due to the running of heavy-duty pumps resulting in noise levels and odor generated by backwash water.

Nature of Impact

The magnitude of this impact is high, adverse and permanent in nature.

Mitigation Measures

The mitigation measures will include:

- Provision of buffer zone in the form of raised walls / plantation and round the clock maintenance in the form of oiling of parts producing noise and vibrations.
- Landscaping and plantation will improve the aesthetic value and ecological habitat of the project area as well as reducing the impact of noise on the surrounding environment.

4) Land Use

The present land use of the area available for the construction of the proposed filtration plants at different locations is barren land. The remaining land other than the built-up structures will be utilized for landscaping and tree plantation.

Mitigation Measures

A proper landscape plan will be designed for the proposed action to minimize the impact. Landscaping and plantation will improve the aesthetic value and ecological habitat of the project area as well as reducing the impact of noise on the surrounding environment.

7.9.2 Impacts and Mitigation Measures during Construction / Installation Phase of Filtration Plants

Construction activities will involve acquisition of small pieces of land, establishment of contractor's camps, generation of dust, noise, soil erosion and contamination, waste water and solid waste generation from labor camps. Each impact of

construction activities and their mitigation measures accordingly is discussed here under:

1) Impact of Earth fill Material

To raise the plinth level of selected plots to protect them against flooding, soil would be needed to collect from nearby areas for filling. This may result in slope failure and water ponding.

Nature of Impact

The magnitude of this impact is moderate negative and temporary in nature.

Mitigation Measures

A small quantity of earth fill material will be required for raising plots plinth level, so existing sources for earth fill material will be used to minimize the impacts on natural environment of the area. In addition, earth will be leveled after borrow of material to avoid any slope failure and ponding of the area during rain.

2) Topography and Geology

There will be area requirement for the construction of water treatment plants, so minor change in topography will be expected.

Nature of Impact

This impact is considered negative of minor magnitude.

Mitigation Measures

All the mitigation measures mentioned below should be taken in order to minimize the impacts on topography in the Project Area. These measures include, but are not limited to the following:

With the construction of proposed filtration buildings and by providing plenty of plantation the topography of the area will be improved. Plantation of trees in the plain areas will be carried out to increase aesthetic value of the area.

3) Impact of Laying of Water Pipelines

This project involves laying of water supply lines (i.e. water distribution network pipelines) from water filtration plants to supply water to the residents of the area.

Mitigation Measures

The lying of water supply lines should be as per standard specifications. Fence should be installed as protection during lying of pipelines to avoid access of people and animals to pipeline trenches.

4) Impact of Contractor`s Camps

Contractor camps will be established near the Project site to carry out the Project activities. Though the number of labor and size of camp will not be large, even then this will have an impact on the surrounding environment. The transportation of construction material, fuel, construction plants and daily use items may also create disturbance to the local community.

Nature of Impact

The magnitude of this impact is moderate adverse and temporary in nature.

Mitigation Measures

The Contractor camp size should be as per standard specifications and should be established at least 500m away from settlements to avoid/minimize the construction impacts. Traffic signs and safety warnings will be installed at Project site to avoid disturbance to local communities. In addition to that the night time deliveries will also be restricted and normal working hours will be observed for such deliveries.

5) Soil Erosion

The project area is plain with paved road structure. Soil erosion and contamination may occur on roadside, at contractor`s camps due to the following likely impacts:

- Excavation process can destabilize the surrounding land surface, particularly if excavated area is left unfilled for a long time, which may lead to rainfall induced soil erosion.

- Leakages of oils, lubricants, chemicals and other similar substances from their storage sites and from engines of the generators, machines, equipment's and vehicles.
- Non – provision of septic tanks with the temporary work site toilets, constructed for the labors and others, can contaminate the receiving soils because of raw nature of the effluents; and
- Also washing of the machinery and equipment without proper drainage of the washout water can adversely affect the soil quality.

Mitigation Measures

Mitigation measures will include:

- Ensure that surface run-off controls are installed and maintained so as to minimize erosion.
- Ensure adherence to the speed limit of 40 km/hr. on access roads.
- Ensure that no contaminated effluent is released in to the environment.
- Ensure spills are avoided during fuel and oil transfer operations. Appropriate arrangements, such as concrete base or drip pans, should be used to avoid spills.
- Ensure that the maintenance of vehicles and other equipment takes place only in designated areas underlined with concrete slabs and a system to collect runoff in to mud pit.
- Ensure fuels, oil and chemical storage is daily checked for leakage.
- Ensure that shovels, plastic bags, sand bags and absorbent materials, are kept available near fuel and oil storage areas.
- Ensure that operating vehicles are checked regularly for any fuel, oil or battery fluid leakage.
- Ensure that leak / spill record is maintained for each vehicle and such vehicles are operated after proper repair.
- Soil contaminated by minor spill (covering an area up to 1 m² and 7.5 mm deep) will be collected and disposed at burn pit.
- Ensure that soil contaminated by moderate spills or leaks (up to 200 liters) is controlled using shovels, sand and mud. The contaminated soil if any will be removed from the site and disposed off at landfill or burn pit as required.

- Loose soil and side slopes will be planted with grass to retain the upper soil and reduce the rainwater velocity.
- Rainy season should be avoided for earth fill as far as practicable.
- Heavy machinery movement should be avoided where the structure of the soil is expected to be destroyed in agriculture areas of the project, and
- A plantation program for grassing slopes will be launched to stabilize soil structure and to reduce soil erosion.

6) Impact of Dust

Air quality is expected to deteriorate locally at active construction sites due to mainly fugitive dust emission and exhaust emission from construction vehicles and equipment's, which will have short term but moderate impacts on local communities. Construction sites activities may generate soil disturbance in a small area and prone to open space for wind to pick up dust particles. Light construction machinery and vehicles will be used during the construction phase. This construction machinery will generate dust, smoke and other potential pollutants in the air.

Nature of Impact

The impacts are considered to be moderate adverse and temporary in nature.

Mitigation Measures

Dust control measures are important in the Project area; as the area is arid or semiarid, where soil can become extremely dry and vulnerable to transport by high winds. The dust control measures that are implemented at Project site will depend on the topography and land cover of that particular site and its soil characteristics and expected rainfall. The Contractor will be responsible to determine that which practice accommodate their needs according to specific site and weather conditions. The following is a brief list of some control measures:

- All sections of the access tracks that are prone to dust emission and where sensitive receptors are located within 500 m should be identified and marked on the map of the project area.
- Ensure that the access tracks which are prone to dust emissions and marked on the map should be maintained by water spraying daily.

- Regular water sprinkling will be carried out in nearby residential areas during earth fill and construction machinery movement.
- Ensure that all equipment, generators and vehicles used during the project are properly tuned and maintained in good working condition, in order to minimize the exhaust emissions.
- Ensure that dust emission at the construction sites is minimized by implementing best management practices.
- Air quality monitoring and analysis for NO_x, SO_x and PM will be done every month during the construction / installation phase.

7) Impact of Noise

Construction activities may increase noise levels at active construction sites particularly near residential areas. There are residential colonies where number of sensitive receptors may expose to the noise pollution. Noise impact on construction workers/ laborers may be avoided in case of loud noise by provision of adequate Personal Protective Equipment's (PPEs) like ear muffs, ear plugs, etc.

Nature of Impact

This impact is considered negative of minor magnitude.

Mitigation Measures

Following measures should be adopted to minimize the noise levels:

- Construction activities should be managed to minimize the impacts on nearby community.
- Noise barriers (paneled fencing) should be installed where possible to keep the noise levels within the permissible limits.
- Ensure prohibition of use of vehicle horns anywhere inside the fenced areas or on the access roads is strictly observed.
- Noise reducing devices (silencers and baffles) should be used for the construction machinery.
- Engines should be turned off when they are not in use.
- Contractor obligation is to use appropriate and fit machinery.
- Noise analysis should be done every month during construction phase.

8) Disposal of Mucking Material

Inevitable earthwork operations during construction will open scars on the land around the project area.

Nature of Impact

This impact is temporary and minor negative in nature.

Mitigation Measures

Mitigation measures will include landscaping, which should be given due consideration along the re-establishment of the local/indigenous vegetation. The excavated materials that are unsuitable for use will need to be stored, transported and disposed of appropriately at designated sites.

9) Accidental damage to Utilities in Excavated Areas

The excavation operations may result in accidental damage to existing utilities like Sui gas, telephone etc. causing inconvenience to the local people.

Nature of Impact

The impacts on the loss of resource are considered to be moderate adverse and temporary in nature.

Mitigation Measures

- Coordination between different utility departments shall be maintained to get the details of existing underground utilities before starting construction of the proposed project.
- The contractor will made arrangement to avoid any accidental damage to the utilities.
- Provision shall be made in the cost estimate for restoration / replacement of damaged utilities and relocation to minimize the adverse impact and restoration of excavated road to its original condition.

10) Impact on Aesthetic / Scenic Quality

The lush green crops and trees in field present a good scenic view of project area. But the project construction and operational activities (clearance of trees) may affect aesthetic / scenic quality of the area.

Nature of Impact

The impact is considered negative of minor magnitude.

Mitigation Measures

Efforts should be made to improve the aesthetics of the project site by plantation around the site.

11) Obstructions to Traffic Flow

Excavation operations for pipe laying may result in temporary blockage of some roads/streets, which may result in hindrance to normal traffic flow. The operation of excavator and movement of vehicles carrying construction materials will certainly hamper the existing traffic movement.

The impacts on vehicle travelers will include the following:

- Increase in traffic congestion; and
- Longer waiting times at intersections.

Nature of Impact

The impacts are regarded as adverse if measures are not implemented to mitigate and control traffic movements and routes.

Mitigation Measures

Mitigation measures to reduce transport and accessibility impacts during construction will be addressed as part of a detailed EMP to include the following traffic management measures.

- Inclusion of further access routes to facilitate the accessibility of vehicles and pedestrians to and from the proposed project areas.

- Close liaison with contractors to ensure minimal interruptions.
- Implementation of site speed limits along with introduction of speed humps.

12) Solid and Hazardous Waste

Construction activities such as excavation, laying of pipes, construction of operator rooms and construction of tube-wells etc. will generate waste materials like excavated soil and domestic waste from workers. Other types of waste that are likely to be generated during construction include:

- Recyclables - paper, cardboard, glass, plastic, wood, metals.
- Organic waste - food waste, vegetation; and
- Hazardous waste – including for example, chemical wastes such as coating substances, solvents, used chemical drums and used spill kit materials.

Any surplus construction waste will be sent to the nearby solid waste landfill site. Assuming that excavation and demolition will be kept to a minimum and considering the construction will only be temporary and will be disposed of to landfill.

Nature of Impact

The waste generated during construction would have a moderate, adverse effect and is temporary in nature.

Mitigation Measures

Construction debris and demolition material will not be allowed to accumulate during construction phase. All such material is to be disposed of on daily basis. Waste piles will only be allowed if the contractors meet the following requirement at the site:

- Pile only contains passive waste (e.g. wood, metal, plastic, dry concrete) and no food waste, hazardous waste or wastewater.
- Waste pile is controlled so that it does not spread and start to impede other activities and stays at a height that it does not become a safety hazard. Barricades may also be placed around the pile to delineate the safe distance for other workers.
- Waste piles are positioned so that they are not visible to the general public where they could have a negative visual impact.

- If the waste pile contains plastic, paper or other light-weight material it needs to be covered with a tarpaulin; and
- Liquid waste, such as grey water, sewage, slurry and other wastewater will be collected from source by a designated tanker and taken off-site for disposal at safe disposal facility.

13) Flora

Tree cutting is involved for land clearing for the installation of filtration plants. The conversion of agriculture land will have moderate negative impact on the floral species and vegetation. However, the impact will be minimized after the landscaping.

Mitigation Measures

The proposed mitigation measures will include:

- Incorporate technical design measures to minimize removal of the trees, if possible.
- Landscaping and plantation will improve the aesthetic value and ecological habitat of the project area.
- A landscape will be properly designed with provision of new trees/ plantations around the boundary, roadside and stretches of open land. The vegetation for the attenuation of air pollution would be most needed in the areas where ground level concentrations of the pollutants are expected to rise.

14) Fauna

During construction, any existing species of fauna could be affected by disturbance and fragmentation, as the construction area may represent a barrier to the species and result in the splitting up of populations. During the construction phase, there will be adverse impact on the mammals, birds and reptiles of the area, due to the construction activities involving excavation, movement of labor, carriageway of goods and machinery to various sites along the project area.

Given that the species of fauna are thought to be present at low density, the number of individuals affected by the proposed Project is likely to be relatively low. Furthermore, the loss of this habitat would not constitute a large impact.

Nature of Impact

The magnitude of this impact is expected to be low adverse and temporary in nature.

Mitigation Measures

- The camps will be properly fenced and gated to check the entry of animals in search of eatable goods. Similarly, wastes of the camps will be properly disposed of to prevent the chances of eating by animals, which may become hazardous to them.
- Special measures will be adopted to minimize impacts on birds, such as avoiding noise generating activities during the critical periods of breeding.
- Staff working on the project should be given clear orders, not to shoot, snare or trap any bird; and
- The Contractor will decide to minimize the vibration, noise pollution through good engineering practices.

15) Impact of Transferrable Diseases

Presence of labor from outside at project site may pose hazard of communicable diseases, which can also spread to the surrounding community.

Nature of Impact

This impact is considered negative of moderate magnitude.

Mitigation Measures

Following must be ensured during project implementation:

- Ensure project staff interaction with local community is minimized.
- Ensure that field crew is medically screened before employed on site.
- Ensure that periodic awareness campaigns for HIV / AIDS are undertaken for the project staff.
- Ensure that guidelines are prepared and implemented to sensitize non-local laborers to local norms and customs in order to minimize cultural tensions.
- When operating in residential areas, display project contact details in prominent locations. This will give local residents a point of contact and should allow you to address any nuisance issues that may arise.

16) Health and Safety of Workers

The health and safety issues are associated with the operation of construction machinery and equipment and storage of flammable materials which may cause minor and severe injuries to workers. Moreover, concrete releasing agents and cleaning agents may cause toxic effects on the workers.

Nature of Impact

The magnitude of this impact is moderately adverse.

Mitigation Measures

- Occupational safety measures such as use of well-maintained machinery and equipment and training of workers in the construction safety shall be taken.
- Ensure provision of protective clothing for laborers handling hazardous materials, e.g. helmet, adequate footwear, gloves etc.
- The safety of the public at all stages of the construction will be ensured through appropriate public education and safety measures such as use of sign boards, barriers and flags and proper illumination at night.
- The flammable and combustible substances will be properly stored in designated areas and Material Safety Data Sheets (MSDS) will be used for proper handling.
- Firefighting equipment will be placed at an easily accessible place and inspected on regular basis.

17) Impacts of Heavy Machinery on Existing Road Networks

The plying of heavy vehicles on existing road network may result in air pollution (if unpaved roads), noise pollution due to tire-road friction especially near sensitive receptors (residential areas, school, mosque, health facility etc.), and damage to roads and traffic congestion.

Nature of Impact

The impact would be temporary and moderately negative in nature.

Mitigation Measures

- Any vehicle with an open load carrying area used for transport of potentially dust producing materials shall have properly fitted side and tailboards. Materials having potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulin in good condition.
- The Contractor shall not use any vehicles either on or off road with grossly excessive noise pollution. In case of built-up areas, noise mufflers shall be installed and maintained in good condition on all motorized equipment under the control of the Contractor.
- The traffic on the existing road shall be managed cooperation with the local traffic police department in order to avoid traffic accidents and congestions causing unnecessary delays.

18) Socio – Economic Impacts

In project area, no significant changes are envisaged in traditional lifestyle and occupation of local people residing in the nearby communities as it is being established at adequate distance from various sensitive receptors. The local people are rather benefited due to the provision of job opportunities. No impact is envisaged due to influx of workers as local will be preferred and hired for working. Social issues may arise which will cause minor negative impact on the social lifestyle of people. Moreover, health and safety related issues may arise during the construction activities. These impacts are in-significant can be further reduced significantly by adopting best management practices.

Nature of Impact

The nature of proposed impact will be direct, low, short-term and hence insignificant.

Mitigation Measures

Following mitigation measures will be adopted to reduce the socio – economic impact on the community:

- Good relations with local communities will be promoted by encouraging contractor to provide opportunities for skilled and un-skilled employment to the locals as well as on job training.
- In case of not hiring the locals, contractor will restrict his permanent staff to mix with the locals to avoid any social problems.
- The contractor should prefer hiring local labor from adjacent communities.
- The contractor will keep the copy of National Identity Card (CNIC) of his employees and will warn the workers not to involve in any anti-social activities otherwise they may face dire consequences.
- At the time of hiring the contractor must ensure that workers should be good repute.
- First aid kits having all the necessary first aid stuff will be available at site.
- Routine medical checkups of all the field staff including unskilled labor needs to be conducted by qualified physician and surgeon.
- Trainings of workers should be carried out for operating various constructional machinery, safety procedures should be adopted, environment awareness should be carried out, equip all workers with safety boots, helmets, and protective masks and monitoring for their proper and sustained usage will be carried out. In case of accidents, contractor will provide free medical treatment to the community.
- The contractor will be responsible for sensitivity towards the local customs and traditions.

7.9.3 Impacts and Mitigation Measures during Operational Phase

1) Impact of Water Intake

Water source for filtration plants will be ground water in Rawalpindi division. The population of these division use ground water for their daily activities. The ground water is collected through hand pumps and motor pumps for their daily activities. Ground water will not be depleted by using it as source intake in filtration plants, because community will use treated water instead of directly using the ground water. The ground water is contaminated by chemical and biological contaminants. Thus treatment of this water by RO and Pre-Filtration Plants will lead a positive impact on health of the local community. So there is no negative impact envisaged in using

ground water as source intake and no mitigation is required accordingly. This is considered as a significant positive impact.

2) Impact of Disposal of Backwash from filtration plants

The quantity and composition of the filter backwash water are functions of the process and the efficiency of the treatment units preceding the filter. The backwash generated from the filtration plants may contaminate the receiving body as well as the ground water.

Nature of Impact

This impact is considered negative of moderate magnitude.

Mitigation Measures

It is suggested that backwash from filtration plants should be injected in deep wells, injection depth should be two to three times greater than suction level.

3) Impact of Air Emissions

The air may be polluted due to vehicular emissions and dust producing activities during the operational phase of the project.

Nature of Impact

This impact is considered negative of moderate magnitude.

Mitigation Measures

Monitoring of air quality (SO_x, NO_x and PM) should be carried out effectively during operational phase of the project.

4) Impact of Clean drinking water

Clean drinking water will be available in remote areas of Punjab during operational phase of this Project; where contaminated water was used earlier for drinking purposes. Project Area community will get rid of the water borne diseases with provision of clean drinking water. This is a significant positive impact of this Project.

5) Impact on Infrastructure / Rehabilitation / Restoration

So far it is anticipated that no harm or damage will be done to any infrastructure. In case of any damage to any structure during the operational phase of the project the client will be the responsible authority.

Mitigation Measures

Restoration and Rehabilitation through

- Disposal of debris as per regulatory requirements given in earlier sections.
- Disposal of waste products, solids and liquid in accordance with regulatory requirements given in earlier sections.
- Backfilling and closing of all solid waste disposal pits as per regulatory requirements given in earlier sections.
- Removal of fencing and gates.

6) Occupational Health and Safety Issues

The occupational health and safety issues are mostly associated with the operation of machinery and equipment, handling of fuel, noise, Odour, exposure to disease vectors etc.

Nature of Impact

The magnitude of this impact is considered to be major adverse, short-term.

Mitigation Measures

- The issues related to operation of machinery and equipment will be controlled by efficient management, staff training, maintenance of machinery and equipment, and other preventive measures.
- Proper Storage and Handling of fuel.
- First Aid kit should be provided at operator rooms
- Provision of PPE's to the employees including masks, gloves etc.

7) Ecological Resources

No negative impacts are envisaged on the flora of the area during the operational phase. New trees/plants will render a positive impact on the flora of the area and will

also cause positive impact on the landscape of the area, which will be permanent in nature.

Presence of adequate flora will absorb emissions, through photosynthesis.

Nature of Impact

The magnitude of impact is moderate beneficial

Mitigation Measures

This aspect is considered to be beneficial; hence no mitigation measure is required.

8) Emergency Preparedness and Response

The operation of the filtration plants may encounter emergencies like operation failure. In addition, disasters such as earthquakes and fires may occur which have to be considered for minimizing their impacts.

Nature of Impact

This impact is moderate inverse.

Mitigation Measures

- An Emergency Response Plans for floods, earthquakes, and manmade disasters will be developed by management. Emergency Response Plan will be implemented in close consultation with Fire Fighting Department and paramedics. In addition, training of staff/employees regarding the emergency procedures/plans should be regularly conducted.
- Responsible person to implement the Emergency Response Plan should be clearly designated.
- The staff should be trained timely and concise response procedures.
- Emergency numbers should be clearly posted so that a quick action is taken when an emergency arises.
- Firefighting systems should be calibrated and maintained regularly; and
- Regular drills for fire emergencies should be carried out.

9) Socio Economic Impacts

It is envisaged that the adverse impacts associated with the development of abovementioned project includes; local community will be disturbed due to increase in the traffic load (i.e., vehicles approaching towards site on daily basis), wastewater management, soil pollution, etc. The intensity of the aforesaid project will be quite low. The commencement of the aforesaid project will have a beneficial impact on the surrounding community such as; increase in employment opportunity, increase in the wages of the local area employees, increase in revenue generation, provision of social welfare funds of the employees, provision of potable drinking water and appreciation in the land value of the area.

Nature of Impact

The aforesaid impact is considered to be positive and will have a direct, medium impact.

Mitigation Measures

No mitigation measures will be required.

7.10 Environmental Enhancement Measures

The said project will be resulting in following benefits:

- Direct and Indirect Employment Opportunities
- Gains in local and national economy
- Increase in aesthetics of commercial and residential areas
- Business spins – off in the project area
- Provision of clean and safe drinking water to the residents

Tree plantation along boundary of project will act as environmental enhancement measure. Trees including shatoot, Jaman, Moor Pankh, Fish paam, Trysenia, etc. will be grown on all open spaces and along boundary of project. Environmental Budget allocated for the said project is **1 – 2 %** of the project cost.

8 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

This chapter elaborates the approach and mechanism best suited and essential for monitoring environmental and social issues through an institutional framework ensuring resource allocations related to the proposed subproject. The mechanism thus called as Environmental Management Plan (EMP) is devised being indispensable for the Proper Environmental Management. The EMP crucially includes allocation of resources for mitigation of any potential environmental impacts that might take place due to the implementation of the project comprising of design, execution and operation phases.

As per the environmental legislation in Pakistan, the EMP for operations phase, along with other documents, is to be submitted to the Environmental Protection Agency to obtain confirmation for compliance and Environmental Approval for project operation. Even after implementation of the suggested mitigation measures, the impact may remain significant, and require monitoring. This section also underlines the monitoring framework for operation phase to check compliance of the EMP and to take timely actions for correction in case any incidence of significant criteria, requirements or goals is found.

8.1 Objectives of Environmental Management Plan

The primary objectives of EMP are to:

- Define the responsibilities of the project proponent and other role players during the pre-construction, construction and operational phases;
- Facilitate the implementation of the mitigation measures by providing technical details of each project impact, and proposing an implementation schedule of the proposed mitigation measures
- To develop a monitoring mechanism and identify monitoring parameters to ensure that all the proposed mitigation measures are completely and effectively implemented;
- Identify training requirements at various levels and provide a plan for the implementation of training sessions;

- Identify the resources required to implement the EMP and outline corresponding financing arrangements; and
- Providing a cost estimate for all the proposed EMP actions.'

8.2 Management Approach

The organizational roles and responsibilities of the key managers are summarized as below:

Table 8-1: Roles and Responsibilities

Sr.#	Managers	Responsibilities
1.	Contract Manager	• Ensure EMP development. • Implementation of EMP with true spirit. • Environmental issues identification within pre-construction phase. • Communication of EMP with other employees.
2.	Contractor	• Ensuring that the control measures identified from environmental surveys are implemented as they are relevant to their work/visit. • Ensuring that the project management team is notified of any non-conformance of control measures or environmental incident where the environment has been put at risk.
3.	Site Manager	• Ensure site material and chemicals are safe. • Controlled access arrangement to avoid hazards. • Emergency egress arrangements to avoid dangerous situation. • Provide first aid facilities.
4.	Site HSE Advisor	• Ensure work is carried out in safe manner. • Ensure good standards of workmanship. • Health and safety advisor to complete the site waste management plan to be followed. • Ensure EMP implementation. • Daily checks and weekly checks. • Consultation with workers.
5.	Site Environment Advisor	• According to legislation and consent develop EMP. • Ensure application of EMP. • Carry out site inspection.

8.3 Components of EMP

Components of EMP are as follows:

- Management Plan
- Monitoring Plan
- Communication and Documentation
- Environmental Training

8.4 Institutional Capacity of Aforesaid Project

The organizational structure for the Environmental Management Plan is as follows:

8.4.1 Primary Responsibilities

The primary responsibility for implementing EMP during construction and operational phase of the project lies with the client: Punjab Aab-e-Pak Authority.

8.4.2 Operational Management and Control

Conducting the operational activities in environmentally sound manner will be the responsibility of the concerned Manager; for which he will be trained.

8.4.3 Supervision and Monitoring

Senior Supervisor will be responsible for all environmental issues and for the implementation of EMP.

8.4.4 Role of Contractor in EMP

The Contractor will be responsible for the implementation of the Proposed Project under the supervision of the Punjab Aab-e-Pak Authority & Consultant. The Contractor will be bound to follow the provisions of the contract documents especially about environmental protection and apply good construction / installation techniques and methodology without damaging the environment. Obligation of the contractor, to safeguard, mitigate adverse impacts and rehabilitate the environment should be addressed through environmental provisions in the contract document and through adequate implementation at site.

8.4.5 Communication and Documentation

An effective mechanism to store and communicate environmental information during the project is an essential requirement of an EMP.

8.4.6 Meetings

Two kinds of environmental meetings will take place during the project:

- Kick Off Meetings
- Weekly Meetings

The purpose of the kick-off meeting will be to present the EMP to project staff and discuss its implementation and to discuss any event of environmental significance that has happened in the under-discussion hotel or a similar five star hotel to investigate its root causes and develop its solutions. The purpose of the weekly meetings will be to discuss the conduct of the operation and environmental issues and their management. The proceedings of the meeting will be recorded in the form of a weekly environmental report.

8.4.7 Changes Record Register

A change record register will be maintained at the site in order to document any changes in the project design. The changes will be handled through the change management mechanism.

8.5 Environmental Management and Monitoring Framework

The purpose of environmental management and monitoring framework is to facilitate the implementation of environmental commitments, included in environmental impact assessment study. The proponent is committed for protection of environment and for sustainable management of its related operation and activities. The environmental management and monitoring plan are given below:

Table 8-2: Environmental Management Plan (EMP)

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
(CONSTRUCTION PHASE)				
1.	Lying of water pipelines	This project involves lying of water supply pipelines (i.e. water distribution network pipelines) from Water Filtration units to the residential communities.	The lying of water supply pipelines should be according to the specifications. Fence should be installed as protection during lying of pipelines to avoid access of people and animals to pipeline trenches.	PAPA, CC, RE and EPA
2.	Backwash Pipeline Construction	The backwash pipeline for transportation of backwash to injection wells will be part of construction's scope of work.	It is suggested that backwash from treatment plants should be injected in deep well, injection depth should be two to three times greater than the suction level.	PAPA, CC, RE and EPA
3.	Land Acquisition	- Land will be acquired within the villages of Rawalpindi division. In case of non-availability of state / Government Land, Private Land will be acquired. In these division mostly state lands are available and at remaining locations, donation of private land will be acquired. - CBO's were concerned for the said purpose and the sites were visited and the private land will be acquired during implementation phase of the project.	During mobilization of the contractor, PAPA authority officials, CBO's of PHED, Contractors and Consultants will meet with the owners of the private lands and the lands will be purchased for installation of the filtration plants and water supply schemes.	PAPA, CBO's, CC, PC

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
4.	Contractor Camps	Contractor camp will be established near the Project site to carry out the Project activities. Though the number of labor and size of camp will not be large, even this will have an impact on the surrounding environment.	- Ensure that contractor camp size is per standard specifications. - Ensure that contractor camp is established at least 500 m away from settlements to void / minimize the construction impacts.	PAPA, CC, RE and EPA
5.	Installation of Batching Plant	Batching Plant will be installed at Project area for construction activities. Batching Plant operation will be a source of nuisance for surrounding community.	- Ensure that location of batching plant must be at least 500 meters away from the settlement. - Ensure that Batching plant material is stocked on specified material in compliance with specifications of installation of Batching Plant. - Ensure that the Batching Plant is installed with zero emissions. - Ensure that the Batching material does not contaminate the land or natural drainage.	PAPA, CC, RE and EPA
6.	Dust	The earthen portion of road / tracks may be prone to dust emissions due to moving machinery. Machinery consisting of bulldozers, dumpers, generators and vehicles will be used during the construction phase. This construction machinery will generate lot of dust, smoke and other potential pollutants in the air.	- All sections of the access tracks that are prone to dust emission and where sensitive receptor are located within 500 m should be identified and marked on the map of the project area. - Wind breaks or barriers (either natural or constructed) should be installed at susceptible construction sites that reduce	CC, RE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			wind velocity and reduce the possibility of suspended particles. Wind breaks can cause trees or shrubs left in place during site clearing or constructed barriers such as a wind fence or sediment wall. ▪ Ensure that the access tracks which are prone to dust emissions and marked on the map should be maintained by water sprinkling daily. ▪ Ensure that batching plant design meets requirements of zero emission. ▪ Ensure that dust emissions due to vehicular traffic are minimized through good traffic management and water sprinkling when required. ▪ Ensure that dust emissions at the construction sites are minimized by implementing best management practices.	
7.	Noise	▪ Noise will be produced from constructional activities. This can disrupt the daily activities of the nearby communities and could prove to be a noise nuisance for them.	▪ Noise barriers should be installed where possible to keep the noise levels within permissible limits. ▪ Ensure prohibition of use of vehicle horns anywhere inside the fenced areas or on the access roads is strictly observed.	PAPA, CC, RE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			- While replacing equipment, consider purchasing quieter alternatives. New equipment can introduce a noise problem, therefore a noise assessment should be carried out while installing new machinery / equipment's. - Noise reducing devices (Silencers / Baffles) should be used for the machinery. - Engines should be turned off when they are not in use. - Contractor obligation is to use appropriate and modern machinery. - Selection of up-to-date and well-maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or appropriate muffling devices; - Confining excessively noisy work to normal working hours in the day, as far as possible; - Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use; - Preferably, restricting construction vehicles movement during nighttime; - Heavy machinery like percussion hammers and pneumatic drills should not be used	

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			during the night without prior approval of the Client; ▪ Vehicles and equipment used should be fitted, as applicable, with silencers and properly maintained; ▪ Use of low noise machinery, or machinery with noise shielding and absorption; ▪ Contractors should comply with submitted work schedule, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures. ▪ Locating the concrete mixing and materials shipment yards away from residential areas, particularly schools and homes will also help reduce local noise levels. Such activity taking place near or through villages will broadcast continuous noise in the 70–80 dB (A) range or above. ▪ In accordance with the Environmental Monitoring Plan noise measurements will be carried out at locations and schedule specified to ensure the effectiveness of mitigation measures.	

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
8.	Solid Waste Generation	The contractor camp will generate solid waste. Improper disposal of solid waste will contaminate land and can sprout numerous diseases.	- Solid waste should be segregated according to its type. - Material suitable for recycling should be stored separately and sold afterwards. - Combustible waste to be burnt at designated burn pit only as demarcated by Resident Engineer. - Non-combustible, non-recyclable garbage should be sent to the designated landfill site in project area as demarcated by Resident Engineer. - Contaminated soil should be sent to burn pit or landfill. - Medical waste (if any) should be transported to the nearby hospital incineration plant. - Solid residue from the septic tanks of the construction sites should be transported to the municipality's sewage facilities as demarcated by Resident Engineer.	PAPA, CC, RE and EPA
9.	Waste Water Discharge	The contractor camp will produce waste water. Unmanaged disposal of this water will contaminate land and will lead to water borne diseases.	- Ensure that washing areas are demarcated and water from washing areas and kitchen is released in sumps. - Ensure septic tanks of appropriate design have been used for sewage treatment and outlets are released into sumps.	PAPA, CC, RE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			▪ Ensure that outlets released into sumps must not make a pond of stagnant water. ▪ Ensure that latrines, septic tanks, and sumps are built at a safe distance from water body, stream, or dry streambed and the bottom of the sump is above the ground water level. ▪ Ensure that the sumps are in absorbent soil, down slope and away from the camp, downstream from the camp water source and above the high water mark of nearby water body (if any). ▪ Ensure that effective drainage is in place at the site.	
10.	Construction Waste	▪ Project activities will generate construction waste. Improper disposal of that waste could create nuisance to the surrounding community.	▪ Ensure that the site selected for waste material disposal is demarked by Resident Engineer before starting the work. ▪ Ensure that all trucks used for the transportation of waste material are airtight and watertight. ▪ Ensure that photographs of selected area are taken. ▪ Ensure that the movement of waste lifting machinery and vehicles is limited to the work area.	PAPA, CC, RE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			- Ensure that waste material is properly disposed-off in a manner that does not affect the natural drainage. - Ensure that the dumping area has been leveled properly after disposal of waste material.	
11.	Soil Erosion	Construction activities will lead to soil erosion. Soil erosion from construction sites can cause pollutants generation and also depletion of the soil quality.	- Ensure that surface run-off controls are installed and maintained so as to minimize erosion. - Ensure adherence to the speed limit of 40 km/hr. at the access roads. - Ensure that vegetation clearing is minimized and no trees are felled without prior permission of Consultant's Environmentalist.	PAPA, CC, RE and EPA
12.	Land Contamination	The construction machinery including cranes, trucks, loaders/ dumper and batching plants will be used during the construction period. There are chances of land contamination due to release / spill of lubricants, oil, chemicals and toxic materials.	- Ensure that the maintenance of vehicle and other equipment takes place only in designated areas underlined with concrete slabs and a system to collect runoff in to mud pit. - Ensure that no contaminated effluent is released in to the environment. - Ensure machinery wash and other potentially contaminated effluents are released in mud pit.	PAPA, CC, RE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			▪ Ensure that fuels, oils, and other hazardous substances are handled and stored according to standard safety practices such as secondary containment. Fuel tanks should be labeled according to impervious lining and dykes etc. ▪ Ensure spills are avoided during fuel and oil transfer operations. Appropriate arrangements, such as concrete base or drip pans, should be used to avoid spills. ▪ Ensure fuels, oil and chemical storage are daily checked for leakage. ▪ Ensure that shovels, plastic bags, sand bags and absorbent materials, are kept available near fuel and oil storage areas. ▪ Ensure that operating vehicles are checked regularly for any fuel, oil, or battery fluid leakage. ▪ Ensure that leak /spill record is maintained for each vehicle and such vehicles are operated after proper repair. ▪ Soil contaminated by minor spill (covering an area up to 01 m² and 7.5 mm deep) will be collected and disposed at burn pit. ▪ Ensure that soil contaminated by moderate spills or leaks (up to 200 liters) is controlled	

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			using shovels, sand and mud. The contaminated soil if any will be removed from the site and disposed-off at landfill or burn pit as required.	
13.	Relocation of Camps	In case if the Contractor changes the locations of camps materials and specified approaches of routes and roads then proper measures need to be adopted.	Ensure that the Contractor makes the necessary arrangements (as discussed earlier) by his own expenses, if Contractor decides to change the location of camp.	CC and RE
14.	Wastage of Water Resource	Water may be wasted during daily activities of labor camps.	Avoiding undue wastage of water through conservation techniques and selection of adequate water supply sources to ensure that water usage does not affect local consumption.	PAPA, CC, RE and EPA
15.	Flora	- The construction of the water treatment buildings may involve cutting and removal of number of trees. - There is no protected or reserved forest in the vicinity of the construction area. Therefore, no effect is envisaged.	- Ensure that during aligning the access roads, minimum vegetation is lost. If any tree is uprooted, ensure that the Contractor has planted at least three fold of trees lost. - Ensure that endangered trees species (if any) indicated in Section 7 (EIA) are not cut. - Ensure that trees and shrubs are not used as fuel during construction or operation.	PAPA, CC, RE and Forestry department.

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			After completion of construction phase the vegetation of the area should be restored through plantation.	
16.	Fauna	The construction activities may disturb the habitats of native animal species.	- Natural habitats should be maintained to the maximum extent and undue interference should be avoided during construction phase of the Project. - Endangered species if any should be documented and activities should be carried out to reduce negative impacts on endangered species. - Contractor's staff should be strictly prohibited from buying any wild animals/birds. - Ensure that safe driving practices are observed so that the accidental killing of reptiles or small animals crossing the roads could be avoided. - Ensure that a no-hunting, no trapping, no harassing wildlife policy is strictly observed. - Ensure that the general awareness of the crew is enhanced regarding the wildlife, through environmental training, notices boards etc.	PAPA, CC, RE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
17.	Agricultural Land and Crop destruction	No agricultural land is involved anywhere in the Project implementation.	No action is required	-
18.	Health impacts due to water borne diseases	Construction activities can lead to stagnant water. This may govern water borne diseases.	- Good design and construction management to avoid stagnant water. - Proper management and disposal of rubbish and wastes from camp site.	PAPA, CC, RE and EPA
19.	Job Opportunities	The project will open job opportunities which the local population can avail. Contractor should hire skilled and unskilled labor force from the local communities.	- Ensure that at least up to 95% of unskilled, up to 43% of semi-skilled employment and up to 100% of skilled jobs are provided to people from local communities, provided that the persons with required qualifications are available. - Ensure Project staff interaction with local community is minimized. - Ensure that guidelines are prepared and implemented to sensitize non-local laborers to local norms and customs in order to minimize cultural tensions.	PAPA, CC, RE and EPA
20.	Communicable Diseases	Presence of labor at Project site may pose hazard of communicable diseases, which can also spread to the surrounding community.	- Ensure that field crew is medically screened before employed on site. - Ensure Project staff interaction with local community is minimized.	PAPA, CC, RE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			Ensure that periodic awareness campaigns for HIV / AIDS are undertaken for the project staff.	
21.	Health and Safety of workers	Construction machinery and equipment and storage of flammable materials and may cause minor severe injuries to workers.	- Well-maintained machinery and equipment and training of the workers in the construction safety shall be taken. - Provision of protective clothing for laborers handling hazardous materials, e.g. helmet, adequate footwear, protective goggles, gloves etc. - The flammable and combustible substances will be properly stored in designated areas and Material Safety Data Sheet (MSDS) will be used for proper handling. - Fire-fighting equipment will be placed at an easily accessible place and inspected on regular basis.	CC, RE, HSE and EPA

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
(OPERATIONAL PHASE)				
1.	Water Intake	Water source for filtration plants will be ground water in Rawalpindi division.	The population of these division use ground water for their daily activities. The ground water is collected through hand pumps and motor pumps for their daily activities. Ground water will not be depleted by using it as source intake in filtration plants, because community will use treated water instead of directly using the ground water. The ground water is contaminated by chemical and biological contaminants. Thus treatment of this water by RO and Pre-Filtration Plants will lead a positive impact on health of the local community. So there is no negative impact envisaged in using ground water as source intake and no	PAPA PHED and

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
			mitigation is required accordingly. This is considered as a significant positive impact.	
2.	Disposal of Backwash	The quantity and composition of the filter backwash water are functions of the process and the efficiency of the treatment units preceding the filter. The backwash generated from the treatment plants may contaminate the receiving body as well as the ground water.	It is suggested that backwash from treatment plants be injected deep in the aquifer.	PAPA and PHED
3.	Air Emissions	- Movement of vehicles and machinery during normal operation and under maintenance work may impair air quality. - Stack emissions of generators at site will produce hazardous gas like NO₂, SO₂, CO₂, PM and CO. These gases will cause air pollution if not properly managed or mitigated	- Setting up of system to monitor air quality along project area in accordance with acceptable standards; - Roadside tree plantations as applicable and feasible under harsh climatic conditions; plants should be selected in accordance to their ability to absorb emissions; - Air quality monitoring will be carried out on regular basis for parameters like CO, CO₂, NO₂, SO₂ and PM₁₀.	PAPA and PHED

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
4.	Aesthetic / Scenic Quality	The Project construction and operational activities may affect aesthetic/scenic quality of the area.	The standing lush green crops and trees in filed present a good scenic view of Project area. This should be conserved at all costs.	PAPA and PHED
5.	Groundwater	Contamination of groundwater source may occur in case of corrosion or leakage of pipelines.	- The impact should be minimized by regular checks for leaks and corrosion etc. and maintenance of damaged pipes should be done periodically. - Moreover, monitoring of groundwater will be conducted.	PAPA, PHED and EPA
6.	Energy Consumption	Loss of Natural resource	- Regular maintenance of the equipment should be ensured to avoid excessive fuel consumption or leaks. - Switch off machinery / appliances when not in use.	PAPA, PHED and
7.	Occupational Health and Safety Issues	Operation of machinery and equipment, handling of fuel, noise odor, exposure to disease vectors etc.	- The issues related to operation of machinery and equipment will be controlled by efficient management, staff training, maintenance of machinery and equipment, and other preventive measures. - Proper storage and handling of fuel. - First Aid kits should be provided. - Provision of safe drinking water. - Provision of PPE's to the employees including masks, gloves etc.	PAPA, PHED and HSE.

Sr. No	Component	Description	Recommended Mitigation Measures	Implementation Responsibility
8.	Ecological Resources	New trees / plants will render a positive impact on the flora of the area and will also cause positive impact on the landscape of the area, which will be permanent in nature.	Not Required	-
9.	Emergency Preparedness and Response Plan	The operation of the filtration plants may encounter emergencies like operation failure.	- An Emergency Response Plans for floods, earthquakes, and manmade disasters will be developed by management. - Responsible person to implement the Emergency Response Plan should be clearly designated. - The staff should be trained timely and concise response procedures. - Emergency numbers should be clearly posted so that a quick action is taken when an emergency arises. - Fire-fighting systems should be calibrated and maintained regularly.	PAPA, PHED and

KEY:

- CC = Construction Contractor
- PAPA = Punjab Aab-e-Pak Authority
- RE = Resident Engineer
- HSE = Health & Safety Engineer
- EPA = Environmental Protection Agency
- PHED = Public Health Engineering Department

8.6 Environmental Monitoring

This section provides environmental monitoring Plan that identifies the roles and responsibilities of project staff involved in environmental monitoring and list the parameters that will be used in the monitoring process.

8.6.1 Objectives of Environmental Monitoring

The main objectives of the pre-construction and construction phase monitoring plans will be to:

- Monitor the actual impacts of the works on the project site physical, biological and socio – economic receptors. This will indicate the adequacy of the EIA assessment.
- Recommend mitigation measures for any unexpected impact or where the impact level exceeds the anticipated impacts.
- Ensure compliance with legal obligations including safety on construction site.
- To monitor the rehabilitation of the borrow areas and the restoration of construction campsites as described in the EMP.

The main objectives of monitoring during operational phase activities are as follows:

- Appraise the adequacy of the EIA with respect to the project's predicted long term impacts of operation of the filtration plants on physical, biological and socio-economic environment.
- Evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements, when necessary; and
- Compile periodic environmental monitoring reports on the basis of recommendations provided in the EMP.

8.6.2 Environmental Monitoring Parameters

The following environmental parameters will be monitored at locations identified during the construction phase of the aforesaid project.

- Ambient Air Quality (NO_x, SO_x, CO and PM₁₀)
- Ambient Noise level
- Ground Water Quality

8.6.3 Reporting Structure and Outcomes

Progress reporting will be the overall responsibility of the project director who will provide inputs to the supervision consultants for submission of progress reports to the concerned client.

8.6.4 Environmental Monitoring Plan

Table 8-3: Environmental Monitoring Plan at the Construction and Operational Phases of the Project

Components	Parameters	Location	No. of Samples	Frequency	Responsibility	Duration
CONSTRUCTION PHASE						
Ambient Air Quality	CO, NO _x , SO _x , PM ₁₀	Labor camp sites Batching Plant sites	2	Monthly	PC & independent testing authority	24 Hours
Noise Level	-	Construction Site Camp Site	4	Monthly at both sites throughout the construction period and When required.	PC & independent testing authority	Reading taken at 15 Sec. Intervals over 15 min, every hour and then averaged
Ground Water Quality	For Parameters given in PEQS	At Filtration Plant Sites	2	Monthly	PC & independent testing authority	Composite or Grab Samples

Visual Check for Vegetation Loss	Type and number of tree species uprooted	Construction Site Camp Site	-	At the beginning of construction activities	-	-
OPERATIONAL PHASE						
Air Quality	CO, NOx, SOx, PM ₁₀	Filtration Plant Sites	1	Quarterly	PAPA	24 Hours
Ground Water Quality	As mentioned in PEQS	Filtration Plant sites	1	Quarterly	PAPA	Composite or Grab Sample
Noise Level	-	Filtration Plant sites	4	Quarterly	PAPA	Reading taken at 15 Sec. Intervals over 15 min, every hour and then averaged

8.7 Environmental Training

An environmental training and technical assistance program will be carried out to build the capacity to effectively implement this EMP, as well as to facilitate the improved environmental management of future projects by increasing the environmental and social awareness of PAPA staff in general. PAPA with the collaboration of monitoring consultants will arrange the environmental trainings sessions for their staff. The objectives of this session will be to help establish appropriate systems, and to train PAPA staff responsible for managing environment, operations and planning, who can then impart training at a broader level within and outside the PAPA. The details of this training program is presented in table below:

Table 8-4: Training Program / Technical Assistance Services

Consultants	Contents	Trainees	Duration
Monitoring consultants/ organizations specializing in environmental management and monitoring	Short seminars and courses on: Environmental laws and regulations daily monitoring and supervision	Two seminars for PAPA Project staff	2 Weeks
Monitoring consultants/ organizations specializing in social management and monitoring	Short seminars and courses on Social awareness	Two seminars for Project staff dealing in Social matters	2 Weeks
Monitoring consultants/ organizations specializing in Occupational, health and safety issue	Short lectures relating to Occupational Health and Safety	Two seminars for contractor's staff	2 Weeks

8.8 Equipment Maintenance Details

PPE's and other required machinery of latest technology with high efficiency will be purchased by the proponent. Maintenance of equipment such as filters will be done twice a year for the smooth operation of disposal station's and water filtration plants.

Table 8-5: Equipment Maintenance Details

Task	Weekly	Monthly	Semi - Annually	Annually
Testing and Inspection		✓		
Check for Leakage		✓		
Recharging				✓
Filters and pipelines		✓		
Machinery			✓	
Cartridges			✓	

9 CONCLUSION AND RECOMMENDATIONS

9.1 General

This section presents conclusions of the EIA study of proposed Project. The overall objective of this EIA is to carry out a detailed environmental assessment of the project area; to assess impacts caused by the different activities of the proposed project and to address measures to mitigate adverse environmental impacts arising from the execution of the proposed project. The conclusions mentioned below are based on the findings of detailed environmental assessment, which has been carried out as per requirement of Environmental Protection Agency (EPA).

9.2 Main Issues and Concerns

During the field surveys, significant efforts were made to identify the main environmental, ecological and social issues related to the implementation of the proposed project. Residents and stakeholders were also contacted for obtaining salient information of the project. Following is the list of main issues and concerns:

- Disturbance to the public movement during constructional activity.
- Noise and air pollution due to the operation of construction machinery during construction phase of the project.
- Disruption of existing public utilities during construction phase.
- Oil spillages from construction machinery, resulting in soil and drinking / spring water contamination.
- Health and safety problem of the workers may also arise during the construction and operation phases of the project.

All the adverse impacts of the proposed project have properly been mitigated and a comprehensive EMP has been formulated. The implementation of EMP will help to reduce the adverse impacts of the aforesaid project.

9.3 Conclusions

After the completion of the proposed project, residents of the project area will get the following benefits;

- Improvement in environmental conditions of the project area.
- Direct employment of approximately 150 to 200 local people during construction phase and direct employment of approximately 100 to 125 employees is anticipated during the operational phase. The development will also generate indirect employment. This represents a significant and positive, both direct and indirect, long term impact.
- Other than providing direct & indirect employment and revenue source, the development shall lead to an improvement of infrastructure of the town area. These are important direct and lasting positive impacts on the community.
- Socioeconomic conditions of the area will be enhanced along with the overall boost to the environment of the project area.
- The project activity will fulfill the growing demand of potable drinking water in Rawalpindi division of Pakistan.
- This project is directly beneficial for the Residents of Rawalpindi division as potable drinking water will reduce the chances of pathogenic diseases such as typhoid, dysentery, hepatitis etc.
- At the end of the construction phase, 02 – 03 times of removed trees will be planted in the designated green areas, this will enhance the aesthetic beauty of the project areas.
- Availability of water at the designated times in the filtration plants will reduce the unnecessary loss of water in these division.
- Due to aforesaid project sustainable development goals in Pakistan will be achieved on a minor scale with the passage of time.
- With the construction of the proposed project and subsequent development of infrastructure in the area, the lifestyle of the community will be improved. This is considered a positive impact.
- Improvement in health conditions of the residents of the project area.
- Decrease in health budget of the residents of the project area.
- Business will spin – off in the water sector and for filtration plants providers.

9.4 Recommendations

- The construction activities shall be phased to confine the disruption of traffic. Traffic diversion / re – routing plans, if found necessary, shall be made with

the help of traffic police for smooth flow of traffic. The vehicles carrying the construction materials will not be allowed to enter the town during rush hours.

- Inclusion of further access routes to facilitate the accessibility of vehicles and pedestrians to and from the proposed Project site.
- Strict supervision of the excavation process should be carried out and residents should be informed in advance about the excavation activity.
- Noise measurements will be carried out at locations and schedule specified to ensure the effectiveness of mitigation measures.
- Odour (if any) should be minimized by installing ventilators and vegetation arrangements.

As a conclusion of the study, the proposed project will not cause potentially significant environmental and social adverse impacts on the local environment after implementation of the mitigation measures. Results of the EIA Study have shown that overall, the project is environmentally feasible. Most of the environmental impacts are moderate adverse in nature. However, these impacts can be mitigated by the implementation of Environmental Management Plan. Overall; the impacts related to construction phase could be minimized by the implementation of the proper mitigation measures.

9.4.1 Contractor`s Obligations

- **Environmental Mitigation Measures**

The contractor should carry out the mitigation measures according to the guidelines and satisfaction of the client. Environmental management and monitoring is to be performed as per environmental management and monitoring plans.

- **Existing infrastructure / Utilities**

The contractor should make necessary arrangements to protect the existing infrastructure / existing utilities and if not avoidable should compensate the damages occurred to the utilities at his own expense.

- **First Aid Facilities**

The contractor should arrange first aid facilities at site for any emergency purpose. Contractor should designate one of the staff members to act as lead person for emergency response and safety issues.

- **Health and Safety of Workers**

The Contractor should make arrangements for the health and safety of the workers and general public by; providing safety equipment such as helmets, gloves, safety harnesses etc.; erection of safety signage at potentially dangerous working areas; making proper lighting arrangements should be provided for night shift working; providing insurance against accidental death and injuries to workers and public; restricting public and animal access to construction site by providing fence on the periphery.

- **Employment of Local Personnel**

The contractor should subject to availability and workability, employ maximum number of workers from the local area.

- **Disposal of Waste**

The Contractor should in consultation with and with the approval of Resident Engineer (RE) of the Project select and abide by the selection, sites for disposal of waste construction material, solid waste and waste water.

- **Location of Labor Camps, Material Depots, Equipment and Machinery, approach routes and roads etc.**

Where Government owned land is available for location of Labor Camps, Material Depots, Equipment and Machinery Yard, Link Road or other activities related to these matters the Contractor should choose particular sites within the overall project area indicated in consultation with RE. These activities shall not be allowed outside this land. If the Contractor chooses to locate his facilities on a private land, he himself should be responsible for any compensation, resettlement or rehabilitation process and costs.

- **Socio-economic, Cultural values and Heritage**

The contractor should be bound to:

- a) Ensure that no damage or disruption is caused to the public services being supplied to the people e.g. education, health, electricity supply, drinking water supply facilities for public gathering or religious congregations.
- b) Ensure the contractor or his employees remain above the local tribal tensions.
- c) Ensure that existing ownership of land around the project is respected.
- d) Ensure that if some construction material, has to be procured from or through a member of local community, it must be by a proper Social Framework Agreement.

- e) Ensure that no damage or adverse effect is caused to archaeological (present or chance find) sites, graveyards and burial places.
- f) Ensure that privacy of local women is respected and any violator is strictly disciplined.

The above clauses have been suggested in technical context. These should be got vetted by qualified law officer before incorporation into the Tender Documents or the Contract Documents.

Annexure-I

Punjab Environmental Protection Act
1997 (Amendment 2017)

THE PUNJAB ENVIRONMENTAL PROTECTION ACT, 1997

(XXXIV of 1997)

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SCHEDULE

TEXT

¹THE ²[PUNJAB] ENVIRONMENTAL PROTECTION ACT, 1997
(XXXIV of 1997)

[6th December, 1997]

**An
Act**

to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development

WHEREAS, it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto;

It is hereby enacted as follows:—

1. Short title, extent and commencement.— (1) This Act may be called the ³[Punjab] Environmental Protection Act, 1997.

(2) It extends to the whole of ⁴[the Punjab].

(3) It shall come into force at once.

2. Definitions.— In this Act, unless there is anything repugnant in the subject or context,—

- (i) “adverse environmental effect” means impairment of, or damage to, the environment and includes—
 - (a) impairment of, or damage to, human health and safety or to biodiversity or property;
 - (b) pollution; and
 - (c) any adverse environmental effect as may be specified in the regulations;
- (ii) “agriculture waste” means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry, residues from the use of fertilizers, pesticides and other farm chemicals;

¹This Act of Parliament received the assent of the President on 3 December 1997, and was published in the Gazette of Pakistan, Extraordinary, dated 6 December 1997. This Act was originally in the Federal ambit, however, the subject on which this law was enacted devolved to the provinces by virtue of 18th Amendment in the Constitution, hence it was adapted, with amendments, for the province of the Punjab by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012).

²Substituted for the word “Pakistan” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.3; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³Substituted for the word “Pakistan” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.3; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴Substituted for the word “Pakistan” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.3; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (iii) “air pollutant” means any substance that causes pollution of air and includes soot, smoke, dust particles, odor, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;
- (iv) “biodiversity” or “biological diversity” means the variability among living organisms from all sources, including *inter alia* terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; including diversity within species, between species and of eco-systems;
- (v) “Council” means the ⁵[Punjab] Environmental Protection Council established under section 3;
- (vi) “discharge” includes spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;
- (vii) “ecosystem” means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;
- (viii) “effluent” means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;
- (ix) “emission standards” means the permissible standards established by the ⁶[Provincial Agency] for emission of air pollutants and noise and for discharge of effluent and waste;
- (x) “environment” means—
 - (a) air, water and land;
 - (b) all layers of the atmosphere;
 - (c) all organic and inorganic matter and living organisms;
 - (d) the ecosystem and ecological relationships;
 - (e) buildings, structures, roads, facilities and works;
 - (f) all social and economic conditions affecting community life; and
 - (g) the inter-relationships between any of the factors in sub-clauses (a) to (f);
- (xi) “environmental impact assessment” means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;

⁵Substituted for the word “Pakistan” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶Substituted for the words “Federal Agency or a Provincial Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (xii) “Environmental Magistrate” means the Magistrate of the First Class appointed under section 24;
- (xiii) “Environmental Tribunal” means the Environmental Tribunal constituted under section 20;
- ⁷[(xiv) * * * * *]
- (xv) “factory” means any premises in which industrial activity is being undertaken;
- ⁸[(xvi) “Government” means Government of the Punjab;]
- ⁹[(xvii) “Government Agency” includes—
- (a) a department, an attached department or any other office of the Government; and
 - (b) a development authority, local authority, company or a body corporate established or controlled by the Government;]
- (xviii) “hazardous substance” means—
- (a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and
 - (b) any substance which may be prescribed as a hazardous substance;
- (xix) “hazardous waste” means waste which is or which contains a hazardous substance or which may be prescribed as hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;
- ¹⁰[(xx) * * * * *]
- (xxi) “hospital waste” includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;
- (xxii) “industrial activity” means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or

⁷Omitted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁹Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁰Omitted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;

- (xxiii) "industrial waste" means waste resulting from an industrial activity;
- (xxiv) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;
- (xxv) "local authority" means any agency set-up or designated by the¹¹[Government] by notification in the official Gazette to be a local authority for the purposes of this Act;
- (xxvi) "local council" means a local council constituted or established under a law relating to local government;
- (xxvii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;
- (xxviii) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;
- ¹²[(xxix) * * * * *]
- (xxx) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;
- (xxxi) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;
- (xxxii) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;
- (xxxiii) "pollution" means the contamination of air, land or water by the discharge or emission of effluents or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious,

¹¹Substituted for the words "Federal Government or a Provincial Government" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹²Omitted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

¹³[(xxxiv) “prescribed” means prescribed by the rules or regulations;]

(xxxv) “project” means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes–

- (a) construction or use of buildings or other works;
- (b) construction or use of roads or other transport systems;
- (c) construction or operation of factories or other installations;
- (d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;
- (e) any change of land use or water use; and
- (f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

(xxxvi) “proponent” means the person who proposes or intends to undertake a project;

¹⁴[(xxxvii) “Provincial Agency” means the Provincial Environmental Protection Agency established under the Act, or any Government Agency, local council or local authority exercising the powers and functions of the Provincial Agency;]

¹⁵[(xxxvii-a) “Punjab Environmental Quality Standards” mean the standards prepared by the Provincial Agency and approved by the Council;]

(xxxviii) “regulations” means regulations made under this Act;

(xxxix) “rules” means rules made under this Act;

(xl) “sewage” means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xli) “standards” means qualitative and quantitative standards for discharge of effluents and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the ¹⁶[Punjab] Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations made thereunder;

¹³Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁴Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁵Inserted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁶Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (xlii) “sustainable development” means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

¹⁷[(xliii) * * * * *]

- (xliv) “vessel” includes anything made for the conveyance by water of human beings or of goods; and

- (xlv) “waste” means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

3. Establishment of the ¹⁸[Punjab] Environmental Protection Council.– ¹⁹[(1)
The Government shall, by notification in the official Gazette, establish a Council to be known as the Punjab Environmental Protection Council consisting of–

- i) Chief Minister of the Punjab; or such other person Chairperson
as nominated by the Chief Minister;
 - ii) Minister Incharge of the Environment Protection Vice Chairperson
Department;
 - iii) such other persons not exceeding thirty five as Members
the Government may appoint, of which at least
twenty five shall be non-official including at least
three Members of the Provincial Assembly of the
Punjab, five representatives of the Chambers of
Commerce and Industry and one or more
representatives of the Chambers of Agriculture,
Medical and legal profession, trade unions and
non- governmental organizations concerned with
the environment and sustainable development,
and scientists, technical experts and
educationalists²⁰[:]
- 21[Provided that at least one female member of
the Assembly and at least four women shall be
appointed as non-official members; and]
- iv) Secretary to the Government, Environment Member/Secretary]

¹⁷Omitted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.4; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁸Substituted for the word “Pakistan” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.5; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁹Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.5; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

²⁰Substituted for the semi-colon and word “; and” by the Punjab Fair Representation of Women Act 2014 (IV of 2014), w.e.f. 12.3.2014, s.2 and the Schedule; and published in the Punjab Gazette (Extraordinary), pages 2733-2744.

²¹Added by the Punjab Fair Representation of Women Act 2014 (IV of 2014), w.e.f. 12.3.2014, s.2 and the Schedule; and published in the Punjab Gazette (Extraordinary), pages 2733-2744.

Protection Department.

(2) The Members of the Council, other than *ex-officio* members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of three years.

(3) The Council shall frame its own rules of procedure.

(4) The Council shall hold meetings as and when necessary, but not less than two meetings shall be held in a year.

(5) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(6) The Council or any of its committees may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4. Functions and powers of the Council.– (1) The Council shall–

- (a) co-ordinate and supervise enforcement of the provisions of this Act;
- (b) approve comprehensive ²²[Punjab] environmental policies and ensure their implementation within the framework of a ²³[Punjab] conservation strategy as may be approved by the ²⁴[Government] from time to time;
- (c) approve the ²⁵[Punjab] Environmental Quality Standards;
- (d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
- (e) coordinate integration of the principles and concerns of sustainable development into ²⁶[Punjab] development plans and policies; and
- (f) consider the ²⁷[Punjab] Environment Report and give appropriate directions thereon.

(2) The Council may, either itself or on the request of any person or organisation, direct the ²⁸[Provincial Agency] or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation

²²Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

²³Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

²⁴Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

²⁵Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

²⁶Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

²⁷Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

²⁸Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources, or to undertake research in any specified aspect of environment.

5. Establishment of the ²⁹[Provincial] Environmental Protection Agency.–

³⁰[(1) The Government shall, by notification in the official Gazette, establish the Provincial Environmental Protection Agency to exercise the powers and perform the functions assigned to it under this Act, the rules and the regulations.]

(2) The ³¹[Provincial Agency] shall be headed by a Director-General, who shall be appointed by the ³²[Government] on such terms and conditions as it may determine.

(3) The ³³[Provincial Agency] shall have such administrative, technical and legal staff as the ³⁴[Government] may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the ³⁵[Provincial Agency] shall be exercised and performed by the Director-General.

³⁶[(5) The Director General may, by general or special order, delegate any of the functions of the Provincial Agency exercised by him under subsection (4) to any other officer appointed under subsection (3).]

(6) For assisting the ³⁷[Provincial Agency] in the discharge of its functions, the ³⁸[Government] shall establish Advisory Committees for various sectors, and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6. Functions of the ³⁹[Provincial Agency].– (1) The ⁴⁰[Provincial Agency] shall–

²⁹Substituted for the word “Pakistan” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.6; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³⁰Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.6; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³¹Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³²Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³³Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³⁴Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³⁵Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³⁶Substituted by the Punjab Environmental Protection (Amendment) Act 2017 (XIX of 2017), published in the Punjab Gazette (Extraordinary), dated: 08 November 2017, pp 3139 - 3140, s.2

³⁷Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³⁸Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

³⁹Words “Federal Agency” substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁴⁰Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (a) administer and implement the provisions of this Act and the rules and regulations made thereunder;
- (b) prepare, in coordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, ⁴¹[* * *] environmental policies for approval by the Council;
- (c) take all necessary measures for the implementation of the ⁴²[* * *] environmental policies approved by the Council;
- (d) prepare and publish an annual ⁴³[Punjab] Environmental Report on the state of the environment;
- (e) prepare or revise, and establish the ⁴⁴[Punjab] Environmental Quality Standards with approval of the Council:

Provided that before seeking approval of the Council, the ⁴⁵[Provincial Agency] shall publish the proposed ⁴⁶[Punjab] Environmental Quality Standards for public opinion in accordance with the prescribed procedure; and

- (f) ensure enforcement of the ⁴⁷[Punjab] Environmental Quality Standards;
- ⁴⁸[(g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette;]
- (h) co-ordinate environmental policies and programmes nationally and internationally;
- (i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;
- (j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;
- (k) certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as

⁴¹Omitted the word "national" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.7; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴²Omitted the word "national" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.7; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴³Substituted for the word "National" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴⁴Substituted for the word "National" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴⁵Substituted for the words "Federal Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴⁶Substituted for the word "National" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴⁷Substituted for the word "National" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁴⁸Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.7; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

environmental research institutes for conducting research and investigation, for the purposes of this Act;

- (l) identify the needs for, and initiate legislation in various sectors of the environment;
- (m) render advice and assistance in environmental matters, including such information and data available with it as may be required for carrying out the purposes of this Act:

Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;

- (n) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;
 - (o) provide information and guidance to the public environmental matters;
 - (p) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;
 - (q) promote public education and awareness of environmental issues through mass media and other means, including seminars and workshops;
 - (r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;
 - (s) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;
 - (t) take or cause to be taken all necessary measure for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and
 - (u) perform any function which the Council may assign to it.
- (2) The ⁴⁹[Provincial Agency] may–
- (a) undertake inquires or investigation into environmental issues, either of its own accord or upon complaint from any person or organisation;
 - (b) request any person to furnish any information or data relevant to its functions;
 - (c) initiate with the approval of the ⁵⁰[Government], requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange

⁴⁹Substituted for the words "Federal Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵⁰Substituted for the words "Federal Government" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

of material or information and participate in international seminars or meetings;

- (d) recommend to the ⁵¹[Government] the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including–
 - (i) incentives, prizes awards, subsidies, tax exemptions, rebates and depreciation allowances; and
 - (ii) taxes, duties, cesses and other levies;
- (e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and
- (f) provide or arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7. Powers of the ⁵²[Provincial Agency].– Subject to the provisions of this Act, the ⁵³[Provincial Agency] may–

- (a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both movable and immovable;
- (b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;
- (c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations made thereunder;
- (d) enter into the contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;
- (e) appoint with the approval of the ⁵⁴[Government] and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;
- (f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;
- (g) enter and inspect and under the authority of a search warrant issued by the Environmental Tribunal or Environmental Magistrate, search at

⁵¹Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵²Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵³Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵⁴Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which, there are reasonable grounds to believe that an offence under this Act has been or is being committed;

- (h) take samples of any materials, products, articles or substances or of the effluents, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;
- (i) arrange for test and analysis of the samples at a certified laboratory;
- (j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the power under clauses (f), (h), (i), and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Tribunal or Environmental Magistrate; and

- ⁵⁵[(k) establish the Punjab Environmental Coordination Committee comprising the Director General as its convener and such other members as the Government may appoint to exercise such powers and perform such functions as may be delegated or assigned to it by the Government for carrying out the purposes of this Act.]

⁵⁶[8. *Establishment, powers and functions of the Provincial Environmental Protection Agencies.*— * * * * *]

9. Establishment of the Provincial Sustainable Development Funds.— ⁵⁷[(1) There shall be established a Provincial Sustainable Development Fund.]

(2) The Provincial Sustainable Development Fund shall be derived from the following sources, namely:—

- (a) grants made or loans advanced by the ⁵⁸[Government or the Federal Government];
- (b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, ⁵⁹[Punjab] or international agencies, and non-governmental organizations; and
- (c) contributions from private organizations, and other persons.

(3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for—

⁵⁵Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.8; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵⁶Omitted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.9; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵⁷Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.10; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵⁸Substituted for the words “Federal Government or the Provincial Governments” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.10; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁵⁹Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any specified aspect of environment; and
- (b) any other purpose which in the opinion of the Board will help achieve environmental objectives and the purposes of this Act.

10. Management of the Provincial Sustainable Development Fund.—⁶⁰[(1) The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of-

- (i) Chairman, Planning and Development Board; Chairperson
 - (ii) Such officers of the Government, not exceeding six, as the Government may appoint including Secretaries incharge of the Finance, Industries and Environment Departments; Members
 - (iii) such non-official persons not exceeding ten as the Government may appoint including representatives of the Chamber of Commerce and Industry, non-governmental organizations and major donors; and Members
 - (iv) Director General of the Provincial Agency. Member/Secretary]
- (2) In accordance with such procedure and such criteria as may be prescribed, the Board shall have the power to—
- (a) sanction financial assistance for eligible projects;
 - (b) invest moneys held in the Provincial Sustainable Development Fund in such profit-bearing government bonds, savings schemes and securities as it may deem suitable; and
 - (c) take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.
- (3) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts, and performance evaluation based on the progress reports.

11. Prohibition of certain discharges or emissions.— (1) Subject to the provisions of this Act and the rules and regulations made thereunder no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the

⁶⁰Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.11; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶¹[Punjab] Environmental Quality Standards or, where applicable, the standards established under ⁶²[* * * * *] clause (g) of sub-section (1) of section 6.

(2) The ⁶³[Government] may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provisions of sub-section (3) shall not apply to projects, which commenced industrial activity on or after the thirtieth day of June, 1994.

12. Initial environmental examination and environmental impact assessment.– (1) No proponent of a project shall commence construction or operation unless he has filed with the ⁶⁴[Provincial Agency] an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the ⁶⁵[Provincial Agency] approval in respect thereof.

(2) The ⁶⁶[Provincial Agency] shall–

- (a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or
- (b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated, or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to–

- (i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director-General of

⁶¹Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶²The words “sub-clause (i) of” Omitted by the Punjab Environmental Protection (Amendment) Act 2017 (XIX of 2017), published in the Punjab Gazette (Extraordinary), dated: 08 November 2017, pp 3139 - 3140, s.3

⁶³ Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶⁴Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶⁵Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶⁶Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

the ⁶⁷[Provincial Agency] is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or

- (ii) international relations, ⁶⁸[Punjab] security or maintenance of law and order, except with the consent of the ⁶⁹[Government]; or
- (iii) matters covered by legal professional privilege.

(4) The ⁷⁰[Provincial Agency] shall communicate its approval or otherwise within a period of four months from the date the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder.

(5) Subject to sub-section (4) the ⁷¹[Government] may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-sections (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The ⁷²[Provincial Agency] shall maintain separate Registers for initial environmental examination and environmental impact assessment project, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such Registers shall be subject to the restrictions specified in sub-section (3).

⁷³**[13. Prohibition of import of hazardous waste.–** No person shall import hazardous waste into the Punjab.]

14. Handling of hazardous substances.– Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except–

⁶⁷Substituted for the words "Federal Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶⁸Substituted for the word "National" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁶⁹Substituted for the words "Federal Government" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷⁰Substituted for the words "Federal Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷¹Substituted for the words "Federal Government" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷²Substituted for the words "Federal Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷³Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.12; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (a) under a licence issued by the ⁷⁴[Provincial Agency] and in such manner as may be prescribed; or
- (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

15. Regulation of motor vehicles.– (1) subject to the provisions of this Act and the rules and regulations made thereunder, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the ⁷⁵[Punjab] Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the ⁷⁶[Provincial Agency] may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

(3) Where a direction has been issued by the ⁷⁷[Provincial Agency] under sub-section (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16. Environmental protection order.–⁷⁸[(1) Where the Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or handling of hazardous substance, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of any provision of this Act, rules or regulations or of the conditions of a license, or is likely to cause, or is causing, or has caused an adverse environmental effect, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order, direct such person to take such measures as the Provincial Agency may consider necessary within such period as may be specified in the order.]

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include–

- (a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;
- (b) installation, replacement or alteration of any equipment or thing to eliminate or control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

⁷⁴Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷⁵Substituted for the word “National” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷⁶Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷⁷Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁷⁸Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.13; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and
- (d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such conditions may be reasonable in the circumstances, to the satisfaction of the ⁷⁹[Provincial Agency].

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the ⁸⁰[Provincial Agency] may, in addition to the proceeding initiated against him under this Act or the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deem necessary, and may recover the costs of taking such measures from such person as arrears of land revenue.

17. Penalties.– (1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13, or section 16 or any order issued thereunder shall be punishable with fine which may extend to ⁸¹[five million] rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues and where such contravention or failure continues:

Provided that if contravention of the provision of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction issued by the Council or by the ⁸²[Provincial Agency] shall be punishable with fine which may extend to ⁸³[five hundred thousand] rupees, and in case of continuing contravention, or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-section (1) and (2), the Environmental Tribunal and Environmental Magistrate shall, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence, and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-section (1) and the Environmental Tribunal is satisfied that as a result of the commission of the offence monetary benefits have accrued to the offender, the Environmental Tribunal may order the offender to pay, in addition to the fines under

⁷⁹Substituted for the words and comma "Federal Agency or, Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.13; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸⁰Substituted for the words "Federal Agency or Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.13; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸¹Substituted for the words "one million" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.14; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸²Substituted for the words "Federal Agency or Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.14; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸³Substituted for the words "one hundred thousand" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.14; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

(5) Where a person convicted under sub-sections (1) or sub-section (2); and had been previously convicted for any contravention under this Act, the Environmental Tribunal or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder–

- (a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;
- (b) sentence him to imprisonment for a term which may extend up to two years;
- (c) order the closure of the factory;
- (d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act:

Provided that for a period of three years from the date of commencement of this Act, the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of section 11, 13, 14 or 16 involving hazardous waste;

- (e) order such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the ⁸⁴[Provincial Agency]; and
- (f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the ⁸⁵[Provincial Agency] or an officer generally or specially authorised by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunal or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the ⁸⁶[Provincial Agency] is of the opinion that a person has contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the ⁸⁷[Provincial

⁸⁴Substituted for the words and commas "Federal Agency or, as the case may be, Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f. 18.4.2012, s.14; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸⁵Substituted for the words "Federal Agency or of a Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f. 18.4.2012, s.14; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸⁶Substituted for the words "Federal Agency or of a Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f. 18.4.2012, s.14; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸⁷Substituted for the words and commas "Federal Agency or, as the case may be, Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f. 18.4.2012, s.14; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

Agency] an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act or who has paid an administrative penalty for a contravention of any provision of this Act.

18. Offences by bodies corporate.— Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance or, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.— For the purposes of this section, “body corporate” includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19. Offences by Government Agencies, local authorities or local councils.— Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of the Head or any other officer of the Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20. Environmental Tribunals.— (1) The ⁸⁸[Government] may, by notification in the official gazette, establish as many Environmental Tribunals as it considers necessary and, where it establishes more than one Environmental Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the ⁸⁹[Government] of which at least one shall be a technical member with suitable professional qualifications and experience in the environmental field as may be prescribed.

⁸⁸Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁸⁹Substituted for the words “Federal Government” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

(3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

⁹⁰[(4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the Chairperson.]

(5) An Environmental Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who was given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of vacancy in, or defect in the constitution of, the Environmental Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Tribunal shall be such as may be prescribed.

21. Jurisdiction and powers of Environmental Tribunals.- (1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act, or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by–

- (a) the ⁹¹[Provincial Agency] ⁹²[or an officer authorized by it] or any Government Agency or local council; and
- (b) any aggrieved person, who has given notice of not less than thirty days to the ⁹³[Provincial Agency] ⁹⁴[or an officer authorized by it] of the alleged contravention and of his intention to make a complaint to the Environmental Tribunal.

⁹⁰Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.15; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁹¹Substituted for the words “Federal Agency” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁹²Inserted by the Punjab Environmental Protection (Amendment) Act 2017 (XIX of 2017), published in the Punjab Gazette (Extraordinary), dated: 08 November 2017, pp 3139 - 3140, s.4

⁹³Substituted for the words “Federal Agency or the Provincial Agency concerned” by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.16; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁹⁴Inserted by the Punjab Environmental Protection (Amendment) Act 2017 (XIX of 2017), published in the Punjab Gazette (Extraordinary), dated: 08 November 2017, pp 3139 - 3140, s.4

(4) In exercise of its criminal jurisdiction, the Environmental Tribunal shall have the same powers as are vested in Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this ⁹⁵[Act], the Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorised on this behalf by the Director-General of the ⁹⁶[Provincial Agency], issue bailable warrant for the arrest of any person against whom reasonable suspicion exists of his having been involved in contravention punishable under sub-section (1) of section 17:

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant, he shall be released from custody, failing which he shall be taken or sent without delay to the officer-in-charge of the nearest police station.

(8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Tribunal shall be deemed to be a court for the purposes of sections 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act or the rules and regulations made thereunder.

(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22. Appeals to the Environmental Tribunal.—(1) Any person aggrieved by any order or direction of the ⁹⁷[Provincial Agency] under any provision of this Act and rules or regulations made thereunder may refer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

⁹⁵Misprinted in the Gazette as "Ordinance".

⁹⁶Substituted for the words "Federal Agency or of Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.16; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁹⁷Substituted for the words "Federal Agency or any Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.17; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23. Appeals from orders of the Environmental Tribunal.– (1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24. Jurisdiction of Environmental Magistrates.– (1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An Environmental Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 17.

(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by–

- (a) the ⁹⁸[Provincial Agency], or Government Agency or local council; and
- (b) any aggrieved person.

25. Appeals from orders of Environmental Magistrates.– Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions, whose decision thereon shall be final.

⁹⁹**[26. Power to delegate.**– The Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act, the rules or the regulations to any Government Agency, local council or local authority.]

¹⁰⁰**[27. Power to give directions.**– In the performance of its functions, the Provincial Agency shall be bound by the directions given to it in writing by the Government.]

¹⁰¹**[28. Indemnity.**– No suit, prosecution or other legal proceedings shall lie against the Government, the Council, the Provincial Agency, the Director General of the Provincial

⁹⁸Substituted for the words and comma "Federal Agency, Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.18; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

⁹⁹Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.19; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

Section 27 substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012).

¹⁰¹Substituted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.21; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

Agency, members, officers, employees, experts, advisors, or consultants of the Provincial Agency or the Environmental Tribunal, an Environmental Magistrate or any other person for anything which is in good faith done or intended to be done under this Act or the rules or the regulations.]

29. Dues recoverable as arrears of land revenue.– Any dues recoverable by the ¹⁰²[Provincial Agency] under this Act, or the rules or regulations made thereunder shall be recoverable as arrears of land revenue.

30. Ordinance to override other laws.– The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31. Power to make rules.– The ¹⁰³[Government] may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental agreements, specified in the Schedule to this Act.

32. Power to amend the Schedule.– The ¹⁰⁴[Government] may, by notification in the official Gazette, amend the Schedule so as to add any entry thereto or modify or omit any entry therein.

33. Power to make regulations.– (1) For carrying out the purposes of this Act, the ¹⁰⁵[Provincial Agency] may, by notification in the official Gazette and with the approval of the ¹⁰⁶[Government], make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for–

- (a) submission of periodical reports, data or information by any Government Agency, local authority or local council in respect of environmental matters;
- (b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;
- (c) appointment of officers, advisors, experts, consultants and employees;
- (d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;

¹⁰²Substituted for the words "Federal Agency or Provincial Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.22; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁰³Substituted for the words "Federal Government" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁰⁴Substituted for the words "Federal Government" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁰⁵Substituted for the words "Federal Agency" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁰⁶Substituted for the words "Federal Government" by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.2; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

- (e) monitoring and measurement of discharges and emissions;
- (f) categorization of projects to which, and the manner in which, section 12 applies;
- (g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filling, review and approval;
- (h) providing procedures for handling hazardous substances; and
- (i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34. Repeal, savings and succession.– (1) The Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983) is hereby repealed.

(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act, be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

¹⁰⁷[(3) * * * * *]

¹⁰⁸[(4) Notwithstanding the omission of section 8 of the Act by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), any rules, regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings taken, rights acquired, liabilities incurred, penalties imposed, rates, fees or charges levied or other things done or actions taken under the provisions of said section, shall continue to have effect unless recalled withdrawn or cancelled.]

¹⁰⁷Omitted by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), w.e.f.18.4.2012, s.23; and published in the Punjab Gazette (Extraordinary), pages 41061-41065.

¹⁰⁸Added by the Punjab Environmental Protection (Amendment) Act 2017 (XIX of 2017), published in the Punjab Gazette (Extraordinary), dated: 08 November 2017, pp 3139 - 3140, s.5; and deemed to have been so added on and from 18 April 2012 when the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012) came into force.

SCHEDULE

(See section 31)

1. International Plant Protection Convention, Rome, 1951.
2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.
3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.
4. Convention on Wetlands of International importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), Paris, 1972.
6. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.
8. Convention on the Law of the Sea, Montego Bay, 1982.
9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Aquaculture Centres in Asia and the Pacific, Bangkok, 1988.
12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
13. Convention on Biological Diversity, Rio De Janeiro, 1992.
14. United Nations Framework Convention on Climate Change, Rio De Janeiro, 1992.



The Punjab Gazette

PUBLISHED BY AUTHORITY

LAHORE WEDNESDAY NOVEMBER 08, 2017

PROVINCIAL ASSEMBLY OF THE PUNJAB NOTIFICATION

November 08, 2017

No.PAP/Legis-2(174)/2017/1671. The Punjab Environmental Protection (Amendment) Bill 2017, having been passed by the Provincial Assembly of the Punjab on October 25, 2017, and assented to by the Governor of the Punjab on October 30, 2017, is hereby published as an Act of the Provincial Assembly of the Punjab.

THE PUNJAB ENVIRONMENTAL PROTECTION (AMENDMENT) ACT 2017

ACT XIX OF 2017

[First published, after having received the assent of the Governor of the Punjab, in the Gazette of the Punjab (Extraordinary) dated November 08, 2017.]

An
Act

further to amend the Punjab Environmental Protection Act, 1997.

It is necessary further to amend the Punjab Environmental Protection Act, 1997 (XXXIV of 1997) to rationalize the provisions about the delegation of powers of the Director General, filing of complaints and incidental matters.

Be it enacted by the Provincial Assembly of the Punjab as follows:

1. **Short title and commencement** – (1) This Act may be cited as the Punjab Environmental Protection (Amendment) Act 2017.
(2) It shall come into force at once.

2. **Amendment in section 5 of Act XXXIV of 1997.** – In the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), for brevity cited as the Act, in section 5, for subsection (5), the following shall be substituted:

(5) The Director General may, by general or special order, delegate any of the functions of the Provincial Agency exercised by him under subsection (4) to any other officer appointed under subsection (3)."

3. Amendment in section 11 of Act XXXIV of 1997.— In the Act, in section 11, in subsection (1), after the words "standards established under", the words " sub-clause (i) of" shall be omitted.

4. Amendment in section 21 of Act XXXIV of 1997.— In the Act, in section 21, in subsection (3), after the words "Provincial Agency", wherever occur, the words "or an officer authorized by it" shall be inserted.

5. Amendment in section 34 of Act XXXIV of 1997.— In the Act, in section 34, after subsection (2), the following subsection (3) shall be added and shall be deemed to have been so added on and from 18 April 2012 when the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012) came into force:

(3) Notwithstanding the omission of section 8 of the Act by the Punjab Environmental Protection (Amendment) Act 2012 (XXXV of 2012), any rules, regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings taken, rights acquired, liabilities incurred, penalties imposed, rates, fees or charges levied or other things done or actions taken under the provisions of said section, shall continue to have effect unless recalled withdrawn or cancelled."

Annexure-II

Review of IEE and EIA Regulations, 2022



The Punjab Gazette

PUBLISHED BY AUTHORITY

LAHORE FRIDAY DECEMBER 16, 2022

GOVERNMENT OF THE PUNJAB LAW AND PARLIAMENTARY AFFAIRS DEPARTMENT

NOTIFICATION
(150 of 2022)

16 DECEMBER 2022

Notification No.01/EPA/EIA/MISC/21/4214, dated 16.12.2022 issued by the Environment Protection Department, is hereby published in the Punjab Gazette (Extraordinary) for general information:



**"GOVERNMENT OF THE PUNJAB
ENVIRONMENT PROTECTION DEPARTMENT**

Dated, Lahore 16 December 2022

NOTIFICATION

No.01/EPA/EIA/MISC/21/4214.- In exercise of the powers conferred under section 33 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), the Environmental Protection Agency, Punjab, with the approval of the Government, is pleased to make the following regulations:

1. Short title and commencement.- (1) These regulations may be cited as the Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations 2022.

(2) They shall come into force at once.

2. Definitions.- (1) In the regulations, unless the context or subject otherwise requires:

- (a) "Act" means the Punjab Environmental Protection Act, 1997 (XXXIV of 1997);
- (b) "Agency" means the Environmental Protection Agency, Punjab;
- (c) "Director General" means the Director General of the Agency;
- (d) "regulations" means the Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations 2022; and
- (e) "Schedule" means the Schedule appended to the regulations.

(2) A word or expression used but not defined in the regulations shall have the same meaning as assigned to it in the Act.

3. Project requiring an initial environmental examination.- A proponent of a project falling in any category listed in Schedule-I shall file an initial environmental examination with the Agency and the provisions of section 12 of the Act shall apply to such projects.

4. Project requiring an environmental impact assessment.- A proponent of a project falling in any category listed in Schedule-II shall file an environmental impact assessment with the Agency and the provisions of section 12 of the Act shall apply to such projects.

5. Projects not requiring an initial environmental examination or environmental impact assessment.- (1) A proponent of a project not falling in any category listed in Schedule-I

and II shall not be required to file an Initial environmental examination or environmental impact assessment:

Provided that the proponent shall file:

- (a) an environmental impact assessment, if the project is likely to cause an adverse environmental effect; and
- (b) an application for projects not listed in Schedule-I and II, in respect of which the Agency has issued guidelines for construction and operation, for approval accompanied by an undertaking, an affidavit and any other document as prescribed in checklist that the aforesaid guidelines shall be fully complied with.

(2) Notwithstanding anything contained in sub-regulation (1), the Agency may direct the proponent of a project, whether or not listed in Schedule-I or II, to file an initial environmental examination or environmental impact assessment, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendation in writing of the Environmental Assessment Advisory Committee constituted under regulation 22.

6. Review Fee.- The proponent shall pay, at the time of submission of an initial environmental examination or environmental impact assessment, a nonrefundable Review Fee to the Agency as per rates specified in Schedule-III.

7. Filing of initial environmental examination and environmental impact assessment.- (1) Every initial environmental examination or environmental impact assessment shall be accompanied by:

- (a) an application, in the form prescribed in Schedule-IV; and
- (b) copy of receipt showing payment of the Review Fee.

(2) Five ring bound printed paper copies and one electronic copy (PDF or Word format) of an initial environmental examination or environmental impact assessment shall be filed with the Agency.

8. Preliminary scrutiny.- (1) The Agency, within ten working days of filing of initial environmental examination or environmental impact assessment, shall:

- (a) confirm that the initial environmental examination or environmental impact assessment is complete for the purposes of initiation of the review process; or
- (b) require the proponent to submit such additional information as may be required; or
- (c) return the initial environmental examination or environmental impact assessment to the proponent,

clearly listing the contents requiring further study and discussion.

(2) In case the proponent fails to submit the required documents or conduct further study or discussion after three notices served to him by the Agency, with a gap of not less than seven days, his application shall be closed and he shall be required to submit a fresh application for approval.

(3) In case of closure of application under sub-regulation (2), the Review Fee shall remain valid for a period of six months from the date of closure of application.

(4) Nothing in sub-regulation (1) shall prohibit the Agency from requiring the proponent to submit additional information at any stage during the review process.

9. Public participation.- (1) In the case of an environmental impact assessment, the Agency shall, simultaneously with issuance of confirmation of completeness under clause (a) of sub-regulation (1) of regulation 8, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of the project, its exact location, the name and address of the proponent, and the places at which the environmental impact assessment of the project can, subject to the restrictions in sub-section (3) of section 12 of the Act, be accessed.

(2) The notice issued under sub-regulation (1) shall fix a date, time, and place for public hearing of any comments on the project or its environmental impact assessment.

(3) The date fixed under sub-regulation (2) shall not be less than seven days from the date of publication of the notice.

(4) The Agency may circulate the environmental impact assessment to concerned Government Agencies, local authority or local council for their comments, if any.

(5) During the public hearing, the proponent shall provide sufficient details of the nature of the project, the adverse environmental impacts of the project and the preventive, mitigatory or compensatory measures to be taken by the proponent to address such impacts.

(6) All comments received by the Agency from the public or any Government Agency, local authority or local council shall be collated, tabulated, and shall be duly considered before a decision on the environmental impact assessment.

10. Review.- (1) The Agency shall make every effort to carry out its review of the initial environmental examination within thirty days, and environmental impact assessment within forty-five days, of issuance of confirmation of completeness under clause (a) of sub-regulation (1) of regulation 8.

(2) In reviewing the initial environmental examination or environmental impact assessment, the Agency may consult such

Committee of Experts as may be constituted for the purpose by the Director General, and may also solicit views of the Sectoral Advisory Committee, if any, constituted by Government under subsection (6) of section 5 of the Act.

(3) The Director General may, where he considers it necessary, constitute a Committee to inspect the site of a project and submit its report on such matters as may be specified.

(4) Depending upon the type of project, the review of the initial environmental examination or environmental impact assessment by the Agency may:

(a) be based on quantitative and qualitative assessment of documents and data furnished by the proponent, comments from public and Government Agencies, local authority or local council received under regulation 9, and views of the depending upon the type of project, Committees under sub-regulations (2) and (3); and

(b) consider the life cycle of the project, best available technologies and any social impacts of the project through its life cycle, assess any relevant measures of reduction, recycling, or re-use that may be employed by the project proponent.

11. Approval.- On completion of review, approval of the Agency shall be communicated to the proponent in the form prescribed in Schedule-V in case of an initial environmental examination, and in the form prescribed in Schedule-VI in case of an environmental impact assessment.

12. Conditions of approval.- (1) Every approval of an initial environmental examination or environmental impact assessment shall, in addition to such conditions as may be imposed by the Agency, be subject to the condition that the project shall be designed and constructed strictly in accordance with the initial environmental examination or environmental impact assessment, unless any variation thereto have been specified in the approval by the Agency.

(2) Where the Agency accords its approval subject to certain conditions, the proponent shall:

(a) before commencing construction of the project, acknowledge acceptance of stipulated conditions by executing an undertaking in the form prescribed in Schedule-VII; and

(b) before commencing operation of the project, obtain from the Agency written confirmation that the conditions of approval, and the requirements in the initial environmental examination or environmental impact assessment, as the case may be, relating to

design, construction, adoption of preventive, mitigatory, compensatory and other measures, and other relevant matters have been duly complied with.

13. Confirmation of compliance.- (1) The request for confirmation of compliance under clause (b) of sub-regulation (2) of regulation 12 shall be accompanied by an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring, reporting and auditing.

(2) Where a request for confirmation of compliance is received from a proponent, the Agency may carry out such inspection of the site, plant and machinery, and seek such additional information from the proponent as it may deemed fit:

Provided that every effort shall be made by the Agency to provide the requisite confirmation or otherwise within fifteen days of receipt of the request, with complete information, from the proponent.

(3) The Agency may, while issuing the requisite confirmation of compliance, impose such other conditions as to the Environmental Management Plan, and operation, maintenance and monitoring of project as it deemed fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

14. Deemed approval.- The four months period for communication of the Agency's approval stipulated in subsection (4) of section 12 of the Act shall commence from the completion of preliminary scrutiny under clause (a) of sub-regulation (1) of regulation 8.

15. Extension in review period.- Where the Government in a particular case extends the period of four months for communication of approval prescribed in subsection (5) of section 12 of the Act, it shall, in consultation with the Agency, indicate the various steps of the review process to be taken during the extended period, and the estimated time required for each step.

16. Validity period of approval.- (1) The approval accorded by the Agency under section 12 of the Act read with regulation 11 shall be valid, for commencement of construction, for a period of three years from the date of issue.

(2) After issuance of confirmation of compliance under regulation 13, the approval for the commencement of operation of the project or business shall be valid for a period of three years from the date of issuance of the confirmation of compliance.

(3) The proponent may apply to the Agency for extension in validity periods mentioned in sub-regulations (1) and (2) which may be granted by the Agency in its discretion for such period not exceeding three years at a time, if conditions of environmental approval do not require significant change:

Provided that the Agency may require proponent to submit a fresh initial environmental examination or environmental impact

assessment, if the changes in location, design, construction, and operation of the project so warrant.

17. Entry and inspection.- (1) For the purposes of verification of any matter relating to review or to conditions of approval of an initial environmental examination or environmental impact assessment prior to, during, or after the commencement of construction or operation of a project, duly authorized staff of the Agency shall be entitled to enter and inspect a project site, factory building and plant, and equipment installed therein.

(2) The proponent shall ensure full cooperation of project staff at site to facilitate the inspection and provide such information and documentation as may be required by the Agency for this purpose and pursuant thereto.

18. Monitoring.- (1) After issue of approval, the proponent shall submit a report to the Agency on completion of construction of the project.

(2) After the commencement of operation of the project or business, the proponent shall submit an annual report summarizing the operational performance of the project, with reference to the conditions of approval and maintenance, and preventive, mitigatory or compensatory measures being adopted by the project and compliance with the Environmental Management Plan submitted under regulation 13.

(3) To enable the Agency to effectively monitor compliance with the conditions of approval, the proponent shall furnish such additional information as the Agency may require.

19. Cancellation of approval.- (1) Notwithstanding anything contained in the regulations, if, at any time, on the basis of information or report received or inspection carried out, the Agency is of the opinion that the conditions of approval have not been complied with, or that the information supplied by the proponent in the approved initial environmental examination or environmental impact assessment is incorrect, it shall issue notice to the proponent to show cause within two weeks of its receipt thereof, why the approval should not be cancelled.

(2) If no reply is received or if the reply is considered unsatisfactory, the Agency may, after affording the proponent an opportunity of being heard:

- (a) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or
- (b) cancel the approval.

(3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.

(4) The Agency may circulate the cancellation of approval of a

project to the concerned Government Agencies.

(5) Action taken under the regulations shall be without prejudice to any other action that may be taken against the proponent under the Act or rules or regulations or any other law for the time being in force.

20. Registers of initial environmental examination and environmental impact assessment projects.- Separate registers (hard or soft) to be maintained by the Agency for initial environmental examination and environmental impact assessment projects under subsection (7) of section 12 of the Act shall be in the form prescribed in Schedule-VIII.

21. Environmentally sensitive areas.- (1) The Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.

(2) For an area to be declared as an environmentally sensitive, the District Administration concerned or any other concerned Government Agency (Wildlife and Parks Department and Forest Department, etc.) shall forward the following, in writing, to the Agency:

- (a) the specific area along with Khasra and Khewat Nos. to be declared as environmentally sensitive; and
- (b) the reasons for declaring as above.

(3) Notwithstanding anything contained in regulations 3, 4 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an environmental impact assessment with the Agency.

(4) The Agency may from time-to-time issue guidelines to assist proponents and other persons involved in environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

(5) Where guidelines have been issued under sub-regulation (3), projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in environmental impact assessment pertaining to projects.

22. Environmental Assessment Advisory Committee.- For purposes of rendering advice on all aspects of environmental assessment, including guidelines, procedures and categorization of projects, the Director General shall constitute an Environmental Assessment Advisory Committee comprising:

(a)	Director (EIA)	Chairman
(b)	one representative of Industries, Commerce, Investment and Skills Development Department	Member
(c)	one representative of Chamber of Commerce and Industries	Member

(d)	Deputy Director (EIA)	Secretary
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23. Other approvals.- Issue of an approval under section 12 of the Act read with regulation 11 shall not absolve a proponent of the duty to obtain any other approval or consent that may be required under any law for the time being in force.

24. Savings.- All orders made, notifications issued, actions taken under the Pakistan Environmental Protection Agency, Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000 shall remain in force until amended, altered or repealed by the provisions of the regulations.

**SECRETARY
GOVERNMENT OF THE PUNJAB
ENVIRONMENT PROTECTION DEPARTMENT"**

**AKHTAR JAVAID
SECRETARY
Government of the Punjab
Law and Parliamentary Affairs Department**

SCHEDULE - I
(See Regulation 3)
List of projects requiring an IEE

A: Agriculture, Livestock and Fisheries etc.

1. Controlled Poultry Farms, Hatchery, Livestock, stud and fish farms with total cost more than Rs 10 million
2. Projects involving repacking, formulation or warehousing of agricultural products

B: Energy

1. Hydroelectric power generation *from 1 MW to 50MW*
2. Transmission lines *from 11 kV to 132 kV*, and large distribution projects *up to 132 kV*
3. Oil and gas transmission systems
4. Renewable Energy projects (including *wind and solar*) *greater than 05 MW upto 100MW and biogas plants for commercial purposes*
5. Waste-to-energy generation projects

C. Manufacturing and processing

1. Apparel (including garments and leather stitching units), cotton, spinning mills, woolen mills, weaving mills and manual carpet weaving units;
2. Food processing industries including beverages, milk and dairy products with total cost less than Rs 200 million
3. Synthetic resins, plastics and man-made fibers
4. Flour mill, Rice mills, edible oils, fats and vegetable ghee and Feed Mills
5. Rubber products with total cost less than Rs. 100 million
6. Chemical formulation units
7. Brick Kilns

D. Mining and mineral processing

1. Commercial extraction of sand gravel, limestone, clay, Sulphur and other minerals not included in schedule III with total cost less than 500 million
2. Exploration of coal, gold, copper, Sulphur and precious stones
3. Crushing, grinding and separation processes including stone crushers

E. Transport

Federal or Provincial highways (except the maintenance, rebuilding or reconstruction of existing metalled roads) with total cost less than Rs 50 million

F. Water management, dams, irrigation and flood protection

1. Small Dams and reservoirs

2. Irrigation and drainage projects

G. Water Supply and Treatment

Water supply schemes and treatment plants with total cost less than Rs. 50 million

H. Waste disposal

Non-hazardous scrap yard / warehouse.

I. Urban development and tourism

1. Housing Schemes less than 300 kanals including Land sub-divisions
2. Multistoried buildings, residential apartments, educational institutions, restaurants and hotels with height more than 70 feet and area more than 02 kanals.
3. Medical colleges and universities, research institutes
4. Hospitals less than 50 beds
5. Urban development projects

J. Other projects

Any other project for which filing of an IEE is required by the *Provincial Agency* under sub regulation (2) of Regulation 5

SCHEDULE II
(See Regulation 4)
List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50MW
2. Transmission lines more than 132 kV and grid stations
3. Nuclear power plants
4. Petroleum refineries
5. Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
6. Renewable Energy projects (including wind and solar) more than 100 MW

B. Manufacturing and processing

1. Cement plant
2. Chemical manufacturing units, including pharmaceuticals and cosmetic
3. Sugar mills and Distilleries
4. Food processing industries including, beverages, milk and dairy products with total cost more than Rs 200 million
5. Paper and paperboard, paper pulping, paints and dyes,
6. Textile units comprising of dyeing & printing
8. Pesticides and fertilizer manufacturing units
9. Poultry waste processing units / rendering units
10. Tannery and leather units
11. Rubber projects with total cost more than Rs. 100 million
12. Battery Manufacturing and Recycling Plants
13. Ceramics and glass units
14. Electro plating and nickel/chrome plating including Surgical Units
15. Cutlery units
16. Slaughter House
17. Iron and steel rolling mills
18. Steel Furnaces
19. Smelting plants
20. Auto mobile manufacturing and assembling units
21. Resource Recovery Units

C. Mining and mineral processing

1. Mining and processing of coal, gold, copper, Sulphur and precious stones

2. Mining and processing of major non-ferrous metals.
3. Commercial extraction of sand using dredger

D. Transport

1. Airports
2. Highways, Motorways, Express ways or major roads
3. Ports and harbor development for ships of 500 gross tons and above
4. Railway works
5. Flyovers, underpass and bridges having total length of more than 500 meters

E. Water management, dams, irrigation and flood protection

1. Medium and large Dams and reservoirs

F. Water supply, Sewerage System and treatment

1. Water supply schemes and treatment plants (excluding the Reverse Osmosis, Ultra filtration and such like) with total cost more than Rs. 50 million
2. Wastewater channels / Sewerage System Schemes
3. Combined Wastewater Treatment Plants with treatment capacity greater than 100m³/hr

G. Waste Storage and Disposal

1. Landfill sites
2. Waste Incinerators and autoclaves
3. Hazardous substance or waste storage warehouse

H. Urban development and tourism

1. Housing Schemes more than 300 kanals
2. Large-scale tourism development projects
3. Hospitals having more than 50 Beds
4. Hotels with more than 100 rooms
5. Industrial estates (including export processing zones)

I. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

J. Other projects

Any other project for which filing of an EIA is required by the *Provincial Agency* under sub-regulation (2) of Regulation 5.

SCHEDULE III
[See Regulation 6 & 7(b)]

IEE and EIA Review Fee

Total Project Cost	IEE	EIA
Upto Rs. 5,000,000	NIL	NIL
Rs. 5,000,001 to 10,000,000	Rs. 10,000	Rs. 15,000
Greater than Rs. 10,000,000	Rs. 15,000	Rs. 30,000

SCHEDULE IV
[(Sec Regulation 7(1)(a))]
Application Form

1.	Proponent details	i. Name of proponent ii. Name of CEO/Partner/MD/Proprietor iii. Office address of proponent iv. Email of proponent
2.	Consultant details	i. Name of consultant ii. Valid certificate of Practice of consultant iii. Letter of authority from proponent in favor of consultant
3.	Project details	i. Location of project _____ ii. Alternative sites, if any _____ iii. Google or scale map of project (and alternative) vicinity clearly showing the distance from nearest settlement, water bodies or other notable geographical features/protected or reserved forests/National Parks/Environmentally Sensitive Areas (Attached) ☐ iv. Objective of project _____ v. Description of project through its life cycle, including details of costs, land required, capacity and production capability, as applicable _____ vi. Project sub-components that fall within list of projects enumerated in Schedule I or II and, if so, details of each _____
4.	Project Category	i. Mention Schedule of Regulations ii. Attached: IEE ☐ EIA ☐
5.	IEE / EIA details	i. Baseline data on meteorology, ambient air quality and groundwater quality ii. Assessment of potential adverse environmental impacts iii. Identification of environmental impacts of the project through its life cycle iv. Assessment of social impacts of project v. Identification and description of preventive, mitigatory and compensatory measures to be adopted vi. Environment Management Plan vii. Monitoring arrangements viii. Project construction labor details _____ ix. Project operation details _____

Verification. I do solemnly affirm and declare that the information given above and contained in the attached IEE / EIA is true and correct to the best of my knowledge and belief.

Name and designation of proponent _____
 Official stamp/seal) _____
 Signature _____
 Date _____

SCHEDULE VI
(See Regulation 11)
Decision on IEE

1.	Name and Address of Proponent	_____
2.	Description of Project	_____
3.	Location of Project	_____
4.	Date of Filing of IEE	_____
5.	After careful review of the IEE, the Provincial Agency has decided –	
(a)	to accord its approval, subject to the following conditions:	

or

(b) **that the proponent should submit an EIA on the following grounds:**

[Delete (a) or (b), whichever is inapplicable]

Dated: _____

Tracking No. _____

SCHEDULE VII
[See Regulation 11]

Decision on EIA

1. **Name and Address of Proponent** _____
2. **Description of Project** _____
3. **Location of Project** _____
4. **Date of Filing of EIA** _____

5. After careful review of the EIA, and all comments thereon, the Provincial Agency has decided:

(a) to accord its approval, subject to the following conditions:

_____or

(b) that the proponent should submit an EIA with the following modifications—

_____ or

(c) to reject the project, being contrary to environmental objectives, for the following reasons:

[Delete (a)/(b)/(c), whichever is inapplicable]

Date: _____

Tracking No. _____

SCHEDULE VIII
[See Regulation 12(2)(a)]

UNDERTAKING

I, _____ (full name and address) as proponent for _____ (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by the Provincial Agency bearing tracking no. _____ dated _____ and undertake to design, construct and operate the project strict in accordance with the said conditions and the IEE/EIA/IEE Checklist.

Date _____

Signature, _____
Name and Designation of Proponent

Official stamp/seal _____

Witnesses

(full names and addresses)

1. _____
2. _____

SCHEDULE IX
[See Regulation 20]
FORM OF REGISTERS FOR IEE AND EIA PROJECTS

No.	Description	Relevant Information
1.	Tracking Number	
2.	Category type (as per Schedules I and II)	
3.	Name of Proponent	
4.	Name and designation of contact person	
5.	Description and Category of project	
6.	Location of project	
7.	Project capital cost	
8.	Date of receipt of IEE/EIA/	
9.	Approval granted (Yes/No)	
10.	Date of approval granted or refused	
11.	Date of extension of approval validity	
12.	Date of Issue of confirmation of compliance	
13.	Date of cancellation, if applicable	

Annexure-III

Schedule Implementation Plan

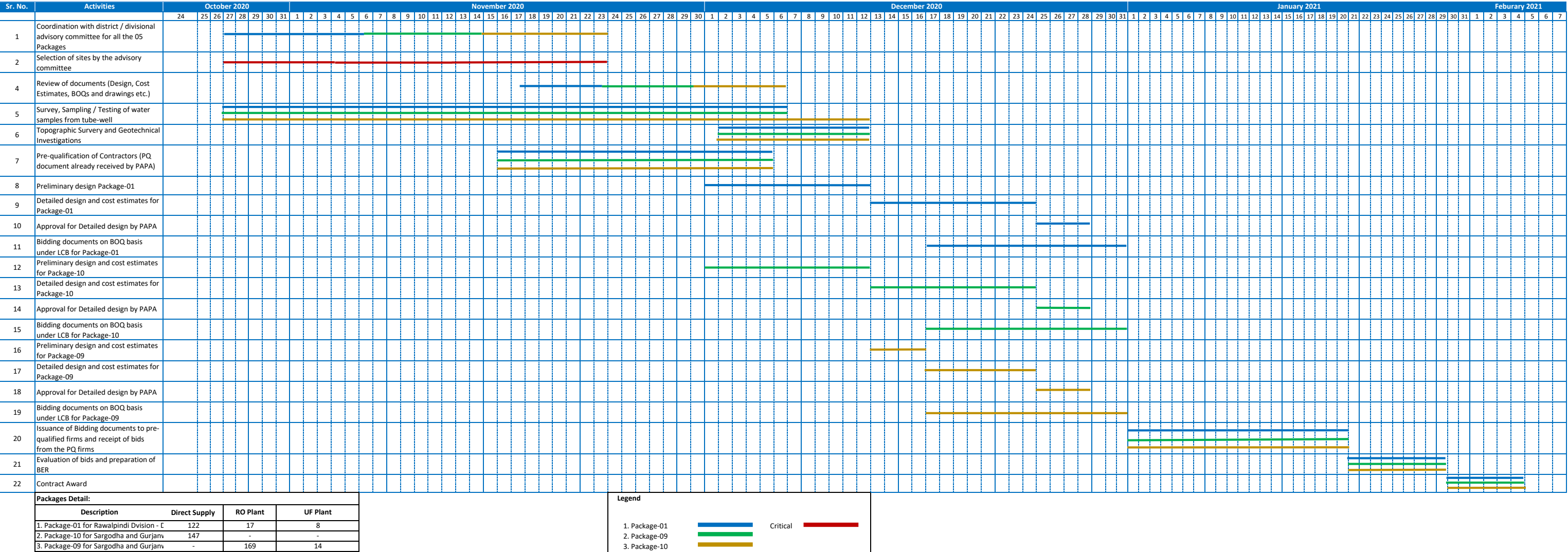
Punjab Aab-e-Pak Authority

Activity Schedule for 03 Contract Packages as per approved PC-I (Stage-I)

1. Package-01 for Rawalpindi Division - Direct Supply + UF/RO Plants (Priority Area)

2. Package-10 for Sargodha and Gurjanwala Division (Direct Supply)

3. Package-09 for Sargodha and Gurjanwala Division (UF/RO Plants)



Annexure-IV

Summary of Cost Estimate for Rawalpindi Division

Package - 1

Summary Sheet		
Sub Head	Description	Detailed Cost Estimate Amount (Rs.)
1	Supply Construction, Installation of Water Filtration Plants & Direct Supply in Rawalpindi Division	239M (PKR)
	Sub Total Capital Cost : -	PKR 238,613,652.04
	O&M charges for 1 Year inclusive of 16% PRA WH	PKR 52,479,773.44
	Total Capital Cost	PKR 291,093,425.48
	Contingencies & Petty Charges 2%	PKR 4,772,273
	Green Punjab Charges 1%	PKR 2,386,137
	PRA Charges 5%	PKR 11,930,683
	Resident Supervision 1.5%	PKR 3,579,205
	Design Charges 1.5%	PKR 3,579,205
	Media Campaign 0.25%	PKR 596,534
	Electric bill Charges for 1 Year	PKR 18,040,320
	New Electric Connection Charges	PKR 2,900,000
	Total: -	PKR 338,877,781
	Say: in Millions	338.88M (PKR)

Summary sheet				
S.No	Description	No of schemes	Amount	Total Amount
A	Supply Construction and installation of RO water filtration plant 2000 LPH in Rawalpindi division			
1	Bore well & Raw water Pump	29	251,234	7,285,775
2	Plant Room 12'x12'	38	962,734	36,583,905
3	Reverse Osmosis Plant 2000 LPH	38	1,932,000	73,416,000
5	Brine Disposal (Injection well) for RO Filtration Plant	10	163,887	1,638,871
6	HDPE Pipe Line Connection	19	123,492	2,346,352
Total Cost of R/O Filtration Plant (1-5)				121,270,903
B	Supply Construction and installation of Pre Filtration plant (S/CA) 2000 LPH with Chlorination in Rawalpindi division			
1	Plant Room	78	962,734	75,093,280
2	Pre Filtration Plant 2000 LPH	78	434,000	33,852,000
3	HDPE Pipe Line Connection	68	123,492	8,397,469
Total Cost of Pre Filtration Plant (1-3)				117,342,749

C	Electric Connections for RO & S/CA			
1	Electric connection charges for RO 2000 LPH	38	25,000	950,000
2	Electric connection charges for Pre Filtration 2000 LPH (S/CA)	78	25,000	1,950,000
Total Electric connection Charges (1)				2,900,000
D	Electric Bill Charges for RO & S/CA			
1	Electricity charges for RO 2000 LPH	38	155,520	5,909,760
2	Electricity charges for PRF 2000 LPH (S/CA)	78	155,520	12,130,560
Total Electric bill Charges (1-2)				18,040,320
E	Operation and Maintenance Cost for RO & S/CA			
1	Operation and Maintenance of RO 2000 LPH	38	399,424	15,178,112
2	Operation and Maintenance of PRF 2000 LPH (S/CA)	78	385,424	30,063,072
Total O&M (1-2)				45,241,184
Add 16% PRA Charges				7,238,589.44
Total O&M Cost				52,479,773

Detailed Engineer's Cost Estimate						
S#	Bill#	Description	Unit	No	Total Cost	
1	Bill#1	Bore well & Raw water pump	Each	1	251,234	
2	Bill#2	Plant room for Filtration plant 12'x12'	Each	1	962,734	
3	Bill#3	Reverse Osmosis Filtration Plant (R/O) 2000 LPH	Each	1	1,932,000	
4	Bill#3.1	Brine Disposal (Injection well) for RO Filtration Plant	Each	1	163,887	
6	Bill#4	Pre Filtration Plant 2000 LPH (S/CA)	Each	1	434,000	
7	Bill#5	HDPE Pipe Line Connection	Each	1	123,492	
Total Bill#(1-5)					3,867,347	
BILL NO.1 : Bore well & Raw feed water pump						
Sr. No.	MRS 2020 B1 Rawalpindi Ref#	Description of items	Unit	Quantity	Rate	Total Amount (Rs)
1	23-1-d	Boring for tubewell in all types of soil except shingle and rock, from ground level to 100 ft. (30 m) depth, including sinking and withdrawing of casing pipe, complete:- (6" dia) 150mm				
			M	30.00	958.10	28,743.00
2	23-2-b	Boring for tubewell in all types of soil except shingle, gravel & rock, from a depth of 100.1 ft. to 200 ft (30 to 60 m) below ground level, including sinking and withdrawing of casing pipe, complete:- (6" dia) 150mm				
			M	30.00	1,492.25	44,767.50
3	6-5-f	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate): Ratio 1: 2: 4				
			M	0.50	7,910.60	3,955.30
4	6-6-a ii 2	Providing and laying reinforced cement concrete (including prestressed concrete), using coarse sand and screened graded and washed				

		aggregate, in required shape and design, including forms, molds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):- (a)(ii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- (nominal mix 1: 1½: 3)				
			M	1.50	10,440.60	15,660.90
5	23-13-b	Providing and installing P.V.C. Bail/End plug, in tube well bore hole: - (4" dia). (100 mm)				
			Each	1.00	86.50	86.50
6	23-11-b	Providing and installing, P.V.C. strainer B.S.S. Class 'B' in tube well bore hole, including sockets and solvents, etc. complete. 4" dia (100mm).				
			M	10.00	608.55	6,085.50
7	23-15-b	Providing and installing P.V.C. blind pipe, B.S.S. Class 'B', in tube well bore hole, including sockets and solvents and jointing with strainer, etc. complete (4" dia)				
			M	55.00	751.2	41,316.00
8	23-18	Shrouding with graded pea gravel 3/8" to 1/8" (10 to 3 mm), around tube well in bore hole.				
			M3	10.00	3,357.15	33,571.50
9	23/17	Testing and developing of tube well of size 6" (150 mm) i/d and above continuously.				
	a	up to 1.5 cs. Discharge	Hour	12.00	1324.55	15,894.60
10	N.S	Providing, fixing, jointing and testing Polypropylene Random Copolymer (PPRC) PN20 pressure pipe for cold and hot water as per DIN 8077-8078, PN 20 for pipes and DIN 16962, PN 25 for				

		fittings (polyfusion welded joints) inside building including fittings and specials (sockets, tees, elbows, bends, crosses, reducers, adaptor, plugs and union etc.) supported on walls or suspended from roof slab or run in chases including pipe hangers, supports, cutting and making good the chases and holes, complete in all respects.				
			M	10.00	1,263.00	12,630.00
11	N.S	Supply & installation of 1/2" i/d thick M.S Cap for 12" housing pipe joint by means of welding & hinges with lock & locking arrangements.				
			Each	1.00	2,522.81	2,522.81
12	N.S	Taking of water samples (2 bottles each) at the end of the pumping test. Full chemical and bacteriological analysis, of water samples according to Pakistani standard.				
			Each	1.00	6,000.00	6,000.00
13	N.S	Providing and Fixing of 4 inch submersible pump with an operating head up to 130m including installation with supporting clamp, pump coupling, cable clip, cable complete in all respect.				
			Job	1.00	40,000.00	40,000.00
Total Cost of Bore well						251,234
Bill No-2 Construction of Plant Room						
Sr. No.	MRS 2020 B1 Rwp Ref#	Description of items	Unit	Quantity	Rate	Total Amount (Rs)
	1	CIVIL WORKS				
1	CH:3/21-b	Excavation in foundation of building, bridges and other structures, including dag belling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (in ordinary soil).				
			Cu.m	24.26	271.50	6,586
2	CH:26/42	Spraying anti-termite liquid mixed with water in the ratio of 1:40.				
			Sq.m	82.83	26.05	2,158

3	CH:03-15(i)	Filling watering and ramming earth under floor with surplus earth from foundation etc.				
			Cu.m	24.26	130.15	3,157
4	CH:6/ 3-b	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:-				
			Cu.m	8.55	4,867.15	41,599
5	CH:6/6-a-ii-3	Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-				
			Cu.m	5.66	9,430.45	53,388
6	CH:6/6-a-i-3 c	Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or pre-stressed members cast in situ, complete in all respects (Ratio 1: 2: 4) (cylindrical strength of concrete 3000 Psi)				
			Cu.m	6.16	13,190.25	81,300
7	CH:6/9-c	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars deformed bar (Grade-60)				
			kg	1532.57	151.84	232,708
8	CH:7/ 4-i	Pacca brick work in foundation and plinth in:- Ratio (1:5).				
			Cu.m	3.03	7,309.50	22,184
9	CH:6/35-b-ii-b	Providing and laying damp proof course with cement sand plaster (1: 3) and ¾" thick and bitumen coating with two coats of bitumen.				
			Sq.m	2.20	404.90	889

10	CH:7/ 5-i	Pacca brick work in ground floor:-:- Ratio (1:5)				
			Cu.m	13.71	7859.45	107,773
11	CH:11/10-b	Cement plaster 3/8" (10 mm) thick under soffit of R.C.C. roof slabs only, upto 20' height. With cement sand mortar 1:3				
			Sq.m	17.29	261.20	4,515
12	CH:11/9-b	Cement plaster (1:4) up to 20'-0" high ½" thick				
			Sq.m	94.74	228.95	21,690
13	CH:11/9-c	Cement plaster (1:4) up to 20'-0" high ¾" thick				
			Sq.m	10.00	304.30	3,043
14	CH:'11-33	Providing and fitting expanded metal edge bead for corners, with nails on both sides of edges.				
			Rft	20.00	137.60	2,752
15	CH:11/ 18-b	Cement pointing struck joints, on walls, upto 20' (6.00 m) height:- b) ratio 1:3				
			Sq.m	38.02	238.65	9,075
16	CH:25/31	Making and fixing steel grated door with 1/16" thick (1.5mm) sheeting, including angle iron frame 2"x2"x3/8" (50x50x10 mm) and ¾" (20 mm) square bars 4" (100 mm) center to center, with locking arrangement.				
			Sq.m	4.55	12642.2	57,571
17		Making and fixing steel grated doors, complete with locking arrangement, angle iron frame 2"x2"x3/8" (50x50x10 mm) and ¾" (20 mm) square bars 4" (100 mm) centre to centre.				
	CH:25/32		Sq.m	2.93	5319.55	15,573
18	CH:25/41-b-v	Providing and fixing steel windows with openable glazed panels, using beam section for frame 1½"x1"x5/8"x1/8" (40x25x16x3 mm), Z-section for leaves ¾"x1"x¾"x1/8" (20x25x20x3 mm), T- section sashes 1"x1"x1/8" (25x25x3 mm), glass panes, wooden screed for glazing embedded over a thin layer of putty duly screwed with leaves, brass				

		fittings, holdfast, duly painted, complete in all respects, including all cost of material and labour, etc. as per approved design and as directed by the Engineer-in-charge: Fixed with wire gauze, 22 SWG i/c Glass pane 5 mm thick				
			Sq.m	0.98	5593.4	5,458
19	CH:6/5-f	Cement concrete plain including placing, compacting, finishing and curing complete including screening and washing of stone aggregate 1:2:4				
			Cu.m	2.59	7910.6	20,502
20	CH:10-23.	Providing and laying floor of mosaic marble chips tiles 1"(25 mm) thick of approved quality and shade, laid in white cement and pigment, over ¾"(20 mm) thick bedding of cement sand mortar 1:2, including finishing and polishing, complete.				
			Sq.m	2.42	987.95	2,387
21	CH:10-24.	Laying floor of approved white glazed tile ¾" (6 mm) thick in white cement 1:2 over ¾" (20mm) thick cement mortar 1:2, complete.				
			Sq.m	13.87	1,675.20	23,236
22	CH:10-37.	White glazed tile (6"x6"x¼") (6 mm) thick dado jointed in white cement and laid over 1:2 cement sand mortar ¾" (20mm) thick, including finishing.				
			Sq.m	15.24	1,835.70	27,979
23	CH:'10-38	Color glazed tile (6"x6"x1/4") thick dado jointed in white cement and laid over 1:2 cement sand mortar ¾" thick including finishing				
			Sq.m	4.46	2,001.25	8,928
24	CH:11-22	Priming coat of chalk under distemper.				
			Sq.m	48.00	20.20	970
25	CH:11/ 23-a	Preparing surface and painting with Distemper 2coats				
			Sq.m	43.54	113.65	4,948
26	CH:9/5 + 26/37-ii	Single layer of tiles 9"x4½"x1½" (225x113x40 mm) laid over 4"(100 mm) earth and 1" (25 mm) mud plaster without Bhoosa, grouted with cement				

		sand 1:3 on top of RCC roof slab, provided with 34 lbs. per %Sft. or 1.72 Kg/Sq.m bitumen coating sand blinded i/c polythene sheet 500 gauge.				
			Sq.m	12.64	822.90	10,401
27	CH:9/44.	Reinforced cement concrete spout, including fixing in position, with top and bottom Khurras				
			Each	2.00	828.80	1,658
28	CH:9/20-a	Cast iron rain water downpipe fixed in position, excluding heads and shoes, but including painting and clamps, etc:-				
			Metre	7.92	759.80	6,021
29	CH:9/21.	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting				
			Each	4.00	586.80	2,347
30	CH:9/22.	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.				
			Each	4.00	339.65	1,359
31	CH:21-8.	Constructing standard gully grating chamber, 3'x2½' (900x750 mm), with chinaware trap as per PHED Drawing STD/PD No. 3 of 1977, complete in all respects.				
			Each	1.00	10136.55	10,137
32	CH:25/10.	Fabrication of heavy steel work, with angle, tees, flat iron round iron and sheet iron for making trusses, girders, tanks, etc., including cutting, drilling, rebitting, handling, assembling and fixing, but excluding erection in position.				
			Kg	200.00	166.96	33,391
33	CH:25/32.	Making and fixing grating in opening, including fixing at site with flat iron 2"x3/8" (50x10 mm) and ¾" (19 mm) square bars, at 4" (100 mm) centre to centre.				
			Sq.m	1.42	5,319.55	7,538
34	CH:13/5-d-i &-ii	Painting new surface:-Preparing surface and painting guard bars, gates of iron				

		bars, gratings, railing (including standards braces, etc.) and in similar open work Three Coats including priming coat.				
			Sq.m	21.846	84.75	1,851
35	CH:13/32A-i &-ii	Providing and applying weather shield paint of approved quality on external surface of building including preparation of surface, application of primer complete in all respect: (new surface) Two Coat				
			Sq.m	29.80	257.05	7,661
36	NS	Supply, install, test and maintain domestic cold/Hot water polypropylene (PPRC) with minimum working pressure 15 bars at 20C° "Tigris, Green" or approved equal pressure pipe for cold water supply as per DIN 8077-8088 for pipes and DIN 16962 for fitting (polyfusion welded joints) inside building including specials (sockets, tees, elbows, bends, crosses, reducers, plug and union etc.) supported on walls or suspended from roof slab or run in chase including pipe hangers, supports, cutting and making good the chases and holes, complete in all respect as shown on drawings and in accordance with the Specifications.				
		PPRC Pipe 50 mm dia	Meter	5.00	575.00	2,875
		PPRC Pipe 32 mm dia	Meter	5.00	424.00	2,120
37	CH:19/26.	Providing and fixing chromium plated bib cock:- ii) 1.5 cm (1/2").				
			Each	8.00	340.60	2,725
38	CH:19/8-iii Rep	Providing and fixing brass ball float valve:- 2.5 cm (1") dia				
			Each	2.00	373.25	747
39	CH:23/26-b	Providing, laying, cutting, jointing, testing and disinfecting U.P.V.C. pipe line with 'B' Class working pressure pipe, in trenches, complete in all respects 4" i/d (100 mm):- as per drawing, specifications and approval of the Engineer.				

			M	10.00	651.10	6,511
40	CH:11/31.	Extra cost of labour and material for red oxide pigment in cement pointing to match with the colour of bricks.				
			Sq.m	38.02	38.75	1,473
41	CH:10/43-a	Providing and laying Tuff pavers, having 7000 PSI, crushing strength of approved manufacturer, over 2" to 3" sand cushion i/c grouting with sand in joints i/c finishing to require slope . Complete in all respect. 50-mm thick				
			Sq.m	6.97	988.95	6,893
TOTAL COST OF CIVIL WORKS (1)						866,076
2	ELECTRIFICATION WORKS					
1	CH-24/3 ii) & iii)	Supply and erection of PVC pipe for wiring recessed in walls, floors, roofs including inspection boxes, pull boxes, hooks, cutting jharries, and repairing surface, etc., complete with all specials. i) 20 mm	M	44.00	157.60	6,934
		ii) 25 mm	M	10.00	181.35	1,814
2	CH-24/1-a ii)	Supply and erection of G.I. pipes for wiring purposes, including pull boxes, inspection boxes, bends, tees, etc. complete with all specials (on surface, including clamps, etc.) i) 20 mm	M	5.00	415.25	2,076
3	CH-24/13-a v)	Supply and erection of PVC insulated, PVC sheathed twin core, 250/440 volts copper conductor cables for service connection, in prelaid pipe/G.I. wire/trenches, etc. (rate for cable only):- i) 7/0.044"	M	11.00	232.25	2,555
4	CH-24/11 i), ii), iii) & vi)	Supply and erection of single core PVC insulated, PVC sheathed copper conductor, 250/440 volts grade cable (BSS-2004), in prelaid PVC pipes/M.S. conduit/G.I. pipe/wooden strip batten/wooden casing and capping/trenches, etc. (rate for cable only):-				

		i) 3/0.029"	M	70.00	40.40	2,828
		ii) 3/0.036"	M	65.00	50.25	3,266
		iii) 7/0.029"	M	20.00	64.25	1,285
		vi) 7/0.064"	M	8.00	232.65	1,861
5	NS	Supply and installation of 4" deep u-PVC concealed switch box for recessed wiring, including making holes for regulators, switches, plugs, etc.	No.	2.00	34.94	70
	CH-24/39 i)	Supply and erection of button holder (bakelite large size).	No.	2.00	32.25	65
6	CH-24/31(ii)	Supply and erection of switches 5 Amp Piano type	No.	4.00	38.30	153
	NS	Supply and erection of 2 Pin switch with socket.	No.	1.00	469.34	469
7	NS	Supply and erection of Recessed Mounted Fluorescent Light Weather Proof Fixture , complete with 2x36 Watt Fluorescent Rods, complete in all respect as approved by the engineer.	Set	1.00	5,526.10	5,526
8	NS	Supply and erection of Recessed Mounted Fluorescent Light Weather Proof Fixture, complete with 1x36 Watt Fluorescent Rods, complete in all respect as approved by the engineer.	Set	1.00	4,920.50	4,921
9	CH-24/43 ii)	Supply and erection of Single rod (40 watts) with one choke and one starter tube light, including rod, choke, starter with frame, flexible wire, including connection from ceiling rose, etc., complete.	Set	2.00	737.50	1,475
10	NS	Supply, installation and commissioning of ceiling fan 56" Sweep complete with capacitor, hanging rod, canopy blades, of approved quality, nuts, bolts, from recommended manufacturer, complete in all respects.	No.	1.00	3,641.00	3,641
11	CH-24/49	Supply and erection of 3/8" (10 mm) dia M.S. bar fan hook, placed at the time of casting of slab.	No.	1.00	43.90	44
12	CH-24/30	Supply and erection of ceiling rose, bakelite.	No.	1.00	41.65	42
13	CH-24/79	Supply and fitting of regulator knob with shaft and plat of electric fan regulator.	No.	1.00	126.65	127

14	NS	Supply, installation and commissioning of Exhaust Fans 12" size metallic body, louvers, all necessary fixing accessories, from recommended manufacturer, complete in all respects.	No.	1.00	3,386.88	3,387
15	NS	Providing and Fixing 12x15 6" deep steel DB Box include 100Amp and 4Nos 20Amp and 12 Nos 10Amp include Voltmeter Amp Meter and Lights. Complete all respect or as directed by Engineer In charge.	No.	1.00	8,700.00	8,700
16	NSI	Supply, Installation, testing and commissioning of Earthing set complete with accessories (Rod length should be 3 meter) as per drawings. To achieve Earthing value less than 1 Ohm, complete in all respects as approved by Engineer In charge.	Set	1.00	45,420.00	45,420
TOTAL COST OF ELECTRIFICATION WORKS (2)						96,658
TOTAL AMOUNT (1+2) =						962,734
Bill No-3 Reverse Osmosis Filtration Plant						
S.No	MRS Ref#	Description	Unit	Quantity	Rate	Amount
1	NSI	Supply, Installation, testing & commissioning of 2,000 L/H Reverse Osmosis (RO) Plant for TDS removal up to 5000 mg/l and removal of other contaminants, including carriage, loading/unloading charges inclusive of all taxes conforming to standard specifications of filtration plants. Control PLC GSM/GPRS, SCADA enabled. The specifications along with equipment and accessories properly mounted in the frame/skid are given below:				
1		ENERGY SOURCE: WAPDA	Each	1	1932000	1,932,000
2		PUMPS AND MOTORS:				
		Bore Pump				
		Numbers				
2.1		Origin: EUROPE/USA/GERMAN/PAKISTANI or EQUIVALENT				
		Pump Type: Submersible				
		Impeller material: SS304				

		Housing material: As per manufacturer				
		Discharge: Required as per the capacity of the plants (4000 LPH)				
		Total Operating Head: Up to 130m				
		Pump efficiency: >60%				
		Motor Manufacturer: as selected by plant manufacturer				
		Motor Power rating, kw: as selected by plant manufacturer				
		Motor Starter: Star Delta				
2.2		Feed Pump				
		Numbers: 1				
		Origin: EUROPE/USA/GERMAN/PAKISTANI or EQUIVALENT				
		Pump Type: Vertical/ horizontal Low-Pressure Pump				
		Impeller material: SS304				
		Housing material: As per manufacturer				
		Discharge: Required as per the capacity of the plants (4000 LPH)				
		Operating Head: Up to 06 Barg				
		Pump efficiency: >60%				
		Motor Manufacturer: as selected by plant manufacturer				
		Motor Power rating, kw: as selected by plant manufacturer				
		High Pressure Pump				
2.3		Numbers: 1				
		Origin: EUROPE/USA/GERMAN/ or EQUIVALENT				
		Pump Type: Vertical/ horizontal High-Pressure Pump				
		Impeller material: SS304				
		Housing material: As per manufacturer				
		Discharge: Required as per the capacity of the plants (4000 LPH)				
		Operating Head: Up to 06 Barg				
		Pump efficiency: >60%				

		Motor Manufacturer: as selected by plant manufacturer				
		Motor Power rating, kw: as selected by plant manufacturer				
		Motor Starter: Star Delta				
		Motor Temperature class: 45°C				
3		PRE-FILTRATION				
3.1		Sand Filter:				
		Number				
		Origin: EUROPE/USA/GERMAN or EQUIVALENT				
		Material: FRP				
		Certification / Stander:NSF				
		Filtration rate:6-15 m/h				
		Operating Pressure Max:Up to 6 Barg				
		Filter media Sand				
		Make				
		Material: Quartz Silica Sand				
		Origin: EUROPE/USA/GERMAN/PAKISTAN/ASIA or EQUIVALENT				
		Size of Media:0.6 to 0.8 mm				
		Cleaning Process: Automatic, through PLC / Time Controller MPV				
	3.2		Activated Carbon Filter			
		Number: 1				
		Origin: EUROPE/USA/GERMAN or EQUIVALENT				
		Material: FRP				
		Certification / Stander:NSF				
		Filtration rate:5-15 m/h				
3.2.1		Operating Pressure Max:Up to 6 Barg				
		Filter media Carbon				
		Media Bed Height: >800mm				

		Origin: EUROPE/USA/GERMAN/ASIA or EQUIVALENT				
		Certification / Stander: NSF				
		Material / Make: Coconut shells				
		Iodine No: 850 to 1000				
		Size of Media: 1.2 - 1.6 mm				
		Surface Area: 900m ² /g				
		Bulk Density: 440-540kg/m ³				
		Hardness No. 80				
		Ash Contents: 5%				
		Height of Gravel: 200mm				
		Dosing Pump				
4		Numbers				
		Origin: EUROPE/USA/GERMAN or EQUIVALENT				
		Material to be handle : Anti Scalent				
		Pump Capacity (Dimensions): 0.2 to 5 LPH				
		Pressure: 0.5-0.7 barg				
		Material: PVDF				
		Ambient Temperature: Up to 45°C				
5		Control Panel				
		HMI 10" display with touch screen				
		Number: 1				
		PLC Origin: EUROPE/USA/GERMAN or EQUIVALENT				
6		Pressure Gauges				
		Origin: EUROPE/USA/GERMAN or EQUIVALENT				
		Operating Pressure: 0-10 Barg				
		Material and dial: SS 304				
		Wetted material: Brass				
		Lens: Acrylic				

7		Water Meter (Totalizer)				
		Number: 1				
		Origin: EUROPE/USA/GERMAN or EQUIVALENT				
		Type of meter: Dial type				
8		Water Flow Meter				
		Number: 1				
		Origin: EUROPE/USA/GERMAN or EQUIVALENT				
		Type of meter: Rotameter/ Float type				
		Material: Acrylic				
9		Ball valve				
		Numbers				
		Origin: EUROPE/USA/GERMAN/PAKISTANI or EQUIVALENT				
		Material of seat:SS-304/ SS-316 L/UPVC				
		Operating Pressure:17 Barg				
		Ambient Temperature: Upto 45°C				
10		Non returning valve				
		Numbers				
		Origin: EUROPE/USA/GERMAN/PAKISTANI or EQUIVALENT				
		Material of seat:SS-304/ SS-316 L/UPVC				
		Ambient Temperature: Up to 45°C				
11		Gate Valve				
		Manufacturer				
		Numbers				
		Origin: EUROPE/USA/GERMAN/PAKISTANI or EQUIVALENT				
		Material of seet: SS-304/ SS-316 L/UPVC				
		Operating Pressure:17 Barg				

		Ambient Temperature: Up to 45°C				
12		Level Meter/Float Valve/ Switch				
		Number:2				
		Origin: EUROPE/USA/GERMAN/ PAKISTANI or EQUIVALENT				
13		Membrane Section				
		RO Plant Design / Origin				
		Manufacturer				
		Ambient Temperature: Up to 45°C				
		Design Salinity: Up to 5000 mg/L				
		Permeate Recovery: >50%				
		Country Make: EUROPE/USA/GERMAN/ or EQUIVALENT				
		No. of Stages: Up to 4 / As per projection of manufacturer				
		Reverse Osmosis Membranes: Low Energy Poly amide				
		No. of Membranes: Up to 08				
		Stable Salt Rejection:99%				
		Array Installation:1-2 membrane in each/ / As per projection of manufacturer				
		Life of RO Membrane: Minimum 03 years				
		Pressure Vessels: As per required				
		Pressure rating: Up to 17 barg				
		Certification: NSF/ANSI				
		Cartridge Filters				
		Porosity 1&5 Micron size 20"				
		Material: Melt Blown PP				
		No of filters: As per flow of 04m3/hr				
		Size: As per flow of 04m3/hr				
		Storage Tanks for Raw and Product water				
14		Number :01 Raw + 01 Product				

15		Capacity:2000L each				
		Material: PE- Food Grade				
		UV Lamps on Blend bypass line				
		Origin: EUROPE/USA/GERMAN or EQUIVALENT				
		Material of casing:SS-304/ SS-316 L/UPVC				
		Operating Pressure:04 Barg				
		Ambient Temperature: Up to 45°C				
	Total Cost of 2000 LPH RO Plant					1,932,000
Bill No-3.1 Brine Disposal (Injection well) for RO Filtration Plant						
S.No	MRS 2020 B1 RWP Ref#	Description	Unit	Qty	Rate	Amount
1	CH:3/4 B1	Borrow pit excavation undressed lead up to 100 ft. (30 meter).				
		a)Ordinary	M3	18	179.9	3,238
2	CH:23/1 B1	Boring for tube well in all types of soil except shingle and rock, from ground level to 100 ft. (30 m) depth, including sinking and withdrawing of casing pipe, complete:-				
		5" 125mm	M3	30	632.45	18,974
3	CH:23/2 B1	Boring for tube well in all types of soil except shingle, gravel & rock, from a depth of 100.1 ft. to 200 ft. (30 to 60 m) below ground level, including sinking and withdrawing of casing pipe, complete:-				
		5" 125mm	M	30	1061.65	31,850
4	CH:23/3 B1	Boring for tube well in all types of soil except shingle, gravel & rock, from a depth of 200.1 ft. to 300 ft. (60 to 90 m) below ground level, including sinking and withdrawing of casing pipe, complete:-				
		5" 125mm	M	30	1484.15	44,525
5	CH:23/26 B1	Providing, laying, cutting, jointing, testing and disinfecting P.V.C. pipe line with 'B' Class working pressure pipe, in trenches, complete in all respects				
		4" 100mm	M	90	651.1	58,599

6	CH:23/11 B1	Providing and installing, P.V.C. strainer B.S.S. Class 'B', in tube well bore hole, including sockets and solvents, etc. complete:-				
		3" 75 mm	M	16	418.9	6,702
		Total Cost of Brine Disposal				163,887

Bill No-4 Pre Filtration Plant (S/CA)

S.No	MRS Ref#	Description	Unit	Qty	Rate	Amount
1	NSI	Supply, transport, erection, installation, testing and commissioning of 2000 litter/hour Pre-Filtration skid mounted plant. The unit should be composed of Raw and Product water tanks (2000Liter capacity for each) Feed pump, Rely Logic Control, pressure gauges, variable area flow meter for raw water and for product water totalizer/ water meter, pressure safety switch and valves, Multiport valves, safety filter strainers/cartridges filter, sand filter, carbon filters. System should be fully automatic. Sand filter: NSF Certified Vessels with filtration media of high quality graded silica sand/quartz. Activated Carbon Filter (NSF Certified Media and Vessel.) Specs Attached	No	1	434,000	434,000
		Provision of Chlorination system with 01 Chlorination PVDF based Pumps and 01 chemical day tank. The complete plant should be able to operate/backwash automatically through Automatic Multi-pore Valve with same feed pump based system. All type of piping and instrumentation shall be considered as part of filtration plant complete in all respect and inclusive of all taxes. The plant should be supplied to provide the treated water as per the WHO limits.				
	Total Cost of 2000 LPH Pre filtration Plant (S/CA)					434,000

Bill#5: HDPE Pipe line Connection

Sr. No.	MRS 2020 B1 RWP	Description of items	Unit	Qty	Rate	Total Amount (Rs)
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1	CH:3/44	Excavation of trenches in all kinds of soil, except cutting rock, for water supply pipelines up to 5 ft. (1.5 m) depth from ground level, including trimming, dressing sides, leveling the beds of trenches to correct grade and cutting pits for joints, etc. complete in all respects.	M3	31.92	193.3	6,171
2	CH:7/I-30	Supplying and filling sand under floor; or plugging in wells. For pipe bedding	M3	11.61	615.7	7,147
3	CH: 3/5 (III)	Earthwork in ordinary soil for embankments lead up to 100 ft. (30 m), including ploughing & mixing with blade grade or disc harrow or other suitable equipment, and compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects: iii) 85% maximum modified AASHO dry density.	M3	18.25	217.95	3,977
4	CH:23/I42	Providing, laying, cutting, jointing, testing and disinfecting HDPE pipe line in trenches as per specifications complete in all respects:				
	b-i	3", 90mm i/d HDPE ,PN 10	M	99.969521	570.2	57,003
5	NSI	Providing, laying and jointing, testing and disinfecting, High Density Polyethylene Fitting (Tees, Cross bend, Elbow, Stub ends, etc) (PE-100) of PN-10 conforming to ISO-4427 or Din 8074/8075 or equivalent standards.				
a	1	Spigot elbow 900				
		90mm	Each	3	2600.4	7,801
b	2	Equal Tee				
		90mm	Each	3	3291.6	9,875
c	3	Stub End				
		90mm	Each	4	2709.6	10,838
d	4	End Cap				
		90mm	Each	4	1555.6	6,222
6	NSI	Providing and fixing of jibould joints I/c cost of nuts and bolts rubber rings complete in all respect.				
		3" dia	Each	6	1143	6,858

7	NSI	M/s flanges includes nuts and bolts and gaskets				
		3" dia	Each	8	950	7,600
Total Cost of Connection Pipe HDEP						123,492

Measurement sheet of plant room							
S.No	Description	Unit	No	Length	Width	Height	Quantity
3/21-b	Excavation in foundation of building, bridges and other structures, including dag belling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (in ordinary soil).						
1	A-C/4 (F1)	Cft	2	6	6	3.5	252.00
2	C/1 (F1)	Cft	1	6	6	3.5	126.00
3	A-B/1 (F1)	Cft	1	9.16	6	3.5	192.36
4	D/2-3 (F2)	Cft	2	4	4	3.5	112.00
	Front short wall Lift, Right side	Cft	2	10.25	1.5	1	30.75
	Front wall	Cft	1	12	1.5	1	18.00
5	Plinth protection Back Side	Cft	1	19.83	2	1	39.66
5	Plinth protection Right, Lift side	Cft	2	21.5	2	1	86.00
Total Cft							856.77
Total M3							24.26
26/42	Spraying anti-termite liquid mixed with water in the ratio of 1:40.						
1	A-C/4 (F1)	Cft	2	6	6		72.00
2	C/1 (F1)	Cft	1	6	6		36.00
3	A-B/1 (F1)	Cft	1	9.16	6	2	109.92
4	D/2-3 (F2)	Cft	1	13.08	6		78.48
5	Front short wall Lift, Right side	Cft	2	10.25	1.5		30.75
6	Front wall	Cft	1	12	1.5		18.00
7	Plinth protection Back Side	Cft	1	19.83	2		39.66
8	Plinth protection Right, Lift side	Cft	2	21.25	2		85.00
9	Floor area	Sft	1	19.83	21.25		421.39

Total Sft							891.20
Total M2							82.83
3/15 ii & 17	Filling watering and ramming earth under floor with surplus earth from foundation etc.						
1	Back filling under floors and in foundation	M3	1			24.26	24.26
Total CM3							24.26
Total Back filling in M3							24.26
6/3-b	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:-						
1	A-C/4 (F1)	Cft	2	4.5	4.5	0.25	10.13
2	C/1 (F1)	Cft	1	4.5	4.5	0.25	5.06
3	A-B/1 (F1)	Cft	1	8.66	4.5	0.25	9.74
4	D/2-3 (F2)	Cft	2	4.5	4.5	0.25	10.13
	Front short wall Lift, Right side	Cft	2	10.25	1.5	0.5	30.75
	Front wall	Cft	1	12	1.5	0.5	18.00
5	Plinth protection Back Side	Cft	1	19.83	2	0.75	29.75
6	Plinth protection Right, Lift side	Cft	2	21.25	2	0.75	63.75
7	Plinth protection Back Side	Cft	1	24	2.25	0.25	13.50
8	Plinth protection Right, Lift side	Cft	2	21	2.25	0.25	23.63
9	Under floor	Cft	1	12	12	0.33	47.52
10	Verandah Under floor	Cft	1	12	8	0.33	31.68
11	Powder Tank	Cft	1	5	5	0.33	8.25
	Total Cft						301.88
	Total M3						8.55
7/4-i	Pucca Brick Work in Ground Floor Ratio (1:5) :-						
1	Front short wall Lift, Right side	Cft	2	9.83	1.125	0.5	11.06
2	Front wall	Cft	1	12	1.125	0.5	6.75
3	Plinth Protection Brick Work Back side	Cft	1	19.5	1.125	0.5	10.97

4	Plinth Protection Brick Work Right ,Lift	Cft	2	22.125	1.125	0.5	24.89
5	Front short wall Lift, Right side	Cft	2	9.83	1.125	0.5	11.06
6	Front wall	Cft	1	12	1.125	0.5	6.75
7	Plinth Protection Brick Work Back side	Cft	1	19.5	1.125	0.5	10.97
8	Plinth Protection Brick Work Right ,Lift	Cft	2	22.125	1.125	0.5	24.89
9	Front short wall Lift, Right side	Cft	2	9.5	0.75	0.75	10.69
10	Front wall	Cft	1	12	0.75	0.75	6.75
11	Plinth Protection Brick Work Back side	Cft	1	19.16	1.125	0.5	10.78
12	Plinth Protection Brick Work Right ,Lift	Cft	2	22.5	1.125	0.5	25.31
	Total Cft						107.20
	Total M3						3.03
7/5-i	Pucca Brick Work in Ground Floor Ratio (1:5) :-						
	9" Wall						
1	1,4/A-C	Cft	2	13.5	0.75	11.25	227.81
2	A,C/1-4	Cft	2	13.5	0.75	11.25	227.81
3	PRODUCT WATER TANK Wall	Cft	2	5	0.75	4	30.00
4	Step up Portion Taps	Cft	1	34	0.75	1	25.50
5	Front short wall Lift, Right side	Cft	2	8.75	0.75	2	26.25
6	Front wall	Cft	1	5	0.75	2	7.50
7	Main Door Column Pillar	Cft	2	4.5	0.1875	4	6.75
8	Parapet Wall 1,4/A-C	Cft	2	13.5	0.75	1.83	37.06
9	Parapet Wall A,C/1-4	Cft	2	12	0.75	1.83	32.94
10	D/d of column (15x15)	Cft	-5	1.25	1.25	11.25	- 87.89
11	D/d of Door	Cft	-1	7	0.75	8.5	- 44.63
12	D/d of Door Lintel Beam	Cft	-1	8.5	0.75	0.75	- 4.78
	Total Cft						484.33
	Total M3						13.71

6/9-C	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labor charges for binding of steel reinforcement (also includes removal of rust from bars): (Grade 60)						
1	Total Steel in Kg						349.71
	Total Steel in Ton						0.35
CH:6/6-a-ii-3	Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and other structural members other than those mentioned in 5(a) (i) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
1	A-C/4 (F1)	Cft	2	4	4	1.25	40.00
2	C/1 (F1)	Cft	1	4	4	1.25	20.00
3	A-B/1 (F1)	Cft	1	8.16	4	1.25	40.80
4	D/2-3 (F2)	Cft	2	4	4	1	32.00
5	Neck Column C1	Cft	5	1.25	1.25	2.5	19.53
6	Neck Column C2	Cft	2	0.75	0.75	1.5	1.69
7	P.Beam1,4/A-C	Cft	2	11	0.75	1.25	20.63
8	P.Beam A,C/1-4	Cft	2	13.5	0.75	1.25	25.31
	Total Cft						199.96
	Total M3						5.66
6/6-a-i-3- c	Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or pre-stressed members cast in situ, complete in all respects (Ratio 1: 2: 4) (cylindrical strength of concrete 3000 Psi)						
1	Column C1	Cft	5	1.25	1.25	11.25	87.89
2	Column C2	Cft	2	0.75	0.75	5	5.63
3	Drop beam 1,4/A-C	Cft	2	11	0.75	0.75	12.38
4	Drop beam A,C/1-4	Cft	2	13.5	0.75	0.75	15.19
5	Slab 1-4/A-C	Cft	1	13.5	13.5	0.5	91.13
6	Door Lintel Beam	Cft	1	8.5	0.5	0.75	3.19
7	Verandah shead	Cft	1	14	0.5	0.33	2.31
	Total Cft						217.70
	Total M3						6.16
6/33-b-i	3 Providing and laying damp proof course of cement concrete 1:2: 4(using cement, sand and shingle), including bitumencoating with two coat of bitumen 1-1/2" :-						

1	Room Long Wall	Sft	2	15.58	1.5		46.74
2	Room Short Wall	Sft	2	13.5	1.5		40.50
3	Verandah Short Wall	Sft	2	9	0.75		13.50
4	Verandah Long Wall	Sft	1	15.58	0.33		5.14
5	Brick Pillar	Sft	4	1.125	1.125		5.06
	Total Sft						110.94
	Total M2						
6/35-b-ii-b	Providing and Laying Damp proof course of with cement sand plaster (1:3) and 3/4" thick and bitumen coating with two coat of bitumen						
1	Front Wall Lift, right side	Sft	2	8.75	0.75		13.13
2	Front Wall	Sft	1	14	0.75		10.50
	Total Sft						23.63
	Total M2						2.20
11/10-b	Cement Plaster 3/8" (10mm) thick under soffit of RCC roof slab only, up to 20' height with cement sand mortar 1:3						
1	Room Slab	Sft	1	13.5	12		162.00
2	Verandah Slab	Sft	1	12	2		24.00
	Total Sft						186.00
	Total M2						17.29
11/9-b	Cement Plaster (1:4) up to 20'-0" height 1/2" thick						
1	1,4/A-C	Sft	2	12		12	288.00
2	A,C/1-4	Sft	3	12		12	432.00
3	Verandah Long wall internal	Sft	1	5		2	10.00
4	Verandah Short Wall internal	Sft	2	8.75		2	35.00
5	PRODUCT WATER TANK Wall	Sft	2	5		3	30.00
7	Parapet Wall 1,4/A-C	Sft	2	13.5		1.83	49.41
8	Parapet Wall A,C/1-4	Sft	2	11		1.83	40.26
9	Column Plaster External A,C/1,4	Sft	4	2.5		11.25	112.50
10	Column Plaster External B/1	Sft	1	1.25		11.25	14.06
11	Drop beam Plaster External 1,4/A-C	Sft	2	11		1.25	27.50

12	Drop beam Plaster External A,C/1-4	Sft	2	13.5		1.25	33.75
13	Door Lintel Beam	Sft	1	8.5		0.75	6.38
14	D/D of door	Sft	-1	7		8.5	- 59.50
	Total Sft						1,019.36
	Total M2						94.74
11/18-b	Cement pointing struck joints ,on walls, up to 20' (6.00m) height ratio 1:3						
1	A/1-4	Sft	1	11		13.08	143.88
2	1/A-C	Sft	1	9.5		13.08	124.26
2	4/A-C	Sft	1	11		13.08	143.88
3	Extarnal Long wall	Sft	1	5		2	10.00
4	Extarnal Short Wall	Sft	2	8.75		2	35.00
5	Brick pillar	Sft	1	4.5		4	18.00
6	D/D Room of door	Sft	-1	7		8.5	- 59.50
7	Door Lintel Beam	Sft	-1	8.5		0.75	- 6.38
	Total Sft						409.15
	Total M2						38.02
25/31	Making and fixing steel grated door with 1/16" thick (1.5mm) sheeting, including angle iron frame 2"x2"x3/8" (50x50x10 mm) and 3/4" (20 mm) square bars 4" (100 mm) center to center, with locking arrangement.						
1	Steel grated door	Sft	1	7		7	49.00
							4.55
	Making and fixing steel grated doors, complete with locking arrangement, angle iron frame 2"x2"x3/8" (50x50x10 mm) and 3/4" (20 mm) square bars 4" (100 mm) center to center.						
	Steel grate door	Sft	1	7	4.5		31.50
							2.93
25/41-b-v	Providing and fixing steel windows with openable glazed panels, using beam section for frame 1½"x1"x5/8"x1/8" (40x25x16x3 mm), Z-section for leaves ¾"x1"x¾"x1/8" (20x25x20x3 mm), T-section sashes 1"x1"x1/8" (25x25x3 mm), glass panes, wooden screed for glazing embedded meter. over a thin layer of putty duly screwed with leaves, brass fittings, holdfast, duly painted, complete in all respects, including all cost of material and labor, etc. as per approved design and as directed by the Engineer-in-charge fixed with wire gauze, 22 SWG i/c glass pane 5 mm thick						
1	Door cum window	sft	1	7		1.5	10.50
	M2						0.98

6/5-f	Cement concrete plain including placing ,compacting finishing and curing complete including screening and washing of stone aggregate 1:2:4						
1	Plinth protection Back side wall	Cft	1	19.5	3	0.25	14.63
2	Plinth protection Right, lift side wall	Cft	2	20	3	0.25	30.00
3	Room	Cft	1	12	12	0.25	36.00
4	Verandah	Cft	1	12	5	0.16	9.60
4	Door sill	Cft	1	7	0.75	0.25	1.31
	Total Sft						91.54
	Total M2						2.59
10_23	Providing and laying floor of mosaic marble chips tiles 1"(25mm) thick of approved quality and shade, laid in white cement and pigment, over ¾"(20 mm) thick bedding of cement sand mortar 1:2, including finishing and polishing, complete.						
1	Sitting area for Persons		1	12	3		36.00
3	Stair Tread	Sft	2	7		0.5	7.00
4	Stair Riser	Sft	2	7	1		14.00
5	D/d Product water tank area	Sft	-1	5	5		- 25.00
6	D/d Bore portion	Sft	-1	1	2	2	
	Drain area		-1	12	0.5		- 6.00
	Total Qty in M2						2.42
10_24	Laying floor of approved white glazed tile 1/4" thick in white cement 1:2 over 3/4" thick cement mortar 1:2 complete						
1	Room	Sft	1	12	12		144.00
2	Door sill	Sft	1	7	0.75		5.25
	Total Sft						149.25
	Total M2						13.87
10_37	White glazed tile (6"x6"x1/4") thick dado jointed in white cement and laid over 1:2 cement sand mortar 3/4" thick including finishing						
1	Room long wall	Sft	2	12		4	96.00
2	Room short wall	Sft	2	12		4	96.00
3	D/D of door	Sft	-1	7		4	- 28.00
	Total Sft						164.00
	Total M2						15.24

10_38	Color glazed tile (6"x6"x1/4") thick dado jointed in white cement and laid over 1:2 cement sand mortar 3/4" thick including finishing						
1	Verandh Wall	Sft	1	12		4	48.00
2	Total M2						4.46
11/23-a	Preparing surface and painting with Distemper 3coats						
1	Room Slab	Sft	1	12	12		144.00
2	Room Long Wall	Sft	2	12		12	288.00
3	Room Short Wall	Sft	2	12		12	288.00
4	D/D of dado tile		-2	12		4	- 96.00
5	D/D of dado tile		-2	12		4	- 96.00
6	D/d door		-1	7		8.5	- 59.50
	Total Sft						468.50
	Total M2						43.54
11/23-a	Priming coat of chalk under distemper.						
1	1,4/A-C	Sft	2	12		12	288.00
2	A,C/1-4	Sft	2	12		12	288.00
4	D/D of door	Sft	-1	7		8.5	- 59.50
	Total Sft						516.50
	Total M2						48.00
9/5+26/37-ii	Single layer of tiles 9"x4½"x1½" (225x113x40 mm) laid over 4"(100 mm) earth and 1" (25 mm) mud plaster without Bhoosa, grouted with cement sand 1:3 on top of RCC roof slab, provided with 34 lbs. per %Sft. or 1.72 Kg/Sq.m bitumen coating sand blinded						
1	Top Roof	Sft	1	12	12		144.00
2	D/d Khura	Sft	-2	2	2		- 8.00
	Total Sft						136.00
	Total M2						12.64
9/44.	Reinforced cement concrete spout, including fixing in position, with top and bottom Khurras.						
1		Each	2				2.00
	Total No,s						2.00
9/20-a	Cast iron rain water downpipe fixed in position, excluding heads and shoes, but including painting and clamps, etc:-						
1		Feet	1	26			26.00

	Total Feet						26.00
	Total M						7.92
9/21.	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.						
1		Each	4				4.00
	Total No,s						4.00
9/22.	Shoes, bends or offsets for cast iron rain water down pipe including fixing and painting.						
1		Each	4				4.00
	Total No,s						4.00
25/09	Fabrication of heavy steel work, with angle, tees, flat iron round iron and sheet iron for making trusses, girders, tanks, etc., including cutting, drilling, revitting, handling, assembling and fixing, but excluding erection in position.						
1		Kg	1	200			200.00
	Total Kg						200.00
25/32	Making and fixing grating in opening, including fixing at site with flat iron 2"x3/8" (50x10 mm) and ¾" (19 mm) square bars, at 4" (100 mm) center to center.						
1	Over Drain	Sft	1	1.417			1.42
	Total Kg						
	Total Kg						1.42
13/5-d-I &-ii	Preparing surface and painting guard bars, gates of iron bars, gratings, railing (including standards, braces, etc.) and in similar open work three coats including priming coat						
1	Railing	Sft	2	11.5		3	69.00
2		Sft	1	7		4.58	32.06
3	Door	Sft	2	7		8.5	119.00
4	Grating	Sft	2	15		0.5	15.00
	Total Sft						235.06
	Total M2						21.85
13/32-a-I &-ii	Providing and applying weather shield paint of approved quality on external surface of building including preparation of surface, application of primer complete in all respect: (new surface) Two Coat						
1	Verandah Shed	Cft	1	12	2		24.00
2	Verandah External Long wall	Sft	0	15.58		8	-
3	Verandah External Long wall	Sft	0	15.58		2	-
4	Verandah external Short Wall	Sft	0	9		2	-
5	Parapet Wall 1,4/A-C	Sft	2	12		2	48.00

6	Parapet Wall A,C/1-4	Sft	2	12		2	48.00
7	Column Plaster External A,C/1,4	Sft	4	2.5		11.25	112.50
8	Column Plaster External B/1	Sft	1	1.25		11.25	14.06
9	Drop beam Plaster External 1,4/A-C	Sft	2	11		1.25	27.50
10	Drop beam Plaster External A,C/1-4	Sft	2	11		1.25	27.50
11	Door Lintel Beam	Sft	1	8.5		0.75	6.38
12	Door Shed	Sft	1	8.5	1.5		12.75
	Total Sft						320.69
	Total M2						29.80
Measurement sheet of HDPE Line Connection							
3/44	Excavation in foundation of building, bridges and other structures, including dag belling, dressing, refilling around structure with excavated earth, watering and ramming lead up to one chain (30 m) and lift up to 5 ft. (in ordinary soil).						
1	HDPE Pipe line excavation	Cft	1	328	1.25	2.75	1,127.50
	Total Cft						1,127.50
	Total M3						31.92
7/I-30	Providing & laying sand bedding for pipes as per Drawings & Specifications complete in all respect.						
1	sand filling	Cft	1	328	1.25	1	410.00
	Total Cft						410.00
	Total M3						11.61
CH: 3/5 (III)	Earthwork in ordinary soil for embankments lead up to 100 ft. (30 m), including ploughing & mixing with blade grade or disc harrow or other suitable equipment, and compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects: iii) 85% maximum modified AASHO dry density. Earthwork excavation undressed lead up to a single throw of Kassi, phaorah or shovel :- b) In ordinary soil.						
1	QTY of excavation	Cft					1,127.50
2	Qty of sand cushion	Cft					- 410.00
3	Volume of pipe	Cft					- 73.00
	Total Cft						644.50
	Total M3						18.25
	Providing, laying, cutting, jointing, testing and disinfecting HDPE pipe line in trenches as per specifications complete in all respects:						
	Pipe	Rft	32 8				328.00

							99.97
NS	Providing, laying and jointing, testing and disinfecting, High Density Polyethylene Fitting (Tees, Cross bend, Elbow, Stub ends, etc) (PE-100) of PN-10 conforming to ISO-4427 or Din 8074/8075 or equivalent standards.						
1	Spigot elbow 900						
	90mm	No	3				3.00
2	Equal Tee						
	90mm	No	3				3.00
3	Stub End						
	90mm	No	4				4.00
4	End Cap						
	90mm	No	4				4.00

BAR BENDING SCHEDULE FOR PLANT ROOM											
Sr.No	Descriptions	Nos	Dia #	Spacing	No.of Bars	Total No of Bars	Cut Length (m)	Total Length	Unit Weight	Quantity/Lbs	Unit
	Isolated Footing										
1	1/A M. Bar Top, Bottom F1	2	#4	5"c/c	20	20	4.5	90	0.302	27.18	Kg
"	1/A D.Bar Top, Bottom F1	2	#4	5"c/c	20	40	8.66	346.4	0.302	104.61	Kg
2	1/C M.Bar F1	1	#4	5"c/c	10	10	4.5	45	0.302	13.59	Kg
"	1/C D.Bar F1	1	#4	5"c/c	10	10	4.5	45	0.302	13.59	Kg
3	4/A,C M.Bar F1	1	#4	5"c/c	10	10	4.5	45	0.302	13.59	Kg
"	4/A,C D.Bar F1	1	#4	5"c/c	10	10	4.5	45	0.302	13.59	Kg
4	4/D M.Bar F2 Top, Bottom	1	#4	9"c/c	7	7	4.5	31.5	0.302	9.51	Kg
"	4/D D.Bar F2 Top, Bottom	1	#4	9"c/c	7	7	4.5	31.5	0.17	5.36	Kg
	Column Foundation To Top										
6	Column C1	4	#4		12	48	19	912	0.302	275.42	Kg

7	Strips at Support	4	#3	6"c/c	14	56	4.5	252	0.17	42.84	Kg
7	Strips at Mid	4	#3	8"c/c	13	52	4.5	234	0.17	39.78	Kg
6	Column C2	2	#4		4	8	10	80	0.302	24.16	Kg
	Strips at Support	2	#3	6"c/c	8	16	2.5	40	0.17	6.8	Kg
	Strips at Mid	2	#3	6"c/c	7	14	2.5	35	0.17	5.95	Kg
	Plinth Beam										
1	1/A-C	1	#6		6	6	14.75	88.5	0.68	60.18	Kg
"	Strips at Support	2	#3	6"c/c	5	10	3.5	35	0.17	5.95	Kg
"	Strips at Mid	1	#3	8"c/c	10	10	3.5	35	0.17	5.95	Kg
2	4/A-C	1	#6		6	6	14.75	88.5	0.68	60.18	Kg
"	Strips at Support	2	#3	6"c/c	5	10	3.5	35	0.17	5.95	Kg
"	Strips at Mid	1	#3	8"c/c	10	10	3.5	35	0.17	5.95	Kg
2	A,C/1-4	2	#6		6	12	14.75	177	0.68	120.36	Kg
"	Strips at Support	4	#3	6"c/c	6	24	3.5	84	0.17	14.28	Kg
"	Strips at Mid	2	#3	8"c/c	10	20	3.5	70	0.17	11.9	Kg

	Roof Beam										
1	1/A-C	1	#6		6	6	14.75	88.5	0.68	60.18	Kg
"	Strips at Support	2	#3	6"c/c	5	10	3.5	35	0.17	5.95	Kg
"	Strips at Mid	1	#3	8"c/c	10	10	3.5	35	0.17	5.95	Kg
2	4/A-C	1	#6		6	6	14.75	88.5	0.68	60.18	Kg
"	Strips at Support	2	#3	6"c/c	5	10	3.5	35	0.17	5.95	Kg
"	Strips at Mid	1	#3	8"c/c	10	10	3.5	35	0.17	5.95	Kg
2	A,C/1-4	2	#6		6	12	14.75	177	0.68	120.36	Kg
"	Strips at Support	4	#3	6"c/c	6	24	3.5	84	0.17	14.28	Kg
"	Strips at Mid	2	#3	8"c/c	10	20	3.5	70	0.17	11.9	Kg
	Slab Bottom Bar										
1	1-4/A-C M.bar	1	#4	8"c/c	24	24	13.5	324	0.302	97.85	Kg
"	1-4/A-C D.bar	1	#4	8"c/c	19	19	16	304	0.302	91.81	Kg
	Slab Top Extra Bar										
1	1/A-C	1	#4	8"c/c	19	19	7.25	137.8	0.302	41.6	Kg

"	4/A-C	1	#4	8"c/c	19	19	4.5	85.5	0.302	25.82	Kg
"	A,C/1-4	2	#4	8"c/c	22	44	4	176	0.302	53.15	Kg
	Lintel Beam										
1	LB	1	#4		6	6	9.5	57	0.302	17.21	Kg
"	Strips	1	#3	7"c/c	15	15	2.5	37.5	0.17	6.38	Kg
	Connection B/W RCC Column And Brick Masonry										
1		5	#		12	60	4.75	285	0.075	21.38	Kg
	Total in Kg									1532.57	Kg
	Total in Ton									1.53257	Ton

Bill#6 Estimate for one Year Operation and Maintenance					
S/NO	DESCRIPTION OF ITEM	UNIT	QTY	RATE	AMOUNT Rs.
6.1	<u>REVERSE OSMOSIS PLANT 2 CUBIC METER PER HOUR</u>				
	Operate and maintain plants along with plant houses and all related works after commissioning, including the cost of Quarterly water quality tests, chemicals, consumable items, operational staff salary and training of employers staff, Water Charges for irrigation Department complete in all respect to run Treatment plant for One years. The power charges for electricity bill will be borne by Client.	NO	1	399,424	345,424
6.2	<u>PREFILTRATION PLANT 2 CUBIC METER PER HOUR</u>				
	Operate and maintain plants along with plant houses and all related works after commissioning, including the cost of Quarterly water quality tests, chemicals, consumable items, operational staff salary and training of employers staff, Water Charges for irrigation Department complete in all respect to run Treatment plant for One years. The power charges for electricity bill will be borne by Client.	NO	1	385,424	385,424
Total One Year O&M Plant cost					799,248

6.1 O&M FOR 1 YEAR

ONE (01) YEAR OPERATION AND MAINTENANCE RO PLANTS

Sr. No.	Description	Unit	2000LPH PLANTS		
			Qty.	Cost (Rs.)	Total Price (Rs.)
1	Filter 20" PPF Micro	No	24	800	19200
2	Plant Operator, 1 Nos. (for Year 2021)	Man Months	12	18,702	224,424
3	Quarterly test reports from approved laboratories	Quarterly	4	8,000	32,000
4	Monthly Visit of Technical Staff	1	12	5,000	60,000
5	Chemicals for Anti Scalent, disinfection, tank cleaning, site disinfection, other cleaning material, etc.	Per Year	1	28,800	28,800
6	Miscellaneous	Per Year	1	5,000	5,000
7	Project Sign Board & Flex	Nos.	2	15,000	30,000
	Total				399,424

6.2 O&M analysis for Pre-Filtration Plant 2M3/HR

Analysis for Operation and Maintenance of Pre-filtration Plant

	O&M for Surface Treatment Plant	Unit	Nos.	Per Month	1st Year
1	Filter 20" PPF Micro	No	24	800	19200
2	Quarterly Test Reports from approved laboratories	Quarterly	4	8,000	32,000
3	Monthly Visit of Technical Staff	1	12	5,000	60,000
4	Plant Operator, 1 Nos.	1	12	18,702	224,424
5	Sodium Hypochlorite NaOCl	kg	11	1800	19,800
6	Project Sign Board & Flex	Nos.	2	15,000	30,000
	Total Cost of O&M for 1st Year				385,424

Electricity Consumption for RO & S/CA Plants 2M3/HR		
Bill#7 Electricity Cost		
Power Requirement	Electricity for RO Plant 2000 LPH	
Plant Capacity	No. of Plants	Electricity Cost
2000 LPH	1	12,960
Consumption of units Per Hour	5	
Consumption of units per day	40	
Unit Rate of electricity	11	432
Electricity Cost For 1 Month		12,960
Electricity Cost For 1 Year		155,520
Power Requirement	Electricity for Pre-Filtration Plant (S/CA)	
Plant Capacity	No. of Plants	Electricity Cost
2000 LPH	1	12,960
Consumption of units (kwh) Per Hour	5	
Consumption of units per day	40	
Unit Rate of electricity	11	432
Electricity Cost For 1 Month		12,960
Electricity Cost For 1 Year		155,520

Rate Analysis of R/O and Pre filtration Plant 2M3/HR

Sr.No	Description	Quantity	Unit	RO Plant 2M3/HR	Pre- Filtration Plant 2M3/HR
1	Cost of of capacity skid mounted plant including HP pump, Backwash pump, transmission pumps along with all accessories for fully automatic operated system, skid mounted surface water treatment plant including Raw water and treated water pump along with all assessries, pipe connection including carriage charges <u>EUROPE/USA/GERMAN/PAKISTANI or EQUIVALENT</u> (Quotation Attached)	1.00	each	PKR 1,600,000	PKR 345,661
2	Carriage Market to site laboure for, installation & commissioning of plant.	1.00	each	PKR 10,000	PKR 16,000
Sub-Total				PKR 1,610,000	PKR 361,661
Add 20% contractor's Profit and overheads		1.00		PKR 322,000	PKR 72,332
Grand Total				PKR 1,932,000	PKR 433,993.2
Say: -				PKR 1,932,000	PKR 434,000

Annexure V
Water Quality Testing Sheets

WATER TESTING REPORT-PUNJAB AAB-E-PAK PROJECT



For

**ASSOCIATES IN DEVELOPMENT (AID) PVT. LTD.
DEVELOPMENT AND MANAGEMENT CONSULTING**



Prepared by:



Green Engineering Consultant

GEC-535, H2- Block, Johar Town Lahore-Pakistan

Report 1: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Chak Malook, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1050
Coordinates:	32.959692 72.955316	Sample Identification:	AID-DW-056
Sampling Source:	-	Sample Collection Date:	December 28, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.8	< 5	< 5
	Total hardness as CaCO ₃	mg/l	103.6	< 500	---
	TDS	mg/l	1025	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.9	< 1.5	1.5
	Nitrate	mg/l	17.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

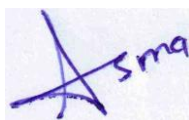
Note: This report is not valid for court.

Sample Analyzed by:



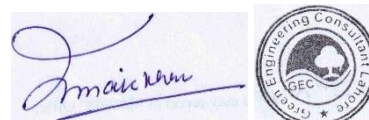
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 2: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Warwal, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1051
Coordinates:	33.135996 72.526005	Sample Identification:	AID-DW-057
Sampling Source:	-	Sample Collection Date:	December 28, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.2	< 5	< 5
	Total hardness as CaCO ₃	mg/l	108.7	< 500	---
	TDS	mg/l	1097	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	7	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.7	< 1.5	1.5
	Nitrate	mg/l	15.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

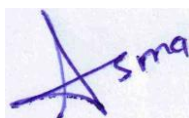
Note: This report is not valid for court.

Sample Analyzed by:



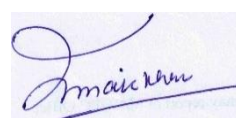
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 3: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Joya Mair, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1052
Coordinates:	33.008446 72.811077	Sample Identification:	AID-DW-058
Sampling Source:	-	Sample Collection Date:	December 28, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.93	< 5	< 5
	Total hardness as CaCO ₃	mg/l	101.4	< 500	---
	TDS	mg/l	1019	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.8	< 1.5	1.5
	Nitrate	mg/l	14.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

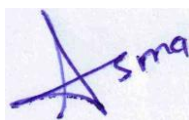
Note: This report is not valid for court.

Sample Analyzed by:



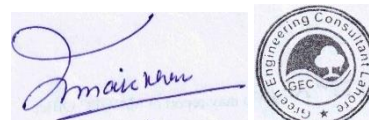
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 4: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Amir Pur Mangan, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1053
Coordinates:	32.971952 73.029297	Sample Identification:	AID-DW-059
Sampling Source:	-	Sample Collection Date:	December 28, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.91	< 5	< 5
	Total hardness as CaCO ₃	mg/l	94.6	< 500	---
	TDS	mg/l	811	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.1	< 1.5	1.5
	Nitrate	mg/l	11.2	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

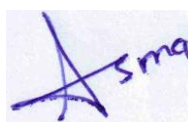
Note: This report is not valid for court.

Sample Analyzed by:



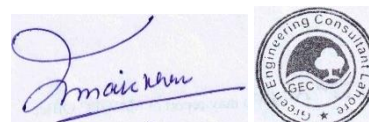
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 5: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Sutwal, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1054
Coordinates:	32.894457 72.872152	Sample Identification:	AID-DW-060
Sampling Source:	-	Sample Collection Date:	December 28, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.47	< 5	< 5
	Total hardness as CaCO ₃	mg/l	117.8	< 500	---
	TDS	mg/l	1011	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	2.3	< 1.5	1.5
	Nitrate	mg/l	16.9	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	14	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	6	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	2	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

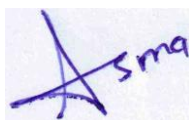
Note: This report is not valid for court.

Sample Analyzed by:



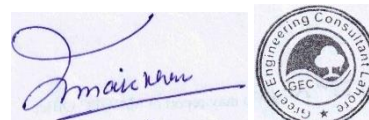
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 6: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Ghugh, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1055
Coordinates:	33.131809 72.744714	Sample Identification:	AID-DW-061
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.1	< 5	< 5
	Total hardness as CaCO ₃	mg/l	94.7	< 500	---
	TDS	mg/l	927	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.9	< 1.5	1.5
	Nitrate	mg/l	9.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

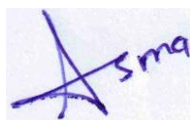
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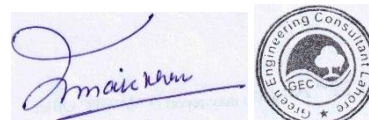
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 7: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Bagwal, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1056
Coordinates:	33.074116 72.594543	Sample Identification:	AID-DW-062
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.87	< 5	< 5
	Total hardness as CaCO ₃	mg/l	111.5	< 500	---
	TDS	mg/l	1122	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	2.1	< 1.5	1.5
	Nitrate	mg/l	14.5	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	19	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	9	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	5	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

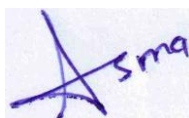
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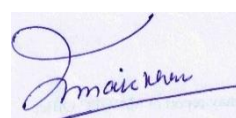
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 8: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Panjain, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1057
Coordinates:	32.925722 73.011147	Sample Identification:	AID-DW-063
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.53	< 5	< 5
	Total hardness as CaCO ₃	mg/l	95.3	< 500	---
	TDS	mg/l	987	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.4	< 1.5	1.5
	Nitrate	mg/l	11.3	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except Taste according to Punjab Environmental Quality Standards.

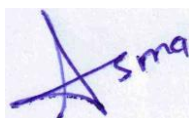
Note: This report is not valid for court.

Sample Analyzed by:



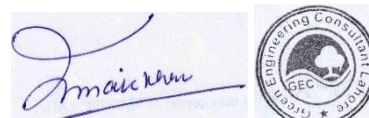
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 9: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Panjain, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1058
Coordinates:	32.925722 73.011147	Sample Identification:	AID-DW-064
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.76	< 5	< 5
	Total hardness as CaCO ₃	mg/l	95.3	< 500	---
	TDS	mg/l	987	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	7	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.4	< 1.5	1.5
	Nitrate	mg/l	10.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except Taste according to Punjab Environmental Quality Standards.

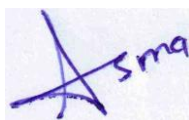
Note: This report is not valid for court.

Sample Analyzed by:



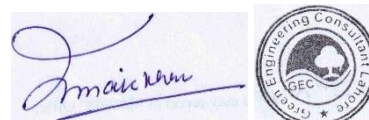
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 10: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Bullay Bala, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1059
Coordinates:	32.976742 72.758142	Sample Identification:	AID-DW-065
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.1	< 5	< 5
	Total hardness as CaCO ₃	mg/l	170.6	< 500	---
	TDS	mg/l	1314	< 1000	< 1000
	TSS	mg/l	2	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	2.3	< 1.5	1.5
	Nitrate	mg/l	18.9	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

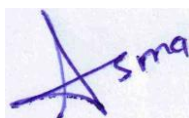
Note: This report is not valid for court.

Sample Analyzed by:



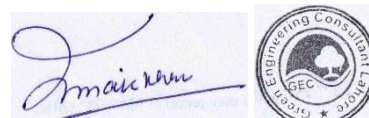
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 11: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Maingan, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1060
Coordinates:	32.937626 72.704977	Sample Identification:	AID-DW-066
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.34	< 5	< 5
	Total hardness as CaCO ₃	mg/l	197.2	< 500	---
	TDS	mg/l	1615	< 1000	< 1000
	TSS	mg/l	2	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	2.3	< 1.5	1.5
	Nitrate	mg/l	21.3	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

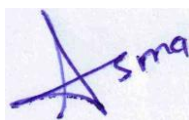
Note: This report is not valid for court.

Sample Analyzed by:



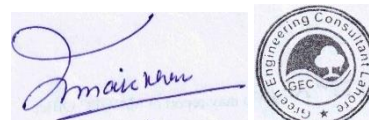
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 12: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Chak Koka, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1061
Coordinates:	33.194043 72.689547	Sample Identification:	AID-DW-067
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.78	< 5	< 5
	Total hardness as CaCO ₃	mg/l	161.6	< 500	---
	TDS	mg/l	1109	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	2.1	< 1.5	1.5
	Nitrate	mg/l	12.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

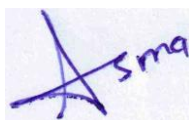
Note: This report is not valid for court.

Sample Analyzed by:



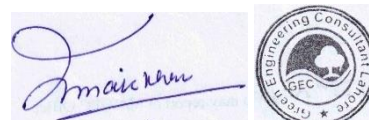
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 13: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Chak Umra, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1062
Coordinates:	32.995477 72.961431	Sample Identification:	AID-DW-068
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.65	< 5	< 5
	Total hardness as CaCO ₃	mg/l	114.2	< 500	---
	TDS	mg/l	1025	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.8	< 1.5	1.5
	Nitrate	mg/l	10.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	16	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	4	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	2	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

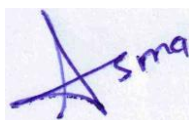
Note: This report is not valid for court.

Sample Analyzed by:



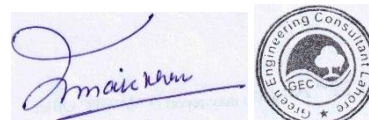
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 14: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Khara, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1063
Coordinates:	33.084587 72.63282	Sample Identification:	AID-DW-069
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.3	< 5	< 5
	Total hardness as CaCO ₃	mg/l	168.4	< 500	---
	TDS	mg/l	1215	< 1000	< 1000
	TSS	mg/l	2	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.7	< 1.5	1.5
	Nitrate	mg/l	11.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	19	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	5	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	3	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

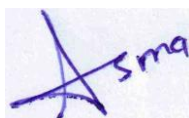
Note: This report is not valid for court.

Sample Analyzed by:



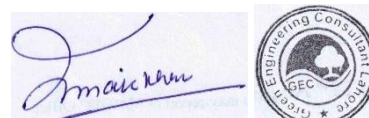
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 15: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Dalel Pur, Kallar Kahar	GEC Report No:	GEC-ENV-P-089/20-R-1064
Coordinates:	32.730012 72.844978	Sample Identification:	AID-DW-070
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.98	< 5	< 5
	Total hardness as CaCO ₃	mg/l	194.2	< 500	---
	TDS	mg/l	1613	< 1000	< 1000
	TSS	mg/l	2	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.4	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	2.1	< 1.5	1.5
	Nitrate	mg/l	19	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	12	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	3	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	2	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

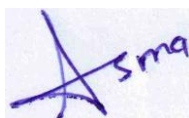
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Sample Analyzed by:



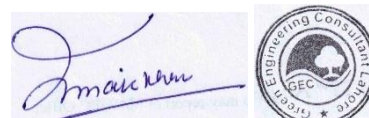
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 16: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Dolatpur, Pind Dadan Khan	GEC Report No:	GEC-ENV-P-089/20-R-1065
Coordinates:	32°32'19.83"N 72°55'56.16"E	Sample Identification:	AID-DW-071
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.54	< 5	< 5
	Total hardness as CaCO ₃	mg/l	165.9	< 500	---
	TDS	mg/l	1252	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	7	15	15
	pH	-	8.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.9	< 1.5	1.5
	Nitrate	mg/l	8.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks All the parameters are within limit except TDS according to Punjab Environmental Quality Standards.

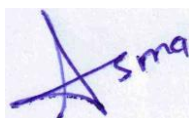
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Sample Analyzed by:



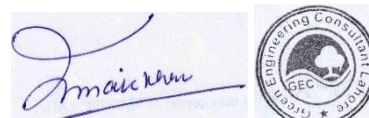
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 17: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Kot Kacha, Pind Dadan Khan	GEC Report No:	GEC-ENV-P-089/20-R-1066
Coordinates:	32°32'19.83"N 72°55'56.16"E	Sample Identification:	AID-DW-072
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.43	< 5	< 5
	Total hardness as CaCO ₃	mg/l	145.1	< 500	---
	TDS	mg/l	1675	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	7	15	15
	pH	-	7.5	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1	< 1.5	1.5
	Nitrate	mg/l	10.3	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

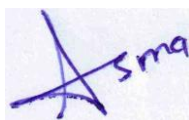
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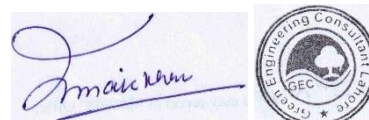
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 18: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Mastala, Gujar Khan	GEC Report No:	GEC-ENV-P-089/20-R-1067
Coordinates:	32°32'19.83"N 72°55'56.16"E	Sample Identification:	AID-DW-073
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.33	< 5	< 5
	Total hardness as CaCO ₃	mg/l	45.3	< 500	---
	TDS	mg/l	664	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	7	15	15
	pH	-	7.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.4	< 1.5	1.5
	Nitrate	mg/l	6.5	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

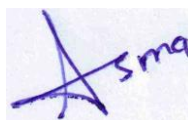
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Sample Analyzed by:



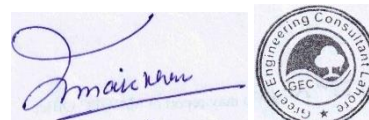
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 19: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Adra Usman, Gujar Khan	GEC Report No:	GEC-ENV-P-089/20-R-1068
Coordinates:	32°32'19.83"N 72°55'56.16"E	Sample Identification:	AID-DW-074
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.41	< 5	< 5
	Total hardness as CaCO ₃	mg/l	54.2	< 500	---
	TDS	mg/l	618	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.1	< 1.5	1.5
	Nitrate	mg/l	5.9	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

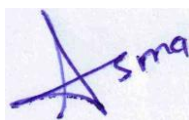
Note: This report is not valid for court.

Sample Analyzed by:



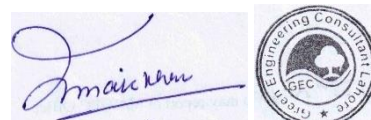
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 20: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Panjhgran Kalan, Gujar Khan	GEC Report No:	GEC-ENV-P-089/20-R-1069
Coordinates:	32°32'19.83"N 72°55'56.16"E	Sample Identification:	AID-DW-075
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.51	< 5	< 5
	Total hardness as CaCO ₃	mg/l	218.4	< 500	---
	TDS	mg/l	2618	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Non-Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.2	< 1.5	1.5
	Nitrate	mg/l	13.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

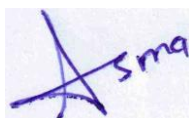
Note: This report is not valid for court.

Sample Analyzed by:



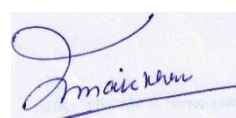
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 21: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Changa Bagyal, Gujar Khan	GEC Report No:	GEC-ENV-P-089/20-R-1070
Coordinates:	32°32'19.83"N 72°55'56.16"E	Sample Identification:	AID-DW-076
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	2.77	< 5	< 5
	Total hardness as CaCO ₃	mg/l	38.5	< 500	---
	TDS	mg/l	356	< 1000	< 1000
	TSS	mg/l	3	-	---
	Odour	-	Non-Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Non-Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	8	15	15
	pH	-	7.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.1	< 1.5	1.5
	Nitrate	mg/l	5.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	14	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	5	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	3	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

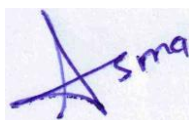
Note: This report is not valid for court.

Sample Analyzed by:



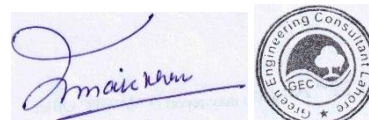
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 22: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Padehana, Gujar Khan	GEC Report No:	GEC-ENV-P-089/20-R-1071
Coordinates:	32°32'19.83"N 72°55'56.16"E	Sample Identification:	AID-DW-077
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.28	< 5	< 5
	Total hardness as CaCO ₃	mg/l	111.7	< 500	---
	TDS	mg/l	1321	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	7	15	15
	pH	-	7.6	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	10.4	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except TDS according to Punjab Environmental Quality Standards.

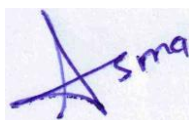
Note: This report is not valid for court.

Sample Analyzed by:



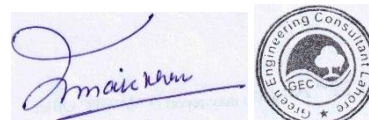
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 23: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Lawrencepur, Attock	GEC Report No:	GEC-ENV-P-089/20-R-1072
Coordinates:	33.829862 72.503629	Sample Identification:	AID-DW-078
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.35	< 5	< 5
	Total hardness as CaCO ₃	mg/l	80.4	< 500	---
	TDS	mg/l	720	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	6.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

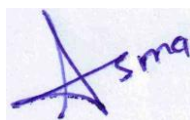
Note: This report is not valid for court.

Sample Analyzed by:



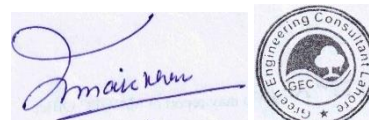
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 24: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Haji Shah I, Attock	GEC Report No:	GEC-ENV-P-089/20-R-1073
Coordinates:	33.876497 72.328283	Sample Identification:	AID-DW-079
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.29	< 5	< 5
	Total hardness as CaCO ₃	mg/l	79.1	< 500	---
	TDS	mg/l	513	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	4.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

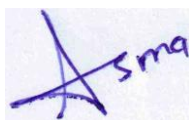
Note: This report is not valid for court.

Sample Analyzed by:



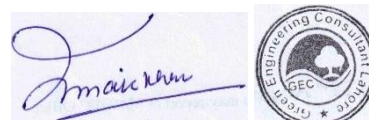
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 25: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Haji Shah II, Attock	GEC Report No:	GEC-ENV-P-089/20-R-1074
Coordinates:	33.890579 72.32259	Sample Identification:	AID-DW-080
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.32	< 5	< 5
	Total hardness as CaCO ₃	mg/l	59.6	< 500	---
	TDS	mg/l	492	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	4.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

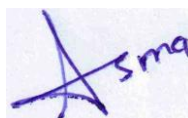
Note: This report is not valid for court.

Sample Analyzed by:



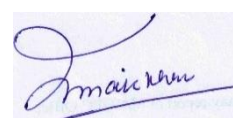
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 26: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Gondal , Attock	GEC Report No:	GEC-ENV-P-089/20-R-1075
Coordinates:	33.888554 72.349912	Sample Identification:	AID-DW-081
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.42	< 5	< 5
	Total hardness as CaCO ₃	mg/l	73.1	< 500	---
	TDS	mg/l	580	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	3	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.4	< 1.5	1.5
	Nitrate	mg/l	3.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

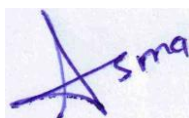
Note: This report is not valid for court.

Sample Analyzed by:



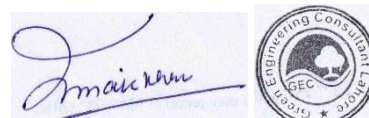
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 27: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Mullan Mansoor, Attock	GEC Report No:	GEC-ENV-P-089/20-R-1076
Coordinates:	33.897326 72.283699	Sample Identification:	AID-DW-082
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.38	< 5	< 5
	Total hardness as CaCO ₃	mg/l	66.2	< 500	---
	TDS	mg/l	420	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.4	< 1.5	1.5
	Nitrate	mg/l	3.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

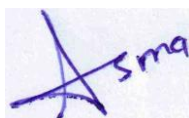
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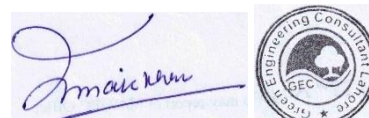
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 28: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Golra, Attock	GEC Report No:	GEC-ENV-P-089/20-R-1077
Coordinates:	33.789841 72.48106	Sample Identification:	AID-DW-083
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.28	< 5	< 5
	Total hardness as CaCO ₃	mg/l	61.2	< 500	---
	TDS	mg/l	370	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	3.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

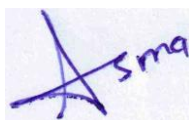
Note: This report is not valid for court.

Sample Analyzed by:



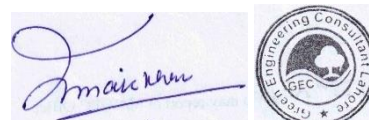
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 29: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Dakhnair, Attock	GEC Report No:	GEC-ENV-P-089/20-R-1078
Coordinates:	33.837059 72.273843	Sample Identification:	AID-DW-084
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.32	< 5	< 5
	Total hardness as CaCO ₃	mg/l	56.9	< 500	---
	TDS	mg/l	197	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	3	15	15
	pH	-	6.6	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.4	< 1.5	1.5
	Nitrate	mg/l	2.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

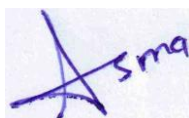
Note: This report is not valid for court.

Sample Analyzed by:



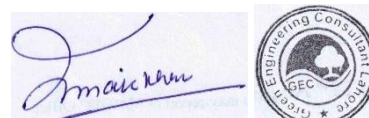
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 30: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Surag Mongiwali, Attock	GEC Report No:	GEC-ENV-P-089/20-R-1079
Coordinates:	33.876508 72.328281	Sample Identification:	AID-DW-085
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.48	< 5	< 5
	Total hardness as CaCO ₃	mg/l	64.2	< 500	---
	TDS	mg/l	482	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	3.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

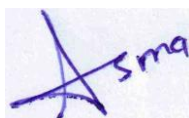
Note: This report is not valid for court.

Sample Analyzed by:



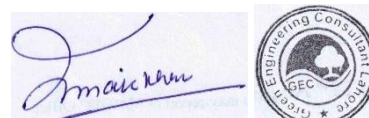
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 31: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Malal, Fateh Jang	GEC Report No:	GEC-ENV-P-089/20-R-1080
Coordinates:	33.407627 72.632119	Sample Identification:	AID-DW-086
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.58	< 5	< 5
	Total hardness as CaCO ₃	mg/l	78.1	< 500	---
	TDS	mg/l	716	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	5.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

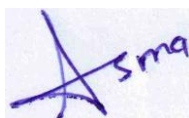
Note: This report is not valid for court.

Sample Analyzed by:



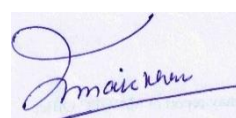
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 32: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Gadda, Fateh Jang	GEC Report No:	GEC-ENV-P-089/20-R-1081
Coordinates:	33.470974 72.538026	Sample Identification:	AID-DW-087
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.48	< 5	< 5
	Total hardness as CaCO ₃	mg/l	62.3	< 500	---
	TDS	mg/l	391	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	2.5	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

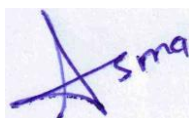
Note: This report is not valid for court.

Sample Analyzed by:



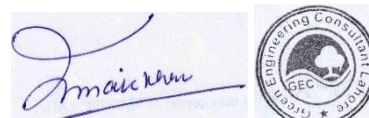
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 33: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Gulial, Fateh Jang	GEC Report No:	GEC-ENV-P-089/20-R-1082
Coordinates:	33.506596 72.520288	Sample Identification:	AID-DW-088
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.32	< 5	< 5
	Total hardness as CaCO ₃	mg/l	65.1	< 500	---
	TDS	mg/l	432	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	2.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

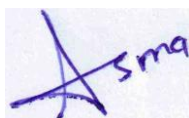
Note: This report is not valid for court.

Sample Analyzed by:



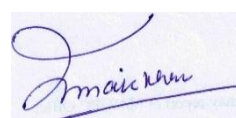
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 34: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Sultanpur, Hassan Abdal	GEC Report No:	GEC-ENV-P-089/20-R-1083
Coordinates:	33.883613 72.748121	Sample Identification:	AID-DW-089
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.68	< 5	< 5
	Total hardness as CaCO ₃	mg/l	77.2	< 500	---
	TDS	mg/l	597	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	2.4	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

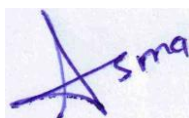
Note: This report is not valid for court.

Sample Analyzed by:



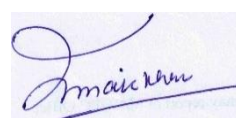
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 35: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Kohlia, Hassan Abdal	GEC Report No:	GEC-ENV-P-089/20-R-1084
Coordinates:	33.829862 72.503629	Sample Identification:	AID-DW-090
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.58	< 5	< 5
	Total hardness as CaCO ₃	mg/l	73.4	< 500	---
	TDS	mg/l	693	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	2.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	9	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	3	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	4	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

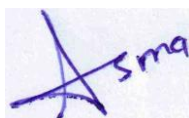
Note: This report is not valid for court.

Sample Analyzed by:



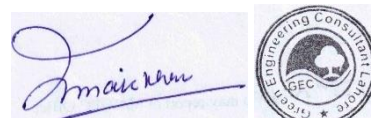
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 36: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Basal, Jand	GEC Report No:	GEC-ENV-P-089/20-R-1085
Coordinates:	33.551043 72.243421	Sample Identification:	AID-DW-091
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	1.3	< 5	< 5
	Total hardness as CaCO ₃	mg/l	164.2	< 500	---
	TDS	mg/l	1213	< 1000	< 1000
	TSS	mg/l	2	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.7	< 1.5	1.5
	Nitrate	mg/l	21.3	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

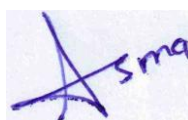
Note: This report is not valid for court.

Sample Analyzed by:



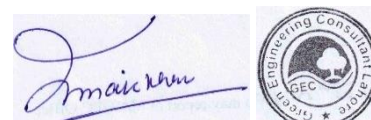
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 37: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Thatta, Jand	GEC Report No:	GEC-ENV-P-089/20-R-1086
Coordinates:	33.577646 72.218022	Sample Identification:	AID-DW-092
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.98	< 5	< 5
	Total hardness as CaCO ₃	mg/l	95.2	< 500	---
	TDS	mg/l	916	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.5	< 1.5	1.5
	Nitrate	mg/l	16.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

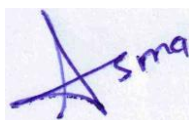
Note: This report is not valid for court.

Sample Analyzed by:



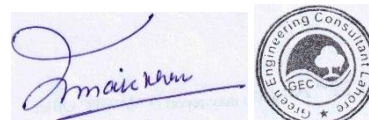
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 38: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Kot Chajji, Jand	GEC Report No:	GEC-ENV-P-089/20-R-1087
Coordinates:	33.53272 72.080345	Sample Identification:	AID-DW-093
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.5	< 5	< 5
	Total hardness as CaCO ₃	mg/l	198.4	< 500	---
	TDS	mg/l	1721	< 1000	< 1000
	TSS	mg/l	3	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	1.9	< 1.5	1.5
	Nitrate	mg/l	19.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

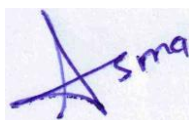
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Sample Analyzed by:



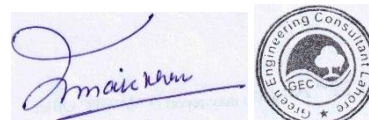
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 39: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Marmaki Jandial, Jand	GEC Report No:	GEC-ENV-P-089/20-R-1088
Coordinates:	33.515525 72.295404	Sample Identification:	AID-DW-094
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	1.2	< 5	< 5
	Total hardness as CaCO ₃	mg/l	201.2	< 500	---
	TDS	mg/l	1817	< 1000	< 1000
	TSS	mg/l	3	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	2.1	< 1.5	1.5
	Nitrate	mg/l	16.2	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

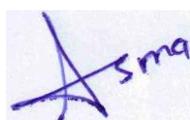
Note: This report is not valid for court.

Sample Analyzed by:



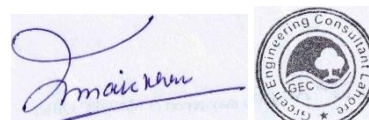
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 40: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Mir Ahmed Wali, Jand	GEC Report No:	GEC-ENV-P-089/20-R-1089
Coordinates:	33.361841 71.9291210	Sample Identification:	AID-DW-095
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.68	< 5	< 5
	Total hardness as CaCO ₃	mg/l	96.7	< 500	---
	TDS	mg/l	812	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.4	< 1.5	1.5
	Nitrate	mg/l	7.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	14	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	5	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	3	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

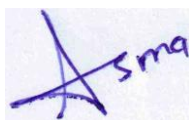
Note: This report is not valid for court.

Sample Analyzed by:



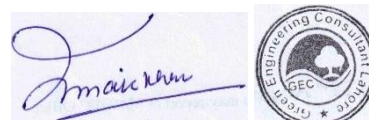
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 41: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Khour, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1090
Coordinates:	33.247958 72.45938	Sample Identification:	AID-DW-096
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.45	< 5	< 5
	Total hardness as CaCO ₃	mg/l	64.5	< 500	---
	TDS	mg/l	470	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.9	< 1.5	1.5
	Nitrate	mg/l	3.5	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

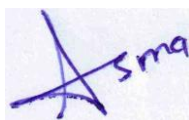
Note: This report is not valid for court.

Sample Analyzed by:



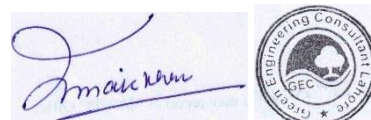
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 42: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Khour Company, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1091
Coordinates:	33.260937 72.46505	Sample Identification:	AID-DW-097
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.32	< 5	< 5
	Total hardness as CaCO ₃	mg/l	62.3	< 500	---
	TDS	mg/l	325	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	2.9	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

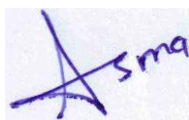
Note: This report is not valid for court.

Sample Analyzed by:



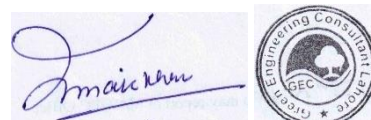
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 43: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Kasran, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1092
Coordinates:	33.483403 72.278781	Sample Identification:	AID-DW-098
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	1.5	< 5	< 5
	Total hardness as CaCO ₃	mg/l	203.2	< 500	---
	TDS	mg/l	2235	< 1000	< 1000
	TSS	mg/l	3	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.4	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	2.3	< 1.5	1.5
	Nitrate	mg/l	29.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

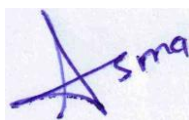
Note: This report is not valid for court.

Sample Analyzed by:



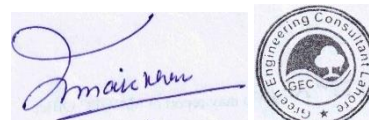
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 44: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Kanat, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1093
Coordinates:	33.332906 72.221532	Sample Identification:	AID-DW-099
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.4	< 5	< 5
	Total hardness as CaCO ₃	mg/l	197.4	< 500	---
	TDS	mg/l	1932	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	2.7	< 1.5	1.5
	Nitrate	mg/l	27.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

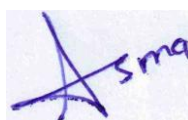
Note: This report is not valid for court.

Sample Analyzed by:



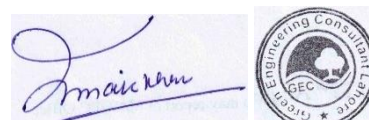
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 45: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Kamrial, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1094
Coordinates:	33.290774 72.576632	Sample Identification:	AID-DW-100
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	1.2	< 5	< 5
	Total hardness as CaCO ₃	mg/l	196.2	< 500	---
	TDS	mg/l	1693	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	1.6	< 1.5	1.5
	Nitrate	mg/l	26.5	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

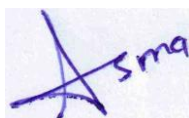
Note: This report is not valid for court.

Sample Analyzed by:



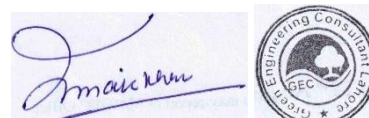
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 46: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Ahmdal, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1095
Coordinates:	33.285823 72.493610	Sample Identification:	AID-DW-101
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.8	< 5	< 5
	Total hardness as CaCO ₃	mg/l	96.6	< 500	---
	TDS	mg/l	911	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.7	< 1.5	1.5
	Nitrate	mg/l	16.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

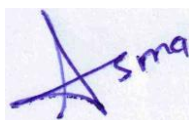
Note: This report is not valid for court.

Sample Analyzed by:



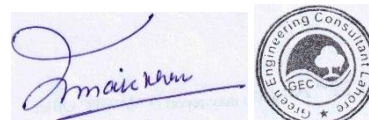
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 47: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Nosherah, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1096
Coordinates:	33.222714 72.248784	Sample Identification:	AID-DW-102
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.45	< 5	< 5
	Total hardness as CaCO ₃	mg/l	172.3	< 500	---
	TDS	mg/l	1429	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.8	< 1.5	1.5
	Nitrate	mg/l	19.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

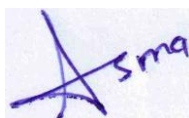
Note: This report is not valid for court.

Sample Analyzed by:



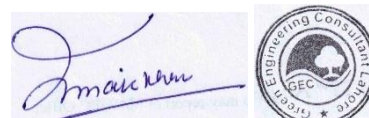
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 48: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Kharppa, Pindi Gheb	GEC Report No:	GEC-ENV-P-089/20-R-1097
Coordinates:	33.283440 72.205936	Sample Identification:	AID-DW-103
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.67	< 5	< 5
	Total hardness as CaCO ₃	mg/l	199.5	< 500	---
	TDS	mg/l	1739	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	1.9	< 1.5	1.5
	Nitrate	mg/l	22.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

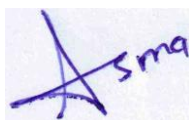
Note: This report is not valid for court.

Sample Analyzed by:



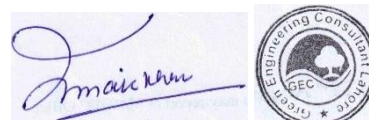
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 49: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Balkassar, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1098
Coordinates:	32.940171 72.644523	Sample Identification:	AID-DW-104
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.25	< 5	< 5
	Total hardness as CaCO ₃	mg/l	79.7	< 500	---
	TDS	mg/l	623	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	6.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

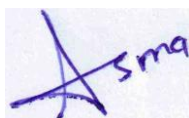
Note: This report is not valid for court.

Sample Analyzed by:



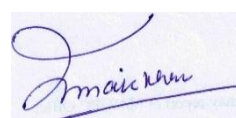
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 50: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Thoa Bahadur, Chakwal	GEC Report No:	GEC-ENV-P-089/20-R-1099
Coordinates:	32.937625 72.704977	Sample Identification:	AID-DW-105
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.45	< 5	< 5
	Total hardness as CaCO ₃	mg/l	81.3	< 500	---
	TDS	mg/l	712	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	5.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

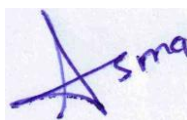
Note: This report is not valid for court.

Sample Analyzed by:



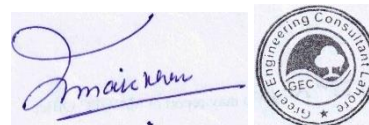
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 51: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Dandoot, Choa Saiden Shah	GEC Report No:	GEC-ENV-P-089/20-R-1100
Coordinates:		Sample Identification:	AID-DW-106
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.34	< 5	< 5
	Total hardness as CaCO ₃	mg/l	55.9	< 500	---
	TDS	mg/l	675	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Non-Acceptable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	7.2	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except according to Punjab Environmental Quality Standards.

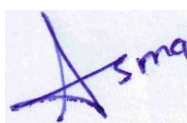
Note: This report is not valid for court.

Sample Analyzed by:



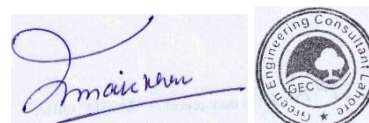
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 52: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Dalwal, Choa Saiden Shah	GEC Report No:	GEC-ENV-P-089/20-R-1101
Coordinates:	32.704049 72.886131	Sample Identification:	AID-DW-107
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	1.5	< 5	< 5
	Total hardness as CaCO ₃	mg/l	95.4	< 500	---
	TDS	mg/l	925	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.9	< 1.5	1.5
	Nitrate	mg/l	11.2	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

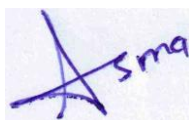
Note: This report is not valid for court.

Sample Analyzed by:



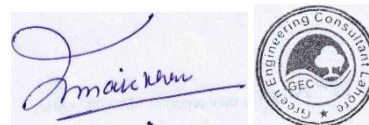
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 53: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Wahula, Choa Saiden Shah	GEC Report No:	GEC-ENV-P-089/20-R-1102
Coordinates:	32.715271 32.901939	Sample Identification:	AID-DW-108
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.67	< 5	< 5
	Total hardness as CaCO ₃	mg/l	78.2	< 500	---
	TDS	mg/l	637	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	7.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

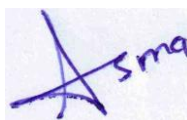
Note: This report is not valid for court.

Sample Analyzed by:



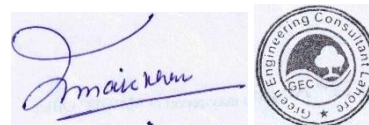
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 54: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Dulmial, Choa Saiden Shah	GEC Report No:	GEC-ENV-P-089/20-R-1103
Coordinates:	32.738501 72.923271	Sample Identification:	AID-DW-109
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.39	< 5	< 5
	Total hardness as CaCO ₃	mg/l	74.1	< 500	---
	TDS	mg/l	535	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	4.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

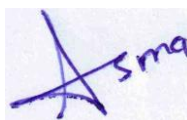
Note: This report is not valid for court.

Sample Analyzed by:



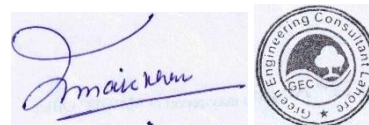
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 55: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Buchal Kalan, Kalar Kahar	GEC Report No:	GEC-ENV-P-089/20-R-1104
Coordinates:	32.677056 72.634598	Sample Identification:	AID-DW-110
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.28	< 5	< 5
	Total hardness as CaCO ₃	mg/l	64.2	< 500	---
	TDS	mg/l	463	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.6	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	4.9	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

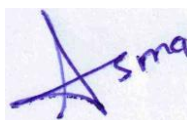
Note: This report is not valid for court.

Sample Analyzed by:



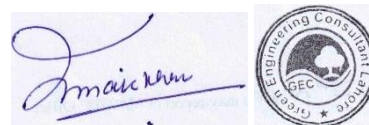
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 56: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Jhamra, Kalar Kahar	GEC Report No:	GEC-ENV-P-089/20-R-1105
Coordinates:	32.711432 72.618814	Sample Identification:	AID-DW-111
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.49	< 5	< 5
	Total hardness as CaCO ₃	mg/l	79.1	< 500	---
	TDS	mg/l	718	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-		6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	6.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

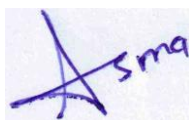
Note: This report is not valid for court.

Sample Analyzed by:



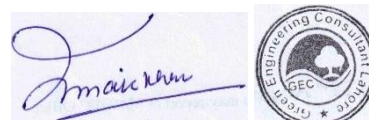
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 57: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Sarkalan, Kalar Kahar	GEC Report No:	GEC-ENV-P-089/20-R-1106
Coordinates:	32.64456 72.80850	Sample Identification:	AID-DW-112
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.41	< 5	< 5
	Total hardness as CaCO ₃	mg/l	66.2	< 500	---
	TDS	mg/l	335	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.4	< 1.5	1.5
	Nitrate	mg/l	4.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

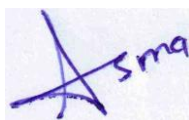
Note: This report is not valid for court.

Sample Analyzed by:



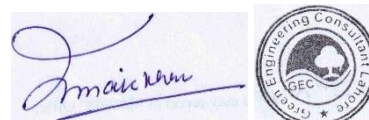
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 58: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Khairpur, Kalar Kahar	GEC Report No:	GEC-ENV-P-089/20-R-1107
Coordinates:	32.737877 72.794706	Sample Identification:	AID-DW-113
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.29	< 5	< 5
	Total hardness as CaCO ₃	mg/l	65.2	< 500	---
	TDS	mg/l	417	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.4	< 1.5	1.5
	Nitrate	mg/l	5.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

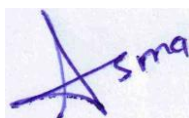
Note: This report is not valid for court.

Sample Analyzed by:



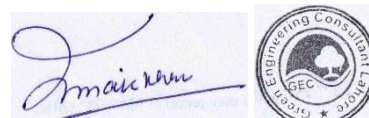
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 59: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Munara, Kalar Kahar	GEC Report No:	GEC-ENV-P-089/20-R-1108
Coordinates:	32.666471 72.512328	Sample Identification:	AID-DW-114
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.27	< 5	< 5
	Total hardness as CaCO ₃	mg/l	58.1	< 500	---
	TDS	mg/l	422	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	3.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

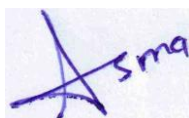
Note: This report is not valid for court.

Sample Analyzed by:



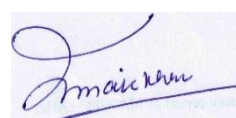
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 60: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Lawa, Lawa	GEC Report No:	GEC-ENV-P-089/20-R-1109
Coordinates:	32.697684 71.932922	Sample Identification:	AID-DW-115
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.49	< 5	< 5
	Total hardness as CaCO ₃	mg/l	78.8	< 500	---
	TDS	mg/l	721	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.3	< 1.5	1.5
	Nitrate	mg/l	7.4	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

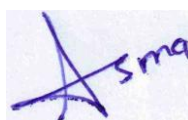
Note: This report is not valid for court.

Sample Analyzed by:



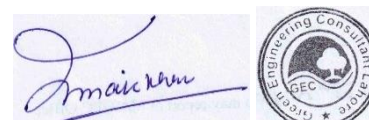
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 61: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	WSS Tamman, Talagang	GEC Report No:	GEC-ENV-P-089/20-R-1110
Coordinates:	33.004688 72.109848	Sample Identification:	AID-DW-116
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.37	< 5	< 5
	Total hardness as CaCO ₃	mg/l	74.2	< 500	---
	TDS	mg/l	627	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	6.2	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

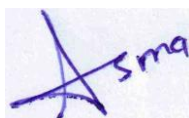
Note: This report is not valid for court.

Sample Analyzed by:



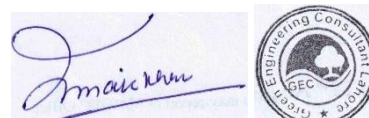
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 62: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Dhurnal, Talagang	GEC Report No:	GEC-ENV-P-089/20-R-1111
Coordinates:	32.810812 72.101067	Sample Identification:	AID-DW-117
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.26	< 5	< 5
	Total hardness as CaCO ₃	mg/l	61.7	< 500	---
	TDS	mg/l	412	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	3.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

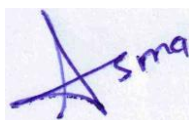
Note: This report is not valid for court.

Sample Analyzed by:



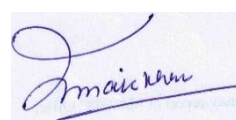
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 63: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Jhatla, Talagang	GEC Report No:	GEC-ENV-P-089/20-R-1112
Coordinates:	32.820117 72.381195	Sample Identification:	AID-DW-118
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.27	< 5	< 5
	Total hardness as CaCO ₃	mg/l	80.4	< 500	---
	TDS	mg/l	623	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	4.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

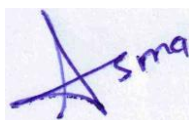
Note: This report is not valid for court.

Sample Analyzed by:



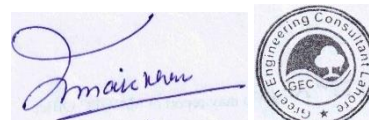
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 64: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	WSS Akwal, Talagang	GEC Report No:	GEC-ENV-P-089/20-R-1113
Coordinates:	32.927037 72.368241	Sample Identification:	AID-DW-119
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.36	< 5	< 5
	Total hardness as CaCO ₃	mg/l	65.7	< 500	---
	TDS	mg/l	395	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.6	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	3.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

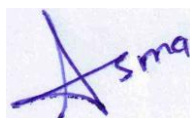
Note: This report is not valid for court.

Sample Analyzed by:



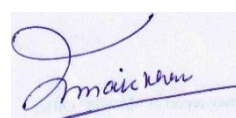
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:




Muhammad Umair

Report 65: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Nakka Kahut, Talagang	GEC Report No:	GEC-ENV-P-089/20-R-1114
Coordinates:	32.942171 72.477974	Sample Identification:	AID-DW-120
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.47	< 5	< 5
	Total hardness as CaCO ₃	mg/l	81.2	< 500	---
	TDS	mg/l	617	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.9	< 1.5	1.5
	Nitrate	mg/l	6.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

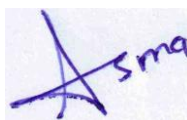
Note: This report is not valid for court.

Sample Analyzed by:



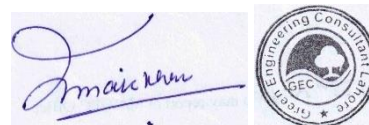
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 66: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Chinji, Talagang	GEC Report No:	GEC-ENV-P-089/20-R-1115
Coordinates:	32.712992 72.368432	Sample Identification:	AID-DW-121
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.95	< 5	< 5
	Total hardness as CaCO ₃	mg/l	178.3	< 500	---
	TDS	mg/l	1329	< 1000	< 1000
	TSS	mg/l	1	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.6	< 1.5	1.5
	Nitrate	mg/l	15.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

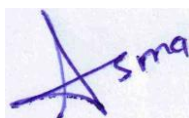
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Sample Analyzed by:



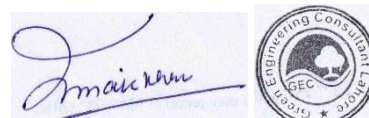
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 67: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Bhilomar, Talagang	GEC Report No:	GEC-ENV-P-089/20-R-1116
Coordinates:	32.724397 72.433568	Sample Identification:	AID-DW-122
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.49	< 5	< 5
	Total hardness as CaCO ₃	mg/l	194.4	< 500	---
	TDS	mg/l	1610	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	1.9	< 1.5	1.5
	Nitrate	mg/l	19.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

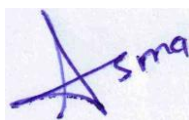
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Sample Analyzed by:



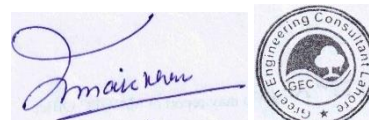
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 68: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Karl UC Dhurnian., Kotli Sattian	GEC Report No:	GEC-ENV-P-089/20-R-1117
Coordinates:	33.808661 73.478593	Sample Identification:	AID-DW-123
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.34	< 5	< 5
	Total hardness as CaCO ₃	mg/l	78.3	< 500	---
	TDS	mg/l	722	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	4.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

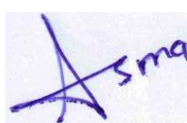
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Sample Analyzed by:



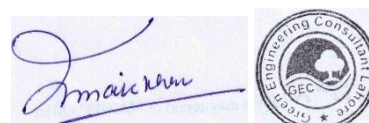
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 69: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Parhanna UC Ban., Murree	GEC Report No:	GEC-ENV-P-089/20-R-1118
Coordinates:	33.84877 73.46172	Sample Identification:	AID-DW-124
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.27	< 5	< 5
	Total hardness as CaCO ₃	mg/l	66.1	< 500	---
	TDS	mg/l	413	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.6	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.4	< 1.5	1.5
	Nitrate	mg/l	2.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

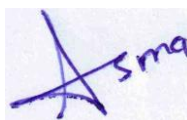
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Sample Analyzed by:



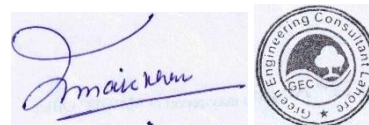
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 70: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Dhanda UC Ghel., Murree	GEC Report No:	GEC-ENV-P-089/20-R-1119
Coordinates:	33.903716 73.510376	Sample Identification:	AID-DW-125
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.47	< 5	< 5
	Total hardness as CaCO ₃	mg/l	73.2	< 500	---
	TDS	mg/l	511	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	4.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

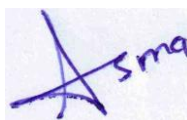
Note: This report is not valid for court.

Sample Analyzed by:



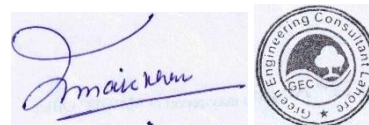
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 71: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Manga UC Tret., Murree	GEC Report No:	GEC-ENV-P-089/20-R-1120
Coordinates:	33.807975 73.298065	Sample Identification:	AID-DW-126
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.51	< 5	< 5
	Total hardness as CaCO ₃	mg/l	76.1	< 500	---
	TDS	mg/l	629	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	4.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

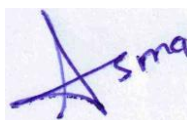
Note: This report is not valid for court.

Sample Analyzed by:



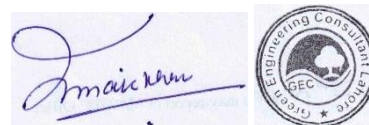
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 72: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Rehmatabad., Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1121
Coordinates:	33.599015 73.100410	Sample Identification:	AID-DW-127
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.63	< 5	< 5
	Total hardness as CaCO ₃	mg/l	93.6	< 500	---
	TDS	mg/l	825	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	7.9	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

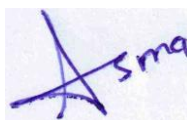
Note: This report is not valid for court.

Sample Analyzed by:



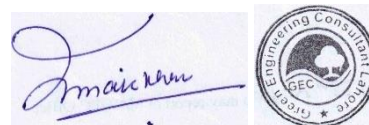
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 73: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Mangral Town, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1122
Coordinates:	33.612204 73.124009	Sample Identification:	AID-DW-128
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.49	< 5	< 5
	Total hardness as CaCO ₃	mg/l	95.1	< 500	---
	TDS	mg/l	850	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.1	< 1.5	1.5
	Nitrate	mg/l	6.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

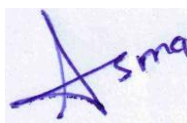
Note: This report is not valid for court.

Sample Analyzed by:



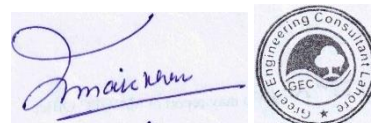
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 74: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply UC-75, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1123
Coordinates:	33.612051 73.115955	Sample Identification:	AID-DW-129
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.66	< 5	< 5
	Total hardness as CaCO ₃	mg/l	74.2	< 500	---
	TDS	mg/l	520	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.5	< 1.5	1.5
	Nitrate	mg/l	2.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

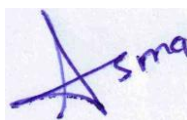
Note: This report is not valid for court.

Sample Analyzed by:



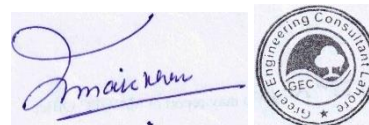
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 75: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Defense Colony, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1124
Coordinates:	33.624893 73.109243	Sample Identification:	AID-DW-130
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.47	< 5	< 5
	Total hardness as CaCO ₃	mg/l	81.7	< 500	---
	TDS	mg/l	770	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.7	< 1.5	1.5
	Nitrate	mg/l	6.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

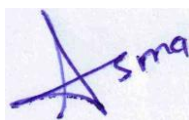
Note: This report is not valid for court.

Sample Analyzed by:



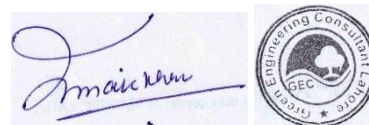
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 76: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Nai Abadi, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1125
Coordinates:	33.616526 73.108173	Sample Identification:	AID-DW-131
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.69	< 5	< 5
	Total hardness as CaCO ₃	mg/l	81.9	< 500	---
	TDS	mg/l	795	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	7.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except according to Punjab Environmental Quality Standards.

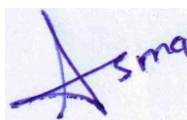
Note: This report is not valid for court.

Sample Analyzed by:



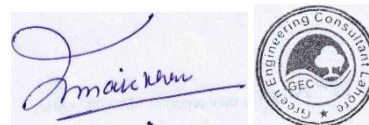
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 77: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Madni Mohallah, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1126
Coordinates:	33.57398 73.045962	Sample Identification:	AID-DW-132
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.83	< 5	< 5
	Total hardness as CaCO ₃	mg/l	114.6	< 500	---
	TDS	mg/l	1025	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	10.4	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

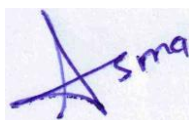
Note: This report is not valid for court.

Sample Analyzed by:



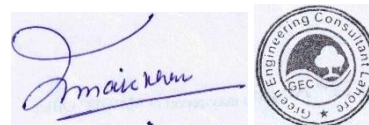
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 78: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Schem Mir Haider Colony (Rehab.) Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1127
Coordinates:	33.580874 73.012174	Sample Identification:	AID-DW-133
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.69	< 5	< 5
	Total hardness as CaCO ₃	mg/l	78.8	< 500	---
	TDS	mg/l	705	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	9.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

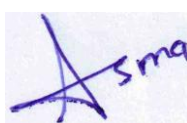
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Sample Analyzed by:



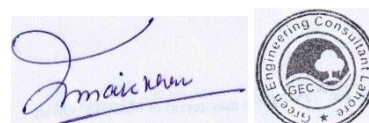
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 79: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Kokhar Abad, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1128
Coordinates:	33.622938 73.105122	Sample Identification:	AID-DW-134
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth:	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.37	< 5	< 5
	Total hardness as CaCO ₃	mg/l	58.4	< 500	---
	TDS	mg/l	325	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.6	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.2	< 1.5	1.5
	Nitrate	mg/l	4.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

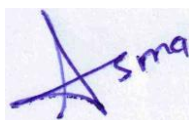
Note: This report is not valid for court.

Sample Analyzed by:



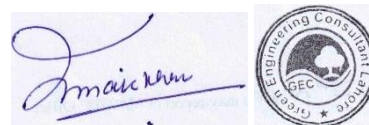
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 80: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Hayal Sherif, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1129
Coordinates:	33.539820 73.011016	Sample Identification:	AID-DW-135
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.96	< 5	< 5
	Total hardness as CaCO ₃	mg/l	178.4	< 500	---
	TDS	mg/l	1520	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.3	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	1.6	< 1.5	1.5
	Nitrate	mg/l	14.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

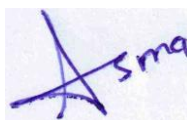
Note: This report is not valid for court.

Sample Analyzed by:



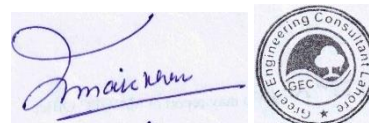
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 81: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Malik Colony Nai Abadi, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1130
Coordinates:	33.571700 73.002199	Sample Identification:	AID-DW-136
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.81	< 5	< 5
	Total hardness as CaCO ₃	mg/l	79.4	< 500	---
	TDS	mg/l	730	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	6.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

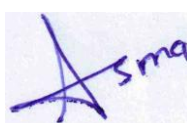
Note: This report is not valid for court.

Sample Analyzed by:



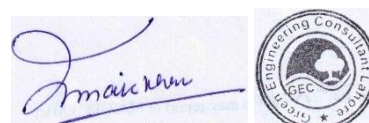
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 82: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Afzal Abad, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1131
Coordinates:	33.588927 73.103709	Sample Identification:	AID-DW-137
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.89	< 5	< 5
	Total hardness as CaCO ₃	mg/l	96.2	< 500	---
	TDS	mg/l	970	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.1	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.9	< 1.5	1.5
	Nitrate	mg/l	6.9	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit except taste according to Punjab Environmental Quality Standards.

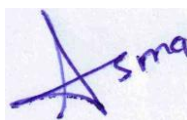
Note: This report is not valid for court.

Sample Analyzed by:



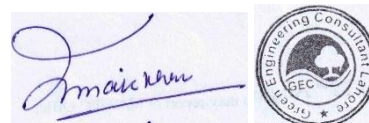
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 83: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Shaheen Colony, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1132
Coordinates:	33.633159 73.101291	Sample Identification:	AID-DW-138
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.37	< 5	< 5
	Total hardness as CaCO ₃	mg/l	60.4	< 500	---
	TDS	mg/l	320	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.6	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.3	< 1.5	1.5
	Nitrate	mg/l	2.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

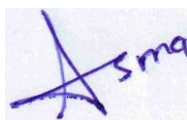
Note: This report is not valid for court.

Sample Analyzed by:



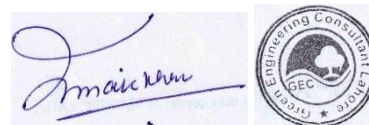
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 84: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Lala Ruka, Lakhan, Rawalpindi	GEC Report No:	GEC-ENV-P-089/20-R-1133
Coordinates:	33.562093 73.015156	Sample Identification:	AID-DW-139
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	1.2	< 5	< 5
	Total hardness as CaCO ₃	mg/l	163.2	< 500	---
	TDS	mg/l	1280	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.7	< 1.5	1.5
	Nitrate	mg/l	13.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	16	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	7	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	5	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

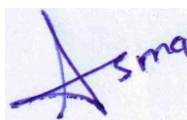
Note: This report is not valid for court.

Sample Analyzed by:



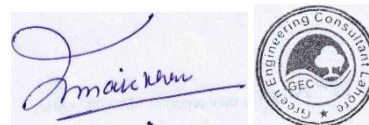
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 85: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	UWSS Taxila MC Taxila. (Phase-II), Taxila	GEC Report No:	GEC-ENV-P-089/20-R-1134
Coordinates:	33.753164 72.811078	Sample Identification:	AID-DW-140
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.36	< 5	< 5
	Total hardness as CaCO ₃	mg/l	74.1	< 500	---
	TDS	mg/l	520	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.3	< 1.5	1.5
	Nitrate	mg/l	2.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

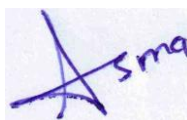
Note: This report is not valid for court.

Sample Analyzed by:



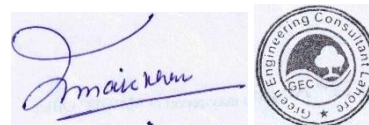
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 86: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	RWSS Thatta Khalil UC Thatta Khalil., Taxila	GEC Report No:	GEC-ENV-P-089/20-R-1135
Coordinates:	33.664641 72.757970	Sample Identification:	AID-DW-141
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.92	< 5	< 5
	Total hardness as CaCO ₃	mg/l	197.3	< 500	---
	TDS	mg/l	1820	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	4	15	15
	pH	-	7.2	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	0.025	< 0.05	0.01
	Fluoride	mg/l	1.7	< 1.5	1.5
	Nitrate	mg/l	19.8	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	17	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	6	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	4	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

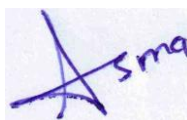
Note: This report is not valid for court.

Sample Analyzed by:



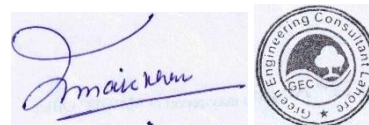
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 87: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Budho UC Gharri Afhana, Taxila	GEC Report No:	GEC-ENV-P-089/20-R-1136
Coordinates:	33.79966 72.78387	Sample Identification:	AID-DW-142
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.65	< 5	< 5
	Total hardness as CaCO ₃	mg/l	76.2	< 500	---
	TDS	mg/l	610	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	2.7	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

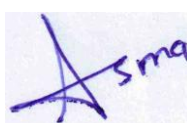
Note: This report is not valid for court.

Sample Analyzed by:



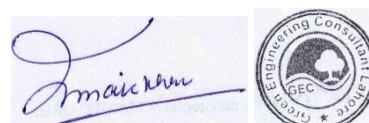
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 88: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Asif Abad Wah Cantt Area , Taxila	GEC Report No:	GEC-ENV-P-089/20-R-1137
Coordinates:	33.780821 72.717562	Sample Identification:	AID-DW-143
Sampling Source:	-	Sample Collection Date:	December 26,2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.61	< 5	< 5
	Total hardness as CaCO ₃	mg/l	95.4	< 500	---
	TDS	mg/l	960	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	Objectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	6.9	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	1.1	< 1.5	1.5
	Nitrate	mg/l	7.2	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	14	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	8	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	5	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: Some of the parameters are out of limit according to Punjab Environmental Quality Standards.

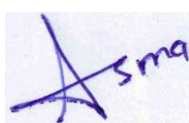
Note: This report is not valid for court.

Sample Analyzed by:



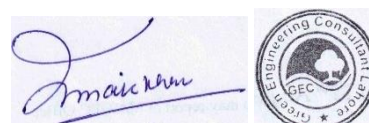
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 89: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Lab Thattho UC Lab Thatto., Taxila	GEC Report No:	GEC-ENV-P-089/20-R-1138
Coordinates:	33.851628 72.751924	Sample Identification:	AID-DW-144
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameters</u>	Turbidity	NTU	0.61	< 5	< 5
	Total hardness as CaCO ₃	mg/l	64.2	< 500	---
	TDS	mg/l	480	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	5	15	15
	pH	-	6.7	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.8	< 1.5	1.5
	Nitrate	mg/l	1.6	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

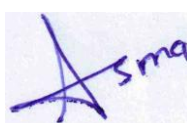
Note: This report is not valid for court.

Sample Analyzed by:



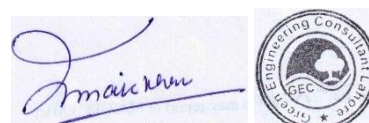
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair

Report 90: Drinking Water Analysis Report

Client Name:	Associates In Development (AID) Pvt. Ltd	GEC Job Reference:	P-GEC-ENV-089/2020
Village Name:	Rural Water Supply Scheme Rehbar Colony UC Usman Khattar	GEC Report No:	GEC-ENV-P-089/20-R-1139
Coordinates:	33.774317 72.820614	Sample Identification:	AID-DW-145
Sampling Source:	-	Sample Collection Date:	December 26, 2020
Source Depth	-	Report Issue Date:	January 11, 2021

Analysis Results

Type	Parameter	Unit	Result	PEQS	WHO Standards
<u>Physical Parameter</u>	Turbidity	NTU	0.43	< 5	< 5
	Total hardness as CaCO ₃	mg/l	73.2	< 500	---
	TDS	mg/l	570	< 1000	< 1000
	TSS	mg/l	0	-	---
	Odour	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Taste	-	unobjectionable	Acceptable/Non-Objectionable	Acceptable/Non-Objectionable
	Color	TCU	6	15	15
	pH	-	6.8	6.5-8.5	6.5-8.5
<u>Chemical Parameters</u>	Arsenic	mg/l	BDL	< 0.05	0.01
	Fluoride	mg/l	0.6	< 1.5	1.5
	Nitrate	mg/l	2.1	< 50	50
<u>Microbiological Parameters</u>	Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	Feacal Coli Form	Cfu/100ml	0.0	Must not be detectable	Must not be detectable
	E Coli	Cfu/100ml	0.0	Must not be detectable	Must not be detectable

APHA: American Public Health Association

BDL: Below Detection Limit

ND: Not Detectable

PEQS: Punjab Environmental Quality Standards

Remarks: All the parameters are within limit according to Punjab Environmental Quality Standards.

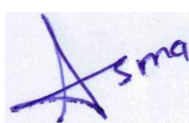
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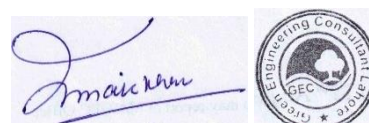
Nabila Shabbir

Chief Chemist:



Asma Khalid

Head of Env Lab:



Muhammad Umair



Figure 62: Onsite Sample Testing at RWSS Odherwal, Chakwal



Figure 63: Onsite Sample Testing at RWSS Dheedwal, Chakwal



Figure 64: Onsite Sample Testing at RWSS Bhoun, Kallar Kahhar



Figure 65: Onsite Sample Testing at Pindori, Dina



Figure 66: Onsite Sample Testing at Lilla Thal, P.D Khan



Figure 67: Onsite Sample Testing at Kandwal, P.D Khan



Figure 68: Onsite Sample Testing at Peer Khara, P.D Khan



Figure 69: Onsite Sample Testing at Jalal Pur Sharif, P.D Khan



Figure 70: Onsite Sample Testing at Gole Pur, P.D Khan



Figure 71: Onsite Sample Testing at Tobah, P.D Khan



Figure 72: Onsite Sample Testing at Haran Pur, P.D Khan



Figure 73: Onsite Sample Testing at Saroba, P.D Khan



Figure 74: Onsite Sample Testing at Dharyala Jalib, P.D Khan



Figure 75: Onsite Sample Testing at Ather, P.D Khan



Figure 76: Onsite Sample Testing at Sodi Gujjar, P.D Khan



Figure 77: Onsite Sample Testing at Jotana, P.D Khan



Figure 78: Onsite Sample Testing at Bilowal, P.D Khan



Figure 79: Onsite Sample Testing at Dhudi Phaphra, P.D Khan



Figure 80: Onsite Sample Testing at Domeli, Sohawa



Figure 81: Onsite Sample Testing at Khuramb Kaswal, Gujar Khan



Figure 82: Onsite Sample Testing at RWWS Sukho, Gujar Khan



Figure 83: Onsite Sample Testing at RWWS Hamid Jhangi, Gujar Khan



Figure 84: Onsite Sample Testing at RWWS Karyala UC Punjgran, Gujar Khan



Figure 85: Onsite Sample Testing at UWSS MC Kahuta, Kahuta



Figure 86: Onsite Sample Testing at MC Kallar Syedan



Figure 87: Onsite Sample Testing at UC Dubaran, Kallar Syedan



Figure 88: Onsite Sample Testing at Pind Bainso, Kallar Syedan

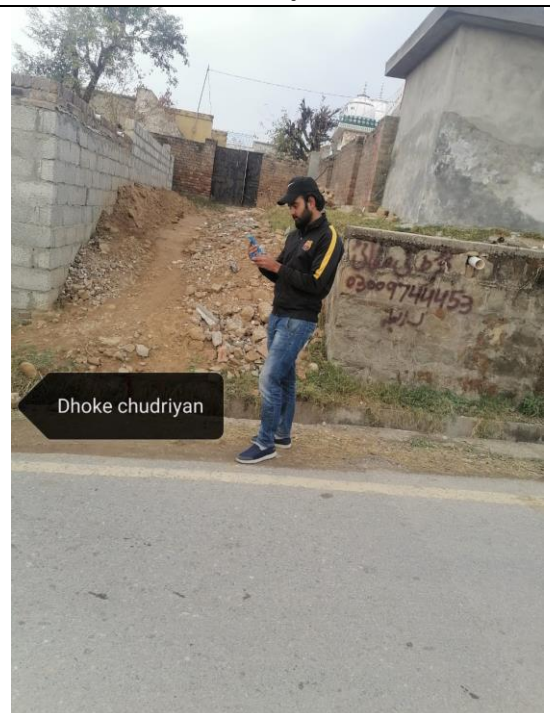


Figure 89: Onsite Sample Testing at Dhoke Chudriyan



Figure 90: Onsite Sample Testing at Dhamial UC Mori Ghazan



Figure 91: Onsite Sample Testing at Morgha



Figure 92: Onsite Sample Testing at Dhoke Munshi



Figure 93: Onsite Sample Testing at Kotha Kalan

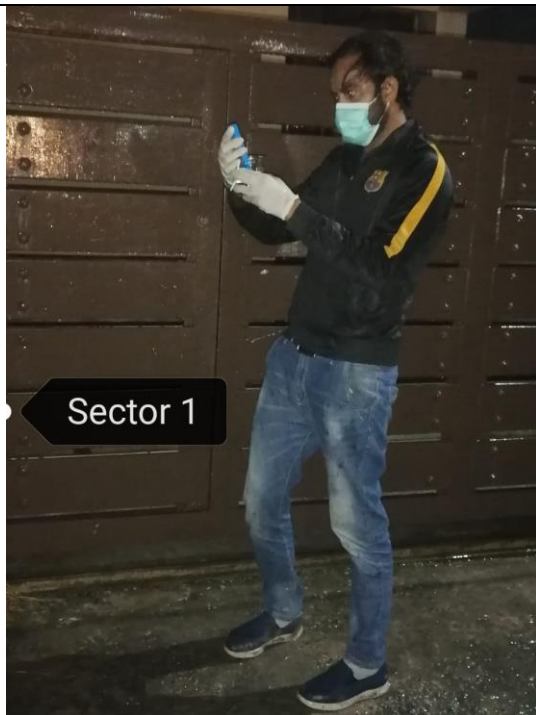


Figure 94: Onsite Sample Testing at Sector 1



Figure 95: Onsite Sample Testing at UC Basali



Figure 96: Onsite Sample Testing at Professor Colony



Figure 97: Onsite Sample Testing at UC Chahan



Figure 98: Onsite Sample Testing at Chak Beli Khan



Figure 99: Onsite Sample Testing at Kali Parri



Figure 100: Onsite Sample Testing at UC Sagri



Figure 101: Onsite Sample Testing at Dhoke Lalyal



Figure 102: Onsite Sample Testing at Al Noor Colony

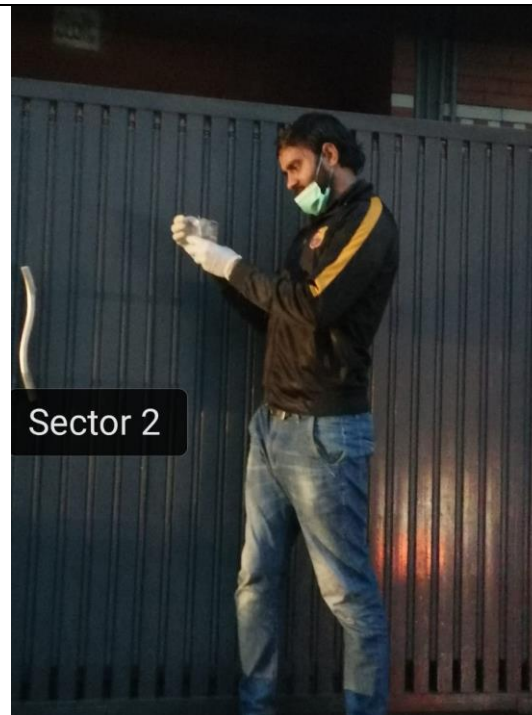


Figure 103: Onsite Sample Testing at Sector 2



Figure 104: Onsite Sample Testing at Salmoon UC Chontra



Figure 105: Onsite Sample Testing at UC Chontra



Figure 106: Onsite Sample Testing at Rajar UC Chahan



Figure 107: Onsite Sample Testing at Chaklala



Figure 108: Onsite Sample Testing at UC Adyala



Figure 109: Onsite Sample Testing at Kurrar UC Parial



Figure 110: Onsite Sample Testing at UC Chakri



Figure 111: Onsite Sample Testing at Mial UC Parial



Figure 112: Onsite Sample Testing at Dheri UC Chontra

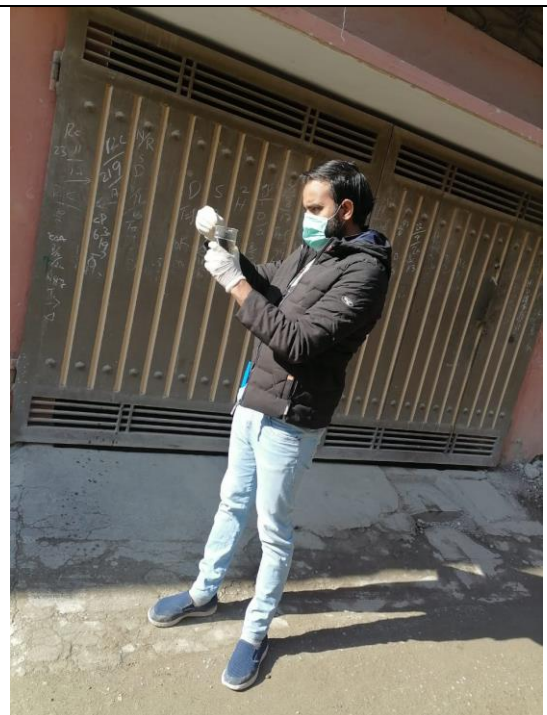


Figure 113: Onsite Sample Testing at Muzammal Town

Annexure-VII

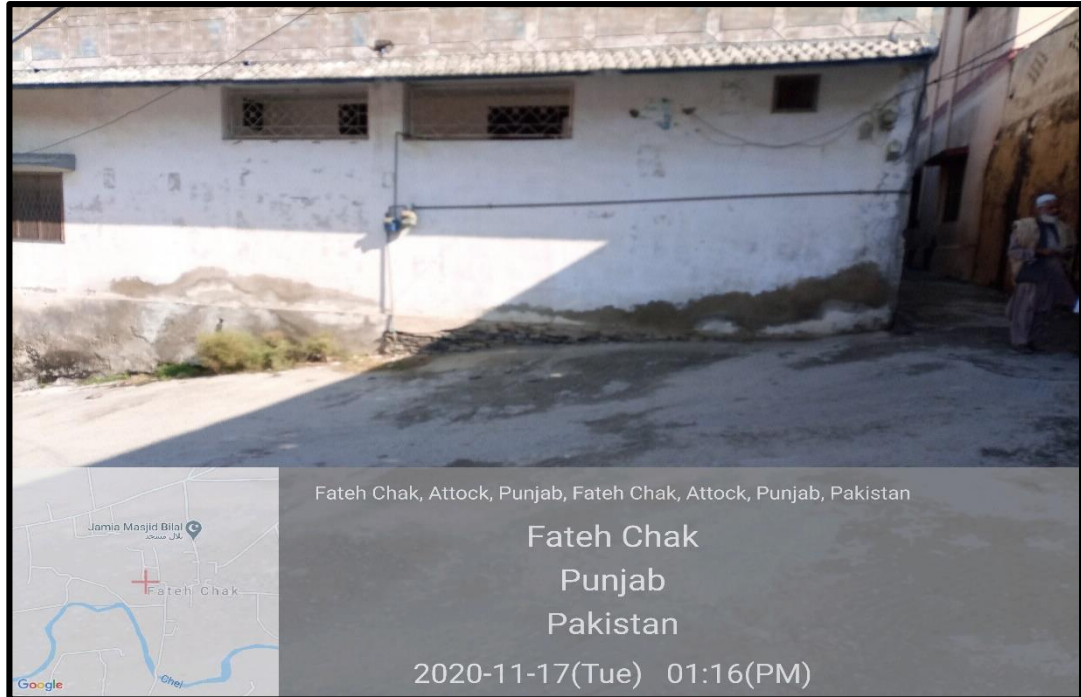
PHOTO LOG



Proposed site for installation of RO Plant in Village Dalwal Chao Sayda Sha Chakwal District, Pakistan



Proposed site for installation of S/AC plant in village Gondal, Attock District, Pakistan



Proposed site for Installation of S/AC filtration Plant in Village Haji Shah II, District Attock, Pakistan



Proposed site for RO filtration plant in Joya Mir, District Chakwal, Pakistan



Proposed site for installation of S/AC plant in Basal, Attock district, Pakistan



Proposed Site for Installation of in Dakhnair, District Attock, Pakistan



Proposed land for installation of S/AC filter in village Gadda Attock district, Pakistan



Proposed site for installation of S/AC Filtration plant in Malal, District Attock, Pakistan



Proposed site for installation of RO filtration plant in Thatta, Attock District, Pakistan



Proposed site for installation of RO filter with Chlorination in Maingan, District Chakwal, Pakistan



Public Consultation with Deputy Director of Punjab Aab-e-Pak Authority



Consultation with CBM Mr. Jahanzaib PHED Attock



Consultation with Mr. Uzair CBM PHED Attock, Pakistan



Consultation with Mr. Azim CBM PHED Rawalpindi, Pakistan



Consultation with Local Residents Regarding Aforesaid Project Bully Bala Chakwal, Pakistan



***Public Consultation near filtration plant site in WSS Dhurnal Talagamg
Chakwal, Pakistan***



Consultation in the vicinity of aforesaid project in Mangain, District Chakwal, Pakistan



Consultation with local residents regarding aforesaid project in Bhoun Kallar Kahar, Chakwal District, Pakistan



Consultation with local Residents Regarding the Aforesaid Project



Consultation with local Residents Regarding the aforesaid Project