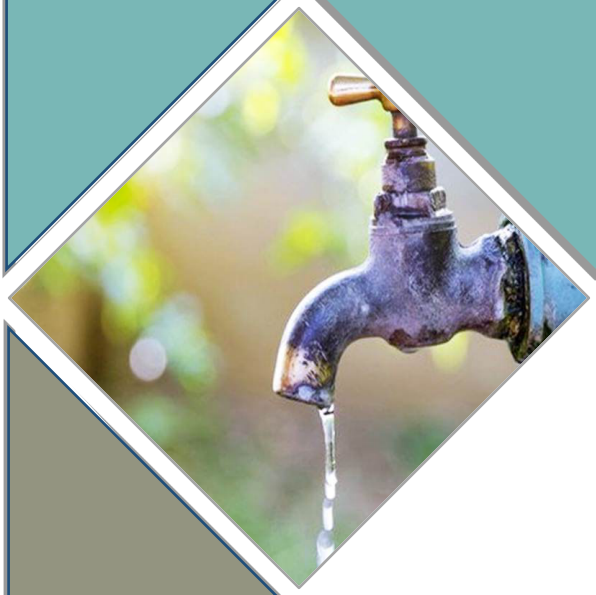
REGIONAL DEVELOPMENT
Master Plan

NAROWAL



- Water Supply
- Sanitation
- Environment

The Urban Unit
Urban Sector Planning & Management Services Unit (Pvt.) Ltd.

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Acronyms & Abbreviations

AC	Asbestos Cement
ADP	Annual Development Plan
AQI	Air Quality Index
DDC	District Development Committee
DNI	Distribution Network
ICT	Information Communication Technology
LG&CD	Local Government and Community Development
MC	Municipal Corporation
MS	Mild Steel
NEQS	National Environmental Quality Standards
NOx	Nitrogen Oxides
PCGIP	Punjab Cities Governance Improvement Project
PDSSP	Punjab Devolved Social Services Program
PEQS	Punjab Environmental Quality Standards
PRCC	Plain Reinforced Cement Concrete
PSLM	Pakistan Social and living Standards Measurement
PVC	Poly Vinyl Chloride
RCC	Reinforced Cement Concrete
RSPM	Respirable Suspended Particulate Matter
SPM	Suspended Particulate Matter
TDS	Total Dissolved Solids
UCs	Union Councils
WHO	World Health Organization

Executive Summary

The Development plan has been prepared with the coordination of Municipal Committee and public health officials of Narowal. Its objective is to help identify and resolve the escalating problems resulting from the substandard condition of the existing infrastructure. The Urban Unit has not only made an effort to compile all the information through GIS and remote sensing but also collected data through extensive field surveys and condition assessment of the assets for a concrete analysis which forms the basis of our recommendations in the end.

The report is divided into four main chapters. The first chapter gives an overview of Narowal City explaining its history, demography and population projections. In the second chapter, water supply system of Narowal city is discussed. It delineates existing water supply infrastructure, deficits in demand and supply, asset condition assessments and proposes a development plan for the betterment of service. In addition to it, potential sites for rain water harvesting are also identified in this chapter. Sewerage system of Narowal city is described in third chapter which encompasses existing sewerage network, condition assessment of disposal stations and sewerage pipes, projected sewage flow generation and future recommendations in the project digest. All the sewage generated by Narowal city is being dumped untreated in to the Nullahs, which ultimately pollute the water resources. Therefore, wastewater treatment plant and its potential location is also proposed in this development plan.The final chapter of this report is focused on the environmental problems and various solutions in the form of proposed projects are identified as their solution. For a better undersanding of the surroundings, the air quality parameters for the district Narowal were mapped by using satellite data for the identification of hotspots for the major pollutants. Furthermore, annual climatic conditions, existing public parks and major sources of flood are discussed. Coupled with many other suggestions, a park is also proposed for the Narowal city considering the need of the hour.

The proclivity of the development plan is towards the extensive rehabilitation and upgradation of ongoing schemes and the already existing service structure. Moreover, it also caters to the extension of service network to the unserved areas of the city. Hence, a robust implementation of these projects in true letter and spirit will allow bring revolutionary changes in the service delivery of the District Narowal.

Chapter 1. District Profile

1.1 Historical Background

Narowal City was established during Mughal Empire after the name Naroo, head of Naroo cast, who inhabited it in the sixteenth century. Narowal city is situated on right bank of River Ravi (Northern Side) at a distance of 110 km from Lahore on Muridkey - Shakargarh Road and 65 km from Sialkot. The city was also connected with District Gurdaspur (India) by rail and road/ bridge but during war in 1965, the Dera Baba Nanak Bridge on River Ravi was blasted and means of communication were disconnected with India.

The town was market center before partition due to its agricultural background. The main product of the area is rice, wheat, maize, barley etc. Narowal was declared as tehsil in 1927, while the town was converted into district in 1991 with two tehsil headquarters namely Narowal, Shakargarh and Zafarwal Tehsil was established during 2012. The other important towns are Baddomalhi, Qila Ahmad Abad. The Town Committee Narowal was established before partition and was converted in Tehsil Municipal Administration during 2002.

1.2 Topography

General topography of area is plain and under cultivation. The River Ravi passes at a distance of about 7-km on the southern side from the city and virtually forms international boundary. Its north eastern boundary is at a distance of about 32 kilometers from the outer line of the Himalayas. However, the foot hills stop short of the district and its surface is level plain, broken only by the River Ravi, by the Aik and Dake streams and few nullahs. With respect to water supply & adjoining rivers & nullahs, district Narowal is bounded on south – east by the river Ravi, the district is fringed on either side by a line of fresh alluvial soil, about which rise the low banks that form the limits of the riverbeds. Despite these borders, the general physical aspects of the district display little variety. It is fertile and its dense population ensures that almost every available acre is brought under the plough. There is gentle slopefrom North to South. The Nullah Jujri and River Ravi are main source of drainage.

1.3 Geographical Location

Narowal district is situated to the North-East of Pakistan consisting of three tehsils i.e. Narowal, Shakargarh and Zafarwal. Narowal District lies from 31° 55' to 32° 30' north latitudes and 74° 35' to 75° 21' east longitudes with altitude of 266 m above sea level. The district is bound on the northwest by Sialkot district, on the north by Kathua district of Jammu and Kashmir India, on the southeast by Gurdaspur district (India) & Pathankot District (Republic of India) and on the south by Amritsar district (India) and on the southwest by Sheikhupura district. The total area of the district is approximately 2,337 square kilometers. Prior to the creation of Zafarwal Tehsil in July 2009, Narowal Tehsil occupied 1,065 square kilometers while the remaining area (1,272 square kilometers) fell in Shakargarh Tehsil. Figure 1 shows the location and boundary of district Narowal.

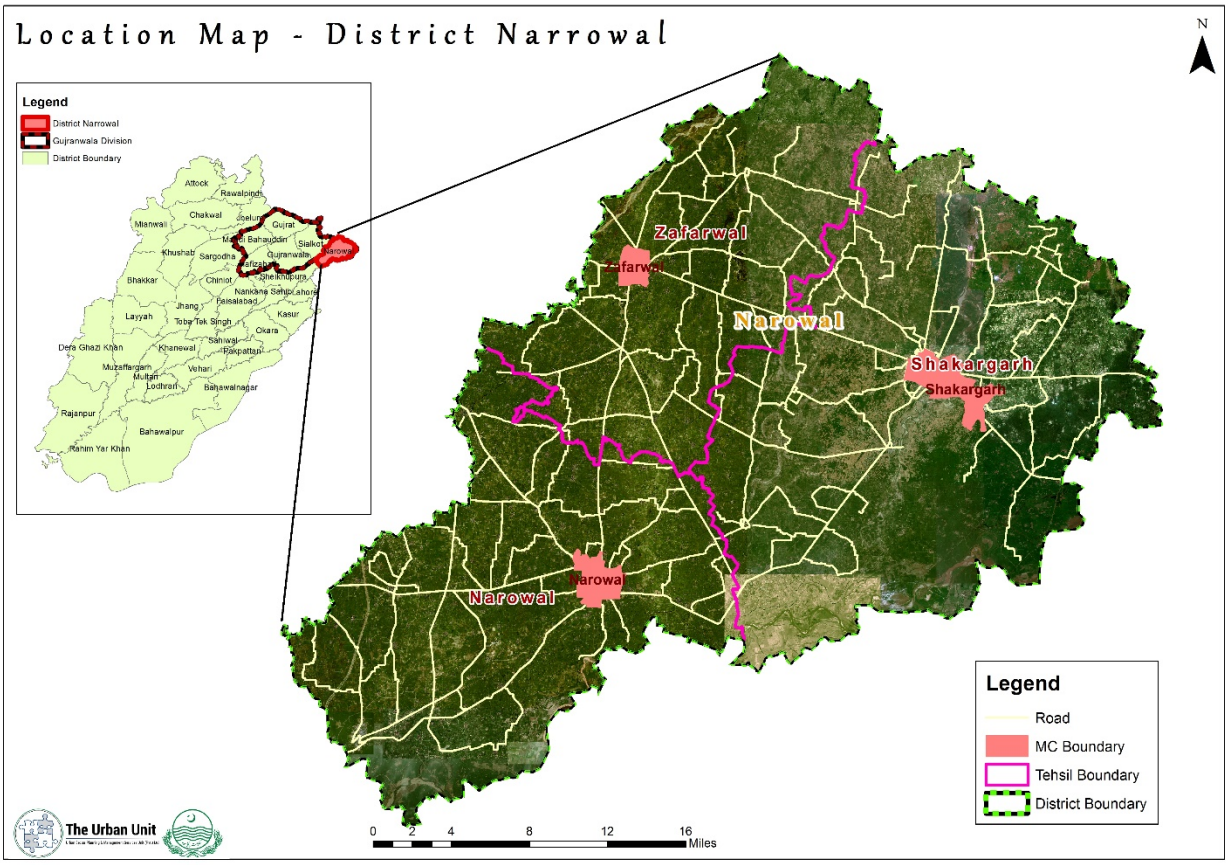


Figure 1: Location Map of District Narowal

1.4 Demographic Trends

According to the 6th population and housing census 2017 of Pakistan, the total population of Narowal District is 1,709,757 whereas the population of three tehsils namely Narowal, Shakargarh and Zafarwala tehsils are 596,565, 674,223 and 438,969 respectively. Most of the population dwells in villages and is engaged in agriculture. The major portion of the population belongs to Jatt clan. The main crops of the district are wheat and rice. Notable people of the district includes Faiz Ahmad Faiz, the famous revolutionary poet and Ahsan Iqbal the Former Interior Minister of Pakistan.The growth rate and future projections of the district are tabulated in Table 1 while Table 2 shows demographic profile. Further information about the population structure is presented in Figure-2.

Table 1: Future population projections of Narowal

Population in 2017	Growth Rate (1998-2017)	Future Estimates		
		2020	2025	2030
1,709,757	1.59	1,792,616	1,939,733	2,098,924

District Narowal at a Glance	
Tehsils	03 (Narowal, Shakargarh & Zafarwala)
Total Union Councils (UCs)	98
Area	2337 Sq. km.
Population (As per 2017 Census)	1,709,757
Urban Population	257,248
Rural Population	1,452,509
Male	841,950
Female	867,712
Average Household size	7.1
Average Annual Growth Rate (1998 – 2017)	1.59

Table 2: Demographic profile of Narowal

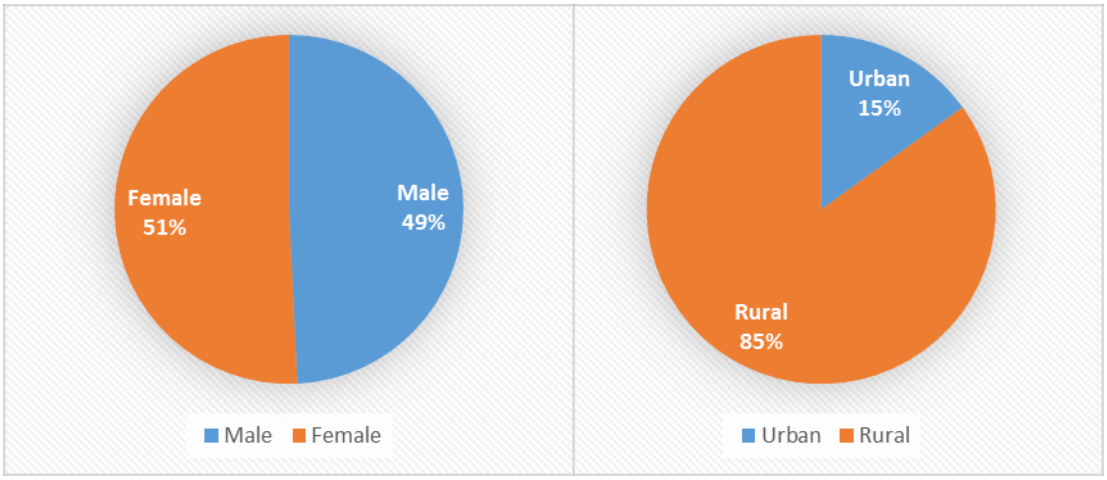


Figure 2: Population structure of District Narowal

1.5 Development Portfolio of District Narowal

On looking at the existing development portfolio of water and sanitation sector of Narowal district, 18 projects have been approved since 2014 in this sector worth PKR 1124.782 million. It is pertinent to mention here that out of 18 project, only one project that was approved in 2014 was related to Rehabilitation of Urban Water Supply Scheme of Narowal City. The remaining 17 projects are related to sewerage and drainage projects. This shows that the key consideration of this district for development in water and sanitation is majorly focused towards Sanitation and drainage. The list of these projects is presented below in Table 3.

Table 3: Development Portfolio of District Narowal

Sr. No.	GS. No.	Project Name	Approval Status	Cost (PKR Million)
Sanitation and Drainage				
1.	1118	Drainage / PCC scheme for village Gorala Maanpur	Approved 23-09-2016	50
2.	1119	PCC , Soling and Drainage Scheme in Village Babral, Kallah, Mahlo, Sahlo,Tehsil Shakargarh, District Narowal	Approved 23-09-2016	41.4
3.	1120	PCC / Soling / Filtration Plant in Village Noor Kot Manngri and Bagha Madan Thakrian Pagla, District Narowal.	Approved 01-07-2016	46
4.	1121	Construction of Nalian, Soling, PCC & Boundary Walls of Graveyard in UCs Nallah, Bua, Melo Salo, Kalah, Mainagty, Bara Manga, Kot Naina, Bahree, Ikhras Pur, Jalala, Sujowal, Pehgwari, Malik Pur, Fateh Pur Afghana, Sahari, Ghona, Ghumtala, Kanjror, Lang	Approved 13-03-2017	85
5.	1122	Urban / Sewerage / PCC & Tuff Tile Scheme Narowal City	Approved 23-090-2016	175
6.	1123	Provision of Drains/Soling and PCC in UCs, Datewal, Mangolay, Hallowal, Dhrug Miana and Ghota Fateh Garh District Narowal	Approved 03-08-2017	30
7.	1124	Provision of Drains/Soling and PCC in UCs, Talwandi Bhindran, Giddan, Niddokay, Kot Lakha Singh and Domala, District Narowal	Approved 03-08-2017	30

8.	1125	Provision of Drains/Soling and PCC in UCs, Khan Kassa, Dongian, Bubak Murali, Sadowala Uncha and Falezpur District Narowal	Approved 03-08-2017	30
9.	1126	Provision of Drains/Soling and PCC in UCs, Ahmadabad, Depokey, Jestiwala, Uncha, Lala and Nonar, District Narowal	Approved 03-08-2017	30
10.	1127	Provision of Drains/Soling and PCC in UCs, Mehlu Wala, Dhamthal, Langarkay, Tapiala and Sankhtara District Narowal	Approved 03-08-2017	30
11.	1128	Provision of PCC/Streets/Nalian at Bado Malihi, Chandarkay, Ransiwal, Manak, Qayampur, Agrian, Pungarian, Salukay, Dawod, Chundowal, Klass Gorya, Muhammad Rana Wala District Narowal	Approved 19-10-2017	130
12.	1129	Provision of Tuff Tile from Zafarwal bypass to Chowk Ghas Mandi, District Narowal	Approved 03-08-2017	22
13.	1130	Construction of Drainage System, PCC and Brick Pavement in Villages of Jandiala Tehsil Zafarwal District Narowal	Approved 03-08-2017	15
14.	1131	Provision of PCC / Sewerage / Drainage etc. in PP-133, District Narowal	Approved 02-08-2017	25
15.	1680	Const of PCC / Tuff tiles of City Package Zafarwal City	Approved 09-04-2016	70.1
16.	1681	Sewerage scheme for Talwandi Bhindran, Narowal.	Approved 03-05-2014	109.9
Water Supply				
17.	1799	Rehabilitation / Augmentation of Urban water Supply Scheme Narowal City	Approved 30-09-2014	185.4
Environmental Consideration and Green Spaces				
18.	2057	Establishment of Public Park at Zafarwal, Narowal District	Approved 18-09-2019	20
Total Portfolio				***1124.782***

Chapter 2. Water Supply System

2.1 Introduction

The Water Supply system in Narowal is composed of Tube Well Stations, Overhead Reservoirs (OHRs), and Water Supply Pipelines. Government has provided piped water supply system in the town in different phases over the past two decade. The water supply scheme in its entirety comprises of all the components that are then maintained and operated by the TMA Narowal. Narowal city solely relies on the groundwater and the water is directly pumped into the pipe network through tube wells.

As informed during the meeting with Deputy Commissioner Narowal and his team, there is generally no major issue of water quality with respect to its source as the ground water is clean and safe as tested by Public Health Water Quality Lab. However, there is a dire need to improve the condition of existing assets especially in the city area so that clean water is delivered to the consumers. Despite the verified quality of the waters, thepipelines delivering the waters have turned old and rusty and consequently the Municipal Committee is getting constant complaints of sewerage water mixing. That is the reason that most of the households are using their own bore wells for ground water supply.

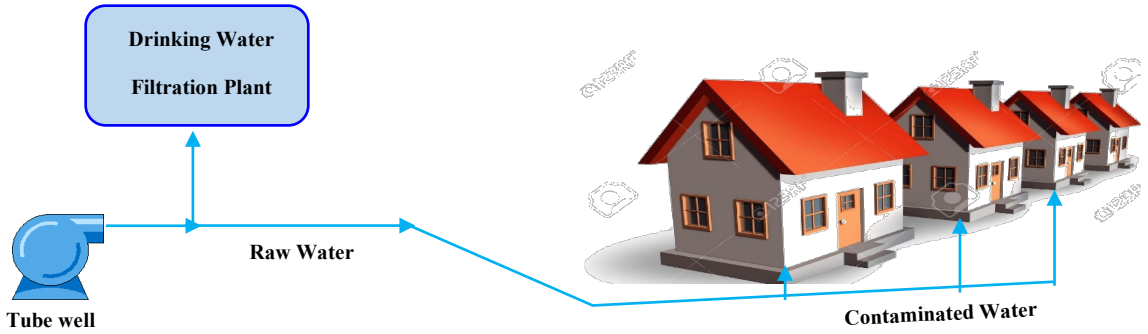


Figure 3: Layout of Water Supply System

2.2 Design Criteria

Design Criteria for water supply system has been based on "Technical and Service Delivery Standards for Water Supply and Sanitation Sectors" by PDSSP and PHED guidelines.

2.2.1 Tube Wells

Design criteria for major components of tube wells are described in this section. It involves size/capacity, location and possible advancements in comparison to existing situations. As per the demand estimations, the capacity of proposed tubewell is 1.5 cusecs with pump setting depth of 165 ft.

- Diurnal demands are estimated on the basis of PHED standard of 50 gallons per capita per day. However, both PDSSP and PHED recommends to design a tube well station at max daily demand. As per PDSSP, max day demand is 1.5 times average day demand. Therefore, demand estimations are calculated in accordance with aforementioned criteria and considered diurnal demand pattern is shown in figure 4.

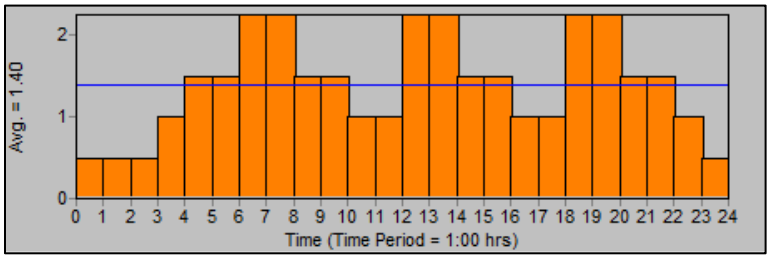


Figure 4: Water Demands on hourly basis

- Distribution pipes should designed on peak hour flow i.e. 1.5 times the max day demand, as per PDSSP criteria. Pressure rating for the transmission main and distribution network should be **HDPE PE100 PN 12** and **HDPE PE100 PN 10** respectively. High Density Poly Ethylene (HDPE) pipe shall be used for transmission main and distribution network depending upon the availability of size and pressure rating of the pipe.Sand bedding will be provided for all pipes. As per PDSSP criteria, an earth cover of 1 meter (3.281 ft) shall be provided over laid water supplypipe lines of all sizes except in hilly areas.(See figure5)

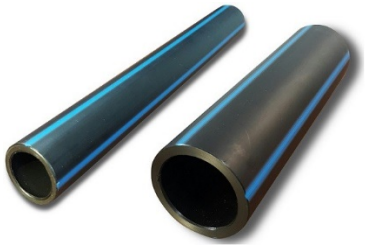


Figure 5: High Density Poly Ethylene Pipes

- Valves up to 250 mm size shall be gate valves. For 300 mm and above pipes, butterfly valves shall be used. Valves above 300 mm diameter shall be gear operated if torque is more than 15 Nm. Valve chamber shall be provided for all sizes of valves except 150mm where a surface box will be used on underground pipelines. Moreover, Air valves with isolation gate valve will be provided to remove air during pipe filling and to avoid sub-atmospheric conditions during transient flow.Washouts/ Drain valves shall be provided at the low points to drain off any accumulated sediments in the transmission mains or to facilitate repairs etc.(See figure 6)

Figure 6: Gate valve, Butterfly valve and Air Release Valve

The locations of tubewells are marked using GIS tools according to the demand requirement as shown in Figure 9. It is thereby recommended that automatic dozing hypo chlorinators are installed on the delivery line of tube well. Automatic dozing pump is shown in Figure 7. Amongst the different advantages of using this type of digital automatic dosing pump, its automatic adjustment of the chlorine requirement with respect to flow particularly stands out. Furthermore, it is also proposed that flow meters shall be installed at the delivery of tube wells. In this regard, electromagnetic flow meters are recommended as shown in Figure 7.

Figure 7: Automatic dosing pump and electromagnetic flowmeter

2.2.2 Overhead Reservoirs

Development plan of OHRs involve usage of OHRs, size/capacity, location and possible advancements in comparison to existing situations. OHRs are also key component of water distribution system. In water supply system OHRs serve the following functions:

- Store water for use during electric load-shedding and during maintenance works of tube-wells/pumps.
- Provide balancing of flow and pressure during peak hours.

They are elevated enough to provide the required pressure for the end user. According to Punjab Devolved Social Services Program (PDSSP) criteria, OHRs are sized to store about a 1/10th of

water demand. One of the advantages of an OHR is that it helps to optimize the performance of pumps by avoiding pump overloading which consequently increases the life of the employed pumps.

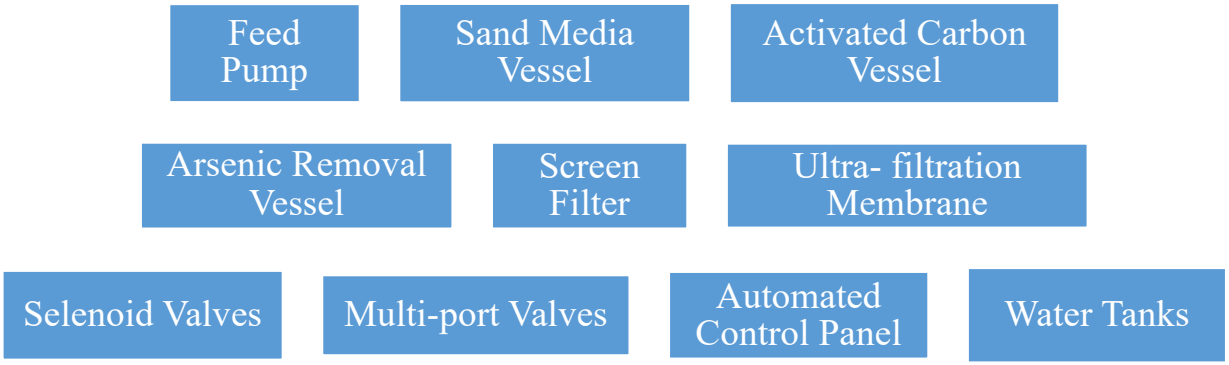
In Narowal city, there is one operational OHR which is being used in feeding water to filtration plant. Hence, overall storage capacity in Narowal water supply system is zero. Table 4 shows the number of proposed OHRs with capacities and their locations are tentative which may alter as per actual land acquired by MC Narowal.

Table 4: Details of proposed OHRs with capacities

Sr. No	**Capacity** (Gals)	**Quantity** (Nos)	**Storage** (Gals)
1	50,000	9	450,000
2	100,000	6	600,000
Total		15	**1,050,000**

2.2.3 Filtration Plants

As Water Filtration Plants are proposed to be installed near tube wells and groundwater will be directly pumped for the treatment process, therefore, it is suggested to install the water filtration plants based on Ultrafiltration Technology. Following are the components of Filtration Plant:



➢ Process Description

The raw water will be taken from overhead water tank supply line for the treatment process. The pump will be functioned to feed raw water to Pre-Filtration Vessel to remove suspended solid following by Ferric Hydroxide Vessel to remove the Arsenic from water by chemical oxidation method and then to Activated Carbon Vessel for removing color, taste, and odor by absorption method. This treated water will then pass from the Ultrafiltration membranes for removing bacteria and viruses from the water. Before moving to ultrafiltration membranes, a cartridge filter will be precautionararily placed for the protection of ultrafiltration membranes to further remove suspended solid that is left from pre-filtration system.

The main purpose of Pre-Filtration System is to reduce load from UF membrane and to expand life time of UF membrane while removing the contamination. Pore size of UF membrane ranges from **0.002 to 0.1** microns. The filtrate water from UF will be stored in Filtrate Water Storage Tankwhere the water will be transferred to filling unit. A typical UF membrane is displayed in Figure 8.

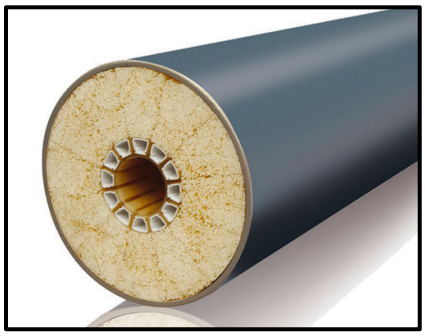


Figure 8: Ultra-filtration membrane

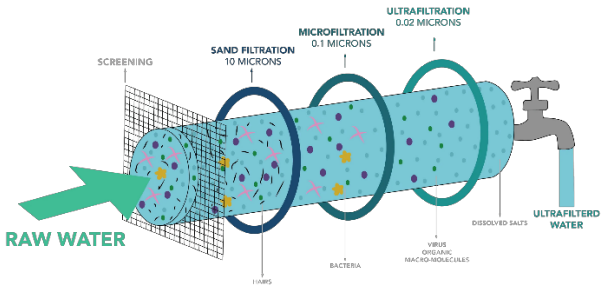


Figure 9: Water Filtration Process

➢ Water Quality Testing

Water Filtration Plants proposed under this development plan should give product water in accordance with the bottled water standards of PQSCA against all the parameters. In case of any deficiency, design of filtration plant shall be reviewed and modified accordingly. The selected filtration plant shall be installed on direct water intake line from the tube well. Water quality shall be tested against following basic tests (range as per NEQS mentioned) for each run of the plant and filling of storage tanks:

- pH(6.5 to 8.5)
- Turbidity(<5 NTU)
- Total Dissolved Solids (TDS)(1000 mg/l)
- Taste
- Colour
- Odour

Furthermore, filtered water shall be tested on monthly basis from EPA approved laboratory for all the water quality parameters to ensure the water quality as per Pakistan Standards and Quality Control Authority (PSQCA) standards.

2.3 Water Demand Estimations

Based on the current and projected populations for the Municipal Committee (Narowal) and as per design criteria of Public Health Engineering Department, the proposed water demand of 50 gallons per capita per day, the current (2020) water demand and future (2025 and 2030) water demands for the existing and potential future service areas are shown in **Table 5** below..

Industrial water demand is assumed to be only 15% of the total water consumption as it is assumed that larger industrial establishments have a private water supply. Commercial and institutional demands have been assumed to be 15% and 10% of the total water consumption respectively.

At present, the water losses are assumed to be around 30%. However, the targeted loss is around 10% in the year 2030 only.

Table 5: Water Demand Projection of Narowal City

Description	2020	2025	2030
	Existing Urban Boundary	Existing Urban Boundary	Existing Urban Boundary
Population	113,150	132,194	154,443
Domestic (GD)	5,657,488	6,609,678	7,722,128
Commercial (GD)	848,623	991,452	1,158,319
Institutional (GD)	565,749	660,968	772,213
Industrial (GD)	565,749	660,968	772,213
Losses (GD)	2,291,283	2,676,920	3,127,462
Total (Gallons Per Day)	9,928,891	11,599,985	13,552,334
Total (MGD)	9.93	11.60	13.55
Total (Cusecs)	18.45	21.55	25.177

As per PDSSP criteria, tube wells shall be designed on Max Day Demand rather than Average Day Water Demand. Max day demand is taken as 1.5 times of the average day demand i.e.

Max Day Demand = 1.5 x Average Day Water Demand

Table 6: Maximum Water Demand of Narowal City

Year	Average Day Water Demand		Maximum Day Water Demand	
	MGD	Cusecs	MGD	Cusecs
2020	9.93	18.45	14.895	27.675
2025	11.60	21.55	17.4	32.325
2030	13.55	25.177	20.325	37.765

2.4 Existing Water Supply Network

The piped water system in Narowal is supplied by tube wells that are constructed at various locations in the city which pump water directly into the water supply system.Tubewells are the key components of water supply system which play the crucial role of being the water source for the entire system. If one or two tubewells are dysfunctional, other tubewells in the vicinity come handy and feed the system thus catering for emergency needs. MC Narowal has 15 tube wells installed with rated capacity of 13.25 cusecs.The present average water demand is **9.93 MGD**. The capacity of the existing water supply system is **2.85 MGD (**at 8 hours a day) which is 28.7 % of the water demand at present. However since the water supply system was installed back in the 80's and due to lack of proper maintenance most of the residential and commercial units do not rely on the Municipal Committee for water supplies anymore. Rather they meet their needs by having installed water bores in their own property and extract water directly from the ground.

Table 7: Existing and future water deficits

Year	Population	Average Day Water Demand	Maximum Day Water Demand	TMA Narowal Supply (at 8 hrs)	Deficit (avg)	Deficit (Max)
		MGD	MGD	MGD	MGD	MGD
2020	113,150	9.93	14.895	2.85	7.08	12.045
2025	132,194	11.60	17.4		8.75	14.55
2030	154,443	13.55	20.325		10.7	17.4

2.4.1 Tube Wells

The MC Narowal owns 15 tube wells which had been previously installed and these continue to provide portable water to the city. The water supply service is intermittent and only pumps water into supply during periods of high demand, morning and afternoon. Water is pumped directly into supply via a single lift system which is used by employing shaft-driven direct-coupled electric motors. Although the efficiency of this arrangement is not measured, however, it is recorded to be better than 70%. To avoid bacterial contamination, eight chlorinators were installed out of which two are out of order at the moment.

Tube wells are installed in different schemes, detail of installed tube wells and the layout map is given in **Table 8** and **figure 10** respectively.

Table 8: Details of Tube Wells in District Narowal

Sr. #	Scheme Name	Discharge Capacity (cusec)	Machinery Condition	Civil Structure Condition	Chlorinator Available	Operational Hours (Avg.)
1	Mohallah Murghi Khana	1	Good	Good	Yes	8
2	Gunj Hussain abad near School (Mank Road)	1	Good	Good	Yes	8
3	Gunj Hussain abad Galla Mandi	0.75	Good	Good	No	8
4	Old Civil Hospital	0.75	Poor	N/A	No	8
5	Veterinary Hospital	1	Good	Good	Yes	8
6	Old Committee Ghar	0.75	Fair	Good	No	8
7	Mohallah Islampura	0.75	Poor	N/A	No	8
8	Lassori Wala Dara	1	Good	Good	Yes	8
9	Mohallah Rasul Pura	1	Good	Good	Out of order	8
10	Normal School	0.75	Good	Good	Yes	8
11	Mohallah Saddique Pura	0.75	Fair	Fair	Out of order	8
12	Moh Meeran Shah Khuaja Rice Mill	1	Good	Fair	Yes	8
13	Rizvia Colony	1	Good	Good	Yes	8
14	Mohalla Abbas Nagar	0.75	Good	Good	No	8
15	Moh Christian Colony	1	Good	Good	Yes	8

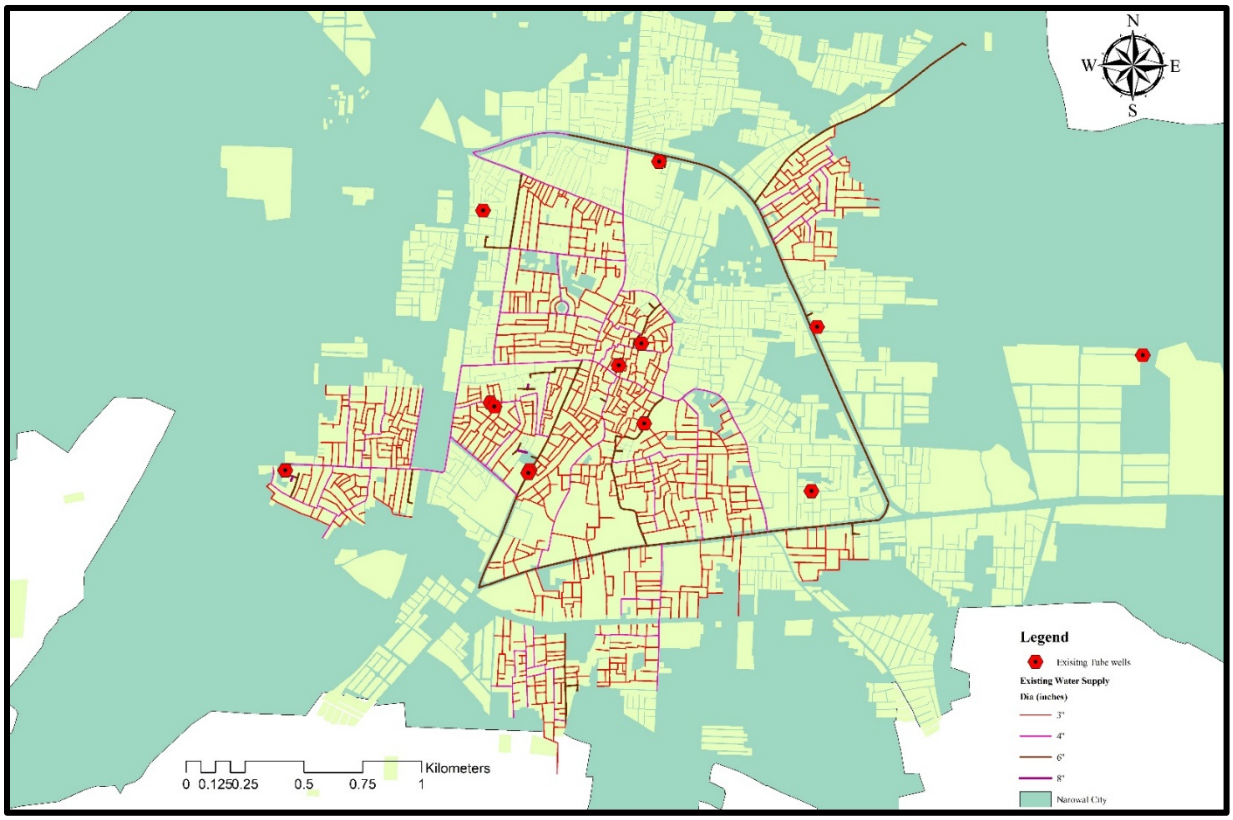


Figure 10: Layout map of existing tube wells

2.4.2 Over Head Reservoir (OHR)

There are only two OHRs in the jurisdiction of MC Narowal i.e. one in TMA Narowal whereas one in Old Civil Hospital. As mentioned in the introduction, water supply system in the district is based on direct pumping of the water to consumers, while the only operational OHR is utilized to feed the filtration plant located in TMA Narowal. Recently PHED has launched a water supply scheme in which new tube wells and OHRs are being constructed. The city requires immediate attention to build new OHRs in order to enhance the water supply service and to help improve the efficiency of pumping infrastructure.

Table 9: Details of OHRs in Narowal City

Sr. #	Name (GPS Coordinates)	Construction Year	Source	Capacity (Gallons)	Type of Construction	Piping Condition	Status
1	**TMA Narowal** (32.10270,74.88136)	1985	Tube well	50000	RCC	C	Functional for Filtration Plant
2	**Old Civil Hospital** (32.09547,74.86881)	1965	Tube well	20000	Brick	C	Not Functional

Figure 11: Existing OHRs in Narowal City (left: Old civil Hospital, Right: TMA Narowal)

2.4.3 Water Distribution System

At present, different diameter pipes are being used in Narowal for distribution of water supply. These come under the jurisdiction of MC Narowal with the total length of distribution network being 51.6 km. On the other hand, approximately 6 km^2 of area in the city still requires distribution network. Brief summary of water supply pipes according to its size, diameter and length is given in the **Table10** and layout in the **Figure 12**.

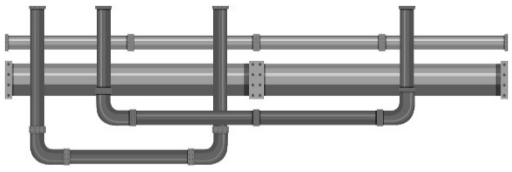


Table 10: Water distribution pipes in Narowal City

Sr. #	Pipe Type	Size	Length (Rft)
1	A.C	8''	1700
2	A.C	6''	15475
3	uPVC	4''	24045
4	uPVC	3''	128188
Total			**161,408**

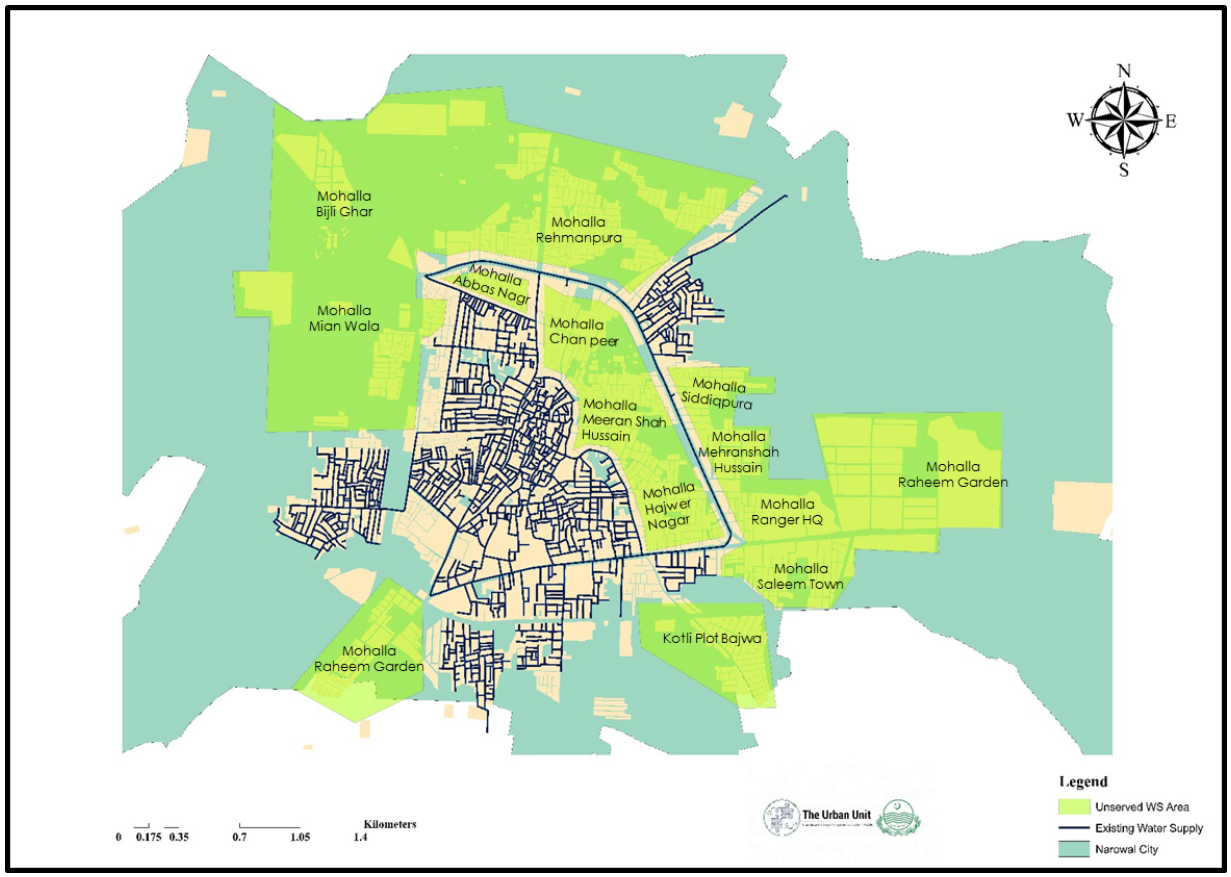


Figure 12: Layout map of existing distribution network

2.5 Asset Condition Assessment – Water Supply

The team performed condition assessment of the infrastructure by physically visiting each facility. Five tube wells, five filtration plants and two OHRs were examined in this regard on the basis of criteria mentioned in **Table 11**.

Rating Chart		
Excellent	A	No noticeable defects. Some aging or wear may be visible.
Good	B	Only minor deterioration or defects are evident.
Fair	C	Some deterioration or defects are evident, but function is not significantly affected.
Poor	D	Serious deterioration in at least some portion of the structure. Function is inadequate.
Failed	F	No longer functional. General failure or complete failure of a major structural component.

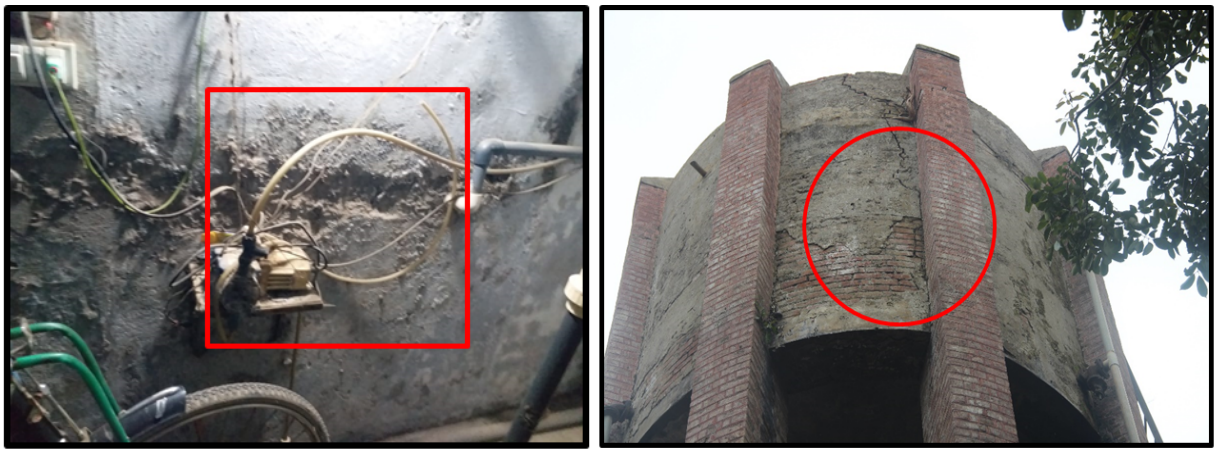
Table 11: Condition assessment rating chart of WS

Following are the observations from asset condition assessment.

1. Out of five tube wells, only one tube well was rated overall A (Excellent). All the remaining tube wells required serious attention in either securing electric connections, out-of-order chlorinators, proper layout of tangled electric cables or providing shade to non-existent pump houses.
2. All the filtration plants visited required civil repair, general housekeeping and provision of proper sanitary.
3. One of the two OHRs have already expired its life. Civil structure is spalling, electric cables were messing around and water leakage was evident.

TMA - Narowal

Old Civil Hospital - Narowal



Madni Street - Narowal

Old Civil Hospital - Narowal

TMA - Narowal

Figure 13: Asset condition assessment of WS infrastructure

2.6 Challenges in Service Delivery – Water Supply

According to the development portfolio of district Narowal, only one project was approved in 2014 that was related to Rehabilitation of Urban Water Supply Scheme of Narowal City. It is evident that low budget allocation for extension of existing water supply schemes and construction of new water supply schemes has been the root cause of the existing dismal condition. Consequently, the underground water distribution network has run out of its life and is now being contaminated with sewage. In addition, institutional framework related to water governance is weak and poorly managed i.e. there is prevalent obscurity about roles and functions of departments. There is an unclear jurisdiction of service areas which results in overlapping of their functions and this results in a lot of areas as remaining un-served. This section aims to recommend development projects based on above assessments to augment the service structure.

2.7 Identification of Potential Sites for Rain Water Harvesting

Rainwater harvesting or collecting system is a method that collects and stores rainwater for human use. The infrastructure of this proposed model may vary from being simple and inexpensive to complex and expensive. It consists of simple rain barrels, or more elaborate structures with pumps, tanks, and purification systems. The non-potable water can be used to irrigate landscapes, flush toilets, wash cars, launder clothes, and it can even be purified for human consumption.

The Digital Elevation Model (DEM) of Narowal district shows that the elevation decreases from the north-eastern zone to the south-west. Average rainfall estimates for the year 2020 was acquired using remote sensing precipitation data from CHIRPS Satellite. Following figure shows identified sites for small dams and water elevation of district Narowal.

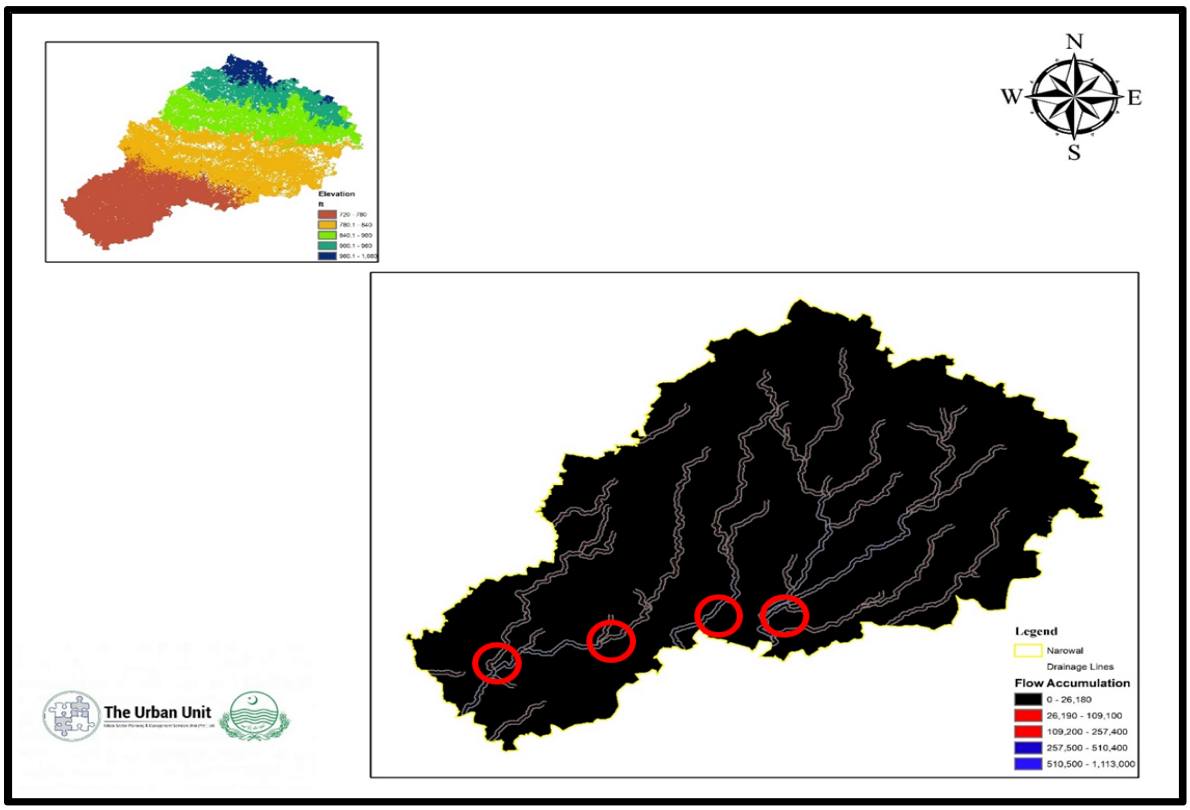


Figure 14: Elevation profiling and identification of potential sites for rain water harvesting

Project Digest

2.8 Proposed Projects

After extensive deliberations, the consultation meetings, planning exercises and comprehensive analysis of the on-going ADP schemes, a phase wise plan is developed for the Narowal district. The short term projects include rehabilitation schemes, construction of new infrastructure and extension of network. Under medium term projects, DNI zones will be established and unserved areas will be focused. Lastly, the long term projects will serve the population settlements.

Rehabilitation of existing water supply setup includes replacement of old damaged delivery system; revival of inefficient machinery and civil structures; and installation of new chlorinators, pressure gauges and bulk water meters. Provision of new schemes will cater to construction of tube wells, Overhead reservoirs and distribution systems. Implementation of these projects in true letter and spirit will enhance water supply coverage to the unserved areas and will facilitate to plug the loopholes in this existing system. Detailed cost specfications for the projects are attached in Annexure 1.

2.8.1 Short Term Projects (0-3 Years)

Sr. #	Project Name	Cost (Million PKR)
1	Replacement of Water Supply pipe lines in Moh Gulshan e Norowal, Jillani Colony, Moh Barailwi, Moh Abbas Nagar, Moh. Sheikhaan and Moh. Muhammad pura.	92.97
2	Conduct Energy audit to assess conditions of motors and pump and verification of electricity bills.	
3	Construction of 3 Tube wells (1.5 cusec each) along with 3 Filtration plants (with each tube well) in Moh. Brailwi, Hayat Town and Moh Christian colony respectively	41.99
4	Construction of 3OHRs (50,000 gal each) in Moh. Kashmiriyan, Moh Abbas Nagar and Hayat Town respectively	56.92
5	Extension of existing Water Supply System to the unserved areas of Moh. Kashmirian, Model town, Hayat Town and Christian colony	28.10
6	Rehabilitation of Tube wells (Upgrade to 1.5 cusec each) in Rasool pura, Purani Committee Ghar, Lasoori wala dera, katcheri road, Moh. Islampura and Moh. Muhammad pura	2.46

7	Rehabilitation of existing filtration plants (civil structure, plumbing and electrical works) in Rasool pura, Purani Committee Ghar, Lasoori wala dera, katcheri road, Moh. Islampura and Moh. Muhammad pura	29.19
Total (Million PKR)		**251.63**

2.8.2 Medium Term Projects (3-6 Years)

Sr. #	Project Name	Cost (Million PKR)
1	Development of 2 DNI Zones for 24 x7 Water Supply (Zone III and IV) by providing SCADA monitoring system	443.76
2	Extension of water supply to the Unserved Areas (Chiragpura, Rehmanpura, Rana Town, Chan Peer, Abbas Nagar, Bilal Ganj, Hajwer Nagar, Ranger HQ, Raheem Garden)	110.42
3	Construction of 5 Tube wells (1.5 cusec each) along with 5 Filtration plants (with each tube well) in Moh. Abbas Nagar, Meeran Shah Hussain, Khawajgan, Ranger HQ and Saleem town respectively	69.99
4	Rehabilitation of existing Filtration plants (civil structure, plumbing and electrical works) in Moh. Ghausia and Meeran Shah Hussain	9.73
5	Construction of 6OHR (100,000 gallons each)in Moh. Ghausia, Moh. Meeran Shah Hussain, Moh. Khawajgan, Ranger HQ, Moh. Rehmanpura and Saleem town respectively	173.11
6	Rehabilitation of water supply in Moh. Gunj Hussain abad, Abu Bakar pura, Farooq ganj, Khawajgan, Sheikhaan, Amin colony, defence colony, gulshan e Iqbal, Saman abad, Riazvia Colony.	73.25
7	Rehabilitation of Tube wells (Upgrade to 1.5 cusec each) in Moh Ghausia, Hajwer Nagar and Meeran Shah	1.73
Total (Million PKR)		**882**

2.8.3 Long Term Projects (6-10 Years)

Sr. #	Project	Cost (Million PKR)
1	Establishment of DNI Zones for 24 x7 Water Supply (Zone I and III) by providing SCADA monitoring system	707.19
2	Extension of Water Supply Services in unserved areas of Moh. Miyan Wala, Moh. Bijli ghar, Moh. Jaman Chandu waal, Majidia, Naqash Band Abad, New Habib Town, Kotli Plot Bajwa, Rahim Garden, Bilal Ganj, Moh. Siddique pura, Moh. Eesa Nagri, Moh. Rasool pura	124.07
3	Construction of 5 Tube wells (1.5 cusec each) along with 5 Filtration plants (with each tube well) in Moh.Bijli ghar, Naqash Band abad, Kotli Plot Bajwa, Moh. Rasool Nagar, Moh. Raheem Garden respectively	69.99
4	Construction of 6OHR (50,000 gallons each) in Moh. Ganj Hussain abad, Moh. Bijli ghar, Naqash Band abad, Kotli Plot Bajwa, Moh. Rasool Nagar and Moh. Raheem Garden respectively	113.84
5	Rehabilitation of existing Filtration plants (civil structure, plumbing and electrical works) in Moh. Ganj Hussain abad and Moh. Raheem Garden	9.73
6	Rehabilitation of existing supply lines in Moh. Siddiqpura	40.02
7	Rehabilitation of Tube wells (Civil, electrical & mechanical works) in Moh Ganj Hussain abad, Raheem Garden and Chandowaal	1.73
Total (Million PKR)		**1066.57**

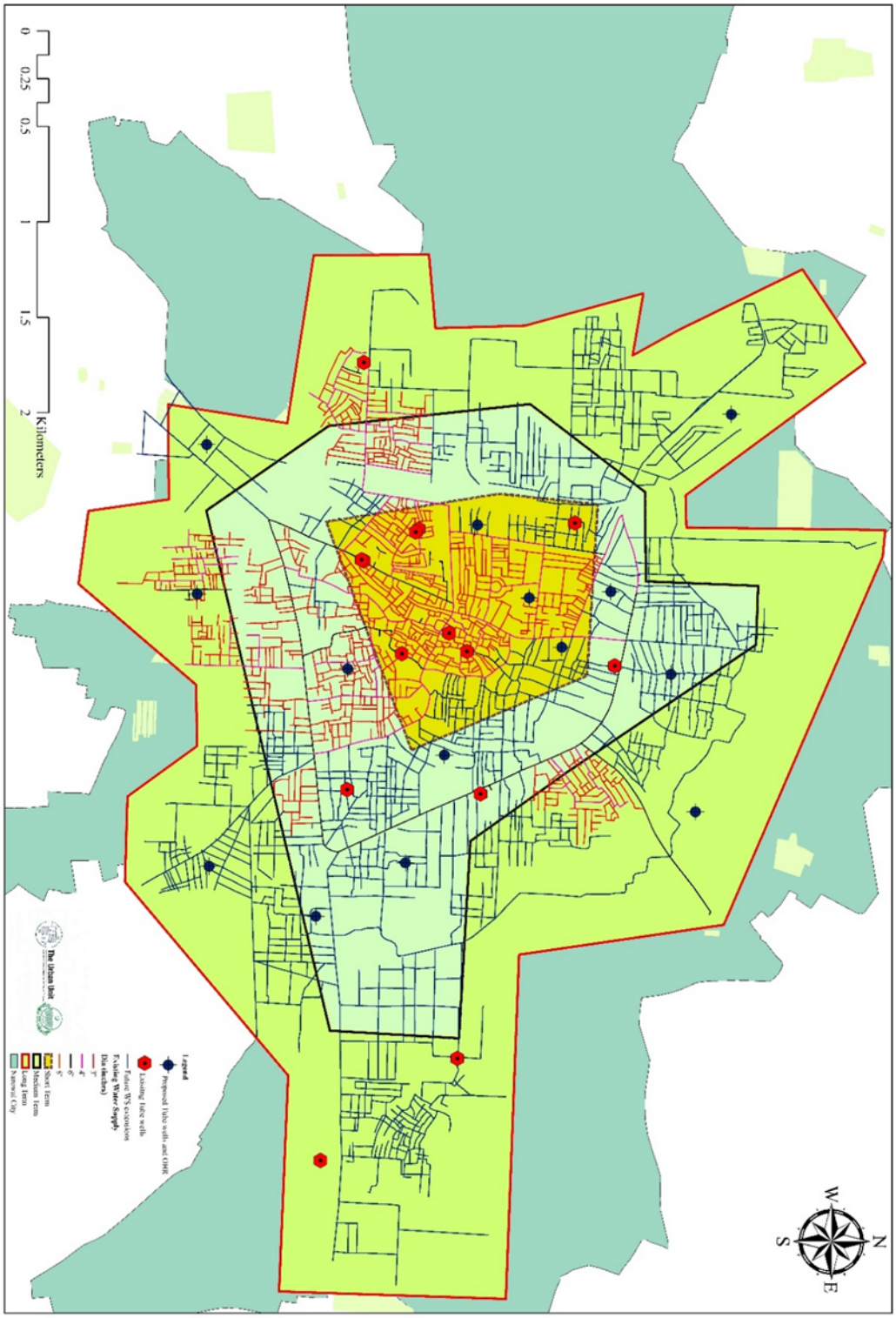


Figure 15: Layout map of proposed development plan

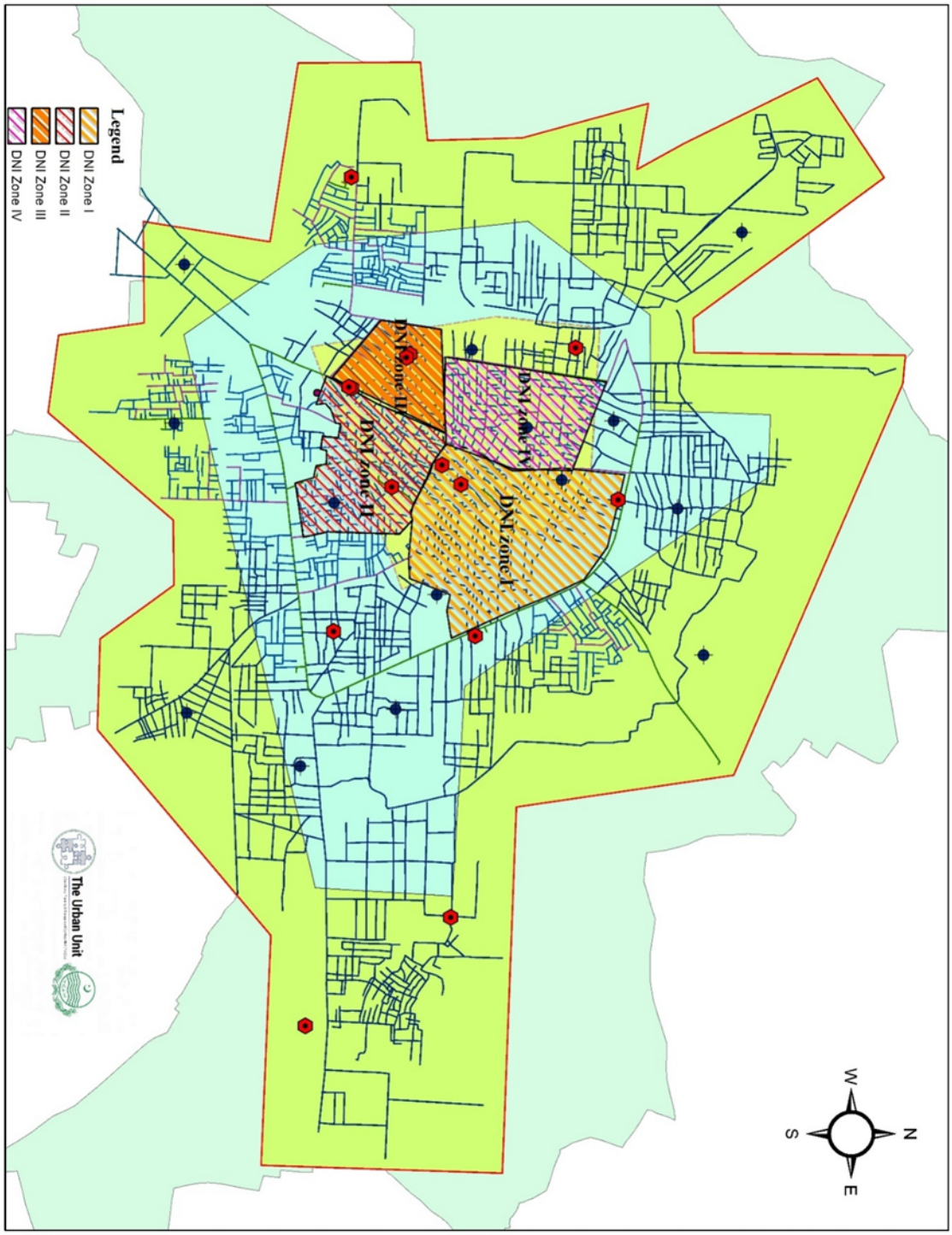


Figure 16: Layout map of proposed water supply network with DNI Zones

Chapter 3. Sewerage System

3.1 Introduction

The existing sewerage system of Narowal city is composed of 02 Disposal Stations, Sewerage pipe network of 11.3 km and open drains in localities. The city has severe sewerage and drainage issues. During our discussion with Deputy Commissioner Narowal and his team, it was pointed out that sewerage and drainage issues are of serious nature and major streets in the city center (i.e. Eidgah road, Church road, Kachahry road, Tariq pura area, Sadiq pure area and Model Town) were flooded in the last monsoon and rainwater accumulated inside residential houses during Eid-ul Azha.

3.2 Design Criteria

The main objective of the present section is to propose a workable, technically sound, sustainable and financially viable solution for the provision and development of sewage collection system. The design criteria for different components have been based on Technical and Service Delivery Standards for Public Health works namely "Punjab Devolved Social Services Program (PDSSP)".

3.2.1 Components of Sewerage System

Following are the main components of sewerage collection system.

- **Conveyance Network**
  Lateral (smaller) sewer pipes are used to collect the sewage directly from the interception points and convey sewage up to sub-main or main/trunk sewers. As the sewage is conveyed under gravity flow, therefore pipes are sloped towards final disposal point. To raise hydraulic grade line, the sewage is pumped through a disposal/pumping station.

- **Manholes**
  Manholes are generally provided in the sewer pipes at suitable distances for connection of lateral lines and inspection and maintenance purposes. For closed drains, inspection chambers are provided for removal of sludge and maintenance works.

- **Pumping/Disposal Stations**
  In plain areas, the trunk sewer lines usually go well beneath the natural surface level (NSL) at the end and sewage is pumped through a pumping/disposal station to dispose of into Sewage Treatment Plant. A disposal/pumping station is generally composed of a collection well and pumps with suction and delivery pipe lines.

- **Sewage Treatment Plant (STP)**

  Sewage from the Narowal city will be collected at disposal stations at different locations as per the master plan. This sewage contains hazardous chemicals and pollutants, so they cannot be disposed of directly into any water body as per provisions of the Pakistan Environmental Protection Laws. This acts as the driving force behind construction of the sewage treatment plants that are to be located after disposal stations and/or sullage carriers. These treatment plants will treat the sewage according to the prescribed standards given in Punjab Environmental Quality Standards (PEQS) and the treated product will be afterwards disposed into the water body.

3.2.2 Design Flows

Flow calculations will be based on the following list of parameters.

- **Average Domestic Sewage Flow**

  Sewage production is based on the water consumption. The sewage production will be taken as 80% of the water consumption according to PDSSP criteria. Water consumption per capita per day will be adopted as 50 gallons (PHED).

- **Peak Flow**

  Peak flow will be estimated by multiplying the average daily flow by the Peak factor to calculate the peak flow. Peak Factor depends upon the population as it decreases with increase in population. PDSSP criteria providesdifferent peak factors according to population as shown in **Table 12**.

Table 12: PDSSP's criteria for peak factors

Population	Peak Factor
5000	4.5
5000-10,000	4
10,000-25,000	3.5
25,000-50,000	3
50,000-100,000	2.5
More than 100,000	2

- **Non-domestic Sewage Allowance**

  The non-domestic sewage allowance will be taken as 5% of average sewage flow that will cover institutional, commercial and small industrial discharges.

- **Storm Water Allowance**

  An allowance of storm water flow will be considered in the partially combined sewerage system which shall be equivalent to the 33% of peak sewage flow as per PDSSP design criteria.

- **Infiltration Allowance**

  As per the given PDSSP criteria, an allowance for infiltration rate equals to 5% of average flow will be used.

- **Design Calculations**

  Total sewage flow shall be the sum of all the above flows and sewers/conduits shall be designed on this total sewage flow.

  Total flow = *Average domestic sewage flow + Peak flow + Infiltration rate + Non-domestic flow + Storm water flow*

3.2.3 Conveyance Network

Components of sewerage system mentioned previously will be designed considering above design flows and on the criteria listed as follows.

- **Pipe Materials**

  Selection of a viable pipe material is based on the capital cost to be incurred on the installation of collection network, design life and operation and maintenance expenditure. In this regard, following are the pipe materials which can be considered:

  - RCC Sewer Pipes
  - RCC Drains/conduits
  - High Density Polyethylene (HDPE) Pipes
  - Corrugated High Density Polyethylene (HDPE) Pipes

  RCC sewer pipes are most commonly used successfully for local sewerage schemes. HDPE pipes are relatively less common for gravity sewers in Pakistan due to higher capital cost and non-availability of larger diameters in local market. However, HDPE pipes are being used for gravity sewerage system in developed countries.

  The **Table 13** shows the comparison of above mentioned types used for sewage conveyance.

Table 13: Comparison of different sewage conveyance pipes

Sr. No	Evaluation Criteria	RCC Sewer Pipes	RCC Drains/Conduits	HDPE Pipes
1	Available unit Length	2.4 m	Precast conduits up to 1.8 m length are common	6 or 12m
2	Diameters/Sizes Available	225 to 1830 mm	Can be casted in any required size	Available up to 1600 mm
3	Type of Joint	Bell & Spigot Joint, Tongue &	Expansion Joint with Sealant	Butt fusion welding process.

		Grove Joint		
4	Weight	Heavy	Heavy	Light
5	Handling	Difficult due to heavy weight	Precast conduits are difficult to handle due to heavy weight	Easy mobility but jointing requires trained labour
6	Roughness Coefficient	0.011-0.013	0.011-0.013	0.011
7	Corrosion resistance	Subject to H_2S corrosion due to acids, highly septic sewage and by highly acidic sewage.	Subject to H_2S corrosion due to acids, highly septic sewage and by highly acidic sewage.	Highly Corrosion resistant
8	Structural Life	Around 25 years	Around 25 years	More than 50 years
9	Local Availability	Easily available	Easily available	Larger diameters are manufactured on special orders or imported
10	Requirements of Special Equipment for Jointing	Not required	Not required	Equipment for Butt fusion welding is required
11	Previous Local Experience	Commonly practiced and successful under many local	Commonly practiced when RCC sewer dia. above 72" is required. It is successful for both urban and industrial developments. Used in	Smaller diameters up to 27" have been successfully used in

		circumstances for urban sewerage schemes	industrial estates of PIEDMC.	local projects. Larger diameters are not common.
12	Operational Problems	Cleaning is difficult. Effluent may erode and deteriorate the strength and cause crown-failures. Repairing is difficult	Cleaning is relatively easy and repairing work is easier in case of drains/sullage carrier	Resistant against chemicals of industrial effluents and lesser operational problems

- **Manhole**

  Manholes will be provided at each junction of the sewers with varying diameter, gradient or alignments.. As per PDSSP criteria, size & depths of manholes and spacing of manholes are tabulated within **Table 14** and **Table 15**.

Table 14: PDSSP criteria for spacing between manholes

Sewer Size (mm)	Spacing (m)
310	30
380	45
460	60
530 -610	75
690 -1070	90
1220 -1520	120
Above 1520	150

Table 15: PDSSP criteria for depths of manholes

Size of Sewer (mm)	Sewer Depth (m)	Diameter of Manhole (m)	Remarks
225-530	1.25-2.25	1.25 dia	-Masonry 1:3 Cement

610-760	2.5-6.0	1.5 dia	Sand Mortar -Up to 2.25m depth 225mm Masonry. -From 2.25m to 4.75m Depth 350 to 225mm Masonry -From 4.75m and above 450mm to 350mm.
840-1070	2.5-6.0	2 dia	
1220-1370	2.5-6.0	2.25 dia	
1520	2.5-6.0	2.5 dia	
1680	2.5-6.0	2.5 dia	
1830	2.5-6.0	2.75 dia	

For manholes under sub soil water, RCC core-wall will be designed and floor will be designed as per actual depth of water encountered.Furthermore, it may be noted that the traffic flow is also taken into considerations when deciding manhole covers and their designs.

- **Sewer Pipes**

i) The Master Plan has been prepared for primary, secondary and tertiary sewer pipes. Primary sewerage network include 72", 54", 48" and 36" diameter pipes, secondary sewer pipes are of 30", 27", 24" and 18" diameters and tertiary pipes comprise of 15", 12" and 9".
ii) Reinforced cement concrete pipes conforming to ASTM Specification C-76 shall be used.
iii) A minimum cover of 1 m over the crown of sewers has been proposed from the finished road level.
iv) Pipe roughness coefficient (n) of RCC pipes will be 0.015 and 0.013 for old and new pipes respectively.
v) Bedding materials for the design of sewers above sub-soil water level having diameter 310mm and greater will be crushing stone (6mm to 25mm). For sewers below sub-soil water level, decision to be taken as per site conditions.
vi) Minimum gradient for sewers will be recommended to attain the self-cleansing velocity (0.75 m/sec).
vii) For sewer joints, rubber ring joint in addition to jute wrapping with cement slurry is recommended.

3.2.4 Waste Water Treatment Plant

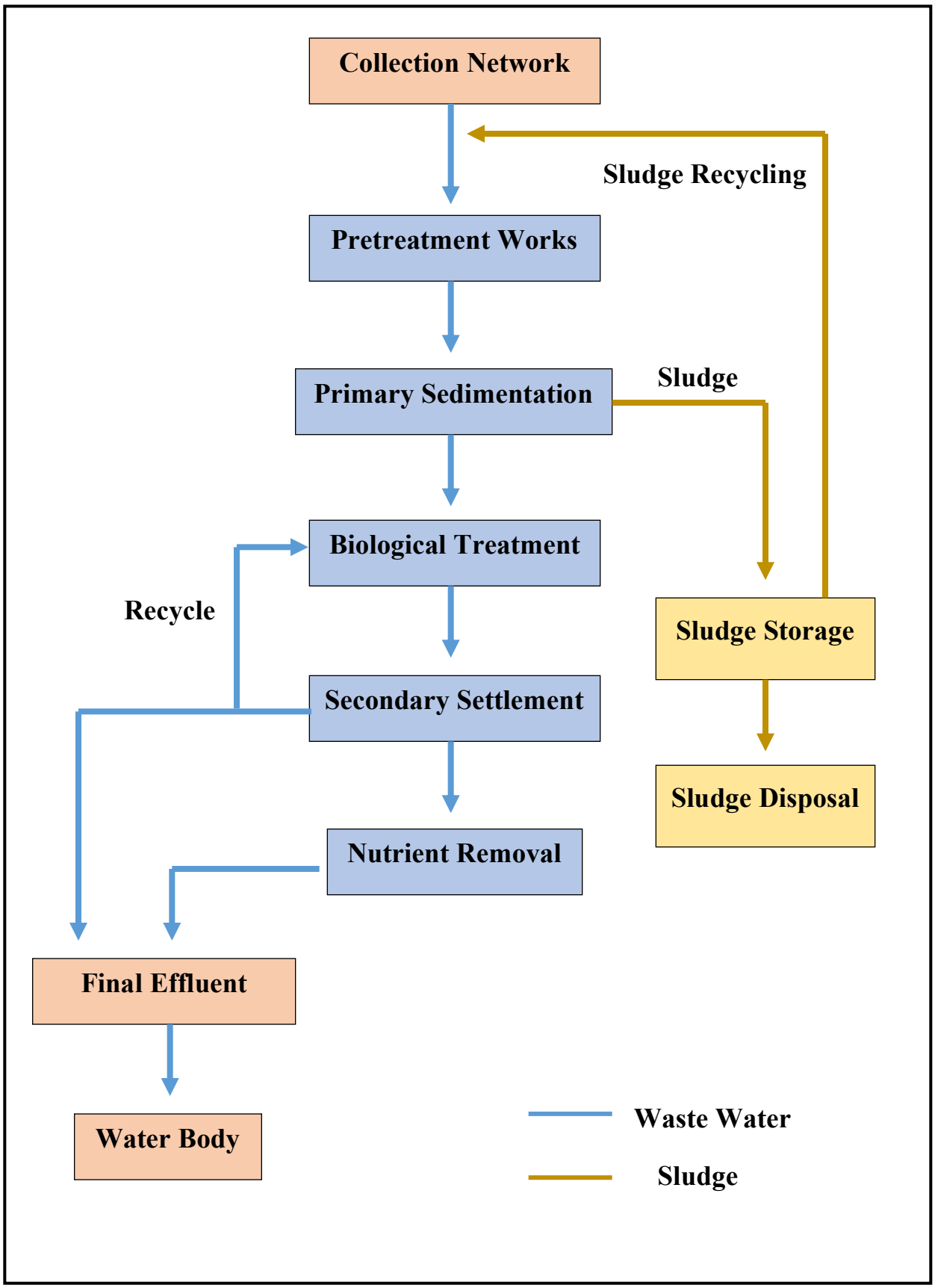
The process design of the sewage treatment plants (STPs) shall be carried out at average sewage flows, whereas the hydraulic design of all the wastewater conveyance and transfer components shall be carried out at peak flows. Urban waste water is categorized in terms of its physical,

biological and chemical constituents. The most common parameters used for measuring the sewage, entering or leaving the treatment plant are as follows:

- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Total Suspended Solids (TSS)
- pH

Waste Water Treatment Plant (WWTP) shall be designed primarily to bring the BOD, COD, pH and TSS values of sewage/wastewater within the National Environmental Quality Standards (NEQS) limits.The process designs of component facilities are primarily based upon the design guidelines and methods as laid down by the Environment Protection Agency.[1] The same has been displayed in the following layout.

[1]www.epa.ie/pubs/advice/water/wastewater/EPA_water_%20treatment_manual_primary_secondary_tertiary1.pdf


Collection Network
Sludge Recycling
Pretreatment Works
Primary Sedimentation
Sludge
Biological Treatment
Recycle
Sludge Storage
Secondary Settlement
Sludge Disposal
Nutrient Removal
Final Effluent
Water Body
Waste Water
Sludge

➢ Pre-treatment Process

Pre-treatment process will be comprised of primary screens, inlet chambers, grit and grease removal system and balancing tanks. The criterion to be considered for the selection and the design of these components is as follows:

▪ Primary Screens

Upon reaching the sewage treatment plant, sewage flows through the primary screening facility which is the first stage of treatment. The screens shall be provided upstream of all inlet pump stations and shall be designed to protect downstream processes and equipment. The purpose of primary screens is to protect equipment from rags, wood and other debris.

Design parameters for the primary screens are summarised in the **Table 16**.

Table 16: Design parameters for primary screens

Description	Unit	Design Criteria	
		Manually Raked	Mechanically Raked
Maximum clear spacing	mm	25	25
Slope to the vertical		30° - 45°	30° - 45°
Max approach velocity at feed channel	m/s	1	1
Max velocity at screen face	m/s	1	1
Min freeboard	mm	150	150
Screen skipping storage facility	day	7	7
Min channel width	mm	500	500
Min channel depth	mm	500	500
RC staircase with riser details	unit	Anti-skid and non-corrosive	Anti-skid and non-corrosive

▪ Inlet Chambers

Provision for inlet chamber before the primary screen channel is necessary for proper operation and maintenance of the plant. A penstock shall be installed upstream to isolate the pump station in the event of flooding in relation to the bypass and emergency overflow. Design criterion for inlet chambers and secondary screens has been summarised in **Table 17** and **Table 18**.

Table 17: Design criteria for inlet chambers

Description	Unit	Design Criteria	
		PE≤50,000	PE>50,000
No. of pumps	Nos	4 (2sets)	6 (3 sets)
Pump design flow		Each at Q_{peak}	Each at Q_{peak}
Min retention time at Q_{ave}	min	30	30
Min pass through openings	mm	75	75
Min suction and discharge openings	Mm	100	100
Pumping cycle	min	6	6-15
Lifting device*	mm	Mechanical and block	Mechanical

*Motorized hoists shall be provided when the lifting weight exceeds 100 kg.

Table 18: Design criteria for secondary screens

Description	Unit	Design Criteria	
		Manually Raked	Mechanically Raked
Maximum clear spacing	mm	12	12
Slope to the vertical		30° - 45°	15° - 45°
Max approach velocity at feed channel	m/s	1	1
Max velocity at screen face	m/s	1	1
Min freeboard	mm	150	150
Screen skipping storage facility	day	7	7
Min channel width	mm	500	500
Min channel depth	mm	500	500
RC staircase with riser details	unit	Anti-skid and non-corrosive	Anti-skid and non-corrosive

- **Grit and Grease Removal**

  In grit removal system, grit or discrete particles that have subsiding velocities or specific gravities substantially greater than those of organic putrescible solids, e.g. eggshells, sands, gravel are removed by gravitate settlement or centrifugal separation. This same principle applies to oil and grease removal system, where free oils and grease globules lighter than water rise through the liquid and are later skimmed from the top surface.

Table 19: Design criteria for grease and grit removal

Description	Unit	Design Criteria
		>PE 50,000
Grease removal		Mechanical
Chamber type		Aerated type
Min detention time (Q_{peak})	min	3
Max gravity flow through velocity	m/s	0.20
Max centrifugal flow through velocity	m/s	<1
Aeration requirement	l/s/length of tank	10
Chamber dimension: (Depth x width) (Length x width)	-	Manufacturer specification
Estimated grit quantity	$m^3/10^3$ m^3 of sewage	0.03
Washing and dewatering of grit	-	Yes

- **Biological Treatment Process**

  Biological treatment is the heart of the sewage treatment process. It is inclusive of different processes whereby the dissolved and non- settle-able organic materials that continue to remain in the sewage are finally removed by living organisms. For reasons of long term whole life economics, ease of operation and maintenance, consistent effluent standards and standardization, the following types of biological treatment processes are recommended:

  - Activated Sludge System
  - Extended Aeration (EA)/Oxidation Ditch (OD) System
  - Sequencing Batch Reactor

- **Activated Sludge System**

  The design parameters to be considered while designing sewage wastewater treatment plant based on conventional activated sludge system are as follows in **Table 20**

Table 20: Design criteria for Activated Sludge System

Description	Unit	Design Criteria
Organic Loading Low rate Intermediate rate High rate	Kg BOD_5/day/m^3	 0.08 – 0.15 0.15 – 0.5 0.5 - 2
Acceptable Media		HDPE, PVC, stone, slag, coke
Hydraulic Loading Low rate Intermediate rate High rate	m^3/day/m^2	 1 – 4 4 – 10 10 – 40
Sludge Yields Low-rate filters Intermediate filters High-rate filters	Kg sludge	 0.5 0.6 – 0.8 1
Minimum depth of media	m	1.5

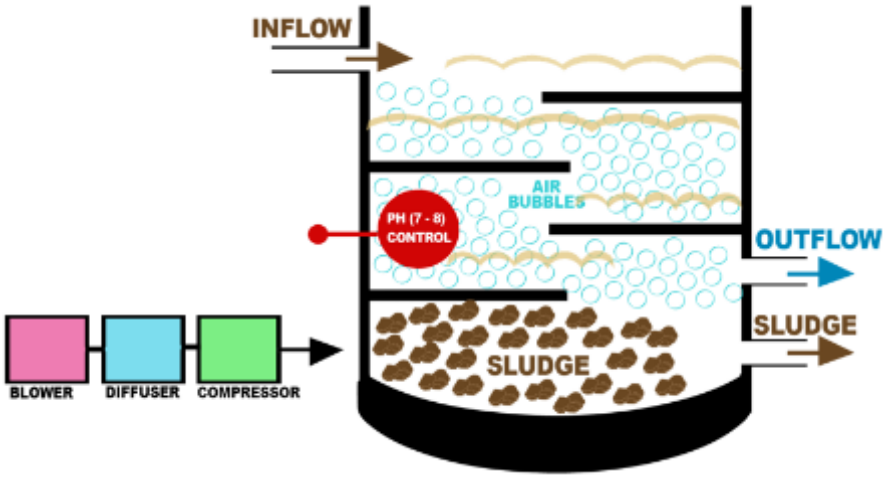


Figure 17: Schematic Diagram of Activated Sludge System

- **Extended Aeration (EA) / Oxidation Ditches (OD)**

  The Extended Aeration process is similar to the Conventional Activated sludge process except that it operates in the endogenous respiration phase of the growth curve, which requires a low organic loading and long aeration time.

  EA plants shall be designed as either plug flow or completely mixed. Anoxic zone at the head of the reactor must be provided for de-nitrification. The anoxic zone is free from dissolved oxygen.

  For Oxidation Ditches, the minimum velocity within the channel shall be sufficient to keep the activated sludge in suspension. The minimum velocity within the channel shall not be less than 0.3 m/s.

Table 21: Design criteria for Extended Aeration

Description	Unit	Design Criteria
Minimum number of aeration tanks	Nos	2
F/M Ratio		0.05 – 0.1
Hydraulic Retention Time	Hours	18 - 24
Oxygen requirement	KgO/Kg	2
Mixed Liquor Suspended Solids (MLSS)	mg/l	2500 - 5000
Dissolved Oxygen (DO)	mg/l	2
Sludge yield	Kg sludge produced/ kg BOD5 consumed	0.4 (at 24 hrs HRT) 0.6 (at 18 hrs HRT)
Sludge age	day	>20
Waste activated sludge, Q_{WAS}	m^3/day	Refer to equation
Return activated sludge flow, QRAS	m^3/day	(MLSS /$C \cup MLSS) x Qav$
RAS pump rating	Hrs/day	24
Recirculationratio, Q_{RAS}/I_{nflow}		0.5 - 1
MLSS recycle ratio		4-5 times of Q_{avg}
Volumetric loading	kg BOD5 /m3.d	0.1– 0.4
Minimum mixing requirement	W/ m3	20

Table 22: Design criteria for Extended Aeration

Description	Unit	Design Criteria
Organic Loading Low rate Intermediate rate High rate	Kg BOD_5/day/m^3	 0.08 – 0.15 0.15 – 0.5 0.5 - 2
Recirculation of flow to head of plant		>1
Acceptable Media		HDPE, PVC, stone, slag, coke
Hydraulic Loading Low rate Intermediate rate High rate	m^3/day/m^2	 1 – 4 4 – 10 10 – 40
Sludge Yields Low-rate filters Intermediate filters High-rate filters	Kg sludge	 0.5 0.6 – 0.8 1
Minimum depth of media	m	1.5

- ## Sequencing Batch Reactor

  Sequencing Batch Reactors system is suspended activated sludge system. In this system, the sewage flows into one or more reactors where biological oxidation and its clarification take place within the same reactors sequentially on cyclical mode. Detailed design parameters are shown in **Table 23**.

Table 23: Design criteria for Sequencing Batch Reactors

Description	Unit	Continuously fill Intermittently decent	Intermittently fill Intermittently decent
Number of reactors	Nos	2	2
F/M Ratio		0.05- 0.08	0.05 – 0.30
Hydraulic Retention Time	Hours	18 - 24	18 - 24
Mixed Liquor Suspended Solids (MLSS)	mg/l	3000 - 4500	3000 - 4500
Dissolved Oxygen (DO)	mg/l	0 – 6.50	0 – 6.50
Sludge yield	Kg sludge produced/ kg BOD5 consumed	0.75 – 0.85	0.75 – 0.85
Cycle time	hrs	4 - 8	4 - 8
Waste activated sludge	kg sludge/day	WAS = total sludge/sludge age	WAS = total sludge/sludge age
Decant time	hrs	>1	>1
Decant volume	m^3	Max 0.5	Max 0.5
Decanting device loading rate	m3 /m/hr	≤20 for decant drawdown from TWL	≤20 for decant drawdown from TWL
Minimum number of decanter		2 nos. independent decanter per tank	2 nos. independent decanter per tank
Max decanter length	m	4	4

3.3 Existing Sewerage System

The sewerage scheme Narowal was first introduced by Public Health Engineering Department in 1963. Egg shaped sewer of 18", 24" 33" and 36" was connected with different types of drains - II and III. The disposal work was constructed behind Mission High School for boys across railway line on the southern side of town. The scheme was designed for a population of 18,000 persons at that time; the central city was not covered in the sewerage scheme rather it was covered with open surface type drains. As the town developed, another scheme was taken in hand by PHED in 1983-84 that includes construction of disposal station at Zafarwal Road and RCC sewer pipelines. Later extension of Scheme was approved in 1992 that includes shifting of old disposal station (old disposal work Murgi Khana to Rasinwal Phatak, Salaughter house on Paikowali road) and laying down open surface drains and RCC sewer pipes. Currently, a scheme named Urban Sewerage PCC and Tuff Tile is underway by PHED. The details of scheme are tabulated in **Table 24**:

Table 24: Details of PHED Sewerage Scheme

Sr. #	Size	Estimated Length (Rft)	Work Done (Rft)
1	72''	6800	6329
2	54''	1482	144
3	48''	4691	-
4	42''	392	-
5	36''	1475	-
6	33''	2970	-
7	30''	1283	-
8	27"	1274	-
9	15"	1376	1491
Total		**21,743**	**7,964**

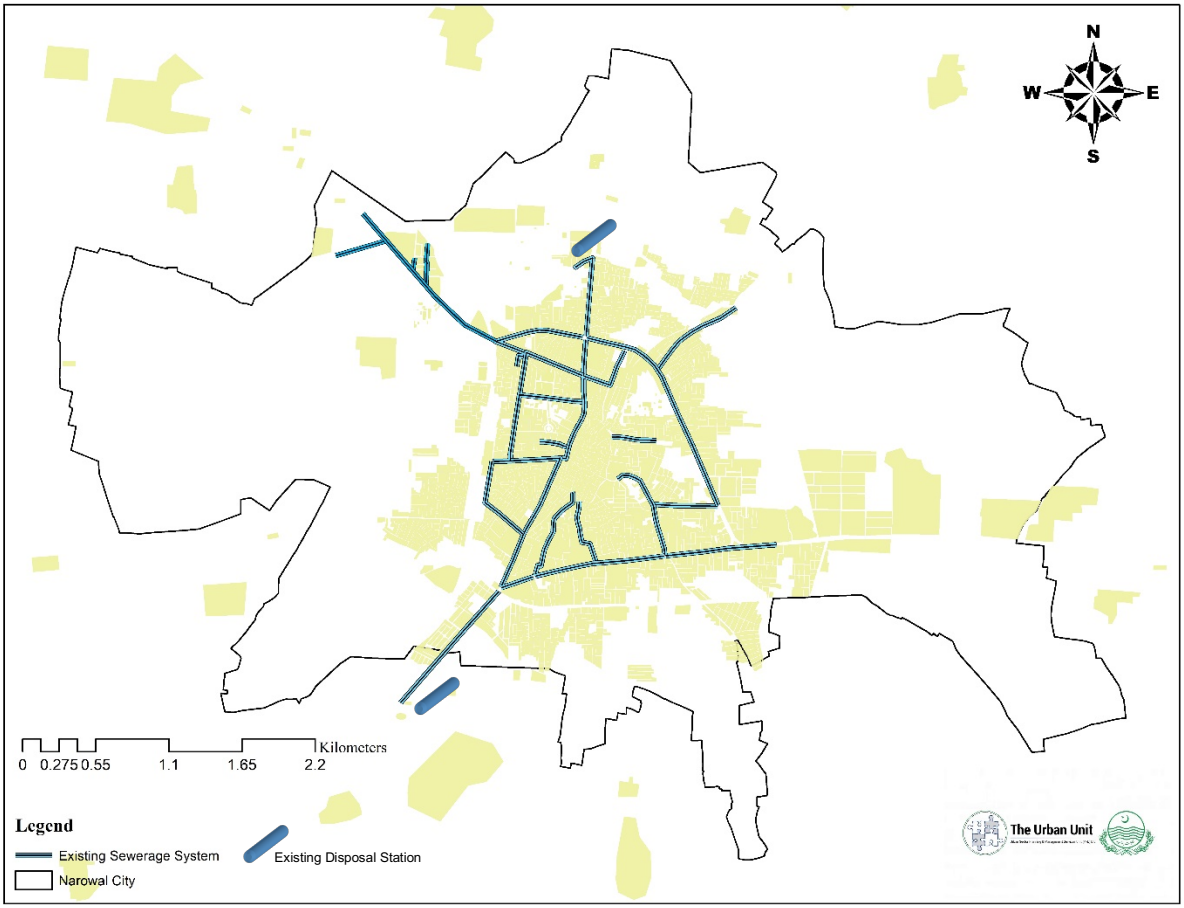


Figure 18: Layout map of existing sewerage scheme

3.3.1 Disposal Stations

There are a 2 Disposal Stations in Narowal city with installed pump capacity of 41 cusec that operates for an average of 10 hours per day. A summary is given in the **Table 25** and photos of disposal stations are attached as **figure 19**.

Table 25: Details of existing disposal stations in Narowal city

Sr.#	Name	Installation Year	No of Installed Pump sets	Discharge Capacity (Cusec)	Status	Condition	Operational Hours (Avg)
1	Disposal Station (Rasinwal)	1992	4	16	Functional	Fair	10 Hours
2	Disposal Station (Zafarwal Road)	1985	7	25	Functional	Fair	10 Hours

Currently, sewerage system of Narowal city is dependent on these disposal stations. However, the ongoing scheme by PHED is designed on gravity based flow. A screen mechanism is installed to stop the solid waste to enter the pumping machinery. The screens are cleaned manually as per requirement and accumulated solid is transported to dump site. **Figure 19** below shows the disposal stations i.e. Rasinwal Station and Zafarwal Road Station respectively.

Disposal Station- Zafarwal Road Narowal

Disposal Station- Rasinwaal Narowal

Figure 19: Disposal Stations of Narowal city

3.3.2 Sewage Generation

The existing sewerage network is evaluated considering the parameters based on PDSSP Criteria. Per capita sewage generation is taken as 80% of the water consumption. In addition, peak factors are mentioned in **Table 26** which accounts for 33% Storm water allowance, 5% non-domestic water and 5% infiltration allowance as has been provided by the PDSSP criteria. A detailed estimation of sewage generation of the Narowal City is shown within **Table 27**.

Table 26: PDSSP Peak Factor criteria

Population in Thousands	Peak Factor
Up to 5,000	4.5
5,000 - 10,000	4.0
10,000 - 25,000	3.5
25,000 - 50,000	3.0
50,000 - 100,000	2.5
>100,000	2.0

Table 27: Estimation of Sewage generation in Narowal city

Year	Population	Per Capita (gpcd)	Average Flow		Peak Flow (PF 2) (MGD)	Storm Water (33% of Peak flow)		Non-Domestic Flow (5% avg flow)		Infiltration (5% avg flow)		Total Flow (Peak + storm + non-domestic + infiltration)	
			MGD	Cusec		MGD	Cusec	MGD	Cusec	MGD	Cusec	MGD	Cusec
2020	113,150	40	4.52	6.993	9.04	2.98	5.53	0.23	0.35	0.23	0.35	12.48	23.2
2025	132,194	40	5.28	8.169	10.56	3.48	6.46	0.26	0.41	0.26	0.41	14.56	27.05
2030	154,443	40	6.17	9.55	12.34	4.07	7.56	0.31	0.48	0.31	0.48	17.03	31.64

As mentioned earlier in section 3.3.1, existing disposal stations have the capacity of 22.06 MGD at 24 hours service. However, as per discussions with the operators, average operational time of disposal stations is only 10 hours as opposed to the alleged estimations, which consequently limits their actual pumping rate to 9.1 MGD. Considering total estimated flow generation (for 2020) i.e. 12.48 MGD, existing disposal system is short of 3.38 MGD which makes it 27% of the total generated flow.

3.4 Asset Condition Assessment – Sewerage System

The team performed condition assessments of the infrastructure by physically visiting each facility. 02 disposal stations, open drains and ponds were examined in this regard on the basis of criteria mentioned in **Table 28**.

Rating Chart		
Excellent	A	No noticeable defects. Some aging or wear may be visible.
Good	B	Only minor deterioration or defects are evident.
Fair	C	Some deterioration or defects are evident, but function is not significantly affected.
Poor	D	Serious deterioration in at least some portion of the structure. Function is inadequate.
Failed	F	No longer functional. General failure or complete failure of a major structural component.

Table 28: Condition assessment rating chart of sewerage system

Following are the observations from asset condition assessment.

1. Primary sewerage pipes are insufficient to accommodate the existing sewerage flow, overall condition can be rated as C to D
2. Secondary sewerage system is either is not present or not in working condition due to its incapacity. Thus rated C to D
3. Open drains in the tertiary sewerage system are deteriorated and rated D to F
4. Both of the disposal stations are rated C due to mishandling of equipment, unattended electrical system and spalling civil structure

Figure 20: Condition assessment of existing sewerage system

Project Digest

3.5 Proposed Projects

Existing sewerage network which covers an area of 45% has run out off its functional lifetime. There is a dire need to replace the existing network to enhance its capacity and expansion of network to the unserved areas as well.Currently, there is no Waste Water Treatment Plant (WWTP) in district Narowal and all sewage goes directlyinto Nullah Daik through drains and sewerage pipes.

The short term projects include rehabilitation schemes for existing sewerage system and provision of sewer sucking/jetting machinery to cope with the unwanted situations. Under the medium term projects, new sewerage schemes will be provided to unserved areas with some rehabilitation projects. Schemes in the long term projects will serve the population with secondary and tertiary sewerage network and a waste water treatment plant. The proposed projects are listed in the tables below along with the estimated cost and are also illustrated in the **Figure 21**. Furthermore, detailed specifications of the projects are available in annexure 2.

3.5.1 Short Term Projects (0-3 Years)

Sr. No	Project Description	Cost (Million PKR)
1	Replacement of existing 12'' and 15'' sewerage pipes with 18'' and 24'' pipes respectively	76.92
2	Rehabilitation of existing 24'' and 27''sewerage pipes	7.23
3	Upgradation of existing pumping capacity (add 8 cusecs) to mitigate the deficiency	24.97
4	Repair & maintenance of electric control panels, pumps and civil structure on disposal stations	26.71
5	Provision of sucker and jetting trucks (3 each) to cope with blockage issues	21.01
Total (Million PKR)		**157**

3.5.2 Medium Term Projects (3-6 Years)

Sr. No	Project Description	Cost (Million PKR)
1	Laying of gravity trunk sewer pipes 72''on Ghausia road, 54" on Church road, 27" on Chan Peer Road, 36" on Katchehry Road and 48" along Nullah beside circular road	184.55
2	Rehabilitation of existing 30'' and 36'' sewerage pipes	28.96
Total (Million PKR)		**214**

3.5.3 Long Term Projects (6-10 Years)

Sr. No	Project Description	Cost (Million PKR)
1	Future extension of 9'',12'',15'',18'',24'',27'', 30'', 36" and 48" sewer pipes within Mohallaas connecting them with them main trunk pipes	196.87
2	Establishment of wastewater treatment plant for Narowal city on ghausia road extension (32° 4' 35.292" N, 74° 53' 33.036" E)	233.44
Total (Million PKR)		**430**

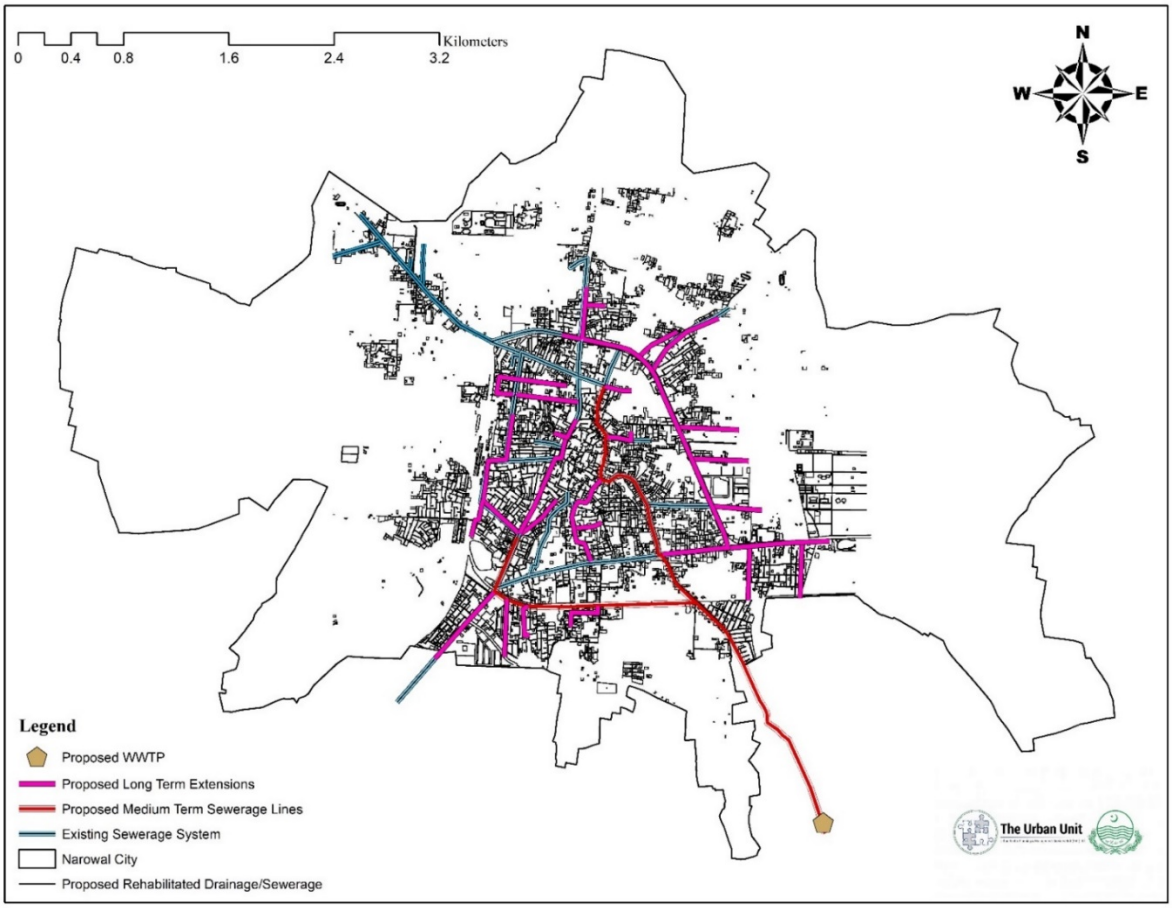


Figure 21: Layout map of proposed sewerage system

Chapter 4. Environment and Green Spaces

4.1 Climate Conditions

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Narowal. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years. The general weather condition is too hot in summer and moderate in winters. Temperature varies from mean minimum temperature of 04 degree Celsius to mean maximum temperature of 44 degree Celsius as shown in **Figure 22**.

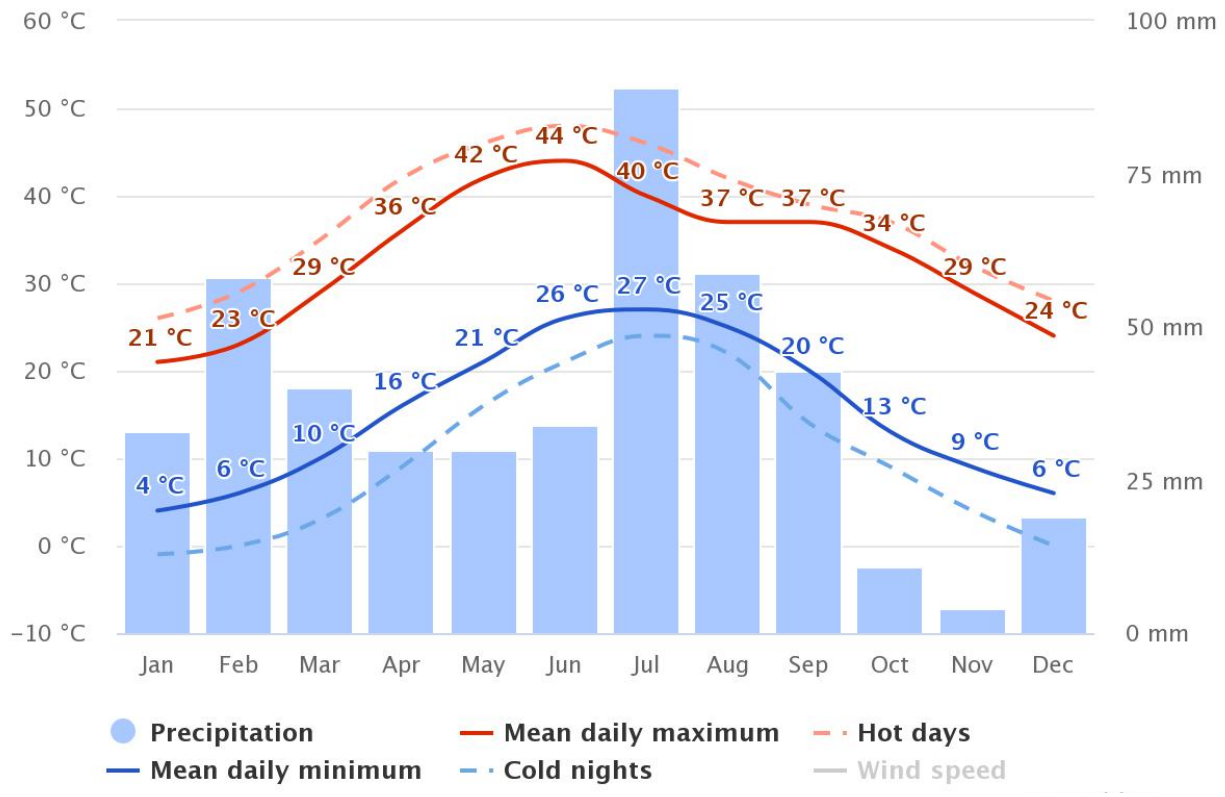


Figure 22: Annual temperature variations of district Narowal

Wind speed in most of the days is within the range of 5 km/hr. to 12 km/hr, whereas wind directions are mostly towards North East and North East as shown in **Figure-23**

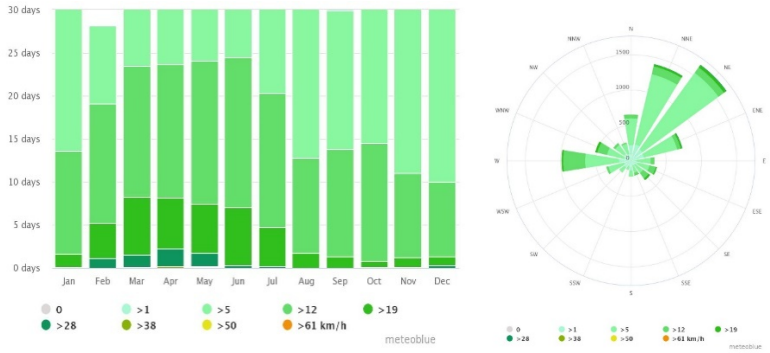


Figure 23: Annual wind speed and directions of district Narowal

4.2 Soil Characteristics

The term soil is derived from a Latin word "Solum" which means floor. It is defined in Webster's collegiate dictionary as "the upper layer of the earth which may be dug, ploughed, etc., especially the loose surface material of the earth in which plant grow". Soil is complex because of the extreme variability in physical and chemical compositions. They are formed from exposed masses of partially weathered rocks and minerals with different chemical composition, different degree of resistance to weathering and different physical properties. [1]

The soil of Narowal city is silty and loamy, suitable for cultivation of a variety of crops. To determine the physical and chemical characteristics of Narowal city's soil, its texture, color, moisture content, pH and EC were analyzed in laboratories of Soil Survey of Punjab and shown in **Table 29**.[2]

Table 29: Properties of soil in district Narowal

Sr. No.	Soil Properties	Values
Physical Properties		
1.	Soil properties	Sand 49%, Silt 37%, Clay 14%
2.	Texture	Loam
3.	Color (Dry soil)	Brown (10YR.5/3)
Chemical Properties		

4.	*pH	7..6
5.	*EC	2.5 dS/m
6.	Water Content	12%

1. Shahid, M. A. K., Awan, M. S. and Hussain, K. 2013. Mineralogy of major soils of Punjab (Pakistan) by X-ray diffraction. *International Journal of Agricultural Science Research*.**2** (8), 265-272.

2. Zereen, A., Ahmad, S. S., Khan, Z. and Jahan, A. Determination of Correlation between Plant Distribution and Ecological Factors in Narowal District Punjab, Pakistan. *Bangladesh Journal of Botany*. **47**(3): 451-458.

4.3 Air Quality

The air of district Narowal is mapped using Sentinel–5 Precursor/TROMPOMI Level 2 Product satellite data (unit: mol/$m^{2)}$. The hotspots of Particulate Matter (PM) i.e. SO_2, NO_2, CO & Aerosol Optical Depth (AOD) can be identified on the maps (**figure 24**). Higher concentrations and the epicenters of these pollutants are found mainly in Narowal city. Parks and green spaces should be well distributed in these areas to control air pollution.

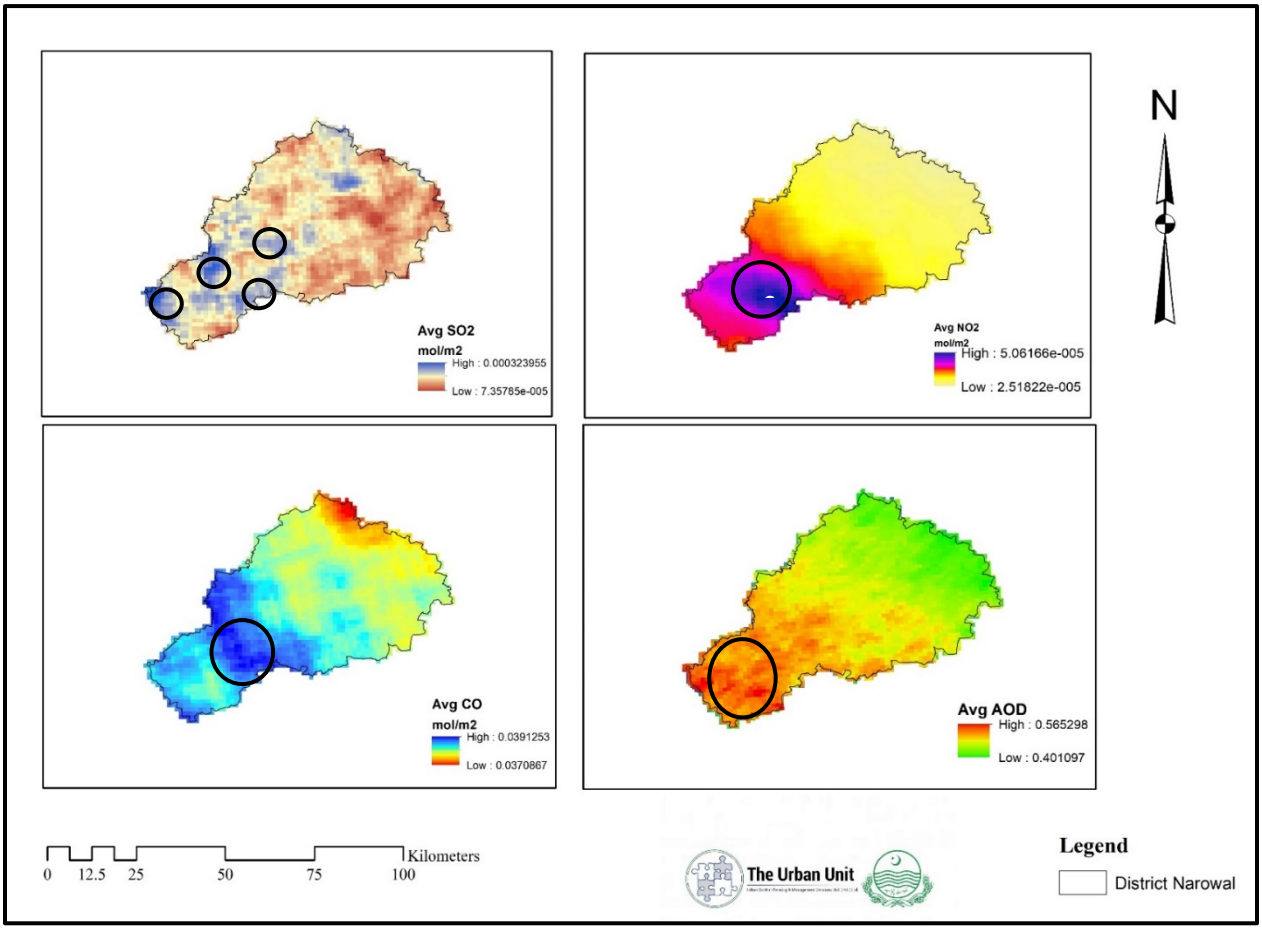


Figure 24: Air quality map of district Narowal

4.4 Protected Area and Biodiversity

Five miles strip along Indo-Pak Border in the Punjab Province was constituted as a Game Reserve under the Punjab Wildlife Act, 1974, vide Government Notification No. SOFT (EXT) XII-1/77, dated 19thSeptember 1995.

Border belt area of district Narowal approximately 130 km in length is also included in the Game Reserve. The area is a complex of aquatic and terrestrial habitat as river Ravi flows through this area. The area is riverine and surrounded by agricultural lands. The natural vegetation of the area is tropical thorn forest type with species of trees, such as *Kikar Acacia nilotica, Shisham Delbergia sisso, Ber Zizyphus mauritiana and Safeda Eucalyptus camaldulensis. The main species of shrubs are Kahi Saccharum spontanium, Kana S. munja, Frash Tamarix aphylla, Aak, Calotropis procera, Lai Tamarix dioica and Dila Capparis decidus.* Ground flora consists mainly of *Bhakhra Tribulius oratus, Medhana Dactyloctenium aegytium, Hermal Peganum hermela, Bathu Chenopodium album* and *Mako Solanum nigrum* provide forage to wild animals.

The area has a very good potential for scientific research, conservation education and sport hunting. For the effective management of a species or population, Rubin et al. (1998) stressed for the need of accurate knowledge of its spatial distribution.

Threats to Protected Area

The major threats to wildlife in the area are given below in order of magnitude.

- It is a riverine area; therefore floods in the river which damage habitat by land erosion are to be perceived naturally. Nests and eggs of the birds are seriously destroyed during flood.
- Illegal hunting, poaching of wildlife and livestock grazing in the area seriously affect the population of wildlife species.
- Exchange of firing between Indo-Pak forces in the border belt area has a negative impact on the wildlife populations as well.
- Few years ago, when Indo-Pak war was suspected, mines were laid down in the area by Pakistan army. It was reported that a large number of domesticated and wild mammals were killed/injured with those mines.

4.5 Public Parks and Green Spaces

Narowal has one proper Public Park namely **Faiz Ahmed Faiz Park** located opposite to the Deputy Commissioner Office (GPS Coordinates: 32.0954: 74.8947). It is a well-maintained park that spreads over an area of 58 kanals. The park is managed by 4 dedicated staff members for maintenance; however, the management feels that the staff is inadequate and may require at least 2 more staff members for adequate management. The park is equipped with following facilities:

- Walking tracks
- Swings for children
- Section dedicated for animals (i.e. Deer, Rabbits, and Peacock etc.)
- Tennis Court
- Badminton Court
- Rooms and Halls available for functions
- Cafeteria for visitors

The provision of an urban green space is necessary to strengthen the efforts of the local authority to create a livable city and encourage urban development which is a step towards a sustainable framework. The application of urban green space standards vary in different cities.

According to the World Health Organization (WHO), every city is recommended to provide a minimum of 9 square meters of urban green space for each person, provided that it should be accessible, safe and functional. The WHO also suggests that an ideal amount of urban green space can be generously provided as much as 50 square meters per person. The given **Table 30** shows that the application standards for urban green spaces is different in different cities

Table 30: International standards of green spaces

Sr. No.	Cities	Size (hectares)	Population	m^2/person
1.	Greater London	4	1000	40
2.	Edinburgh	2.9	1000	29
3.	Cambridge	4.6	1000	46
4.	Washington	3.8	1000	38
5.	Minneapolis	2	1000	20
6.	Los Angeles	4.85	1000	48.5
7.	Kansas City	3.64	1000	36.4
8.	Bristol	1.0	1000	10
9.	India	0.8	1000	8
10.	Pakistan	0.52	1000	5.2

Figure 25: A view of Faiz Ahmed Faiz Park, Narowal

4.6 Major Sources of Flood

There are five main tributaries flowing in district Narowal and these played an incremental role in causing the floods of 2013. These tributaries are;

i. River Ravi at Jassar
ii. Nullah Jajri
iii. Nullah Bein (Shakargarh Highway Bridge)
iv. Nullah Basanter (Railway Bridge near Narowal – Shakargarh road)
v. Nullah Daik (Kingra Bridge)

Among them Nullah Dake, Nullah Basanter and Nullah Baein were main contributor in destruction and causalities during this spell of flood. The description of these Nullahs are as under:

4.6.1 Nullah Dake

Nullah Dake has been most catastrophic for district Narowal during the recent monsoon raining spells. It originates from the hills of Jammu and enters Pakistan near Lehri Village of Zafarwal. It's one of the off shoot which passes through Qila Ahmad Abad, Tatla and Baddomalhi and then passes to MR Link Canal through Siphon near Baddomalhi. Capacity of Siphon is 1000 cusec which is low. Maximum discharge of water from this Nullah has been recorded as 30,500 cusecs. The largest area of district Narowal has been affected by the waters of Nullah Dake starts from Zafarwal to Baddomalhi.

4.6.2 Nullah Basanter

Nullah Basanter is also one of the main tributary of river Ravi which enters into Narowal from Darman area of Zafarwal and then flows to Dhudhu Chak and Nadala Sulehrian and finally falls into river Ravi near Jassar. Historically this tributary has been peaceful even during rainy seasons, however contrarily; this year it has discharged maximum water upto 17,800 cusecs. Basanter has largely affected areas of Union Councils of Darman, Kanjroor & Jassar.

4.6.3 Nullah Bein

Nullah Bein enters in Pakistan near village Sukhu Chak of Tehsil Shakargarh and passes nearby Shakargarh city and falls in River Ravi near village Kartarpur. The flow of water in Nullah Baein has been recorded up to 43,000 cusecs in exceptional cases. In past years, it has been medium level between 3,000-10,000 cusecs. This has largely affected the vast area of Tehsil Shakargarh.

Table 31: Potential flood levels of tributaries in Narowal

Main Tributaries	Flood levels (in thousand Cusec)				
	Low	Medium	High	Very High	Exceptionally High
River Ravi at Jassar	50-75	75-100	100-150	150-200	above 200
Nullah Ujh	15-30	30-50	50-75	75-100	above 100
Nullah Bein	1.6-3	3-10	10-26	26-43	above 43
Nullah Basantar	0.7-4.7	4.7-7.5	7.5-11.6	11.6-17.8	above 17.8
Nullah Daik	5-8	8-12	12-20	20-40	above 40

During the 2013 flood, all three tehsils of District Narowal were severely affected during this flood (i.e. Narowal, Shakargarh and Zafarwal). It was estimated that around 60,705 acre of area (37,595 acre of cropped area) in 304 villages was affected. In addition to this, a total of 24 deaths and 140 houses were reported as damaged during this flood.

Project Digest

4.7 Proposed Projects

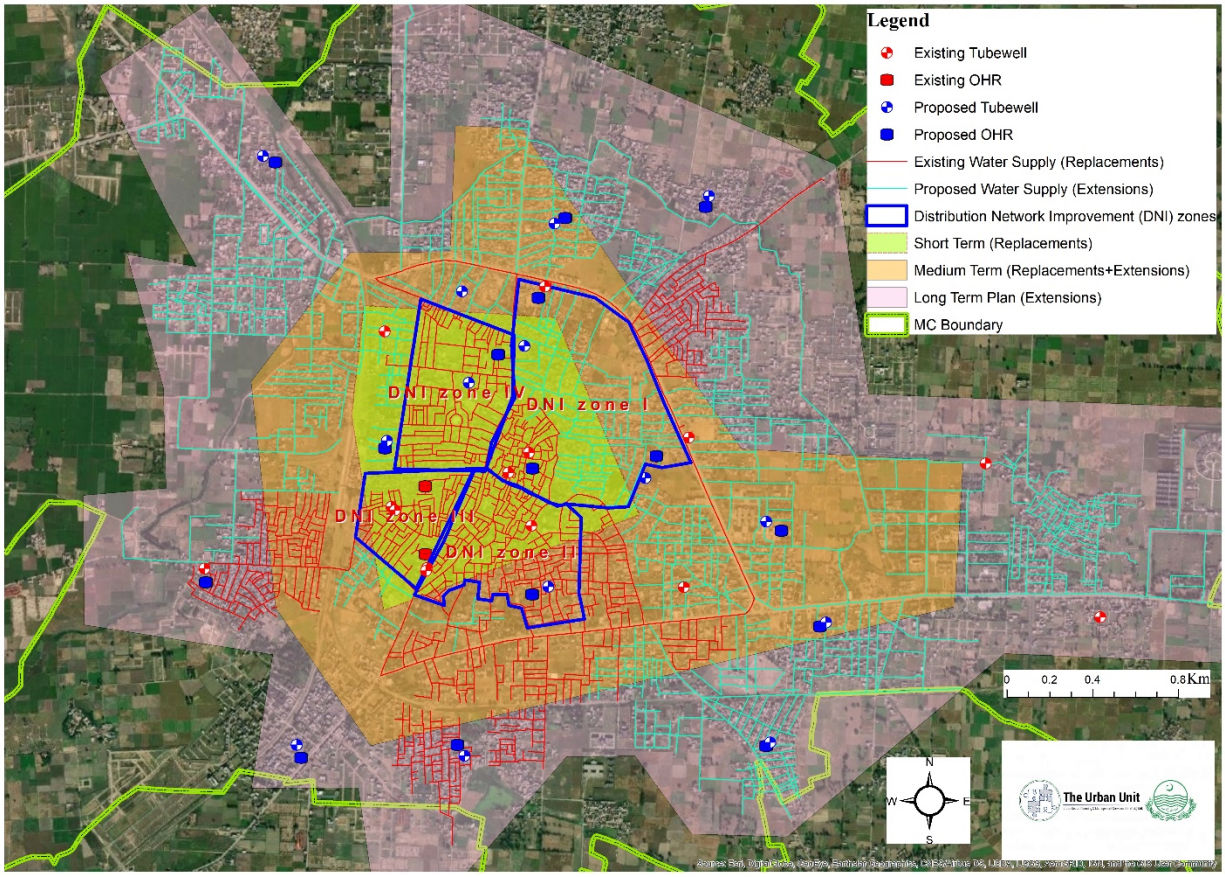
Based on the baseline environmental assessment of Narowal, it was observed that the Narowal city has only one park, namely Faiz Ahmed Faiz Park which is well maintained. However, in order to make the city more livable there is a dire need to develop more parks, recreational parks and green spaces in the city. Similarly riverine forest in Narowal need a proper conservation plan to safeguard riverine forests which is an important habitat and will also protect the city from floods.

The proposed environmental projects and location for a public park based on baseline environmental assessments are is shown in **Figure 18**.

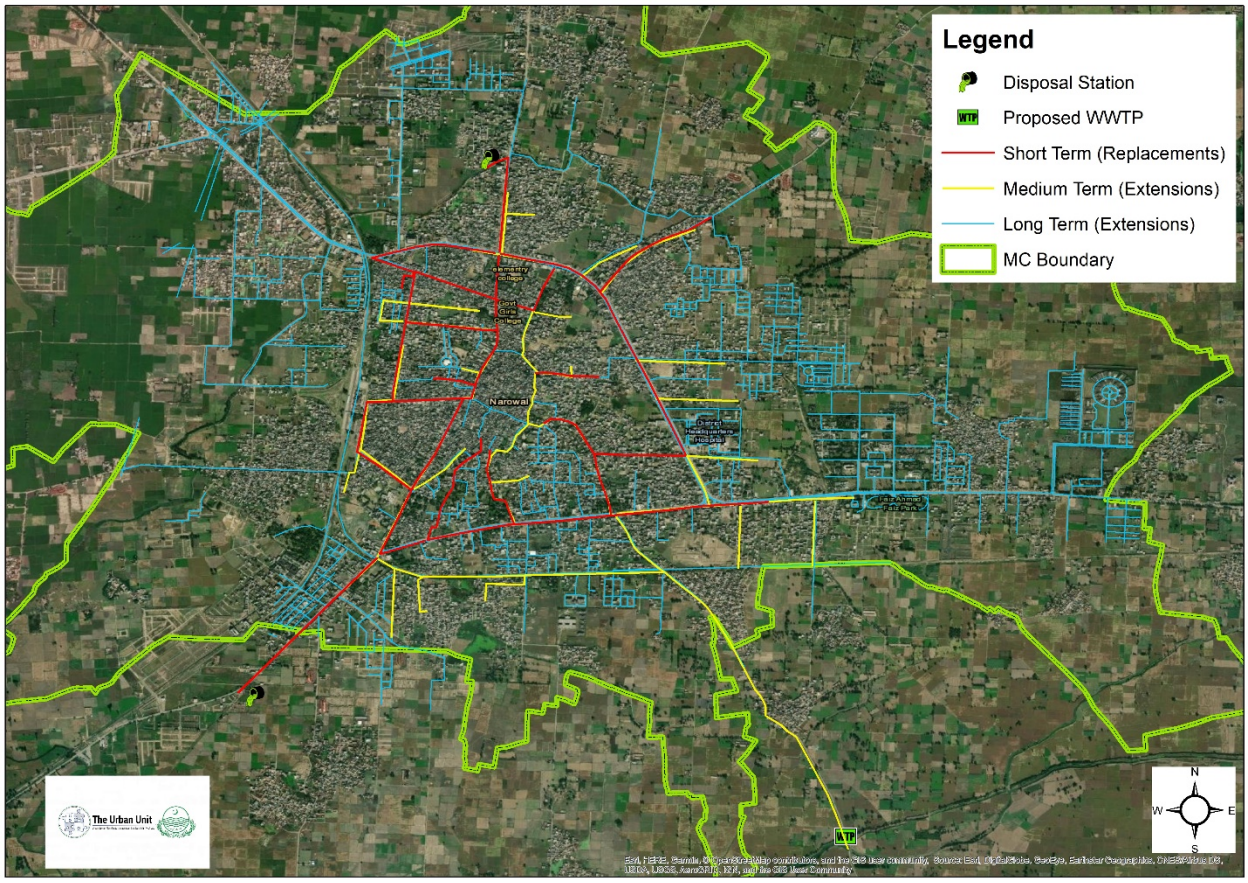
Sr. #	Project	Cost (Million PKR)
1	Establishment of Public Park for Narowal Cityproposed on Manak Road, Narowal**(GPS: 32° 5' 54.38'' N, 74° 51' 51.13'' E)**	23.199
2	Development of Conservation and protection plan for Riverine Forest in Narowal.	5
3	River floodplain Management and Recreational Pathway in Shakargarh.	30
Total (Million PKR)		**58.2**

Figure 26: Proposed location of Public Park near Manak Road, Narowal

Annexure 1: Detailed Layout map of Development Plan for Water Supply Sector



Annexure 2: Detailed layout map of Development Plan for Sewerage System



Annexure 3: Specification for Water Supply System

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD
Regional Development Plan 2020-2030
MRS, 1st BI-ANNUAL-2021 (1st JANUARY-2021 to 30th JUNE -2021) DISTRICT NAROWAL
Short-Term

Replacement of Water Supply pipe lines in Moh Gulshan e Norowal, Jillani Colony, Moh Barailwi, Moh Abbas Nagar, Moh. Sheikhaan and Moh. Muhammad pura.

Sr.#	Item Code	DESCRIPTION								QTY	UNIT	RATE	AMOUNT
1	Ch:-4/45	Dismantling and removing road metalling.								9,428.27	Cft	14.21	134,013
2	Ch:-4/29	Dismantling brick or flagged flooring without concrete.								56,358.161	Sft	6.04	340,460
3	Ch:-3/44	Excavation of trenches in all kind of soil except cutting, rock, for water supply pipe lines up to 5' depth from ground level i/c trimming, dressing sides, leveling the beds of trenches to correct grate and cutting pits for joints etc. complete in all respect.								899,930.74	Cft	5.34	4,805,810
	i.	For 12" i/d	-	X	3	X	5	=	-	Cft			
	ii.	For 10" i/d	-	X	2	X	5	=	-	Cft			
	ii.	For 8" i/d	200.07	X	2	X	4	=	1,600.55	Cft			
	iii.	For 6" i/d	7,534.44	X	2	X	4	=	60,275.55	Cft			
	iv.	For 4" i/d	24,963.25	X	2	X	4	=	199,706.00	Cft			

	v.	For 3" i/d	79,793.58	X	2	X	4	=	638,348.64	C ft			
								=	**899,930.74**	C ft			
4	Ch:-7/30	Supplying and filling sand under floor; or plugging in wells.									37,572.11	Cft	20.96	787,549
	i.	For 12" i/d	-	X	3	X	0.17	=	-	C ft				
	ii.	For 10" i/d	-	X	2	X	0.17	=	-	C ft				
	ii.	For 8" i/d	200.07	X	2	X	0.17	=	66.82	C ft				
	iii.	For 6" i/d	7,534.44	X	2	X	0.17	=	2,516.50	C ft				
	iv.	For 4" i/d	24,963.25	X	2	X	0.17	=	8,337.73	C ft				
	v.	For 3" i/d	79,793.58	X	2	X	0.17	=	26,651.06	C ft				
								=	**37,572.11**	C ft				
5	Ch:-23/42-a	Providing, laying, cutting, jointing, testing and disinfecting High Desnity Polyethylene Pipe (HDPE-100) working pressure pipe in trenches complete in all respects. PN-8 (SDR-21)												
	i.	12” i/d Pipe									-	P. Rft	1,881.10	-
	ii.	10” i/d Pipe									-	P. Rft	943.45	-
	ii.	8” i/d Pipe									200.07	P. Rft	750.05	150,062
	iii.	6” i/d Pipe									7,534.44	P. Rft	482.30	3,633,862
	iv.	4” i/d Pipe										P.		

			24,963.25	Rft	234.20	5,846,393
		3” i/d Pipe	79,793.58	P. Rft	168.80	13,469,156
6	N-s	Providing and fixing HDPE specials i/c carriage from factory to site of work and all taxes complete in all respect.				
	1	Equal Tee 200x200x200 mm	100.00	P. No	9,582.00	958,200
	2	Equal Tee 315x315x315 mm	100.00	P. No	26,019.00	2,601,900
	3	Reducer Tee 315x90 mm	80.00	P. No	38,676.00	3,094,080
	4	Reducer Tee 315x110 mm	80.00	P. No	38,889.00	3,111,120
	5	Reducer Tee 315x160 mm	80.00	P. No	39,006.00	3,120,480
	6	Reducer Tee 315x200 mm	80.00	P. No	39,162.00	3,132,960
	7	Reducer Tee 315x250 mm	80.00	P. No	39,334.00	3,146,720
	8	Reducer Tee 250x200 mm	80.00	P. No	25,774.00	2,061,920
	9	Reducer Tee 200x90 mm	100.00	P. No	10,520.00	1,052,000
	10	Reducer Tee 200x110 mm	100.00	P. No	10,584.00	1,058,400
	11	Reducer Tee 200x160 mm	80.00	P. No	10,701.00	856,080
	12	Stab End 315 mm o/d	80.00	P. No	11,901.00	952,080
	13	Stab End 250 mm o/d	80.00	P. No	7,982.00	638,560

	14	Stab End 200 mm o/d	80.00	P. No	5,157.00	412,560
	15	Stab End 160 mm o/d	80.00	P. No	2,314.00	185,120
	16	Stab End 110 mm o/d	80.00	P. No	1,454.00	116,320
	17	Stab End 90 mm o/d	80.00	P. No	880.00	70,400
	18	Bend 315 mm (90)	80.00	P. No	21,211.00	1,696,880
	19	Bend 315 mm (45)	80.00	P. No	23,009.00	1,840,720
	20	Bend 200 mm (45)	80.00	P. No	6,942.00	555,360
	21	Reducer 315x200 mm	80.00	P. No	17,487.00	1,398,960
	22	Reducer 250x200 mm	80.00	P. No	11,112.00	888,960
	23	Reducer 200x160 mm	80.00	P. No	4,836.00	386,880
	24	M.S Flange 315 mm i/d	80.00	P. No	1,760.00	140,800
	25	M.S Flange 250 mm i/d	80.00	P. No	1,568.00	125,440
	26	M.S Flange 200 mm i/d	80.00	P. No	1,358.00	108,640
	27	M.S Flange 160 mm i/d	80.00	P. No	1,065.00	85,200
	28	M.S Flange 110 mm i/d	100.00	P. No	606.00	60,600
	29	Equal Tee 90 mm	100.00	P. No	1,940.00	194,000
	30	Equal Tee 110 mm	100.00	P. No	2,910.00	291,000
	31	Equal Tee 160 mm	100.00	P. No	6,791.00	679,100
	32	Elbow 90 degree 90 mm	100.00	P. No	1,463.00	146,300
	33	Elbow 90 degree 110 mm	100.00	P. No	2,264.00	226,400
	34	Elbow 90 degree 160 mm	100.00	P. No	5,336.00	533,600

	35	Elbow 90 degree 250 mm	100.00	P. No	16,979.00	1,697,900
	36	Elbow 45 degree 90 mm	100.00	P. No	1,422.00	142,200
	37	Elbow 45 degree 110 mm	100.00	P. No	2,102.00	210,200
	38	Elbow 45 degree 160 mm	100.00	P. No	5,174.00	517,400
	39	Elbow 45 degree 250 mm	100.00	P. No	16,170.00	1,617,000
	40	End Cap 90 mm	100.00	P. No	646.00	64,600
	41	End Cap 110 mm	100.00	P. No	970.00	97,000
	42	End Cap 160 mm	100.00	P. No	2,263.00	226,300
	43	End Cap 250 mm	100.00	P. No	8,085.00	808,500
	44	Cross 90 mm	100.00	P. No	3,234.00	323,400
	45	Cross 110 mm	100.00	P. No	5,660.00	566,000
	46	Reducer Tee 110 X 90 mm	100.00	P. No	2,426.00	242,600
	47	Reducer Tee 160 X 90 mm	100.00	P. No	5,821.00	582,100
	48	Reducer Tee 160 X 110 mm	100.00	P. No	5,821.00	582,100
	49	Reducer Tee 250 X 110 mm	100.00	P. No	19,404.00	1,940,400
	50	Reducer Spigot 250 X 110 mm	100.00	P. No	12,936.00	1,293,600
7	Ch: - 23/ 29	P/F cast iron specials of BSS Class-B (such as bend, tee, collar, reducer, tail piece, flanged socket, flanged spigot, cap, taper angle branch, plug, etc) for Asbestos cement pipe line, with comet joint and rubber ring, complete.				
i		3” to 6” i/d	2,000.00	P. Kg	111.40	222,800
ii		8” to 18” i/d	1,000.00	P. Kg	105.10	105,100

8	Ch:-23/33	Providing and fixing Air Valve 2.5" (65 mm) dia of BSS quality and weight (complete with jointing material) Double	20.00	P. No.	8,010.55	160,211
9	Ch:-23/31-	Providing and fixing sluice valve of BSS quality and weight class B or cast iron pipe line and Asbestos cement pipe line i/c cost of fitting of material.				
i		3" i/d Sluice Valve	50.00	P. No.	6,041.75	302,088
i		4" i/d Sluice Valve	40.00	P. No.	6,932.65	277,306
ii		6" i/d Sluice Valve	20.00	P. No.	11,697.10	233,942
iii		8" i/d Sluice Valve	20.00	P. No.	20,991.10	419,822
iv		10" i/d Sluice Valve	-	P. No.	26,470.55	-
v		12" i/d Sluice Valve	-	P. No.	32,849.75	-
10	N-s	Construction of Sluice Valve Chamber.	200.00	P. No.	30,000.00	6,000,000
11	Ch:-23/41	Making connection for new water supply lines with running main i/c excavation of trenches and refilling complete but excluding the cost of pipe and specials.				
	i	Upto 6" i/d	2,000.00	P. No.	2,026.55	4,053,100
	ii	Upto 8" i/d	1,000.00	P. No.	2,559.55	2,559,550
	iii	Upto 10" i/d	-	P. No.	3,608.90	-
	iv	Upto 12" i/d	-	P. No.	4,941.40	-
12	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	719,944.60	Cft	1.78	1,279,126

13	Ch: - 3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-				-
		95% to 100% maximum modified AASHO dry density.	719,944.60	Cft	0.79	567,496
14	Ch: - 21/12	Restoration of metalled road on laid service line including compaction.				-
		a) Carpetted road, with 2" (50 mm) carpet and 10" (250mm) depth of stone metal for sub-base and base.	7,542.62	Sft	90.47	682,403
		c) Black topped Road with two coats of surfacing & 10" (250mm) depth of stone metal for sub base and base.	1,508.52	Sft	66.07	99,666
		Total Amount (PKR)				**92,968,955**
		Total Amount (In Million)				**93**

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 1st BI-ANNUAL-2021 (1st JANUARY-2021 to 30th JUNE -2021) DISTRICT NAROWAL							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Short Term							
Tube Well							
Construction of Tube Well Boring							
(Abstrect of Cost Sub Head-A)							
1	Ch:-23/6-a	Boring for tubewell in shingle, gravel and rock, including sinking and withdrawing of casing pipe:- a) from ground level to 200 ft. (60 m) below ground level:-				-	
	i	12" to 18" (300 to 450 mm) i/d	Rft.	400	1,232	492,880	
2	Ch:-23/7	Providing strong substantially built box of deodar wood 4'x2½'x9" (1200x750x225 mm), with compartments, lock and locking arrangement, for preserving samples of strata from bore hole.	Job	1	17,250.75	17,251	
3	Ch:-23/9-d	Providing and installing, brass strainer in tubewell bore hole, including sockets, special sockets, studs, etc. complete:- 5" i/d, 3/16" (125 mm i/d 5 mm) thick	Rft.	80	2,451	196,108	

4	Ch:-23/10-g	Providing and installing M.S. Bail plug in tubewell bore hole:) 8" i/d, 2 ft. (200 mm i/d 600 mm) long	Each	2	3,390	6,780	
5	Ch:-23/14-g	Providing and installing M.S. blind pipe socketed/welded joint, M.S. reducer (where necessary), in tubewell bore hole, including jointing/welding with strainer, etc. complete:- 8" i/d, 3/16" (200 mm i/d 5 mm) thick	Rft.	250	1,697	424,188	
6	Ch:-23/8	Furnishing sample of water from bore hole.	Set	2	170.70	341	
7	Ch:-23/18	Shrouding with graded pea gravel 3/8" to 1/8" (10 to 3 mm), around tubewell in bore hole.	Cft.	800	104.90	83,920	
8	Ch:-23/17	Testing and developing of tubewell of size 6" (150 mm) i/d and above continuously.					
	i	upto 1.5 cs. Discharge	Per Hours	72	1,158	83,351	
	(Total Sum of Sub Head A) Amount R.s					**1,304,818**	
Construction of Pump House							
(Abstrect of Cost Sub Head-B)							
1	Ch: 3/21-b	Excavation in foundation of building, bridges and otherstructures, including dagbelling, dressing, refilling around structure with excavated earth, watering and	Cft	1,200	7.49	8,990.76	

		ramming lead upto lift upto 5 ft. (1.5 m) in ordinary soil.					
2	Ch:6/3-d	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:- d) Ratio 1: 6:12	Cft	225	119.78	26,949.49	
3	Ch:7/4-i	Pacca brick work in foundation and plinth in:- Ratio Ratio 1:5	Cft	650	241.10	156,712.73	
4	Ch:6/33-a-i	Providing and laying damp proof course of cement concrete 1:2: 4(using cement, sand and shingle), including bitumen coating :- (b) with 2 coats of bitumen: i) 1½" thick (40 mm)	Sft	69	50.70	3,498.54	
5	Ch:7/5-i	Pacca brick work in ground floor:- cement, sand mortar:- Ratio 1:5	Cft	650	256.23	166,552.10	
6	Ch:6/6-a	Reinforced cement concrete in roof slab, beams,columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		Type C (nominal mix 1: 2: 4)	Cft	222	379.60	84,271.20	

7	Ch:6/9-b	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):- (b) Deformed bars (Grade-40)	Kg	400	159.12	63,646.80	
8	Ch:-11/4-b	Cement Neru plaster 1:2 (cement and sand) upto 20' (6.00 m) height:-½" (13 mm) thick	Sft	775	23.24	18,013.33	
9	Ch:-11/8-b	Cement pointing struck joints, on walls, upto 20' (6.00 m) hiehgt:-ratio 1:3	Sft	1,500	21.96	32,946.75	
10	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) centre to centre, with locking arrangement.	Sft.	150	1,244.35	186,653	

11	Ch:-25/42	Providing and fixing steel windows using M.S. sheet (16SWG) moulded tubular pipe 1½"x1½" (40x40mm)for frame and 1¼"x1¼" (30x30mm) for leaves including M.S. square bars ¼"x¼" (6x6 mm) welded around each panel of frame, 5 mm thick glass panes fixed with double M.S. square tubular pipe 3/8"x3/8" (10x10mm) (22 SWG) beading with U' shaped rubber lining, brass fitting, holdfast, including painting three coats complete in all respects.For openable panels fixed with wire gauze 24 SWG, 12x12 mesh and glass	Sft.	64	394.35	25,238	
12	Ch:11/23-iii	Distempering:-a) new surface:-iii) three coats	Sft	775	7.77	6,023.30	
13	Ch:9/20-a	Cast iron rain water downpipe fixed in position, excluding heads and shoes, but including painting and clamps, etc:- a) 4" dia (100 mm) cast iron down pipe.	P.Rft	20	230.00	4,600.00	
14	Ch:9/21	Rain water down pipe cast iron head fixed in place,including cost of clamp holdfast and painting.	Each	1	579.35	579.35	
15	Ch:9/22	Shoes, bends or offsets for cast iron rain water down pipe,	Each	1	336.70	336.70	

		including fixing and painting.					
16	Ch:9/16	Bottom Khuras of brick masonry in cement mortar 1:6, 4'x2'x4½" (1200x600x113 mm) over 3" (75 mm) cement concrete 1:4:8.	Each	1	955.60	955.60	
17	Ch:-10/15-e	Providing and laying topping of cement concrete 1:2:4,including surface finishing and dividing in panels:-e) 2"(50 mm) thick	Sft	325	53.90	17,516.20	
18	Ch:9/15	Khuras on roof 2'x2'x6" (600 x 600 x 150 mm)	Each	1	548.25	548.25	
19	Ch:13/5-c	Preparing surface and painting of doors and windows any type (including edges):-.i) priming coat.	Sft	338	8.37	2,827.71	
20	Ch:-9/5	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.	Sft	400	76.92	30,768.60	
21	Ch :-6/3-d	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 20.1 -do- 50 mm) gauge, in foundation and plinth:- (d) Ratio 1: 6:12	Cft	100	119.78	11,977.55	

22	Ch:7/7-i	Pacca brick work other than building upto 10ft. (3 m) height. i) cement, sand mortar:- Ratio 1:5	Cft	425	248.51	105,616.11	
	(Total Sum of Sub Head B) Amount R.s					**955,222**	
INTERNAL ELECTRIFICATION							
(Abstrect of Cost Sub Head-C)							
1	Ch:-24/12	Supply and erection of single core PVC insulated, PVC sheathed copper conductor, 660/1100 volts grade cable, in prelaid G.I. pipe/M.S. conduits/PVC pipe/G.I. wire/trenches,etc (rate for cable only):-				-	
	a)	19/2.11 mm (19/0.083")	Rft.	120	332.15	39,858	
	b)	37/2.11 mm (37/0.083"	Rft.	120	581	69,660	
2	Ch:-24/5	Supply and erection of G.I. flexible pipe for wiring, including				-	
	a)	80 mm i/d	Rft.	25	360.25	9,006	
3	Ch:-24/68	Earthing of iron clad/aluminum switches, etc. with G.I. wire No.8 SWG in G.I. pipe 15 mm (½") dia, recessed or on surface of wall and floor, complete with 1.5 metre long G.I. pipe, 50 mm (2") dia with reducing socket 4 to 5 metre below ground level,and 2 metre away from building	Job	2	5,743	11,487	

		plinth.					
4	Ch:-24/10	Supply and erection of single core PVC insulated copper conductor cables, in prelaid PVC pipe/M.S. conduit/G.I pipe/wooden strip batten/wooden casing an capping/G.I.wire/trenches (rate for cables only):-250/440 volts, PVC insulated cotton braided and compounded cables:-				-	
	a)	3/0.74 mm (3/0.029")	Rft.	510	12.50	6,375	
	b)	7/0.74 mm (7/0.029")	Rft.	85	16.80	1,428	
5	Ch:-24/19	Supply and erection of iron/aluminum clad, 500 volts main switches with triple pole and neutral link and HRC fuses, on angle iron board with 3 mm (1/8") thick M.S. sheet covering,including bonding to earth with necessary flexible pipe and thimbles. (500Amp)	Each	1	20,326.00	20,326	

6	Ch:-24/18	Supply and erection of iron/aluminum clad, 500 volts main switches with kitkat fuses, on angle iron board with 3 mm (1/8") thick M.S. sheet covering, including bonding to earth with necessary flexible pipe and thimbles, etc. 15/20 Amp.	Each	1	1,719	1,719	
7	Ch:-24/20	Supply and erection of iron/aluminum clad, branch distribution board, 250 volt, on angle iron frame of suitable size with 3 mm (1/8") M.S. sheet covering: 8 way, 15 Amp per way	Each	2	1,025	2,050	
8	Ch:-24/43	Supply and erection of tube light, including rod, choke, starter with frame, flexible wire, including connection from ceiling rose, etc., complete. double rod (80 watts) with two chokes and 2 starters.	Each	4	1,319.05	5,276	
9	Ch:-24/76	Rewinding of A.C. ceiling fan, capacitor type, including cost of wire, leatheride paper cotton tape, soldering, etc.1400 mm (56") sweep, 250-275 RPM	Each	1	1,213.05	1,213	
10	Ch:-24/69	Earthing of Metallic cases, etc. with G.I. wire No. 8 mm (½") dia G.I. pipe, best	Rft.	60	78.85	4,731	

		quality:-SWG, in on surface, including clamps, etc.					
11	Ch:24/72	Supply and erection of 600x600x3 mm (2'x2'x1/8") copper plate, including revitting to copper tape and placing in mixture of salt and charcoal, etc.	Each	1	4,789	4,789	
12	Ch:24/37	Supply and erection of 3 pin 10/15 Amp. wall socket with shoe,open type.	Each	4	152.750	611.000	
13	Ch:24/30	Supply and erection of ceiling rose, bakelite.	Each	4	41.600	166.400	
	(Total Sum of Sub Head C) Amount R.s					**178,695**	
PUMPING MACHINERS							
(Abstrect of Cost Sub Head-D)							
1	Ch:-23/17-ii	Testing and developing of tubewell of size 6" (150 mm) i/d and above continuously.	Per Hours	72	1,158	83,350.800	
2		Providing, installing, testing and lowering vertical shaft water lubricated deep well **turbine pump** of **0.7 to 1.50** cusecs capacity against a pumping head of 350 ft. including lowering of about 170 ft length bowl assembly 04 stage and shaft complete **(KSB) and AC electric** motor 150 BHP 30 H.P squirrel cage	Set	1	5,750,000	5,750,000	

		induction motor of 1450 RPM alongwith flow meter, gate valves, check valves, air release valves, pressure gauge, CI bends tail pieces etc. up to duck foot bend and earthing, testing complete.					
3	Ch:-23/14-j	Providing and installing M.S. blind pipe socketed/welded joint, M.S. reducer (where necessary), in tubewell bore hole, including jointing/welding with strainer, etc. complete:- 12" i/d, ¼" (300 mm i/d 6 mm) thick	Rft	20	2,770	55,406	
4	Ch:-23/33-b	Providing and fixing, air valve 2½ (65mm) dia of B.S.S. quality and weight (complete with jointing material).	Each	1	8,011	8,011	
5	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, revitting, handling, assembling and fixing, but excluding erection in position.	Kg	152	172	26,201	
6	Ch :-6/3-c	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and	Cft	64	119.78	7,666	

		plinth:-(c) Ratio 1:4:8					
7	Ch:-6/9	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):-	Kg	152	159.12	24,186	
8		**HYPO CHLORINATOR**					
		Providing fixing & testing of Hypo Chlorinator (Chemical metering pump) capacity 0-30 gallons / day at 100 PSI max injection pressure fitted with 1/60 HP air cooled heavy duty electric motor 220 V, 50 Hz single phase AC complete with all accessories like bleed valve assembly, suction tubing, discharge tubing, foot valve and strainer assembly with weight back check valve assembly solution tank injection fitting wall brackets etc complete in all respect to the entire satisfaction of the	Job	1.00	85,000.00	85,000.00	

		Engineer in charge.					
9		**WATER FLOW METERS**					
		Making and fixing and water level indicator gauge painted in quarter FT readings enamal coated on 6" wide 1/4" thick M.S. plate fitted on outer wall of pump house on top of G.S.T. complete with float, guide,steel wire string, pullyes pointer and 1 No. line bracket bulb as per approved design.	Job	1.00	55,000.00	55,000.00	
	(Total Sum of Sub Head D) Amount R.s					**6,094,820**	
a+b+c+d = Total Sub Head Amount R.s						**8,533,555**	
Total Amount of Construction of 3 Tube wells (1.5 cusec each)						**25,600,665.21**	**PKR**
						26	**Millions**

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 1st BI-ANNUAL-2021 (1st JANUARY-2021 to 30th JUNE -2021) DISTRICT NAROWAL							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Short Term							
Construction of 3 OHRs (50,000 gal each) in Moh. Kashmiriyan, Moh Abbas Nagar and Hayat Town respectively							
1	Ch: 3/21-b	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and ramming lead upto one chain (30 m) and lift upto 5 ft. (1.5 m)					
		b) in ordinary soil.	Cft.	36,000.00	7.49	269,722.80	
2	Ch:- 3-13 (b) 3-16(i)	Rehandling of earthwork: b)Upto a lead of 50 ft. (15 m).for earhtwork soft, ordinary, hard and very hard.	Cft.	27,000.00	2.96	79,920.00	
		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).					
3	Ch:- 6/9(c)	Deformed steel bars (Grade 60)	Kg.	32,000.00	164.31	5,258,064.00	

4	Ch:6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate):					
		(i) Ratio 1: 4: 8	Cft.	2,000.00	179.99	359,984.00	
5	Ch:6/6-i-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, moulds, 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) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		(2) Type B (nominal mix 1: 1½: 3)	Cft.	10,938.00	408.70	4,470,360.60	
6	Ch:6/6-ii-2	(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					

		(2) Type B (nominal mix 1: 1½: 3)	Cft.	10,892.50	303.90	3,310,230.75	
7	Ch:6/6-i-1	Reinforced cement concrete type A nominal mix 1:1:2 (cylinder strength 4000 psi) in roof slab, beams lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects.					
		Type A (nominal mix 1:1:2) Bowl Concrete	Cft.	5,200.00	463.00	2,407,600.00	
8	Ch:-6/13 (a)	Extra labour for laying concrete plain or reinforced: a) above 20' (6 m) upto 40'(12 m) height	Cft.	1,751.00	29.10	50,960.23	
9	Ch:-6/13 (b)	b) For every additional 10'(3 m) height.	Cft.		18.19	-	
	"	c) 40'-50' height		450.00	42.07	18,931.50	
	"	d) 50'-60' height		450.00	59.35	26,707.50	
	"	e) 60'-70' height		450.00	76.10	34,245.00	
	"	f) 70'-80' height		1,300.00	90.66	117,858.00	
	"	g) 80'-90' height		1,300.00	106.50	138,450.00	
10	Ch:6/28	Providing embeding 10" (250 mm) wide ¼" (6 mm) thick rubber water stopper in expansion joints of R.C.C. roof slab complete in all respects.	Rft.	120.00	208.00	24,960.00	
11	Ch:-7/4	Pacca brick work in foundation and plinth cement, sand mortar Ratio 1:3 i) Plinth protection.	Cft.	775.00	253.61	196,545.04	

12	Ch:-10/15(e)	Providing and laying topping of cement concrete 1:2:4, including surface finishing and dividing in panels:- (Under Floor) i) 2"(50 mm) thick	Sft	150.00	31.89	4,782.75	
13	Ch:-10/39(a-ii)	½ (13mm) thick mosaic dado or skirting grey cement with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips and 10% puddlo, laid over ½"(13 mm) thick cement plaster 1:3, including rubbing and polishing, complete with finishing.	Sft	575.00	127.90	73,541.93	
14	Ch:-11/28	Extra for lime, mud or cement plaster and pointing from 20' (6.00 m) and above for each additional 10' (3.00 m) height or part thereof.	Sft	575.00	2.85	1,639.61	
15	Ch:-7/30	Supplying and filling sand under floor; or plugging in wells. (Floor and Plinth protection)	Cft.	1,000.00	20.96	20,961.00	
16	Ch:-10/9	Brick on edge flooring, laid in 1:6 cement mortar, over a bed of ¾" (20 mm) thick cement mortar 1:6.	Sft	1,775.00	104.00	184,605.33	
17	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) centre to centre, with locking arrangement.	Sft	11.00	1,244.35	13,687.85	
18	Ch:-25/42 (a)	Providing and fixing steel windows using M.S. sheet (16 SWG) moulded tubular pipe 1½"x1½" (40x40mm) for frame and 1¼"x1¼" (30x30mm) for leaves including M.S. square bars ¼"x¼" (6x6 mm) welded around each panel of frame,					

		5 mm thick glass panes fixed with double M.S. square tubular pipe 3/8"x3/8" (10x10mm) (22 SWG) beading with U' shaped rubber lining, brass fitting, holdfast, including painting three coats complete in all respects.					
		a) For openable panels fixed with wire gauze 24 SWG, 12x12 mesh and glass panes ¼" (6 mm) thick.	Sft	76.00	394.35	29,970.60	
19	Ch:-25/34	Providing/fixing stair railing consisting of M.S. Box section size 1-1/2"x3" of 16 SWG welded with M.S. flat 1"x1/8" continuously and welded over M.S. square bars 5/8"x5/8" punched in M.S. flat 2 ¾' high @ 5½" c/c fixed in steps of stair I/C painting 3 coats complete.	Rft.	73.00	746.90	54,523.70	
20	Ch:-25/35	Providing and fixing terrace railing of 2" (50 mm) i/d conduit pipe 16 SWG, welded with 5/8"x5/8" (16x16 mm) square bar 2.75 ft. (838 mm) high fixed at 5" (125 mm) centre to centre, in reinforced cement concrete slab with suitable arrangement, complete in all respects, as pe design and drawing.	Rft.	73.00	837.70	61,152.10	
27	Ch:-23/28 (b) (ii)	Providing and fixing Cast Iron special of B.S.S. Class `B' (such as bend, tee cross collar, reducer, tail piece, flanged spigot, cap, flanged socket, taper, angle branch, plug etc.) for cast iron pipe line, complete:- b) C.I flanged specials, with flanged and flanged joints:-	Kg.	1,000.00	100.90	100,900.00	
		8" dia (Outlet & Wash Out)					

28	Ch:-23/30 e	Providing and fixing sluice valve of B.S.S. quality and weight, Class `B', for cast iron pipe line, and Asbestoscement pipe line (including cost of jointing material)					
		8" (200 mm) i/d	No	1.00	26,601.50	26,601.50	
		10" (250 mm) i/d	No	1.00	34,459.30	34,459.30	
Total Amount (Rs) of Schedule Items						**17,371,365**	
NON-SCHEDULE ITEMS							
1	N-S	Providing, laying, cutting, jointing, testing and disinfecting Mild Steel pipe erecting in vertical position with M.S clamp with 3"x 3/8" flat iron with nut and bolts, with flanged and flanged joints, complete in all respects:-					
		i) 6" M.S blind pipe (inlet pipe	Rft	200.00	1,548.56	309,712.00	
		ii) 8" M.S blind pipe (washout and overflow pipe)	Rft	300.00	1,994.87	598,461.00	
		iii) 10" M.S blind pipe (outlet pipe)	Rft	170.00	2,992.31	508,692.70	
2	N-S	Providing and installing of aluminium indication gague Level Indicator complete with Steel pully, Steel Wire, Gauge Unit including all accessories such as G.I. Pipe, level indicator needle & anchoring arrangement with Float, jointing material as per drawing and/or directed by the Engineer complete in all	No.	1.00	26,449.04	26,449.04	

		respect.					
3	N-S	Clean, test and disinfect overhead water tank.			80,000.00	80,000.00	
4	N-S	Providing and fixing 4 " dia GRP air vent on roof of overhead water tank.	Rft	14.00	1,315.73	18,420.22	
5	N-S	Providing making and fixing MS cover for roof tank as per drawing, complete in all respects.	No.	1.00	5,597.99	5,597.99	
6	N-S	MS ladder including painting.as per drawings complete in all respect.	Lft	19.00	1,279.93	24,318.67	
7	N-S	Providing and fixing cast iron rungs in underground structures or wherever directed by the Engineer Incharge, to correct lines and levels as per drawing and specification.	No.	9.00	586.93	5,282.37	
8	N-S	Wiring of light or fan point from switch to the point with 3x3/0.91 mm (3/0.036") PVC insulated single core cables in PVC pipes concealed in walls, columns and slabs including accessories, PVC box, 10 Amp. gang switch 1 or 2 way as required, one for each light or fan and installed as in specifications.	Each	8.00	1,398.05	11,184.40	
9	N-S	Circuit wiring from MCBs board to gang switches board with 3x7/0.91 mm (7/0.036") PVC insulated single core cables in appropriate size PVC conduit.	Each	3.00	2,587.70	7,763.10	

11	N-S	5 Amp 2/3 pin universal flush mounting switch socket unit away from switch board and wired with 3x7/0.74mm (7/0.029") single core cable from nearest circuit available in PVC concealed conduits or trunking including all conduit accessories as required complete in all respect.	Each	2.00	1,681.55	3,363.10	
12	N-S	The same as item No. 1.4 but wiring of 15/20A, 3-pin flush mounting switch socket unit wired with 1-core 3x7/0.91mm (7/0.036") starting from D.B.	Each	1.00	2,928.15	2,928.15	
TOTAL Amount (Rs) of Non Schedule Items						**1,602,172.74**	
Total Amount (Rs) of Schedule Items+Non Schedule						**18,973,537.82**	
Total For Construction of 03 x OHRs						**56,920,613.46**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 1st BI-ANNUAL-2021 (1st JANUARY-2021 to 30th JUNE -2021) DISTRICT NAROWAL							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
Short Term							
03 Filtration plants (with each tube well) in Moh. Brailwi, Hayat Town and Moh Christian colony respectively							
2000 L/H Ultra Filtration (UF) Plant							
1		Design, Supply, Installation, testing & commissioning of 2000 L/H Ultra Filtration (UF) Plant for removal of other contaminants, including carriage, loading/unloading charges inclusive of conforming to standarad specifications of filtration plants. Control PLC GSM/GPRS enabled. The specifications along with euipment and accessories properly mounted in the frame/skid are given below:-	LUMSUM	1	4,509,000	4,509,000	
1.1		**Boring/drilling and instalation**					
		Boring/drilling and instalation of Submersible Pump Submersible pump 2000 LPH Bore upto 300 ft					
1.2		**Raw Water Feed Pump**					
		Capacity 2200 LPH, 90 PSI pressure					
1.3		**Raw water tank**					

		Capacity 2000 Litre minimum Material FRP Automatic on off switch for pump					
1.4		**Pressure Sand Filter**					
		Material FRP, make Pentair or Equivalent Fitration Rate 7.5 m/h with automatic back wash system Sand Charactristics - ES00.5 mm					
1.5		**Activated Carbon Filter**					
		Affected size of Media 0.7 to 0.9 Material FRP, make Pentair or Equivalent Fitration Rate 7.5 m/h with automatic back wash system Base material coconut shell, effective size 0.5-1.8mm					
1.6		**Jumbo Filter 02-No**					
		Poristy 1 micron Size 20 Inches Material High pressure Plastic					
1.7		**Ultra Filtration system**					
		Frame stainless steel					
		UF Housing Pentair or Equivalent					
		Material FRP					
		UF Membrane					

		Origion, Europe, Western Europe, USA, Japan Dow, filmtech, hydranutics, lewabrane or equivalent, NSF certified salt rejection - 95% capacity 2000 Litre/hour Bacterial removal efficiency 99.999 % Virus removal efficiency 99.999 % vessel material - FRP recovery 90% Permeate flux 100-350 L/m2h Transmembrane pressure < 1.0 bar Backwash duration 1 - 5 min. pressurer 2 - 4 bar					
1.8		**Automatic PLC Panel**					
		make Japan, USA, Europe Programming fully automatic with breaker, timer and relays complete in all respects HMI display for PLC - 10" minimum size with touch screen Fully automatic control of plant SCADA enabled					
1.9		**Anti Scalent + Injection System**					
		make Europe, USA, Japan Pressure 5 -7 bar tank size minimum 75 liter chemical anti sclanet food grade					
1.1		Blending filter 10" size					
1.11		pressure gauges minimum size 2.5"					
1.12		flow meter for product water					
1.13		online TDS meter					
1.14		UV light. Lap life 12 months, imported.					

1.15		product water tank material FRP Capacity minimum 2000 LPH					
1.16		Pipe and 6 no taps outside room with fencing for taps area					
1.17		All fittings of PVC Sch.80pressure regulation switchauto on/off switch for pump					
1.18		Automatic back wash system for membrane					
1.19		**Design of Fitration Plant**					
		The contractor shall identify viable raw water source and type of plant, conduct complete water quality testing as per WHO guidelines / Punjab environmental quality standards for drinking water as per satisfaction of "The Consultant", The type of plant will be designed according to test results					
2		**Prefabricated Room for Plant**	LUMSUM	1	955,222	955,222	
		Supply and installation of Pre-fabricated room size 12 ft x 12 ft + 3ft					
2.1		**Wall panel**					
		sandwitch panel 100 mm layer medium density polystrene and 0.45 mm prepainted sheet on booth sides					
2.2		**Roof Panel**					
		65 mm layer of medium density polystrene and 0.45 mm prepainted aheet pn both side					
2.3		**Structiure**					

		G.I cold roll formed, framed size 28x110x28x1.75-1.85 mm thickness with 0.45mm cover					
2.4		**Door**					
		G.I cold roll formed door frame section 0.9 mm thickness with powder coated door leaf filled with polystrene with both sides G.I sheet 0.5mm. Total thickness of leaf 36mm with all type of re-inforcement and powder coating					
2.5		**Window**					
		G.I cold roll formed window section 0.7 mm maximum strength width 84 mm powder coated including fan, exhaust fan, chair & table for operator					
2.6		Tiles for dispencing area					
2.7		Drainage for dispencing area					
2.8		Including civil foundation					
	(Total Sum of) Amount R.s					**5,464,222**	
	Total For 03 Filtration plants (with each tube well) in Moh. Brailwi, Hayat Town and Moh Christian colony respectiv					**16,392,666**	
						16.39	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD

Regional Development Plan 2020-2030

MRS, 1st BI-ANNUAL-2021 (1st JANUARY-2021 to 30th JUNE -2021) DISTRICT NAROWAL

Extension of Existing Water Supply System in Moh. Kashmirian

PROVIDING AND LAYING DISTRIBUTION LINES

Sr .#	Item Code	DESCRIPTION									QTY	UNIT	RATE	AMOUNT
1	Ch: - 3/44	Excavation of trenches in all kind of soil except cutting, rock, for water supply pipe lines up to 5' depth from ground level i/c trimming, dressing sides, leveling the beds of trenches to correct grate and cutting pits for joints etc. complete in all respect.									281,082.03	Cft	5.34	1,501,034
	i.	For 12" i/d	-	X	3	X	5	=	-	C ft				
	ii.	For 10" i/d	-	X	2	X	5	=	-	C ft				
	ii.	For 8" i/d	-	X	2	X	4	=	-	C ft				
	iii.	For 6" i/d	2,363.16	X	2	X	4	=	18,905.31	C ft				
	iv.	For 4" i/d	7,744.99	X	2	X	4	=	61,959.92	C ft				
	v.	For 3" i/d	25,027.10	X	2	X	4	=	200,216.80	C ft				
								=	**281,082.03**	C ft				
2	Ch: - 7/30	Supplying and filling sand under floor; or plugging in wells.									17,179.38	Cft	20.96	360,097
	i.	For 12" i/d	-	X	3	X	0.17	=	-	C ft				
	ii.	For 10" i/d	-	X	2	X	0.17	=	-	C ft				

	ii.	For 8" i/d	-	X	2	X	0.17	=	-	C ft			
	iii.	For 6" i/d	2,363.16	X	2	X	0.17	=	789.30	C ft			
	iv.	For 4" i/d	24,045.00	X	2	X	0.17	=	8,031.03	C ft			
	v.	For 3" i/d	25,027.10	X	2	X	0.17	=	8,359.05	C ft			
								=	**17,179.38**	C ft			
3	Ch:-23/42-a	Providing, laying, cutting, jointing, testing and disinfecting High Desnity Polyethylene Pipe (HDPE-100) working pressure pipe in trenches complete in all respects. PN-8 (SDR-21)											
	i.	12” i/d Pipe									-	P. Rft	1,881.10	-
	ii.	10” i/d Pipe									-	P. Rft	943.45	-
	ii.	8” i/d Pipe									-	P. Rft	750.05	-
	iii.	6” i/d Pipe									2,363.16	P. Rft	482.30	1,139,754
	iv.	4” i/d Pipe									7,744.99	P. Rft	234.20	1,813,877
		3” i/d Pipe									25,027.10	P. Rft	168.80	4,224,574
6	N-s	Providing and fixing HDPE specials i/c carriage from factory to site of work and all taxes complete in all respect.												
	1	Equal Tee 200x200x200 mm									25.00	P.No	9,582.00	239,550
	2	Equal Tee 315x315x315 mm									25.00	P.No	26,019.00	650,475
	3	Reducer Tee 315x90 mm										P.N		

			20.00	o	38,676.00	773,520
	4	Reducer Tee 315x110 mm	20.00	P.No	38,889.00	777,780
	5	Reducer Tee 315x160 mm	20.00	P.No	39,006.00	780,120
	6	Reducer Tee 315x200 mm	20.00	P.No	39,162.00	783,240
	7	Reducer Tee 315x250 mm	20.00	P.No	39,334.00	786,680
	8	Reducer Tee 250x200 mm	20.00	P.No	25,774.00	515,480
	9	Reducer Tee 200x90 mm	25.00	P.No	10,520.00	263,000
	10	Reducer Tee 200x110 mm	25.00	P.No	10,584.00	264,600
	11	Reducer Tee 200x160 mm	20.00	P.No	10,701.00	214,020
	12	Stab End 315 mm o/d	20.00	P.No	11,901.00	238,020
	13	Stab End 250 mm o/d	20.00	P.No	7,982.00	159,640
	14	Stab End 200 mm o/d	20.00	P.No	5,157.00	103,140
	15	Stab End 160 mm o/d	20.00	P.No	2,314.00	46,280
	16	Stab End 110 mm o/d	20.00	P.No	1,454.00	29,080
	17	Stab End 90 mm o/d	20.00	P.No	880.00	17,600
	18	Bend 315 mm (90)	20.00	P.No	21,211.00	424,220

	19	Bend 315 mm (45)	20.00	P.No	23,009.00	460,180
	20	Bend 200 mm (45)	20.00	P.No	6,942.00	138,840
	21	Reducer 315x200 mm	20.00	P.No	17,487.00	349,740
	22	Reducer 250x200 mm	20.00	P.No	11,112.00	222,240
	23	Reducer 200x160 mm	20.00	P.No	4,836.00	96,720
	24	M.S Flange 315 mm i/d	20.00	P.No	1,760.00	35,200
	25	M.S Flange 250 mm i/d	20.00	P.No	1,568.00	31,360
	26	M.S Flange 200 mm i/d	20.00	P.No	1,358.00	27,160
	27	M.S Flange 160 mm i/d	20.00	P.No	1,065.00	21,300
	28	M.S Flange 110 mm i/d	25.00	P.No	606.00	15,150
	29	Equal Tee 90 mm	25.00	P.No	1,940.00	48,500
	30	Equal Tee 110 mm	25.00	P.No	2,910.00	72,750
	31	Equal Tee 160 mm	25.00	P.No	6,791.00	169,775
	32	Elbow 90 degree 90 mm	25.00	P.No	1,463.00	36,575
	33	Elbow 90 degree 110 mm	25.00	P.No	2,264.00	56,600

	34	Elbow 90 degree 160 mm	25.00	P.No	5,336.00	133,400
	35	Elbow 90 degree 250 mm	25.00	P.No	16,979.00	424,475
	36	Elbow 45 degree 90 mm	25.00	P.No	1,422.00	35,550
	37	Elbow 45 degree 110 mm	25.00	P.No	2,102.00	52,550
	38	Elbow 45 degree 160 mm	25.00	P.No	5,174.00	129,350
	39	Elbow 45 degree 250 mm	25.00	P.No	16,170.00	404,250
	40	End Cap 90 mm	25.00	P.No	646.00	16,150
	41	End Cap 110 mm	25.00	P.No	970.00	24,250
	42	End Cap 160 mm	25.00	P.No	2,263.00	56,575
	43	End Cap 250 mm	20.00	P.No	8,085.00	161,700
	44	Cross 90 mm	25.00	P.No	3,234.00	80,850
	45	Cross 110 mm	25.00	P.No	5,660.00	141,500
	46	Reducer Tee 110 X 90 mm	25.00	P.No	2,426.00	60,650
	47	Reducer Tee 160 X 90 mm	25.00	P.No	5,821.00	145,525
	48	Reducer Tee 160 X 110 mm	25.00	P.No	5,821.00	145,525
	49	Reducer Tee 250 X 110 mm	25.00	P.No	19,404.00	485,100

	50	Reducer Spigot 250 X 110 mm	20.00	P.No	12,936.00	258,720
7	Ch:-23/29	P/F cast iron specials of BSS Class-B (such as bend, tee, collar, reducer, tail piece, flanged socket, flanged spigot, cap, taper angle branch, plug, etc) for Asbestos cement pipe line, with comet joint and rubber ring, complete.				
i		3” to 6” i/d	1,000.00	P. Kg	111.40	111,400
ii		8” to 18” i/d	500.00	P. Kg	105.10	52,550
8	Ch:-23/33	Providing and fixing Air Valve 2.5" (65 mm) dia of BSS quality and weight (complete with jointing material) Double	5.00	P. No.	8,010.55	40,053
9	Ch:-23/31-	Providing and fixing sluice valve of BSS quality and weight class B or cast iron pipe line and Asbestos cement pipe line i/c cost of fitting of material.				
i		3” i/d Sluice Valve	20.00	P. No.	6,041.75	120,835
i		4” i/d Sluice Valve	20.00	P. No.	6,932.65	138,653
ii		6” i/d Sluice Valve	10.00	P. No.	11,697.10	116,971
iii		8” i/d Sluice Valve	10.00	P. No.	20,991.10	209,911
iv		10” i/d Sluice Valve	-	P. No.	26,470.55	-
v		12” i/d Sluice Valve	-	P. No.	32,849.75	-
10	N-s	Construction of Sluice Valve Chamber.	50.00	P. No.	30,000.00	1,500,000
11	Ch:-23/41	Making connection for new water supply lines with running main i/c excavation of trenches and refilling complete but excluding the cost of pipe and specials.				

	i	Upto 6” i/d	1,000.00	P. No.	2,026.55	2,026,550
	ii	Upto 8” i/d	1,000.00	P. No.	2,559.55	2,559,550
	iii	Upto 10” i/d	-	P. No.	3,608.90	-
	iv	Upto 12” i/d	-	P. No.	4,941.40	-
12	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	224,865.63	Cft	1.78	399,519
13	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-				-
		95% to 100% maximum modified AASHO dry density.	224,865.63	Cft	0.79	177,250
		Total Amount (PKR)				**28,097,233**
		Total Amount (In Million)				**28.10**

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 1st BI-ANNUAL-2021 (1st JANUARY-2021 to 30th JUNE -2021) DISTRICT NAROWAL							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Short Term							
Rehabilitation of Tube wells (Upgrade to 1.5 cusec each) in Rasool pura, Purani Committee Ghar, Lasoori wala dera, katcheri road							
Tube Well							
Construction of Tube Well Boring							
(Abstrect of Cost Sub Head-A)							
		(Total Sum of Sub Head A) Amount R.s				-	
Construction of Pump House							
(Abstrect of Cost Sub Head-B)							
8	Ch:-11/4-b	Cement Neru plaster 1:2 (cement and sand) upto 20' (6.00 m) height:-½" (13 mm) thick	Sft	775	23.24	18,013.33	
9	Ch:-11/8-b	Cement pointing struck joints, on walls, upto 20' (6.00 m) hiehgt:-ratio 1:3	Sft	1,500	21.96	32,946.75	
10	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) centre to centre, with locking arrangement.	Sft.	150	1,244.35	186,653	

11	Ch:-25/42	Providing and fixing steel windows using M.S. sheet (16 SWG) moulded tubular pipe 1½"x1½" (40x40mm) for frame and 1¼"x1¼" (30x30mm) for leaves including M.S. square bars ¼"x¼" (6x6 mm) welded around each panel of frame, 5 mm thick glass panes fixed with double M.S. square tubular pipe 3/8"x3/8" (10x10mm) (22 SWG) beading with U' shaped rubber lining, brass fitting, holdfast, including painting three coats complete in all respects. For openable panels fixed with wire gauze 24 SWG, 12x12 mesh and glass	Sft.	64	394.35	25,238	
12	Ch:11/23-iii	Distempering:-a) new surface:-iii) three coats	Sft	775	7.77	6,023.30	
13	Ch:9/20-a	Cast iron rain water downpipe fixed in position, excluding heads and shoes, but including painting and clamps, etc:- a) 4" dia (100 mm) cast iron down pipe.	P.R ft	20	230.00	4,600.00	
14	Ch:9/21	Rain water down pipe cast iron head fixed in place,including cost of clamp holdfast and painting.	Each	1	579.35	579.35	
15	Ch:9/22	Shoes, bends or offsets for cast iron rain water down pipe,including fixing and painting.	Each	1	336.70	336.70	
16	Ch:9/16	Bottom Khuras of brick masonry in cement mortar 1:6, 4'x2'x4½" (1200x600x113 mm) over 3" (75 mm) cement concrete 1:4:8.	Each	1	955.60	955.60	

17	Ch:-10/15-e	Providing and laying topping of cement concrete 1:2:4,including surface finishing and dividing in panels:-e) 2"(50 mm) thick	Sft	325	53.90	17,516.20	
18	Ch:9/15	Khuras on roof 2'x2'x6" (600 x 600 x 150 mm)	Each	1	548.25	548.25	
19	Ch:13/5-c	Preparing surface and painting of doors and windows any type (including edges):-.i) priming coat.	Sft	338	8.37	2,827.71	
	(Total Sum of Sub Head B) Amount R.s					**296,238**	
INTERNAL ELECTRIFICATION							
(Abstrect of Cost Sub Head-C)							
1	Ch:-24/12	Supply and erection of single core PVC insulated, PVC sheathed copper conductor, 660/1100 volts grade cable, in prelaid G.I. pipe/M.S. conduits/PVC pipe/G.I. wire/trenches,etc (rate for cable only):-				-	
	a)	19/2.11 mm (19/0.083")	Rft.	120	332.15	39,858	
	b)	37/2.11 mm (37/0.083"	Rft.	120	581	69,660	
2	Ch:-24/5	Supply and erection of G.I. flexible pipe for wiring, including				-	
	a)	80 mm i/d	Rft.	25	360.25	9,006	
3	Ch:-24/68	Earthing of iron clad/aluminum switches, etc. with G.I. wire No.8 SWG in G.I. pipe 15 mm (½") dia, recessed or on surface of wall and floor, complete with 1.5 metre long G.I. pipe, 50 mm (2") dia with reducing socket 4 to 5 metre below ground level,and 2 metre away from building plinth.	Job	2	5,743	11,487	

4	Ch:-24/10	Supply and erection of single core PVC insulated copperconductor cables, in prelaid PVC pipe/M.S. conduit/G.Ipipe/wooden strip batten/wooden casing an capping/G.I.wire/trenches (rate for cables only):- 250/440 volts, PVC insulated cotton braided andcompounded cables:-				-	
	a)	3/0.74 mm (3/0.029")	Rft.	510	12.50	6,375	
	b)	7/0.74 mm (7/0.029")	Rft.	85	16.80	1,428	
5	Ch:-24/19	Supply and erection of iron/aluminum clad, 500 volts main switches with triple pole and neutral link and HRC fuses, on angle iron board with 3 mm (1/8") thick M.S. sheet covering,including bonding to earth with necessary flexible pipe and thimbles. (500Amp)	Each	1	20,326.00	20,326	
6	Ch:-24/18	Supply and erection of iron/aluminum clad, 500 volts main switches with kitkat fuses, on angle iron board with 3 mm (1/8") thick M.S. sheet covering, including bonding to earth with necessary flexible pipe and thimbles, etc. 15/20 Amp.	Each	1	1,719	1,719	
7	Ch:-24/20	Supply and erection of iron/aluminum clad, branch distribution board, 250 volt, on angle iron frame of suitable size with 3 mm (1/8") M.S. sheet covering: 8 way, 15 Amp per way	Each	2	1,025	2,050	

8	Ch:-24/43	Supply and erection of tube light, including rod, choke, starter with frame, flexible wire, including connection from ceiling rose, etc., complete. double rod (80 watts) with two chokes and 2 starters.	Each	4	1,319.05	5,276	
9	Ch:-24/76	Rewinding of A.C. ceiling fan, capacitor type, including cost of wire, leatheride paper cotton tape, soldering, etc.1400 mm (56") sweep, 250-275 RPM	Each	1	1,213.05	1,213	
10	Ch:-24/69	Earthing of Metallic cases, etc. with G.I. wire No. 8 mm (½") dia G.I. pipe, best quality:-SWG, in on surface, including clamps, etc.	Rft.	60	78.85	4,731	
11	Ch:24/72	Supply and erection of 600x600x3 mm (2'x2'x1/8") copper plate, including revitting to copper tape and placing in mixture of salt and charcoal, etc.	Each	1	4,789	4,789	
12	Ch:24/37	Supply and erection of 3 pin 10/15 Amp. wall socket with shoe,open type.	Each	4	152.750	611.000	
13	Ch:24/30	Supply and erection of ceiling rose, bakelite.	Each	4	41.600	166.400	
	(Total Sum of Sub Head C) Amount R.s					**178,695**	
PUMPING MACHINERS							
(Abstrect of Cost Sub Head-D)							
1		**HYPO CHLORINATOR**					

		Providing fixing & testing of Hypo Chlorinator (Chemical metering pump) capacity 0-30 gallons / day at 100 PSI max injection pressure fitted with 1/60 HP air cooled heavy duty electric motor 220 V, 50 Hz single phase AC complete with all accessories like bleed valve assembly, suction tubing, discharge tubing, foot valve and strainer assembly with weight back check valve assembly solution tank injection fitting wall brackets etc complete in all respect to the entire satisfaction of the Engineer in charge.	Job	1.00	85,000.00	85,000.00	
2		**WATER FLOW METERS**					
		Making and fixing and water level indicator gauge painted in quarter FT readings enamal coated on 6" wide 1/4" thick M.S. plate fitted on outer wall of pump house on top of G.S.T. complete with float, guide,steel wire string, pullyes pointer and 1 No. line bracket bulb as per approved design.	Job	1.00	55,000.00	55,000.00	
	(Total Sum of Sub Head D) Amount R.s					**140,000**	
a+b+c+d = Total Sub Head Amount R.s						**614,933**	
Total Amount of Rehabilitation of Tube wells (Upgrade to 1.5 cusec each) in Rasool pura, Purani Committee Ghar, Lasoori wala dera, katcheri road						**2,459,731.73**	**PKR**
						2.460	**Millions**

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 1st BI-ANNUAL-2021 (1st JANUARY-2021 to 30th JUNE -2021) DISTRICT NAROWAL							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
Short Term							
Rehabilitation of existing filtration plants (civil structure, plumbing and electrical works) in Rasool pura, Purani Committee Ghar, Lasoori wala dera, katcheri road, Moh. Islampura and Moh. Muhammad pura							
2000 L/H Ultra Filtration (UF) Plant							
1		Design, Supply, Installation, testing & commissioning of 2000 L/H Ultra Filtration (UF) Plant for removal of other contaminants, including carriage, loading/unloading charges inclusive of conforming to standarad specifications of filtration plants. Control PLC GSM/GPRS enabled. The specifications along with euipment and accessories properly mounted in the frame/skid are given below:-	LUMSUM	1	4,509,000	4,509,000	
1.1		**Boring/drilling and instalation**					
		Boring/drilling and instalation of Submersible Pump Submersible pump 2000 LPH Bore upto 300 ft					
1.2		**Raw Water Feed Pump**					
		Capacity 2200 LPH, 90 PSI pressure					

1.3		**Raw water tank**					
		Capacity 2000 Litre minimum Material FRP Automatic on off switch for pump					
1.4		**Pressure Sand Filter**					
		Material FRP, make Pentair or Equivalent Fitration Rate 7.5 m/h with automatic back wash system Sand Charactristics - ES00.5 mm					
1.5		**Activated Carbon Filter**					
		Affected size of Media 0.7 to 0.9 Material FRP, make Pentair or Equivalent Fitration Rate 7.5 m/h with automatic back wash system Base material coconut shell, effective size 0.5-1.8mm					
1.6		**Jumbo Filter 02-No**					
		Poristy 1 micron Size 20 Inches Material High pressure Plastic					
1.7		**Ultra Filtration system**					
		Frame stainless steel					
		UF Housing Pentair or Equivalent					
		Material FRP					
		UF Membrane					

		Origion, Europe, Western Europe, USA, Japan Dow, filmtech, hydranutics, lewabrane or equivalent, NSF certified salt rejection - 95% capacity 2000 Litre/hour Bacterial removal efficiency 99.999 % Virus removal efficiency 99.999 % vessel material - FRP recovery 90% Permeate flux 100-350 L/m2h Transmembrane pressure < 1.0 bar Backwash duration 1 - 5 min. pressurer 2 - 4 bar					
1.8		**Automatic PLC Panel**					
		make Japan, USA, Europe Programming fully automatic with breaker, timer and relays complete in all respects HMI display for PLC - 10" minimum size with touch screen Fully automatic control of plant SCADA enabled					
1.9		**Anti Scalent + Injection System**					
		make Europe, USA, Japan Pressure 5 -7 bar tank size minimum 75 liter chemical anti sclanet food grade					
1.1		Blending filter 10" size					
1.11		pressure gauges minimum size 2.5"					
1.12		flow meter for product water					
1.13		online TDS meter					
1.14		UV light. Lap life 12 months, imported.					

1.15		product water tank material FRP Capacity minimum 2000 LPH					
1.16		Pipe and 6 no taps outside room with fencing for taps area					
1.17		All fittings of PVC Sch.80pressure regulation switchauto on/off switch for pump					
1.18		Automatic back wash system for membrane					
1.19		**Design of Fitration Plant**					
		The contractor shall identify viable raw water source and type of plant, conduct complete water quality testing as per WHO guidelines / Punjab environmental quality standards for drinking water as per satisfaction of "The Consultant", The type of plant will be designed according to test results					
2		**Prefabricated Room for Plant**	LUMSUM	1	355,222	355,222	
		Supply and installation of Pre-fabricated room size 12 ft x 12 ft + 3ft					
2.1		**Wall panel**					
		sandwitch panel 100 mm layer medium density polystrene and 0.45 mm prepainted sheet on booth sides					
2.2		**Roof Panel**					
		65 mm layer of medium density polystrene and 0.45 mm prepainted aheet pn both side					
2.3		**Structiure**					

		G.I cold roll formed, framed size 28x110x28x1.75-1.85 mm thickness with 0.45mm cover					
2.4		**Door**					
		G.I cold roll formed door frame section 0.9 mm thickness with powder coated door leaf filled with polystrene with both sides G.I sheet 0.5mm. Total thickness of leaf 36mm with all type of re-inforcement and powder coating					
2.5		**Window**					
		G.I cold roll formed window section 0.7 mm maximum strength width 84 mm powder coated including fan, exhaust fan, chair & table for operator					
2.6		Tiles for dispencing area					
2.7		Drainage for dispencing area					
2.8		Including civil foundation					
	(Total Sum of) Amount R.s					**4,864,222**	
	Total For Rehabilitation of existing filtration plants (civil structure, plumbing and electrical works) in Rasool pura, Purani Committee Ghar, Lasoori wala dera, katcheri road, Moh. Islampura and Moh. Muhammad pura					**29,185,332**	
						29.19	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD				
REGIONAL DEVELOPMENT PLAN 2020-2030				
ROUGH COST ESTIMATE				
FOR				
DNI Zone II and IV				
Sr. #	**DESCRIPTION**	**AMOUNT Rs.**	**MILLIONS**	**REMARKS**
1	Construction of Over Head Reservoirs (1 X 100,000 Gallon)	274,500,000.00	274.5000	Ref Wasa Lhr
2	Laying/Replacement of Water Supply Distribution Network	516,201,379	516.2014	Ref Wasa Lhr
3	P/Installation of Control Valves and Bulk Flow Meters	73,971,797	73.9718	Ref Wasa Lhr
4	P/Installation of Water Meters	719,340,000	719.3400	Ref Wasa Lhr
5	SCADA Monitoring System	40,017,000	40.0170	Ref Wasa Lhr
6	Tubewell (1 X 4-CFS Capacity)	84,251,420	84.2514	Ref Wasa Lhr
		1,708,281,596.00	**1,708.28**	Ref Wasa Lhr
	2% PMC Charges	34,165,631.92	34.16563192	
	1% Detail Design Charges	17,082,815.96	17.08	
	Land Acquisition for OHR / TW	120,000,000	120.00	
	Lesco Connection Charges	900,000.00	0.90	
	2% Contingencies	34,165,631.92	34.17	
	0.25% Media Campaign	4,270,703.99	4.27	
	1.00% for Horticulture Charges	17,082,816	17.08	
	Restorartion of Road Cut	29,500,000	29.50	
	5% PRA	85,414,080	85.41	
	Total	**2,050,863,275.**	**2,050.86**	

		79		
	Wasa LHR Area UC 99,100,101	11.6		
		176,798,558.26	**176.80**	
	DNI ZONE II AREA	2.51		
	Total Amount of DNI Zone II	**443,764,381.23**	**443.76**	

Annexure 4: Specifications for Sewerage System

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE SEWERAGE OF REPLACEMENT NAROWAL							
Short Term							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Replacement of existing 12'' and 15'' sewerage pipes with 18'' and 24'' pipes respectively							
		DISMANTTLING					
1	Ch:- 4/45	Dismantling and removing road metalling.	Cft	104,032.50	14.21	1,478,717.96	
2	Ch:- 4/46	Dismantling and removing road pavement, etc., including screening and stacking of byproducts upto one chain lead (30 metre).	Cft	163,000.00	18.98	3,093,006.50	
3	Ch:- 4/29	Dismantling brick or flagged flooring without concrete.	Cft	130,500.00	6.04	788,350.50	
		EXCAVATION				-	

4	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:				-	
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	432,591.45	6.22	2,691,216.31	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	316,440.28	10.46	3,311,183.64	
		c) above 15.0 ft. (4.5 m) depth	Cft	-	13.31	-	
		Brick Ballast					
5	Ch :-6/3	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:- (b) Ratio 1: 4: 8	Cft	69,285.65	134.15	9,294,773.21	
		Pipe Laying					
6	Ch:21/3	Providing and laying R.C.C. pipe sewers, moulded with cement concrete 1:1½:3 conforming to ASTM Specification C-76-79, Class III, Wall B, including carriage of pipes from factory to site					

		of work, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing, etc. complete:-					
		310 mm (12") i/d	Rft	16,624.84	430.80	7,161,979.33	
		380 mm (15") i/d	Rft	10,654.53	540.20	5,755,575.81	
		460 mm (18") i/d	Rft	6,528.87	668.00	4,361,285.83	
		530 mm (21") i/d	Rft	-	819.85	-	
		610 mm (24") i/d	Rft	885.83	1,017.75	901,550.43	
		690 mm (27") i/d	Rft	853.02	1,212.15	1,033,985.77	
		760 mm (30") i/d	Rft	2,424.54	1,479.50	3,587,108.41	
		840 mm (33") i/d	Rft	-	1,763.35	-	
		910 mm (36") i/d	Rft	3,641.73	2,335.10	8,503,808.39	
		1070 mm (42") i/d	Rft		3,010.65	-	
		1220 mm (48") i/d	Rft	-	4,056.46	-	
		1370 mm (54") i/d	Rft		5,087.75	-	
		1520 mm (60") i/d	Rft		5,839.40		
		1680 mm (66") i/d	Rft		7,099.50		
		1830 mm (72") i/d	Rft		8,087.25		
7	Ch:- 3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	346,073.16	1.78	614,868.19	

8	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	346,073.16	0.74	254,796.37	
9	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					
		a) Carpetted road, with 2" (50 mm) carpet and 10" (250mm) depth of stone metal for sub-base and base	Sft	83,226.00	88.74	7,385,724.92	
		c) Black topped Road with two coats of surfacing & 10" (250mm) depth of stone metal for sub base and base.	Sft	16,645.20	43.81	729,251.18	
		MANHOLES					
10	Ch:4/45	Dismantling and removing of road metaling.	Cft	83,226.00	14.21	1,182,974.36	
		EXCAVATION					
11	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and					

		dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:					
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	86,518.29	6.22	538,243.26	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	63,288.06	10.46	662,236.73	
		c) above 15.0 ft. (4.5 m) depth	Cft		13.31		
		P.C.C					
12	Ch:6/5	Cement concrete plain including placing,compacting, finishing and curingcomplete (including screening andwashing of stone aggregate):	Cft	2,500.00	174.81	437,020.00	
13	Ch:7/4-i	Pacca brick work in foundation and plinth in:- Ratio 1:6	Cft	2,000.00	214.44	428,877.00	
14	Ch:7/7-i	Pacca brick work other than building upto 10ft. (3 m) height. Ratio 1:6	Cft	3,000.00	221.85	665,551.50	
15	Ch:9/7	Concrete in haunches and over crown, with ½" (13 mm) cement plaster 1:6 on top (except earth filling mud plaster and gobri) soffit of arches cement plastered.	Sft	2,000.00	198.34	396,671.00	

16	Ch:21/15 A	Providing and fixing 6" thick R.C.C. manhole cover with tee shaped C.I. frame of 22" I/d (frame weighing 37.324 Kg. or one maund as per Standard Drawing STD/PD No. 6, of 1977, complete in all respect.	Per Set	500.00	8,914.10	4,457,050.00	
17	Ch:21/9	Extra for making and finishing benching floor work in manhole chamber, with 1/8" (3 mm) thick cement finish	Sft	3,000.00	89.14	267,423.00	
18	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.	Ea ch	250.00	10,373.50	2,593,375.00	
19	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	69,214.63	1.78	122,973.64	
20	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry	Cft	69,214.63	0.74	50,959.27	

		density.					
21	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					
		a) Carpeted road, with 2" (50 mm) carpet and 10" (250mm) depth of stone metal for sub-base and base	Sft	36,411.38	88.74	3,231,254.65	
		c) Black topped Road with two coats of surfacing & 10" (250mm) depth of stone metal for sub base and base.	Sft	7,282.28	43.81	319,047.39	
TOTAL Amount (Rs) of Schedule Items						**76,300,839.55**	
NON-SCHEDULE ITEMS							
1	N.S	Providing and fixing malleable iron step with outer dimensions 300 X 200 mm and weight not less than 4kg, in manhole chambers , including carriage and setting the same in work, to correct lines and levels as per drawing and specification	Nos	500.00	1,236.00	618,000.00	
TOTAL Amount (Rs) of Non Schedule Items						**618,000.00**	
TOTAL Amount (Rs) of Schedule Items+Non Schedule						**76,918,839.55**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE SEWERAGE OF REHABILITAION NAROWAL							
Short Term							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Rehabilitation of existing 24''and 27" sewerage pipes							
		DISMANTTLING					
1	Ch:- 4/45	Dismantling and removing road metalling.	Cft	4,345.30	14.21	61,764.09	
2	Ch:- 4/46	Dismantling and removing road pavement, etc., including screening and stacking of byproducts upto one chain lead (30 metre).	Cft	10,300.00	18.98	195,447.65	
3	Ch:- 4/29	Dismantling brick or flagged flooring without concrete.	Cft	11,050.00	6.04	66,753.05	
		EXCAVATION				-	

4	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:				-	
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	15,059.06	6.22	93,684.66	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	19,192.91	10.46	200,831.68	
		c) above 15.0 ft. (4.5 m) depth	Cft	-	13.31	-	
		Brick Ballast					
5	Ch :-6/3	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:- (b) Ratio 1: 4: 8	Cft	2,893.77	134.15	388,203.59	
		Pipe Laying					

6	Ch:21/3	Providing and laying R.C.C. pipe sewers, moulded with cement concrete 1:1½:3 conforming to ASTM Specification C-76-79, Class III, Wall B, including carriage of pipes from factory to site of work, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing, etc. complete:-					
		310 mm (12") i/d	Rft	-	430.80	-	
		380 mm (15") i/d	Rft	-	540.20	-	
		460 mm (18") i/d	Rft	-	668.00	-	
		530 mm (21") i/d	Rft	-	819.85	-	
		610 mm (24") i/d	Rft	885.83	1,017.75	901,550.43	
		690 mm (27") i/d	Rft	853.02	1,212.15	1,033,985.77	
		760 mm (30") i/d	Rft		1,479.50	-	
		840 mm (33") i/d	Rft	-	1,763.35	-	
		910 mm (36") i/d	Rft		2,335.10	-	
		1070 mm (42") i/d	Rft		3,010.65	-	
		1220 mm (48")	Rft				

		i/d		-	4,056.46	-	
		1370 mm (54") i/d	Rft		5,087.75	-	
		1520 mm (60") i/d	Rft		5,839.40		
		1680 mm (66") i/d	Rft		7,099.50		
		1830 mm (72") i/d	Rft		8,087.25		
7	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	12,047.25	1.78	21,404.34	
8	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	12,047.25	0.74	8,869.79	
9	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					
		a) Carpetted road, with 2" (50 mm) carpet and 10" (250mm) depth of stone metal for sub-base and base	Sft	3,476.24	88.74	308,491.97	
		c) Black topped Road with two coats of surfacing & 10"	Sft	695.25	43.81	30,459.86	

		(250mm) depth of stone metal for sub base and base.					
		MANHOLES					
10	Ch:4/45	Dismantling and removing of road metalling.	Cft	3,476.24	14.21	49,411.28	
		EXCAVATION					
11	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:					
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	3,011.81	6.22	18,736.93	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	3,838.58	10.46	40,166.34	
		c) above 15.0 ft. (4.5 m) depth	Cft		13.31		
		P.C.C					
12	Ch:6/5	Cement concrete plain including placing,compacting, finishing and curingcomplete (including screening andwashing of stone aggregate):	Cft	2,000.00	174.81	349,616.00	

13	Ch:7/4-i	Pacca brick work in foundation and plinth in:- Ratio 1:6	Cft	1,500.00	214.44	321,657.75	
14	Ch:7/7-i	Pacca brick work other than building upto 10ft. (3 m) height. Ratio 1:6	Cft	2,000.00	221.85	443,701.00	
15	Ch:9/7	Concrete in haunches and over crown, with ½" (13 mm) cement plaster 1:6 on top (except earth filling mud plaster and gobri) soffit of arches cement plastered.	Sft	2,000.00	198.34	396,671.00	
16	Ch:21/15 A	Providing and fixing 6" thick R.C.C. manhole cover with tee shaped C.I. frame of 22" I/d (frame weighing 37.324 Kg. or one maund as per Standard Drawing STD/PD No. 6, of 1977, complete in all respect.	Per Set	100.00	8,914.10	891,410.00	
17	Ch:21/9	Extra for making and finishing benching floor work in manhole chamber, with 1/8" (3 mm) thick cement finish	Sft	1,000.00	89.14	89,141.00	
18	Ch:21/8	Constructing standard gully grating chamber, 3'x2½' (900x750	Each	100.00	10,373.50	1,037,350.00	

		mm), with chinaware trap as per PHED Drawing STD/PD No. 3 of 1977, complete in all respects.					
19	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	2,409.45	1.78	4,280.87	
20	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	2,409.45	0.74	1,773.96	
21	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					
		a) Carpetted road, with 2" (50 mm) carpet and 10" (250mm) depth of stone metal for sub-base and base	Sft	1,520.86	88.74	134,965.24	
		c) Black topped Road with two coats of surfacing & 10" (250mm) depth of stone	Sft	304.17	43.81	13,326.19	

		metal for sub base and base.					
TOTAL Amount (Rs) of Schedule Items						**7,103,654.42**	
NON-SCHEDULE ITEMS							
1	N.S	Providing and fixing malleable iron step with outer dimensions 300 X 200 mm and weight not less than 4kg, in manhole chambers , including carriage and setting the same in work, to correct lines and levels as per drawing and specification	Nos	100.00	1,236.00	123,600.00	
TOTAL Amount (Rs) of Non Schedule Items						**123,600.00**	
TOTAL Amount (Rs) of Schedule Items+Non Schedule						**7,227,254.42**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE							
Rehabilitation of Non-Functional Assets at Disposal Stations							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Short Term							
Upgradation of existing pumping capacity (add 8 cusecs) to mitigate the deficiency							

1		Designing, providing and constructing Sewerage Screening Chamber comprising all the civil works including, but may not be limited to, all the earthwork, PCC works, RCC works, brick masonry, plastering, painting & polishing works, plinth protections, water proof & chemical resistant coatings, stairs, ladders, railings, gratings and sluice gates; hydraulic testing; and commissioning, complete in all respects, in accordance with the Contract (but excluding the manually-cleaned bar screens & their hoisting arrangements)s:	Job	1.00	63,500.00	63,500.00	

2		Designing, providing and constructing Sewerage Pumping Station, comprising Wet Well & Dry Well, comprising all the civil works including, but may not be limited to, all the earthwork, PCC works, RCC works, brick masonry, plastering, roofing, flooring, dado, skirting, painting & polishing works, windows, , doors, railings, ladders, stairs, plinth protection, roof drainage, water proof & chemical resistant coatings, access hole covers, sluice gates and hydraulic testing; and commissioning; all the plumbing works including, but may not be limited to, water supply piping	Job	1.00	196,837.00	196,837.00	

		and taps; all the building electrification works, including, but may not be limited to, distribution boards, wiring, switch socket units, ceiling fans, exhaust fans, light fixtures and earthing; and all the telecommunication works, complete in all respects, in accordance with the Contract (but excluding pumps, flow meters and piping works)					
3		Designing, providing, installing, testing and commissioning all the Process Piping Works for the gravity and forced transmission of wastewater, supernatants, filtrates, treated effluents and sludge, including, but may not be limited to, all the earthwork, piping, fittings,	Job	1.00	36,010.25	36,010.25	

		valves, specials, internal & external treatments for piping, pipe beddings, pipe encasements, backing blocks, clamps, supports & anchors for exposed piping, inspection chambers and manholes, complete in all respects, in accordance with the Contract					
4		Designing, providing and executing all the Land Grading and Site Development Works including, but may not be limited to, demolishing the existing structures, all the area excavation, disposal of surplus/unsuitable excavated materials, disposal of debris and surplus excavated material to a designated site as per the	Job	1.00	210,987.01	210,987.01	

		direction of the Client's representative and earth filling with materials excavated from within site and/or with imported earth, complete in all respects, in accordance with the Contract					
5		Designing, providing, installing, testing and commissioning all the External Illumination Works for the Site, including, but may not be limited to, all the light poles, earthwork & foundations for light poles, mercury vapor lamps & holders, service terminal boxes and automatic switching devices, complete in all respects, in accordance with the Contract	Job	1.00	710,541.00	710,541.00	

6		Designing, providing, installing, testing and commissioning all the External and Pumping Station (mechanical equipment) Electrification Works, including, but may not be limited to, all the earthwork, metering panel, HT switchgear panels, LT switchgear panels, power factor improvement (PFI) plants, transformer protection panels, transformers, transformer platforms, HT & LT power and control cables, cable trays, earthing systems, electrical protection works, provisions for manual and/or automatic switching controls for different Plant (mechanical equipment) and	Job	1.00	753,123.25	753,123.25	

		provisions for connection to standby electricity generation facilities, complete in all respects, in accordance with the Contract (but excluding the electric supply connection charges and standby electricity generation facilities)					
7		Designing, providing, installing, testing and commissioning the standby electricity generation facilities, including, but may not be limited to, standby low-voltage diesel electric generator sets, control/instrument panels, synchronized auto main failure (AMF) panels, underground fuel storage tank, electric & manual fuel transfer pumps,	Job	1.00	201,723.00	201,723.00	

		fuel day tanks, fuel piping network, all the internal wiring & cable works and earthing systems, complete in all respects, in accordance with the Contract (but excluding the Generator Building and cranes)					
8		Designing, providing, installing, testing and commissioning all the Raw Sewage Pumps in the Dry Well (vertical-shaft, solids-handling, centrifugal type with overhead motors), and Bildge Pumps including, but may not be limited to, the pumps, motors, motor starters, shafts, intermediate shaft support mechanisms, automatic liquid level controlled switching devices, support base/frame, pressure gauges, all jointing, fixing	Job	1.00	879,110.00	879,110.00	

		& installation accessories, all painting & coatings and a complete set of special tools, test equipment & spare parts, complete in all respects, in accordance with the Contract					
9		Designing, providing, installing, testing and commissioning all the Mechanically-Hoisted, Manually-Cleaned, Bar Screens in the Sewerage Screening Chamber, including, but may not be limited to, the screen panels, guide rails, overhead support frames, hoisting ropes, pulleys & drums, motors, gear boxes, motor starters, brakes, bearings, support base/frame, standby manual hoisting	Job	1.00	710,101.00	710,101.00	

		assemblies and controls & safety mechanisms; all jointing, fixing & installation accessories; all painting & coatings; and a complete set of special tools, test equipment & spare parts, complete in all respects, in accordance with the Contract					
10		Designing, providing, installing, testing and commissioning all the On-line Real-time Sewerage Flow Meters in the Dry Well (Electromagnetic type) including, but may not be limited to, the electronic displays, and telemetry cables; all jointing, fixing & installation accessories, all painting & coatings and a complete set of special tools, test equipment & spare parts, complete in all	Job	1.00	850,251.50	850,251.50	

		respects, in accordance with the Contract					
11		Designing, providing, installing, testing and commissioning Electrically-operated, Top-Running, Overhead Bridge Cranes including, but may not be limited to, all its moving components, motors, gear boxes, motor starters, drive controls, safety mechanisms, cables, cables collapsing mechanisms, operation-control equipment, and side rails; all jointing, fixing & installation accessories, all painting & coatings and a complete set of special tools, test equipment	Job	1.00	20,356,985.00	20,356,985.00	

		& spare parts, complete in all respects, in accordance with the Contract:a) Dry wellb) Electric generator building					
TOTAL Amount (Rs)						**24,969,169.01**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE							
Rehabilitation of Non-Functional Assets at Disposal Stations							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Short Term							
Upgradation of existing pumping capacity (add 8 cusecs) to mitigate the deficiency							
1		Designing, providing and constructing Sewerage Screening Chamber comprising all the civil works including, but may not be limited to, all the earthwork, PCC works, RCC works, brick masonry, plastering, painting & polishing works, plinth protections, water proof & chemical	Job	1.00	63,500.00	63,500.00	

		resistant coatings, stairs, ladders, railings, gratings and sluice gates; hydraulic testing; and commissioning, complete in all respects, in accordance with the Contract (but excluding the manually-cleaned bar screens & their hoisting arrangements)s:					
2		Designing, providing and constructing Sewerage Pumping Station, comprising Wet Well & Dry Well, comprising all the civil works including, but may not be limited to, all the earthwork, PCC works, RCC works, brick masonry, plastering, roofing, flooring, dado, skirting, painting & polishing works, windows, , doors, railings, ladders, stairs,	Job	1.00	196,837.00	196,837.00	

		plinth protection, roof drainage, water proof & chemical resistant coatings, access hole covers, sluice gates and hydraulic testing; and commissioning; all the plumbing works including, but may not be limited to, water supply piping and taps; all the building electrification works, including, but may not be limited to, distribution boards, wiring, switch socket units, ceiling fans, exhaust fans, light fixtures and earthing; and all the telecommunication works, complete in all respects, in accordance with the Contract (but excluding pumps, flow meters and piping works)					

3		Designing, providing, installing, testing and commissioning all the Process Piping Works for the gravity and forced transmission of wastewater, supernatants, filtrates, treated effluents and sludge, including, but may not be limited to, all the earthwork, piping, fittings, valves, specials, internal & external treatments for piping, pipe beddings, pipe encasements, backing blocks, clamps, supports & anchors for exposed piping, inspection chambers and manholes, complete in all respects, in accordance with the Contract	Job	1.00	36,010.25	36,010.25	

4		Designing, providing and executing all the Land Grading and Site Development Works including, but may not be limited to, demolishing the existing structures, all the area excavation, disposal of surplus/unsuitable excavated materials, disposal of debris and surplus excavated material to a designated site as per the direction of the Client's representative and earth filling with materials excavated from within site and/or with imported earth, complete in all respects, in accordance with the Contract	Job	1.00	210,987.01	210,987.01	

5		Designing, providing, installing, testing and commissioning all the External Illumination Works for the Site, including, but may not be limited to, all the light poles, earthwork & foundations for light poles, mercury vapor lamps & holders, service terminal boxes and automatic switching devices, complete in all respects, in accordance with the Contract	Job	1.00	710,541.00	710,541.00	
6		Designing, providing, installing, testing and commissioning all the External and Pumping Station (mechanical equipment) Electrification Works, including, but may not be limited to, all the earthwork, metering panel, HT switchgear panels, LT switchgear	Job	1.00	753,123.25	753,123.25	

		panels, power factor improvement (PFI) plants, transformer protection panels, transformers, transformer platforms, HT & LT power and control cables, cable trays, earthing systems, electrical protection works, provisions for manual and/or automatic switching controls for different Plant (mechanical equipment) and provisions for connection to standby electricity generation facilities, complete in all respects, in accordance with the Contract (but excluding the electric supply connection charges and standby electricity generation facilities)					

7		Designing, providing, installing, testing and commissioning the standby electricity generation facilities, including, but may not be limited to, standby low-voltage diesel electric generator sets, control/instrument panels, synchronized auto main failure (AMF) panels, underground fuel storage tank, electric & manual fuel transfer pumps, fuel day tanks, fuel piping network, all the internal wiring & cable works and earthing systems, complete in all respects, in accordance with the Contract (but excluding the Generator Building and cranes)	Job	1.00	201,723.00	201,723.00	

8		Designing, providing, installing, testing and commissioning all the Raw Sewage Pumps in the Dry Well (vertical-shaft, solids-handling, centrifugal type with overhead motors), and Bildge Pumps including, but may not be limited to, the pumps, motors, motor starters, shafts, intermediate shaft support mechanisms, automatic liquid level controlled switching devices, support base/frame, pressure gauges, all jointing, fixing & installation accessories, all painting & coatings and a complete set of special tools, test equipment & spare parts, complete in all respects, in accordance with the Contract	Job	1.00	879,110.00	879,110.00	

9		Designing, providing, installing, testing and commissioning all the Mechanically-Hoisted, Manually-Cleaned, Bar Screens in the Sewerage Screening Chamber, including, but may not be limited to, the screen panels, guide rails, overhead support frames, hoisting ropes, pulleys & drums, motors, gear boxes, motor starters, brakes, bearings, support base/frame, standby manual hoisting assemblies and controls & safety mechanisms; all jointing, fixing & installation accessories; all painting & coatings; and a complete set of special tools, test equipment & spare parts, complete in all	Job	1.00	710,101.00	710,101.00	

		respects, in accordance with the Contract					
10		Designing, providing, installing, testing and commissioning all the On-line Real-time Sewerage Flow Meters in the Dry Well (Electromagnetic type) including, but may not be limited to, the electronic displays, and telemetry cables; all jointing, fixing & installation accessories, all painting & coatings and a complete set of special tools, test equipment & spare parts, complete in all respects, in accordance with	Job	1.00	850,251.50	850,251.50	

		the Contract					
11		Designing, providing, installing, testing and commissioning Electrically-operated, Top-Running, Overhead Bridge Cranes including, but may not be limited to, all its moving components, motors, gear boxes, motor starters, drive controls, safety mechanisms, cables, cables collapsing mechanisms, operation-control equipment, and side rails; all jointing, fixing & installation accessories, all painting & coatings and a complete set of special tools, test equipment	Job	1.00	22,100,015.00	22,100,015.00	

		& spare parts, complete in all respects, in accordance with the Contract:a) Dry wellb) Electric generator building					
TOTAL Amount (Rs)						**26,712,199.01**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE SEWERAGE OF REPLACEMENT NAROWAL							
Medium-Term							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Laying of gravity trunk sewer pipes 72''on Ghausia road, 54" on Church road, 27" on Chan Peer Road, 36" on Katchehry Road and 48" along Nullah beside circular road							
		EXCAVATION				-	
1	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets				-	

		on both sides of the trenches:					
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	109,473.00	6.22	681,047.95	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	435,605.03	10.46	4,558,105.69	
		c) above 15.0 ft. (4.5 m) depth	Cft	1,201,320.00	13.31	15,985,484.71	
		Brick Ballast					
2	Ch :-6/3	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:- (b) Ratio 1: 4: 8	Cft	152,840.00	134.15	20,503,715.26	
		Pipe Laying					
3	Ch:21/3	Providing and laying R.C.C. pipe sewers, moulded with cement concrete 1:1½:3 conforming to ASTM Specification C-76-79, Class III, Wall B, including carriage of					

		pipes from factory to site of work, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing, etc. complete:-					
		310 mm (12") i/d	Rft	-	430.80	-	
		380 mm (15") i/d	Rft	-	540.20	-	
		460 mm (18") i/d	Rft	-	668.00	-	
		530 mm (21") i/d	Rft	-	819.85	-	
		610 mm (24") i/d	Rft	-	1,017.75	-	
		690 mm (27") i/d	Rft	1,274.00	1,212.15	1,544,279.10	
		760 mm (30") i/d	Rft	-	1,479.50	-	
		840 mm (33") i/d	Rft	-	1,763.35	-	
		910 mm (36") i/d	Rft	1,475.00	2,335.10	3,444,272.50	
		1070 mm (42") i/d	Rft		3,010.65	-	
		1220 mm (48") i/d	Rft	4,691.00	4,056.46	19,028,853.86	
		1370 mm (54") i/d	Rft	1,482.00	5,087.75	7,540,045.50	
		1520 mm (60") i/d	Rft		5,839.40	-	
		1680 mm (66") i/d	Rft		7,099.50	-	
		1830 mm (72") i/d	Rft	6,800.00	8,087.25	54,993,300.00	

4	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	961,056.00	1.78	1,707,508.20	
5	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	961,056.00	0.74	707,577.48	
6	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					
		MANHOLES					
		EXCAVATION					
7	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct					

		section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:					
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	87,578.40	6.22	544,838.36	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	348,484.02	10.46	3,646,484.55	
		c) above 15.0 ft. (4.5 m) depth	Cft	961,056.00	13.31	12,788,387.77	
		P.C.C				-	
8	Ch:6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate):	Cft	6,500.00	174.81	1,136,252.00	
9	Ch:7/4-i	Pacca brick work in foundation and plinth in:- Ratio 1:6	Cft	5,500.00	214.44	1,179,411.75	

10	Ch:7/7-i	Pacca brick work other than building upto 10ft. (3 m) height. Ratio 1:6	Cft	6,000.00	221.85	1,331,103.00	
11	Ch:9/7	concrete in haunches and over crown, with ½" (13 mm) cement plaster 1:6 on top (except earth filling mud plaster and gobri) soffit of arches cement plastered.	Sft	7,500.00	198.34	1,487,516.25	
12	Ch:21/15 A	Providing and fixing 6" thick R.C.C. manhole cover with tee shaped C.I. frame of 22" I/d (frame weighing 37.324 Kg. or one maund as per Standard Drawing STD/PD No. 6, of 1977, complete in all respect.	Per Set	2,000.00	8,914.10	17,828,200.00	
13	Ch:21/9	Extra for making and finishing benching floor work in manhole chamber, with 1/8" (3	Sft	10,000.00	89.14	891,410.00	

		mm) thick cement finish					
14	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	1,000.00	10,373.50	10,373,500.00	
15	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	70,062.72	1.78	124,480.43	
16	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	70,062.72	0.74	51,583.68	
TOTAL Amount (Rs) of Schedule Items						**182,077,358.05**	

NON-SCHEDULE ITEMS							
1	N.S	Providing and fixing malleable iron step with outer dimensions 300 X 200 mm and weight not less than 4kg, in manhole chambers , including carriage and setting the same in work, to correct lines and levels as per drawing and specification	Nos	2,000.00	1,236.00	2,472,000.00	
TOTAL Amount (Rs) of Non Schedule Items						**2,472,000.00**	
TOTAL Amount (Rs) of Schedule Items+Non Schedule						**184,549,358.05**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE SEWERAGE OF NAROWAL CITY							
Medium- Term							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Rehabilitation of existing 24'',27'',30'' and 36'' sewerage pipes							
		DISMANTTLING					
1	Ch:- 4/45	Dismantling and removing road metalling.	Cft	19,512.80	14.21	277,354.94	
2	Ch:- 4/46	Dismantling and removing road pavement, etc., including screening and stacking of byproducts upto one chain lead (30 metre).	Cft	103,000.00	18.98	1,954,476.50	
3	Ch:- 4/29	Dismantling brick or flagged flooring without concrete.	Cft	110,500.00	6.04	667,530.50	
		EXCAVATION				-	

4	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:				-	
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	15,059.06	6.22	93,684.66	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	316,440.28	10.46	3,311,183.64	
		c) above 15.0 ft. (4.5 m) depth	Cft	-	13.31	-	
		Brick Ballast					
5	Ch :-6/3	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:- (b) Ratio 1: 4: 8	Cft	12,995.52	134.15	1,743,369.15	
		Pipe Laying					

6	Ch:21/3	Providing and laying R.C.C. pipe sewers, moulded with cement concrete 1:1½:3 conforming to ASTM Specification C-76-79, Class III, Wall B, including carriage of pipes from factory to site of work, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing, etc. complete:-					
		310 mm (12") i/d	Rft	-	430.80	-	
		380 mm (15") i/d	Rft	-	540.20	-	
		460 mm (18") i/d	Rft	-	668.00	-	
		530 mm (21") i/d	Rft	-	819.85	-	
		610 mm (24") i/d	Rft	-	1,017.75	-	
		690 mm (27") i/d	Rft	-	1,212.15	-	
		760 mm (30") i/d	Rft	2,424.54	1,479.50	3,587,108.41	
		840 mm (33") i/d	Rft	-	1,763.35	-	
		910 mm (36") i/d	Rft	3,641.73	2,335.10	8,503,808.39	
		1070 mm (42") i/d	Rft		3,010.65	-	

		1220 mm (48") i/d	Rft	-	4,056.46	-	
		1370 mm (54") i/d	Rft		5,087.75	-	
		1520 mm (60") i/d	Rft		5,839.40		
		1680 mm (66") i/d	Rft		7,099.50		
		1830 mm (72") i/d	Rft		8,087.25		
7	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	12,047.25	1.78	21,404.34	
8	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	12,047.25	0.74	8,869.79	
9	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					
		a) Carpetted road, with 2" (50 mm) carpet and 10" (250mm) depth of stone metal for sub-base and base	Sft	15,610.24	88.74	1,385,299.53	

		c) Black topped Road with two coats of surfacing & 10" (250mm) depth of stone metal for sub base and base.	Sft	3,122.05	43.81	136,781.61	
		MANHOLES					
10	Ch:4/45	Dismantling and removing of road metalling.	Cft	15,610.24	14.21	221,883.95	
		EXCAVATION					
11	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:					
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	3,011.81	6.22	18,736.93	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	63,288.06	10.46	662,236.73	
		c) above 15.0 ft. (4.5 m) depth	Cft		13.31		
		P.C.C					

12	Ch:6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate):	Cft	2,000.00	174.81	349,616.00	
13	Ch:7/4-i	Pacca brick work in foundation and plinth in:- Ratio 1:6	Cft	1,500.00	214.44	321,657.75	
14	Ch:7/7-i	Pacca brick work other than building upto 10ft. (3 m) height. Ratio 1:6	Cft	2,000.00	221.85	443,701.00	
15	Ch:9/7	concrete in haunches and over crown, with ½" (13 mm) cement plaster 1:6 on top (except earth filling mud plaster and gobri) soffit of arches cement plastered.	Sft	2,000.00	198.34	396,671.00	
16	Ch:21/15 A	Providing and fixing 6" thick R.C.C. manhole cover with tee shaped C.I. frame of 22" I/d (frame weighing 37.324 Kg. or one maund as per Standard Drawing STD/PD No. 6, of 1977, complete in all respect.	Per Set	250.00	8,914.10	2,228,525.00	

17	Ch:21/9	Extra for making and finishing benching floor work in manhole chamber, with 1/8" (3 mm) thick cement finish	Sft	1,000.00	89.14	89,141.00	
18	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	150.00	10,373.50	1,556,025.00	
19	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	2,409.45	1.78	4,280.87	
20	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	2,409.45	0.74	1,773.96	
21	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					

		a) Carpetted road, with 2" (50 mm) carpet and 10" (250mm) depth of stone metal for sub-base and base	Sft	6,829.48	88.74	606,068.54	
		c) Black topped Road with two coats of surfacing & 10" (250mm) depth of stone metal for sub base and base.	Sft	1,365.90	43.81	59,841.95	
TOTAL Amount (Rs) of Schedule Items						**28,651,031.15**	
NON-SCHEDULE ITEMS							
1	N.S	Providing and fixing malleable iron step with outer dimensions 300 X 200 mm and weight not less than 4kg, in manhole chambers , including carriage and setting the same in work, to correct lines and levels as per drawing and specification	Nos	250.00	1,236.00	309,000.00	
TOTAL Amount (Rs) of Non Schedule Items						**309,000.00**	
TOTAL Amount (Rs) of Schedule Items+Non Schedule						**28,960,031.15**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE SEWERAGE OF REPLACEMENT NAROWAL							
Long-Term							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Future extension of 9'',12'',15'',18'',24'',27'', 30'', 36'' and 48'' sewer pipes within Mohallaas connecting them with them main trunk pipes							
		EXCAVATION				-	
1	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides of the trenches:				-	
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	503,865.00	6.22	3,134,619.74	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	424,581.50	10.46	4,442,757.13	
		c) above 15.0 ft. (4.5 m) depth	Cft	279,114.50	13.31	3,714,065.01	
		Brick Ballast					

2	Ch :-6/3	Cement concrete brick or stone ballast 1½ " to 2" (40 mm to 50 mm) gauge, in foundation and plinth:- (b) Ratio 1: 4: 8	Cft	621,980.00	134.15	83,439,549.97	
		Pipe Laying					
3	Ch:21/3	Providing and laying R.C.C. pipe sewers, moulded with cement concrete 1:1½:3 conforming to ASTM Specification C-76-79, Class III, Wall B, including carriage of pipes from factory to site of work, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing, etc. complete:-					
		310 mm (12") i/d	Rft	16,000.00	430.80	6,892,800.00	
		380 mm (15") i/d	Rft	26,000.00	540.20	14,045,200.00	
		460 mm (18") i/d	Rft	10,000.00	668.00	6,680,000.00	
		530 mm (21") i/d	Rft	-	819.85	-	
		610 mm (24") i/d	Rft	1,475.00	1,017.75	1,501,181.25	
		690 mm (27") i/d	Rft	1,274.00	1,212.15	1,544,279.10	
		760 mm (30") i/d	Rft	1,283.00	1,479.50	1,898,198.50	
		840 mm (33") i/d	Rft	-	1,763.35	-	
		910 mm (36") i/d	Rft	1,475.00	2,335.10	3,444,272.50	

		1070 mm (42") i/d	Rft		3,010.65	-	
		1220 mm (48") i/d	Rft	4,691.00	4,056.46	19,028,853.86	
		1370 mm (54") i/d	Rft	-	5,087.75	-	
		1520 mm (60") i/d	Rft		5,839.40	-	
		1680 mm (66") i/d	Rft		7,099.50	-	
		1830 mm (72") i/d	Rft	-	8,087.25	-	
4	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	223,291.60	1.78	396,722.19	
5	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	223,291.60	0.74	164,398.44	
6	Ch:-21/12	Restoration of metalled road on laid service line including compaction.					
		MANHOLES					
		EXCAVATION					
7	Ch: 3/42	Earthwork excavation of trenches in open cutting for sewers and manhole chambers, etc. below sub-soil water level to correct section and dimensions according to templates and levels, including shoring, timbering and shuttering of M.S. sheets on both sides					

		of the trenches:					
		a) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	403,092.00	6.22	2,507,695.80	
		b) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	339,665.20	10.46	3,554,205.70	
		c) above 15.0 ft. (4.5 m) depth	Cft	223,291.60	13.31	2,971,252.00	
		P.C.C				-	
8	Ch:6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate):	Cft	6,500.00	174.81	1,136,252.00	
9	Ch:7/4-i	Pacca brick work in foundation and plinth in:- Ratio 1:6	Cft	5,500.00	214.44	1,179,411.75	
10	Ch:7/7-i	Pacca brick work other than building upto 10ft. (3 m) height. Ratio 1:6	Cft	6,000.00	221.85	1,331,103.00	
11	Ch:9/7	concrete in haunches and over crown, with ½" (13 mm) cement plaster 1:6 on top (except earth filling mud plaster and gobri) soffit of arches cement plastered.	Sft	7,500.00	198.34	1,487,516.25	
12	Ch:21/15A	Providing and fixing 6" thick R.C.C. manhole cover with tee shaped C.I. frame of 22" I/d (frame weighing 37.324 Kg. or one maund as per Standard Drawing STD/PD No. 6,	Per Set	2,000.00	8,914.10	17,828,200.00	

		of 1977, complete in all respect.					
13	Ch:21/9	Extra for making and finishing benching floor work in manhole chamber, with 1/8" (3 mm) thick cement finish	Sft	10,000.00	89.14	891,410.00	
14	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	1,000.00	10,373.50	10,373,500.00	
15	Ch:-3/13-a	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel.	Cft	322,473.60	1.78	572,938.85	
16	Ch:-3/25	compaction by mechanical means at optimum moisture content and dressing to designed section, complete in all respects:-					
		95% to 100% maximum modified AASHO dry density.	Cft	322,473.60	0.74	237,421.19	
TOTAL Amount (Rs) of Schedule Items						**194,397,804.22**	
NON-SCHEDULE ITEMS							
1	N.S	Providing and fixing malleable iron step with outer dimensions 300 X 200 mm and weight not less than 4kg, in manhole chambers , including carriage and setting the same in work, to correct lines and levels as per	Nos	2,000.00	1,236.00	2,472,000.00	

		drawing and specification					
TOTAL Amount (Rs) of Non Schedule Items						**2,472,000.00**	
TOTAL Amount (Rs) of Schedule Items+Non Schedule						**196,869,804.22**	

THE URBAN UNIT (URBAN SECTOR PLANNING & MANAGEMENT SERVICES UNIT PVT.LTD							
Regional Development Plan 2020-2030							
MRS, 2nd BI-ANNUAL-2020 (1st JULY-2020 to 31st DECEMBER-2020) DISTRICT NAROWAL							
ROUGH COST ESTIMATE SEWERAGE OF NAROWAL CITY							
S. No.	**Item Code**	**Description**	**Unit**	**BOQ Quantity**	**Unit Rate (Rs)**	**Total Amount (Rs)**	**Remarks**
SCHEDULE ITEMS							
Long-Term							
Establishment of waste water treatment plant for Narowal city on ghausia road extention (32° 4' 35.292" N, 74° 53' 33.036" E)							
1	Ch:-22/1	Excavation of well in dry upto 20'(6 m) below ground level, and disposal of soil within one chain (30 m)a) in ordinary soil or sand :-					
		a) 0.0 m to 1.5 m depth	Cft	18,992.34	5.41	102,671.62	
		b)1.5 m to 3.0 m depth	Cft	18,992.34	5.65	107,231.68	
2	Ch:-22/2	Dry sinking of well, including loading, and removing excavated material within one chain (30 m):- a) in ordinary soil :-					
		i) from 10' to 15'(3.0 to 4.5 m) depth	Cft	13,346.37	29.10	388,424.03	
		ii)from 15.1' to 20'(4.5 to 6.0 m) depth	Cft	13,346.37	36.38	485,530.21	
		iii) from 20.1' to 25'(6.0	Cft				

		to 7.5 m) depth		13,346.37	43.66	582,636.38	
		iv) from 25.1' to 30'(7.5 to 9.0 m) depth	Cft	13,346.37	50.93	679,742.55	
		v)from 30.1' to 35'(9.0 to 10.5 m) depth	Cft	8,897.81	58.21	517,912.41	
3	Ch:-22/3	Wet sinking of well in ordinary soil (value of C upto 5), for depths below spring level, including charges of machinery, shoring, kentledge and removal of excavated spoil within one chain (30 m):- a) in ordinary soil :-					
		i) from o' to 10'(0 to 3.0 m) depth	Cft	24,844.09	44.31	1,100,727.26	
		ii) above 10' to 20'(3.0 to 6.0 m) depth	Cft	11,666.20	94.15	1,098,360.69	
4	Ch :-3/21(b)	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and rammiing lead upto one chain (30 m) and lift upto 5 ft. (1.5 m) (Plinth protection and Ramp)					
		b) in ordinary soil.	Cft	1,176.51	7.69	9,044.00	
5	Ch :-3/42	Earthwork excavation in open cutting forsewers and manholes as shown in drawingsincluding shuttering and imbering, dressingto correct section and dimensions accordingto templates					

		and levels, and removingsurface water, in all types of soil exceptshingle, gravel and rock:-					
		i) 0 ft. to 7.0 ft. (0 to 2.10 m) depth	Cft	2,455.09	6.37	15,640.79	
		ii) 7-01 ft. to 15.0 ft. (2.15 to 4.5 m) depth	Cft	2,805.82	10.71	30,050.20	
		iii) above 15.0 ft. (4.5 m) depth	Cft	8,864.61	13.62	120,738.25	
6	Ch :- 21/5	Providing and laying R.C.C. pipe sewers, moulded with cement concrete 1:1½:3 conforming to ASTM Specification C-76-79 (Latest version), Class IV, Wall B, including carriage of pipes from factory to si te of work,lowering in trenches to correct alignment and pipes where necessary, testing, et c. complete: -					
		(xiv) 1680 mm (66") i/d	Rft	32.81	8,806.05	288,908.89	
7	Ch:- 26/42	Spraying anti-termite liquid mixed with water in the ratio of 1:40.	Sft	1,245.83	2.42	3,016.14	
8	Ch:- 22/8	Providing, making and laying R.C.C. well curb in position, using coarse sand, including all kinds of form, moulds, including curing,shuttering, rendering and finishing the exposed surface, (including screening and					

		washing of aggregate :-					
		(a) Ratio 1:1.5:3 (Shall have minimum compressive cylinder strength of 21MPa/ 3000psi at 28 days)	Cft	2,351.96	500.45	1,177,037.78	
9	Ch:-22/9	Providing and fixing structural steel for cutting edge.	Kg	44.980	157.51	7,084.80	
10	Ch:-6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate):					
		(f) Ratio 1:2:4 (Pluging in well) (Shall have minimum compressive cylinder strength of 14MPa/ 2000psi at 28 days)	Cft	11,938.87	219.22	2,617,208.45	
		(h) Ratio 1:3:6 (Plith protection & Ramp) (Shall have minimum compressive cylinder strength of 10MPa/ 1500psi at 28 days)	Cft	247.59	193.84	47,992.85	
11	Ch :-6/6	Providing and laying reinforced cementconcrete (including prestessed concreteusing coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting,curing, rendering and finishing exposed surface,					

		complete (but excluding the cost of steel reinforcement, its fabrication placing in position, etc)					
		(a)(i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		1) Type A (nominal mix 1:1:2) (Shall have minimum compressive cylinder strength of 28MPa/ 4000psi at 28 days)	Cft	7,587.44	450.65	3,419,280.92	
		(2) Type B (nominal mix 1: 1½: 3) (Shall have minimum compressive cylinder strength of 21MPa/ 3000psi at 28 days)	Cft	7,587.44	401.20	3,044,081.89	
		(a)(ii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining wal ls; etc and other structural members other than those mentioned in 5(a)(i) above not requiring form work (i.e. horizental shuttering) complete in all respects:-				-	

		(1) Type A (nominal mix 1: 1: 2) (Shall have minimum compressive cylinder strength of 28MPa/ 4000psi at 28 days)	Cft	11,614.63	349.15	4,055,247.65	
12	Ch :- 6/9	Providing and Fabrication of mild steel reinforcement for cement concrete, including cutting, 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)				-	
		C) Deformed bars (Grade 60)	Kg	1,540.95	157.82	243,193.12	
13	Ch:-7/4	Pacca brick work in foundation and plinth in:- i) Cement, sand mortar:- Ratio 1 : 4	Cft	686.97	208.79	143,431.24	
14	Ch:-6/2	Dry rammed brick or stone ballast, 1½" to 2"(40 mm to 50mm) gauge.	Cft	79.47	41.14	3,269.75	
15	Ch:- 10/8	Flat brick flooring laid in 1:6 cement mortar, over a bed of 3/4" (20 mm) thick cement mortar, 1:6.	Sft	161.46	64.16	10,358.87	
15	Ch :- 7/7,8& 10	Pacca brick work other than building including steining of well. i) cement, sand mortar:- Ratio 1:4				-	
		i) Upto 3.0 m height	Cft	4,722.99	211.82	1,000,445.08	
		(ii) Above 3 m upto 6 m height	Cft	5,167.32	216.42	1,118,313.11	

		(iii) Above 6 m upto 9 m height	Cft	4,231.69	223.31	944,997.56	
		(iv) Above 9 m upto 12 m height	Cft	2,398.23	234.80	563,114.73	
16	Ch:-11/8	Cement plaster 1:3 upto 20' (6.00 m) height:- b) ½" (13 mm) thick (inner side)	Sft	5,844.21	20.35	118,914.98	
17	Ch:-11/8,28	Cement plaster 1:3 including extra for lime, mud or cement plaster and pointing from 20'(6.00m) and above for each additional 10'(3.00m) height or part thereof				-	
		i) Above 6 m upto 9 m heigh	Sft	2,638.79	20.35	53,692.87	
		(ii) Above 9 m upto 12 m height	Sft	2,638.79	23.29	61,448.29	
18	Ch:-11/16	Cement pointing flush upto 20' (6.00 m) heihgt:-					
		b) ratio 1:3 (outer side)	Sft	1,031.41	19.68	20,297.05	
19	Ch :-25/44	Providing and fixing windows consisting of M.S. box section frame 2"x1½" (50x40mm), leaves frame 1-½"x1" (40x25mm) box section frame for glazing 3/8"x3/8" (10x10mm) using 16 SWG sheet 'U' shaped rubber supported with 1"x1/8" (25x3mm) M.S. flat for fixing 3/16" (5 mm) thick glass panes M.S. box section ½"x½"(13x13mm) of	Sft	279.00	559.15	156,004.46	

		16 SWG for fixing 24 SWG wire gauze on outer side by means of ¾"x1/8" (20x3mm) M.S. flat and screws I/C all C.P. fitting and painting 3 coats complete in all respect. (Windows and Ventilators)					
20	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) centre to centre, with locking ar rangement.	Sft	51.67	1,209.60	62,496.65	
21	Ch:26/37	Supplying and laying polythene sheet over D.P.C under floors and on roofs, etc. (i) 300 gauge (0.003" thick)	Sft	3,327.58	3.45	11,480.16	
22	Ch;-9/5	Single layer of tiles 225 x 113 x 40 mm laidover 100mm earth and 25mm mud plasterwithout bhoosa grouted with cement sand1:3 on top of RCC roof slab provided with1.72kg/sq.m bitumen coating sand blinded.	Sft	3,327.58	70.73	235,353.29	
23	Ch:-25/35	Providing and fixing terrace railing of 2" (50mm) i/d conduit pipe 16 SWG, welded with 5/8"x5/8" (16x16mm) suitable arrangement, complete in	Rft	279.03	812.70	226,769.34	

		all respects, as per design and drawing.					
24	Ch:-13/9	Bitumen coating to plastered or cement concrete surface. (ii) 6.35kg per sq.m (Applying in two coats as 3.17 Kg/Sq.m)	Sft	1,031.41	7.17	7,392.61	
25	Ch:10/9	Brick on edge flooring, laid in 1:6 cement mortar, over a bed of ¾" (20 mm) thick cement mortar 1:6. (Plinth protection)	Sft	1,010.42	89.74	90,670.75	
26	Ch:-18/19	Providing and laying dry brick pavement/soling in streets or roads, etc. sand grounted, laid in proper camber, including preparation, watering, compaction of bed to proper camber, and sand cushion.	Cft	4,026.48	175.21	705,475.53	
27	Ch:-3/13(a) & 24(d)	Rehandling of earthwork, lead upto a single throw of kassi, phaorah or shovel, including ramming earth work behind retaining walls.	Cft	57,197.21	3.27	187,269.38	
28	Ch:-3/17	Transportation of earth all types when the total distance, including the lead covered in the item of work, is more than 300m					
		a) upto 400m	Cft	57,197.21	3.33	190,644.01	
		b) for every 100m additional lead or part thereof, beyond 400m upto 1.6km (for	Cft	57,197.21	0.04	2,322.21	

		1200m)					
A-Total Amount (Civil & Mechanical Works						**26,055,924.48**	
NON MRS ITEMS							
ELECTRICAL WOKS							
1		Wiring of light or fan point from switch to the point with 1.5 mm2 PVC insulated single core stranded cables in PVC pipes 25 mm concealed/surface on walls, columns and slabs including accessories, PVC box, 10 Amp. gang switch 1 or 2 way as required, one for each light or fan and installed as in specifications.	Each	52.00	1,215.00	63,180.00	
2		Circuit wiring from MCBs board to gangswitches board with 2.5 mm2 PVC insulatedsingle core stranded cables in PVC pipes 25mm concealed/surface on walls, columnsand slabs including accessories.	Each	11.00	1,927.00	21,197.00	
3		The same as item No. 1.1 but from one light point to another light point.	Each	35.00	836.00	29,260.00	
4		10/13 Amp 3 pin universal flush mounting switch socket unit away from switch board and wired with 4 mm² single core stranded cable from nearest circuit available in PVC	Each	10.00	2,641.00	26,410.00	

		concealed conduits or trunking including all conduit accessories as required complete in all respect.					
5		The same as item No.1.4 but wiring from one socket to another socket with 2.5 mm2 single core stranded cable	Each	8.00	1,739.00	13,912.00	
6		15/20A, 3-pin flush mounting switch socket unit wired with 6 mm2 single corestranded cable wires starting from D.B in 25 mm PVC concealed/ surface conduits or trunking including all conduit acce	Each	12.00	3,224.00	38,688.00	
B-Total Amount (Electrical Works)						**192,647.00**	
Total Amount (A+B)						**26,248,571.48**	
NON MRS ITEMS							

1		Designing, manufacturing, testing at manufacturer's workshop, supplying at site, installation, testing, commissioning, guarantee and maintenance for one year during defect Liability Period of each item of following equipment: Close coupled, non-clogging, vertical shaft, centrifugal type, sewage cum strom water pumps of 1019 m3/h (10 cusecs) capacity, 26m (85ft) rated head with suitable AC induction, totally enclosed, 6 pole, 3-Ph, 400 V, 50 Hz, insulation class H, ingress protection IP 68, cooling jacketed motors to be installed in dry well, alongwith control and monitoring system for level monitoring, mechanical seal monitoring, temperature and vibration monitoring, automatic control for alternate operation of pumping units at predetermined time, electrical cable upto 15 m and control cable upto 15m, motor control unit, pressure gauges at suction and discharge side, 2 Nos sluice valve, 01 No non-return valve including					

		factory inspection during casting of pumps and final inspection at test bed, erection & maintenance tools and spare parts as per Specifications. All equipment shall be from internationally reputed manufacturers approved from HUD & PHED.					

		a) Pump Capacity = 1019 m3/h (10 cusecs) Head = 26 m (85 ft) Min. Free Particle Size = 100 mm Min. Efficiency = 80% Maximum speed = 1000 rpm Casing: Cast Iron ASTM A 48 Class 35 (EN-GJL-250) Impeller: Duplex Stainless Steel ASTM A 890 or better Shaft and Sleeve: Stainless Steel ASTM A 276 Type 316 or better Mechanical Seal: Two mechanical seals with oil resevoir and Moisture in Oil sensors					
		b) Motor With Cooling JacketRatied power suitable for Pump described in "a)"Insulation Class = HIngress Protection = IP 68Min. Efficiency = 90%					

		c) Motor Control Unit (MCU) MCU with painted metallic box, auto star delta starter, circuit breaker, magnetic contactor, on/off switch, control fuse, auto level control with ultrasonic level sensor, control wire, under/over voltage relay, electronic over current relay, indication lamps, digital ampere meter, volt meter,hour run meter, dry running protection, high temperature protection, phase reversal protection, alongwith wiring and necessary items for moisture in oil monitoring for mechanical seals and level switches for dry running protection, temperature and vibration monitoring of pump units, controller for alternate operation of pumps at predetermined time, complete in all respects. All the equipment shall be from internationally reputed manufacturers.					
2		d) 2 No's Sluice valve (rising type) and 1 No. Non return valve of B.S.S. 5163 quality and weight with each pumping set.	No's	4.00	22,080,000.00	88,320,000.00	

3		Providing at site, installing, testing and commissioning submersible sump pump 500 litre/min capacity including all accessories with suitable motor and delivery pipe (Head 11m), complete in all respects as per drawings and specifications. The pump and motor should be of some approved manufacturer of HUD and PHE Department, Government of Punjab.	No's	1.00	109,600.00	109,600.00	
4		Providing and fixing motorized operated penstock switch) as perB.S.S 7775 of below mentioned size with SS shutter and frame/channel with interior brass channel on bottom and two sides through whichgate travels i/c non-magnetic SS spindle withs quare thread SS head stock and wheel etc complete in all respect as per drawing and directed by the engineer incharge Penstock Gate Size with clear opening (2000mm x 2000mm)	No's	1.00	2,502,500.00	2,502,500.00	

5		Providing at site, laying, cutting, fixing, jointing, testing and commissioning Ductile iron (D.I) (cast on flange) Pipe class-K9 conforming to specifications (ISO2531 and BS 4772) and relevant ANSI/AWWA standards with all accessories, Nut, Bolts, washers, jointing materialand lubricants complete in all respect as per drawings and specifications.					
		i) 450mm (18" i/d)	Rft	446.19	26,380.15	11,770,528.00	
		ii) 900mm (36" i/d)	Rft	32.81	70,687.03	2,319,100.00	
6		Providing at site, laying, cutting, fixing, jointing, testing and commissioning Ductile iron (cast on flange) specials (such as bend, tee, cross collar, reducer, tail piece, flanged spigot, cap, flanged socket, taper, angle branch, plug etc) class-K12 conforming to specifications (ISO2531 and BS 4772) and relevant ANSI/AWWA standards with all accessories, Nut, Bolts, washers, jointing material and lubricants complete in all respect as per drawings and specifications.					

		Bend 90° 450 mm (18" i/d)	No's	12.00	159,945.00	1,919,340.00	
		Puddle Flange 450 mm (18" i/d)	No's	12.00	21,404.00	256,848.00	
		Reducer Suction 400mm x 450mm (10 Cusecs)	No's	4.00	101,155.00	404,620.00	
		Delivery 450mm x 300mm (10 Cusecs)	No's	4.00	101,155.00	404,620.00	
		Tee 900mm (36" i/d) 01No	No's	1.00	675,944.00	675,944.00	
		Reducing Tee 900mm (36" i/d) 450mm (18" i/d)	No's	4.00	455,373.00	1,821,492.00	
		Short Double Flanged Pipe 900mm (36" i/d) 1 m long	No's	3.00	277,715.00	833,145.00	
		Dead End 900mm (36" i/d)	No's	2.00	7,135.00	14,270.00	
		Flanged Bellmouth 450 mm (18" i/d)	No's	4.00	159,945.00	639,780.00	
7		Provide, install and maintain chain pulley block of 10 tons capacity including girder and all appurtenances as per drawings and direction of the engineer incharge.	No's	1.00	1,594,880.00	1,594,880.00	
8		Providing and fixing malleable iron step with dimensions 300mmx 200mm and weight not less than 6kg, in chambers , including carriage and setting the same in work, to correct lines and levels as per drawing and specification.	No's	46.00	1,236.00	56,856.00	

9		Providing and embeding 10" (240 mm) wide ¼" (6 mm) thick PVC water stopper at joints of R.C.C. walls, roof slab etc complete in all respects as per drawing, specifiction and direction of engineer incharge.	Ft	1,620.78	400.82	649,636.30	
10		Supplying and laying of HDPE Geo-membrane liner 0.75mm thick under the slab of Dry well complete in all respect as per drawing and specification or direction by the Engineer incharge	Sft	1,845.49	35.40	65,322.45	
11		Lowering of sub-soil water table, by installation of sufficient tubewells in area of waste water disposal station and pumping out water (for pluging of wells below sub-soil water level, concreting and curing) including disposal of pumped out water. This will include all the charges related to hiring of pumps, generator, fuel and other equipment and labour charges till completion of works as per satisfaction of the engineer incharge.	Job	1.00	4,808,514.00	4,808,514.00	
12		Providing and fabrication of SS (stainless steel) Screen with angle, tees, flat steel, including, cutting, drilling, rivitting, handling, assembling and fixing, including erection and fitting in position as per drawings, specification or direction	Per Kg	7,439.00	932.00	6,933,148.00	

		by the Engineer incharge. (Screen)					
					A-Total Amount (Civil & Mechanical Works	**126,100,143 .75**	
NON MRS ITEMS							
1		Supply, installation, testing and commissioning of the following items of work (unless specifically stated otherwise) including all material, labour, tools, accessories, etc. required for proper completion of each item as per specification, drawings and as directed by the Engineer					
		POWER CABLE					
2		Copper conductor PVC/PVC 600/1000V cables including sockets and connections at both ends with Cu/Brass glands. The cable shall be drawn in cable trench or clipped on the wall or pulled in cable tray/PVC pipes or as required or as shown on drawings. (Imported copper shall be used. Verified documentary evidence for source of copper & PVC shall be furnished prior to manufacturing)					
		4 core 10 mm2	Rft	328.08	236.22	77,500.00	

		1 core 150 mm2 for Motor	Rft	3,280.80	684.89	2,247,000.00	
		1-core 300 mm2 PVC - (2 Nos. per Phase & Nuetral)	Rft	2,788.68	1,393.56	3,886,200.00	
3		PVC insulated 450/750 Volt grade (Green - Yellow) unarmoured copper cable laid direct in ground, pulled in PVC pipe already laid, on surface of wall or cable trays etc. as required or as shown on drawings (Imported copper shall be used. Verified documentary evidence for source of copper & PVC shall be furnished prior to manufacturing) as earth continuity conductor (ECC/CPC). (Imported copper shall be used. Verified documentary evidence for source of copper & PVC shall be furnished prior to manufacturing)					
		1 core 10 mm2	Rft	328.08	66.75	21,900.00	
		1 core 70 mm2	Rft	656.16	321.57	211,000.00	
		1 core 95 mm2	Rft	3,280.80	438.61	1,439,000.00	
		1 core 300 mm2	Rft	1,312.32	1,362.47	1,788,000.00	
		LIGHT FITTINGS AND FANS					
4		Fluorescent lamp fittings with electronic control gear and complete with all components including P.F. correction					

		capacitors, specifications should meet the ambient conditions at site.					
5		Philips TMS-015/136 complete with electronicballast (EBC-136) & TLD 36W/54 or approvedequivalent	Each	30.00	1,732.00	51,960.00	
6		Philips GMP-015/118 complete with electronic ballast (EBC-118) & TLD 18W/54 or approved equivalent.	Each	3.00	2,077.00	6,231.00	
7		1x26 watt energy saving lamp with holder and all accessories.The fitting shall be approved by the engineer.	Each	16.00	735.00	11,760.00	
8		Surface mounted downlighter Philips type FBS 120 Lunar 14/18 with 1x18W energy saving or approved equivalent. The fitting shall be approved by the engineer.	Each	5.00	1,584.00	7,920.00	
9		Water tight luminaire suitable for 1x18W CFL Lamp, IP65, die cast alluminium and stainless steel body. Sunlight type OD-7009 or approved equivalent. The fitting shall be approved by the engineer.	Each	14.00	5,789.00	81,046.00	
10		Locally manufactured Hanging Light 150 Watt High Bay type complete in all respect. The fitting shall be approved by the Engineer.	Each	2.00	6,787.00	13,574.00	
11		56" ceiling fan sweep (Climax, Pak, Millat)	Each	5.00	5,819.00	29,095.00	

		make or approved equivalent.					
12		Wall Bracket fan 24" sweep make (Royal, Pak, GFC or approved equivalent) capacitor type,copper winding complete with all required accessories etc.	Each	2.00	7,077.00	14,154.00	
13		Exhaust fan 12" sweep make (Royal, Pak, Millat or approved equivalent) capacitor type ,copper winding complete with Plastic body and all accessories etc.	Each	4.00	3,933.00	15,732.00	
14		Exhaust fan 24" sweep make (Royal, Pak, Millat or approved equivalent) capacitor type ,copper winding complete with Metal body and all accessories etc.	Each	8.00	7,015.00	56,120.00	
		uPVC PIPE					
15		PVC pipe conduit with accessories suitable for laying single/multi-core cables.					
		50 mm dia (Class-B)	Rft	328.08	107.29	35,200.00	
		150 mm dia (Class-B)	Rft	656.16	583.70	383,000.00	
		250 mm dia (Class-D)	Rft	656.16	2,677.40	1,756,800.00	
		CABLE/LADDER TRAYS					
16		Perforated cable /ladder tray with cover (14 SWG & covered 16 SWG) G.I Sheet including installation accessories such as wall support bracket assembly, saddles or straps secured with brass or cadmium nuts,					

		rawal plugs, bolts & washer, cable ladder for horizontal run of cable as and provided specification or as required.					
		300 mm x 100 mm	Rft	328.08	1,366.74	448,400.00	
		DISTRIBUTION BOARDS					
17		D.Bs with TP incoming adjustable moulded case circuit breaker and SP miniature outgoing circuit breakers, Panel box SWG 16 powder coated RAL colour 7032, IP class 44 and with all accessories. alongwith all installation and operational accessories as per specification or as shown on the drawings.					
		DB- Pump house					
		MATERIAL					
		01 No. 16 Amps (Adj.) MCCB TP, RC=18kA, Icu=100%Ics	Each	1	36,780.00	36,780.00	
		03 Nos. outgoing 10A, MCB, SP, RC:10 kA, Icu=100%Ics					
		01 Nos.outgoing 20A, MCB, SP, RC:10 kA, Icu=100%Ics					
		02 Nos. Spare 10/20A, MCB, SP, RC:10 kA, Icu=100%Ics					
18		Indication lights, push buttons, digital ammeter with selector switch, digital voltmeter with selector switch, Panel box SWG 16 powder					

		coated RAL colour 7032, IP class 44 and with all accessories					
		D B- Sub-Station & Staff Building					
		MATERIAL	Each	2.00	48,092.00	96,184.00	
		01 No. 25 Amps (Adj.) MCCB TP, RC=25kA, Icu=100%Ics					
		05 No. outgoing 10A, MCB, SP, RC:10 kA, Icu=100%Ics					
		03 No.outgoing 20A, MCB, SP, RC:10 kA,Icu=100%Ics					
		04 No. Spare 10/20A, MCB, SP, RC:10 kA, Icu=100%Ics					
19		Indication lights, push buttons, digital ammeter with selector switch, digital voltmeter with selector switch, Panel box SWG 16 powder coated RAL colour 7032, IP class 44 and with all accessories					
		D B- Operator Quadtor					
		MATERIAL	Each	1.00	53,024.00	53,024.00	
		01 No. 32 Amps (Adj.) MCCB TP, RC=25kA, Icu=100%Ics					
		07 Nos. outgoing 10A, MCB, SP, RC:10 kA, Icu=100%Ics					
		04 Nos.outgoing 20A, MCB, SP, RC:10 kA, Icu=100%Ics					
		04 Nos. Spare 10/20A, MCB, SP, RC:10 kA, Icu=100%Ics					

20		Indication lights, push buttons, digital ammeter with selector switch, digital voltmeter with selector switch, Panel box SWG 16 powder coated RAL colour 7032, IP class 44 and with all accessories.					
		LV SWITCHGEAR / MAIN PANEL BOARD (MPB)					
21		LV Switchgear Panel/Main Panel Board of 14 SWG, IP class 54 & RAL 7032 including I/C and O/G following electrical items, foundation/base frame with all installation and operational accessories as per site requirements, as per tender specifications and drawings and as directed by the Engineer.					
		MPB INCOMING					
		01 No. 1000 Amps TP (adj.) ACB, RC= 66 kA, Icu=100%Ics	No's	1.00	1,238,777.00	1,238,777.00	
		01 No. VSS (07 position)					
		01 No. 0-500 Volts AC DIGITAL Voltmeter					
		03 Nos. 1200/5 Amps Current Transformers					
		01 No. ASS (R-Y-B-OFF)					
		01 No. 0-1200 Amps AC DIGITAL Ammeter					
		06 Nos. RYB and ON OFF TRIP LED indication lights					
		01 No. 14 SWG steel sheet Panel RAL 7032, IP= 54 and all other					

		accessories,					
		01 No. U-O-V Relay 415 VACOUTGOING					
		04 Nos. 400 Amp MCCB TP, (Adj.) RC=50kA , Icu=100%Ics					
		01 No. spare 400 Amp MCCB TP, (Adj.) RC=50kA , Icu=100%Ics					
		02 Nos. 32 Amp MCCB TP, (Adj.) RC=25kA, Icu=100%Ics					
		02 Nos. 25 Amp MCCB TP, (Adj.) RC= 25kA, Icu=100%Ics					
		01 No. 16 Amp MCCB TP, (Adj.) RC= 25kA, Icu=100%Ics					
		01 No. Spare 32 Amp MCCB TP, (Adj.) RC=25kA, Icu=100%Ics					
		01 No. Spare 25 Amp MCCB TP, (Adj.) RC=25kA, Icu=100%Ics					
		01 Panel light with limit switch					
		02 Nos. Exhaust fan 6" & Louver 8" sweep with thermosttae relay and all accessories etc.					
		01 No. 32 amp welding socket with 4x10 mm2 PVC insulated cables in PVC pipes concealed in walls, columns and slabs including accessories.					
		All other accessories required for completion of the qulaity works					
		Electrolytic copper bus bar with electrical grade PVC mountings 3 for each, nuts, bolts and washers, control MCB					

		etc. (1600 Amps. R+Y+B N, 50 Hz, 415 V, AC)					
		Contractor shall submit the genuine certificate from the manufacturer/authorized agent clear by indicating the project name make/model/rating of MCCB, MCB, magnetic contactors, terminal blocks and voltmeters/ ammeter alongwith warranties.					
		DIESEL GENERATOR & FOUNDATION					
		Prime rating at 50 oC, 400 Volts three phase four wire, 50 Hz skid mounted Brand new DG set including day fuel tank 2000 litre suitable for 12 hrs. of continuous operation at rated capacity alongwith remote fuel monitoring facility and all required accessories (this fuel tank shall be placed adjacent to each DG set and is separate from the underground bulk fuel storage tank)					
		800 kVA	No's	1.00	33,789,500.00	33,789,500.00	
		RCC Foundation as per manufacturer'srecommendation (at height of one meter above finished floor level). Contractor shall submit the detail foundation design.					

		800 kVA	No's	1.00	262,500.00	262,500.00	
		AMF/ATS/MCO PANEL					
		AMF/ATS/MCO panel for following DG sets ratings including all installation and operational accessories complete in all respect for proper operation for the DG sets of the ratings as mentioned below and complete with all components/accessories or as per specifications and drawings:	No's	1.00	2,010,101.00	2,010,101.00	
		AMF/ATS Suitable for 800 kVA MATERIAL					

		02 Nos. 1250 Amps 4-P (adj.) ACB, RC=66kA, Icu=100%Ics - 02 Nos. 1250 Amps. Manual Change over (MCO) 4 Pole - 02 Nos. VSS (07 position) - 02 Nos. 0-600 Volts AC DIGITAL Voltmeter - 06 Nos. 1200/5 Amps Current Transformers - 02 Nos. ASS (R-Y-B-OFF) - 02 Nos. 0-1200 Amps AC DIGITAL Ammeter - 06 Nos. RYB and ON OFF TRIP LED indication lights - 01 No. U-O-V Relay 415 VAC,3 - 01 No. Timer Relay with Base 220-240 VAC - 12 Nos. 2 Amps, MCB for control - 01 No Battery Charger 12/24 V - 12 No. Line up Terminals 2.5 mm - 01 No Emergency Stop Switch - 01 No. Panel light with limit switch 01 No. Exhaust fan 6" & Louver 8" sweep with thermosttae relay and all accessories etc. 14 SWG steel sheet Panel RAL 7032, IP= 54/44 and all other accessories, - Electrolytic copper bus bar with electrical grade PVC mountings 3 for each, nuts, bolts and washers, control MCB					

		etc. (1600 Amps. R+Y+B N, 50 Hz, 415 V, AC) - Contractor shall submit the genuine certificate from the manufacturer/authorized agent clear by indicating the project name make/model/rating of MCCB, MCB, magnetic contactors, terminal blocks and voltmeters/ ammeter alongwith warranties					
		POWER FACTOR IMPROVEMENT PANEL (PFI)					
		14 SWG steel sheet clad IP 54 colour RAL 7032powder coated power factor improvement panel (PFI) including Cu busbar, heavy duty incoming and outgoing circuit breaker to capacitor, magnetic contactors, continuous digital p.f controller, on & off pushbuttons etc. complete with all components/ accessories					

		as per specifications and drawings.					
		PFI - 200 kVAR					
		06 steps with continuous digital power factor and capacitor controller with all accessories etc.	No's	1.00	1,075,598.00	1,075,598.00	
		01 No. Manual/OFF/Auto selector switch - 02 No. 50 kVAR capacitor - 04 Nos. 25 kVAR capacitor 02 No. 150A Magnetic contactor (AC-3) - 04 Nos. 110A Magnetic contactor (AC-3) - 02 No. 100A MCCB, TP (Adj.) RC= 25 kA Circuit breaker, Icu=100%Ics - 04 Nos. 63A MCCB, TP (Adj.) RC= 25 kA Circuit breaker, Icu=100%Ics - 21 Nos. Indication light - (for magnetic contactor and phase) - 15 Nos. Push Buttons (ON/OFF) - 12 Nos. Auxiliary contractor (NO/NC) - 01 No. Panel light with limit switch - 02 Nos. Exhaust fan 6" & Louver 8" sweep with thermosttae relay and all					

		accessories etc. - 14 SWG steel sheet Panel RAL 7032, IP= 54 and all other accessories, - Electrolytic copper bus bar with electrical grade PVC mountings 3 for each, nuts, bolts and washers, control MCB etc. (1600 Amps. R+Y+B N, 50 Hz, 415 V, AC) - All other accessories required for completion of the quality works					
		Contractor shall submit the genuine certificate from the manufacturer/authorized agent clear by indicating the project name make/model/rating of MCCB, MCB, magnetic contactors, terminal blocks and voltmeters/ ammeter alongwith warranties.					
		EARTHING AND BONDING					

		Bore type, earthing up to permanent water level/moist soil by arrangement of earth pit/point comprising of concrete/brickwork housing with lifting cover 50mm perforated GI pipe, appropriate bare copper stranded conductor as per details in drawing. The earthing and bonding shall be complete with fixing clamps etc. & all metal works shall be bonded to the proposed earthing network.					
		MATERIAL					
		Drilling of earth bore 3" dia 100 ft. deep or up to permanent water table. (01 No.)					
		Supply and installation of G.I pipe 2" dia 14 SWG to be installed in pre-made bore including all accessories like tees, bends, sockets etc. Pipe shall be connected to tinned copper spike as per detail shown on drawing, complete in all respects. (80 Rft.)					
		Supply and installation of tinned copper spike to be manufactured as per detail shown on drawing. Spike shall be connected/screwed at bottom of G.I pipe including all accessories like nuts and bolts complete in all respect. (01 No.).					

		Supply and installation of 70 mm2 bare stranded electrolytic copper conductor lead in prelaid G.I pipe and connected to tinned copper spike as shown on drawing. 2 Nos. of leads to be installed including all accessories like brass nuts, bolts, washers etc complete in all respect. (200 No.)					
		Supply and installation of tinned earth test link in earthing pit consisting of copper plate (12"x2"x1/2") with fixing arrangement on the wall of man hole including brass nuts, bolts washers lugs etc. complete in all respect. (01 No.)					
		Construction of earthing pit (manhole) of internal size 18"x18"x24" deep with 9" thick brick wall with cement mortar, internal plaster 1:4, RCC 4" thick cover with lifting hooks including all accessories complete in all respect. (01 No.)					
		Testing and commissioning of the earthing system alongwith all testing accessories complete in all respect. (01 No.)					
		Earth point comprising of 10 ft. 5/8" dia. (16 mm dia) copper coated M.S. rods driven in ground.	No's	8.00	9,120.00	72,960.00	

		The earthing rods shall be completed with fixing, clamps etc.					
		TRANSFORMER					
		11/0.415 kV pad mounted Transformer (without HT & LT comparment) complete with all accessories as per WAPDA specifications and practice alongwith RCC foundation including all civil works as per approved design and specification. a) 630 kVA	No's	1.00	1,878,778.00	1,878,778.00	
		Provision for the cost of security deposit and obtaining of 11 kV electrical connection with installation material from WAPDA shall be finalized as per site requirement	Lum Sum	1.00	28,000,000.00	28,000,000.00	
B-Total Amount (Civil & Mechanical Works						**81,095,794.00**	
G-Total Amount (Civil & Mechanical Works						**233,444,509.23**	