Environmental and Social Assessment with Management Plan for Sewerage Works OF MUNI KI RETI - DHALWALA

Year : 2013-2014
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1. Introduction

The river Ganga has significant economic, environmental and cultural value in India. Rising in the Himalayas and flowing in to the Bay of Bengal, the river traverses a course of more than 2,500 km through the plains of north and eastern India. The Ganga main stem – which also extends into parts of Nepal, China and Bangladesh – accounts for 26 per cent of India’s landmass, 30 per cent of its water resources and more than 40 per cent of its population. The Ganga also serves as one of India’s holiest rivers whose cultural and spiritual significance transcends the boundaries of the basin.

Despite its importance, extreme pollution pressures from increasing population and industrialization pose a great threat to the biodiversity and environmental sustainability of the Ganga, with detrimental effects on both the quantity and quality of its flows. Discharge of untreated sewage and industrial wastewater, non-point pollution sources from religious activities along the river, agriculture and livestock as well as poor solid waste management are the main causes for pollution in river Ganga.

1.1 Ganga Clean up Initiatives

The Government of India (GoI) has undertaken clean-up initiatives in the past. The most prominent of such efforts was the Ganga Action Plan, launched in 1985 later complemented by a similar plan for the Yamuna, the biggest tributary of the Ganga. These programmes have faced significant public scrutiny and, despite some gains made in slowing the rate of water quality degradation, they have been widely perceived as failure. The main shortcomings of these initiatives were: (1) inadequate attention to institutional dimensions, including the absence of a long-term-basin planning and implementation framework; (2) little effort made in addressing systemic weakness in the critical sectors of urban wastewater, solid waste management, environmental monitoring, regulation and water resources management; and (3) inadequate scale, coordination and prioritization of investments, with little emphasis on ensuring their sustainability. These programs also did not pay sufficient attention to the social dimensions of river clean-up, failing to recognize the importance of consultation, participation and awareness-raising. The lessons drawn from these prior experiences indicate that improving water quality in the Ganga cannot be achieved by plugging the infrastructure gap alone. Rather, any effective initiative will have to adopt a three-pronged approach:

- Establishing a basin-level, multi-sectoral framework for addressing pollution in the river (including national/state policies and river basin management institutions);
- Making relevant institutions operational and effective (e.g. with the capacity to plan, implement and manage investments and enforce regulations); and,
- Implementing a phased program of prioritized infrastructure investments (with emphasis on sustainable operations and mobilization of community support)

1.2 The Ganga River Basin Project

As a major first step in achieving the above, the Government of India (GoI) constituted the National Ganga River Basin Authority (NGRBA), on 20th February 2009, for the comprehensive management of the river. The NGRBA will adopt a river-basin approach and has been given a multi-sector mandate to address both water quantity and quality aspects. The NGRBA has resolved that by year 2020, no untreated municipal sewage or industrial effluents will be discharged into River Ganga.

The NGRBA program will finance infrastructure investments to reduce pollution loads at priority on the river. The investments are intended to exemplify, among other attributes, the
high standards of technical preparation and implementation, sustainability of operations and public participation. The majority of investments in the NGRBA program are expected to be in the wastewater sector, particularly in wastewater treatment plants and sewerage networks. Investments will also be supported in industrial pollution control and prevention (e.g. common effluent treatment plants), and river front management (e.g. improvement of the built environment along river stretches, improvements of small Ghats and electric crematoria and the conservation and preservation of ecologically sensitive sites). Many investments are likely to combine elements of more than one of these sectors. An investment framework has been finalized for the selection of program investments.

The objectives of this investments framework are to:

- Provide a filter for all the NGRBA investments, for ensuring that the selected investments are well-prepared and amongst the most effective in reducing the pollution loads
- Make transparent the decision making process on investment selection; and,
- Ensure that the investments are implemented in a sustainable manner.

1.3 The project Area

Muni-ki-Reti Dhalwala lies in the foothills of Himalayas, at the confluence of River Ganga from North & Chandrabhaga River from south. Located in Tehri - Garhwal region of Uttarakhand on the national highway NH-58 at a distance of about 45 km from Dehradun, the Capital City of Uttarakhand, Muni Ki Reti is one of the river side town and important tourist place in Uttarakhand State. The holy city; Rishikesh and Haridwar are located at about 2 km and 27 km respectively away from the town through which holy river Ganga passes.

The towns Muni Ki Reti-Dhalwala, in the state Uttarakhand are becoming important being one of the major tourist attraction places of river Ganga situated on Badrinath Highway. The Muni ki Reti town is one of the beginning points for Char Dham Yatra. As Muni Ki Reti-Dhalwala towns have not been covered under any other town level sanitation programme therefore ULBs is enthusiastically handling the town sanitation plan development and implementation. ULB lack necessary technical capacity to understand and manage the issues under sanitation therefore there is a need to strengthen this capacity. There are a number of issues ranging from coverage, quality, infrastructure, awareness, institutional role clarity, financial aspects and human resources that are affecting the status of urban sanitation in the towns. The city sanitation investment plan intends to address these issues.

In absence of well-organized sewerage system in the town, the waste water generated from domestic sewage and kitchen waste normally find their way to the existing drains which ultimately flow into the Ganga River. Open defecation by the side of the surface drain (though limited) along with discharge generated by washing of clothes & discharge from hotels & ashrams ultimately leading to river Ganga is also a common sight, which adds further pollution to the river. People reside near to the river and a portion of the pilgrims visiting the holy Badrinath Temple to take bath in the river and as a result the water body becomes a constant source of contamination. All these cumulative pollution has deteriorated the condition of the river.
2. Project Description

2.1 About the City

Muni Ki Reti–Dhalwala is in Tehri Garhwal district in the Indian state of Uttarakhand. Muni ki Reti was declared an Urban Local Body (ULB) in year 1949. The town’s Local Body is known as Muni ki Reti Nagar Panchayat and Dhalwala Gram Panchayat. The towns lies close to pilgrimage town of Rishikesh, and is most known for a host of ashrams in the area.

Being holy and ancient, lakhs of pilgrims visit the Muni ki Reti during Kumbh/ Ardhkumbh, Kanwar Yatras during Shivratri and many holy occasions like Somvati Amavasya, Purnima, Makar Sankranti etc. Very famous pedestrian bridge “Ram – Jhula” connecting both the banks of river Ganga is in Muni ki Reti. It is said that a bridge was constructed by Lord Rama in his time. There are large number of Ashrams, Temples & hotels located at Muni Ki Reti. During Shivratri lakhs of pilgrims cross the river Ganga by Ram Jhula to Pour Ganga Jal to Lord Shiva at - Neelkanth Mahadev temple.

Muni Ki Reti-Dhalwala town are fast developing town of the state of Uttarakhand along Haridwar - Shri Badrinath road (NH -58). These are growing as a transition towns and works as central place for tourist purpose. Location of Muni ki Reti within Ganga Basin is provided in Figure 2.1.

Figure 2.1: Location of Project Area within Ganga Basin

Average dry weather flow in river Ganga and tributaries is mentioned in table 2.1 below:
Table 2.1: Data of River Ganga and Tributaries in Project Area

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of River</th>
<th>Max Discharge</th>
<th>Lean Discharge</th>
<th>Catchment Area (sq.km)</th>
<th>High Flood Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Holy Ganga River</td>
<td>12,000 cumec</td>
<td>458 cumec</td>
<td>1750.00</td>
<td>341.72M</td>
<td>At Triveni ghat Rishikesh, Uttarakhand.</td>
</tr>
<tr>
<td>2.</td>
<td>Chandrabhaga River</td>
<td>683 cumec</td>
<td>50 cusec</td>
<td>180.00</td>
<td>347.56M</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.2: Map of Tehri Garhwal

2.2 Geographical Location

Muni-ki-Reti Dhalwala lies at the confluence of River Ganga from North & Chandrabhaga River from south. Located in Tehri- Garhwal region of Uttaranchal on the national highway NH-58 at a distance of about 45 km from Dehradun, the Capital City of Uttarakhand, Muni Ki Reti is one of the river side town and important tourist place in Uttarakhand State. The holy city; Rishikesh and Haridwar are located at about 2 km and 27 km respectively away from the town through which holy river Ganga passes.
2.3 Climate

The town experiences cold winters during November – February, with temperatures ranging from 5-8°C and summers from May – June with temperatures varying from 20-30°C. The monsoon period extends from June to September with average rainfall recorded is 435 mm.

2.4 Topography

The Muni Ki Reti-Dhalwala town is at a latitude and longitude of 30°04’N & 78°10’E respectively with hilly terrain sloping towards river Chandrabhaga on the right side of the town and River Ganga along the National Highway. The sacred Ganga River passes through the said town. On average, the town’s altitude is 356 meters above mean sea level. However there is a wide variation in the town’s elevation ranging with a difference of 50 m between the highest and lowest point in the town. The city is surrounded by seven prominent Shivalik hills and a main tourist destination with respect to the sacred river Ganges.

2.5 Necessity of this project

Muni Ki Reti – Dhalwala are river side towns and important tourist place in Uttarakhand State. The population of Muni Ki Reti and Dhalwala towns has increased considerably in past few years. Moreover, being one of the beginning points of “Char Dham Yatra” and an important tourist place, the towns have considerable influx of pilgrims. This has resulted in increase in
wastewater generation in these towns. The existing sewerage network in Muni ki Reti was laid during GAP I, around year 1986. Thereafter, there is no planned extension of sewerage network in the town. The sewerage network for Dhalwala town is although recently laid (during year 2009 -11), but the household are not yet given access, reportedly due to absence of well-defined outfall. Moreover, even in areas having sewer network, not all the population is connected to the network. A segment of population is depending upon community toilets or defecating in open. Therefore, a substantial quantum of wastewater generated in towns is being discharged in open or nearby drains, which ultimately joins river Ganga. Since the wastewater remains untreated till final disposal in river, it is adversely impacting the river water quality.

Therefore, there is an urgent need to upgrade the existing sewerage infrastructure and community sanitation in the towns. The entire town area shall be covered under well planned and designed sewerage collection and conveyance network, with 100% population connected to the system. This wastewater shall be treated to the design effluent standards before final disposal in river, so as to maintain the river water quality.

2.6  Project components

The project components can be broadly divided in three components viz. a) Sewer Network, b) Sewage Pumping Station and c) Sewage Treatment Plant. The proposed scheme for renovation, up-gradation and augmentation of existing sewerage infrastructure is discussed in following sections:

a.  Sewer Network

Sewer networks are designed to collect & convey the wastewater generated in properties across the town to its treatment/disposal site.

Sewer networks are planned & designed to achieve its intended objective throughout its lifetime without any risk to public health, public safety & environment. Proposed scheme for sewer network includes following:

1. Laying of new sewerage network in un-sewered areas.
2. Capacity augmentation of sewers whose capacities are insufficient to carry design flow.
3. Replacement of damaged sections of sewers.
4. Integration of the new network with existing network
5. Ensure 100% sewerage connection for entire wastewater generated in town. Usage of onsite disposal system shall be discouraged in phased manner.
6. Storm water shall be separated from sewerage network. All interconnections of storm water network with sewerage network shall be cut off. Existing storm water drainage network to be rehabilitated.

7. Desilting of existing sewers.

8. Minimum diameter of sewers is recommended to be 200 mm, primarily for three reasons, i) Ease in cleaning & maintenance ii) Sewers in initial stretches are likely to suffer from silting in absence of adequate flow (even during peak flow conditions) resulting in reduction of carrying capacity, thus providing higher diameter sewer would ensure satisfactory performance of sewer over longer duration and iii) the value of infiltration into sewer network is an approximation and the infiltration could be higher during rains as the ground water level goes up; thus providing higher diameter sewer can take care of higher infiltration.

Estimated length of sewers under different categories is provided in table 2.2 below:

<table>
<thead>
<tr>
<th>Town</th>
<th>Approx. Length of New Sewers in areas deprived of Sewer Network (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Muni ki Reti</td>
<td>8495</td>
</tr>
<tr>
<td>Dhalwala</td>
<td>21029</td>
</tr>
</tbody>
</table>

* This includes area of Rishikesh town, for which scheme is to be designed in this project.

b. Sewage Pumping Station (SPS)

Pumping station are required to lift the sewage so as to discharge the collected sewage:

a) To another gravity sewer, whenever the depth of sewers are excessive leading to difficulty in construction and/or uneconomical.

b) For treatment of wastewater
c) For disposal of wastewater

A) Existing SPS

There is only one Sewage pumping station (SPS) in Muni Ki Reti and none in Dhalwala. The existing SPS was built in year 1986. The SPS is located within municipal boundary of Rishikesh. The SPS is of 8.0 m diameter with approximately 1.4 m of liquid depth with horizontal centrifugal pumps sets installed. The SPS has a wet well to collect sewage and a dry well wherein the pumps sets are installed. It receives sewage generated and collected in network from Muni Ki Reti town (i/c part of Rishikesh)

Existing Sewage Pumping Station

The SPS will require civil renovation / rehabilitation works associated with dismantling of existing partition wall, centrifugal pumps and provision of new pumps. Existing E& M equipment are proposed to be replaced suiting the design flow requirements of year 2030.
B) New SPS

New SPS is proposed in Dhalwala town along Chandrabhaga river. This SPS shall receive wastewater of Dhalwla town through a gravity trunk sewer and Muni ki Reti & Rishikesh towns (partially) through rising main.

The scheme of collection, intermediate pumping and terminal pumping is depicted in figure below:

C) Sewage Treatment Plant

There is no existing sewage treatment plant in Muni ki Reti – Dhalwala towns at present. The sewage collected from Muni ki Reti and part of Rishikesh area is collected in SPS at Muni ki Reti and pumped to STP at "Lakkar Ghat" area in Rishikesh.

It is proposed to construct a new STP under this scheme for sewage generated in Muni ki Reti and Dhalwala towns. Sewage of four wards of Rishikesh has also been included in this scheme. The STP is proposed to be constructed at "Chor Pani Area" location in Dhalwala town. The land for the proposed STP has been identified in consultation with ULB officials. Copy of NOC from Gram Panchayat Dhalwala is attached as Annexure -1.
3. Approach and Methodology

3.1 Methodology

As per Environmental and Social Management Frame work (NGRBA, 2011), the river pollution mitigation projects under the NGRBA is anticipated to encounter a variety of environmental and social problems. Hence, an environmental and social assessment with corresponding management plans for the proposed project of sewerage works in Muni ki Reti - Dhalwala has been conducted using the following methodology:

![Flowchart describing the steps adopted for project impact assessment](image)

**Figure3.1: Flowchart describing the steps adopted for project impact assessment**

**a. Defining the project area and carrying out scoping in the field:** Team undertook the field survey and transect walk of the Muni ki Reti – Dhalwala area to develop the understanding of the proposed project. Field visits helped to understand the local knowledge and were valuable in finding alternatives that help avoid or at least reduce the magnitude and severity of adverse impacts.

**b. Survey of the host population:** With the help of questionnaires, local people were interviewed in groups. A wide range of potentially affected people were interviewed in Muni ki Reti including street vendors, residents of households, residents of temporary settlements, shop keepers, hospital patients, hospital staff, etc. Both men and women were interviewed from different sections of the society. Team undertook three field visits to carry out the survey and understand the ground situation. The interviewees were asked about their awareness of the project, their response to it and the project is affecting them (during construction phase) and how it will affect them (after completion phase). Also they were asked about the mitigation plans they have adopted or are planning to adopt, suggestions for improvement and any public grievances. Surveys were conducted along the path of construction site.
c. Discussion with the key stakeholders: Most of the important key stakeholders were interacted during informal and formal discussions with them. All the associated government departments were visited to collect the relevant data and their feedback on the project activities.

d. Screening: Screening is undertaken in the feasibility stages of project development. The purpose of screening is to screen out “no significant impacts” from those with significant impacts and get a broad picture of the nature, scale and magnitude of the issues. Team conducted screening process using the screening checklist format provided in ESMF report of NGRBA, which is described in subsequent section.

e. Identify and assess the impacts: Based on the analysis of the data gathered from field survey, stakeholder interaction/ consultation and secondary sources, issues related to the environmental and social sectors were been identified. The impacts so identified were compared with the existing baseline environmental and social condition of the study region. The impacts of the activities are mostly positive with few adverse impacts.

f. Environment mitigation plan: Based on the environmental and social issues identified, and recommend any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. The mitigation plans is suggested in all three stages: designing phase, construction phase and, operation and maintenance phase.

3.2 Potential environment impacts of the project

From the screening format (as per NGRBA guidelines) it is concluded that the proposed project will have low negative environmental and social impacts. These impacts shall be further reduced by site specific Environmental and Social Management Plan (ESMP) implementation. The land identified for STP Site is forest land. It is a forest land but it is not close to an eco-sensitive area like national park, wild life sanctuary etc. However, to use it for construction of STP it will require Forest Clearance as per Forest (Conservation) Act, 1980 (With Amendments made in 1988) and Forest (Conservation) Rules, 2003 (With Amendments made in 2004).

The proposed project site is a forest land with some bushes only and will not result in loss of income from agricultural land, plantation or other existing land-use. The construction of proposed project will not require relocation of households or displace any tribal settlement Project shall not result in reduction of access to traditional and river dependent communities (s). Moreover, there is no tribal settlement in or around the project area. Thus, there will be minimal adverse social impacts due to the project.

Public consultation was held with the people of Muni ki Reti - Dhalwala and it was generally found that they had no objection regarding proposed location of STP. However, they were of the opinion that they will not accept any STP within the main town area. They were generally satisfied that the project will result in improved sanitation facility of the town in general.

Thus, it is concluded that the proposed project can be categorised as a Low Impact Category project as it is likely to cause minimal or no adverse environmental impacts on human populations or physical environment and as per EIA act no EIA clearance is required from MoEF. Minutes of meeting with Muni ki Reti Nagar Panchayat and Dhalwala Gram Panchayat is attached as Annexure -2.

The proposed project will not have any significant environmental impact but will rather improve health and sanitation facility of the town. In addition to project will also enhance the aesthetics of the entire town and lead to reduced pollution loading in the River Ganga.
Consultation with Dhalwala Pradhan for location of STP site

Dumping of waste to River

Public consultation at Crematoria

Consultation with Business group
4. Regulations and Legal Framework

4.1 Applicable Laws and Regulations – Environmental

The Government of India has laid down various policy guidelines, regulations, acts and legislations pertaining to sustenance and protection of environment and its various components. The following are the key regulations in India applicable for various development Projects.

- The Environment (Protection) Act, 1986
- The Ancient Monuments and Archaeological Sites and Remains Act, 1958
- Wildlife Protection Act, 1972
- Water (Prevention and Control of Pollution) Act, 1974 and its amendments
- Air (Prevention and Control of Pollution) Act, 1981
- Forest (Conservation) Act, 1980 and its amendments
- The Environment (Protection) Act, 1986
- The Motor Vehicle Act 1988
- Hazardous Wastes (Management & Handling) Rules, 1989
- The Municipal Solid Wastes (Management and Handling) Rules, 2000

**The Environment (Protection) Act, 1986**

The Environment (Protection) Act, popularly known as EP Act, is an umbrella legislation that supplements existing environmental regulations. Empowered by the EP Act, the Ministry of Environment & Forests (MoEF), Government of India has issued the following notifications regulating siting of Projects and its operation, procuring clearance to establish industries and development of Projects with appropriate EIA studies, coastal zone regulations and other aspects of environment care:

- Empowers the Government of India to make rules to regulate environmental pollution by stipulating standards and maximum allowable limits to prevent air, water, noise, soil and other environmental pollutants
- Prohibits operations that emit pollutants in excess of standards
- Regulates handling of hazardous substances and identifies persons responsible for discharges and pollution prevention
- It deals with offences committed by Government Departments

**Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments:** Any component of the project having potential to generate sewage or trade effluent will come under the purview of the Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments. Such projects have to obtain Consent to Establishment (CTE) under Section 25 of the Act from State Pollution Control Board (SPCB) before starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies. The following subprojects require CTE and CTO from SPCB:

(i) New or augmentation of water treatment plants; and
(ii) New or augmentation of sewage treatment plants.

**Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments:** The subprojects having potential to emit air pollutants into the atmosphere have to obtain CTE
under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from SPCB before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution. The following require CTE and CTO from SPCB:

(i) Diesel generators; and
(ii) Hot mix plants, wet mix plants, stone crushers, etc., if installed for construction. Emissions and discharges shall comply with standards notified by the CPCB.

Forest Legislations: - The government’s forest legislation dates back to enactment of the Indian Forest Act of 1927. This Act empowers State of Uttarakhand to declare “any forest land or waste-land, which is the property of government or over which the government has proprietary rights or to the whole or any part of the forest-produced of which the government is entitled,” a reserved forest or protected forest. The Act also allows government control over forest and lands not being the property of the government.

For reserved forests and village-forests, activities like clearing or breaking up of any land for cultivation or for any other purpose, damage to vegetation and/or trees and quarrying or removing any forest produce are prohibited. For protected forests, with the provision of the Act, State of Uttarakhand makes rules to regulate activities like cutting of trees and removal of forest produce; clearing or breaking up of land for cultivation or any other purpose; and for protection and management of any portion of protected forest.

According to the Act, State of Uttarakhand requires prior approval of MoEF for the use of forest land for non-forest purposes (means the breaking up or clearing of any forest land) or for assigning lease to any private person or agency not controlled by government. The Forest (Conservation) Rules of 2003 issued under this Act provide specific procedures to be followed for conversion of forest land for non-forest purposes. For the proposed project 1 Ha of forest land is required to divert for construction of STP.

Conversion of forest lands that are part of National Parks and/or Sanctuaries and Tiger Reserve areas (notified under Indian Wildlife [Protection] Act of 1972) is not permitted. In exceptional case, State of Uttarakhand requires consent of the Indian Board of Wildlife for obtaining approval of the State Legislature for de-notification of the area as a sanctuary. The State or National Wildlife Board under MoEF is the authority which will grant a “No Objection Certificate” for any construction within a sensitive area. Every user agency, who proposes to use any forest land for non-forest purposes and use buffer zone of the wildlife protected areas for other purposes, must apply for forest and/or wildlife clearance.

Cutting of trees in non-forest land, irrespective of land ownership, also requires permission from the State Forest and Environment Department. Afforestation to the extent of two trees per each tree felled is mandatory.

Ancient Monuments and Archaeological Sites and Remains Rules, of 1959 and amendments of 2011:- The Rules designate areas within a radius of 100 meters (m) and 300 m from the “protected property” as “protected area” and “controlled area” respectively. No development activity (including mining operations and construction) is permitted in the “protected area” and all development activities likely to damage the protected property are not permitted in the “controlled area” without prior permission of the Archaeological Survey of India (ASI). Protected property includes the site, remains, and monuments protected by ASI or the State Department of Archaeology.

For the subproject, activities within Archaeologically Protected Areas will be avoided. If activities are to be done in the controlled area of protected properties, then the executing and
implementing agencies and the line department will take the necessary No Objection Certificates from ASI.

The Environmental Impact Assessment Notifications 2006 and its Amendments

The EIA Notification of MoEF dated of 2009 is silent on the requirement of an environmental clearance for a sewerage network project.

4.2 Applicable Laws and Regulations - Social

All strategic interventions on human development, spread across all social issues, need directives of policies and legal support to operationalize the appropriate actions. These policies and legislations help to overcome the constraints and support administrator, implementer, community and individual in delivery of justice. This section includes the National policies and Acts as detailed under:

National Policies and Acts
i) National Tribal Policy, 2006
ii) National Resettlement and Rehabilitation Policy, 2007
iii) Land (Acquisition) Act 1894 (as amended)
iv) Forest Rights Act, 2006

The National Tribal Policy (2006)
The Policy has the following objectives:

Regulatory Protection
- Providing an environment conducive to the preservation of traditional and customary systems and regime of rights and concessions enjoyed by different Schedule Tribe (ST) communities, and reconciliation of modes of socio-economic development with these.
- Preventing alienation of land owned by STs and restoring possession of wrongfully alienated lands.
- Protection and vesting of rights of STs on forestlands and other forest rights including ownership over Minor Forest Produce (MFP), minerals and water bodies through appropriate legislations and conversion of all forest villages into revenue villages.
- Protection of political rights to ensure greater and active participation of tribal peoples in political bodies at all levels.

National Resettlement and Rehabilitation Policy for Project Affected Families - 2007

The national policy on resettlement and rehabilitation represents a significant milestone in the development of a systematic approach to addressing resettlement. The policy establishes a Guideline for extending additional assistance to project-affected families, over and above the compensation for affected assets provided under the Land Acquisition (LA) Act.

This policy strikes a balance between the need for land for developmental activities and protecting the interests of land owners and others. The benefits under the new policy are available to all Affected Persons (AP) and families whose land, property or livelihood is adversely affected by land acquisition, involuntary displacement due to natural calamities, etc.

Land Acquisition Act, 1894 (As Modified Until 1st September, 1985)

The Act is applicable to the whole of India except the state of Jammu and Kashmir. The policy provides a broad guideline of procedure of land acquisition. The Land Acquisition (LA) Act of
1984 is commonly used for acquisition of land for any public purpose. It is used at the State level with State amendments made to suit local requirements. Expropriation of and compensation for land, houses and other immovable assets are carried out under the Land Acquisition (Amendment) Act, 1984. The Act deals with compulsory acquisition of private land for public purpose. The LA Act does not contain any provision specifically dealing with resettlement including income restoration aspects.

**Forest Rights Act 2006**

The Act basically does two things:
- Grants legal recognition to the rights of traditional forest dwelling communities, partially correcting the injustice caused by the forest laws.
- Makes a beginning towards giving communities and the public a voice in forest and wildlife conservation

**4.3 Other Legislations applicable to Construction Projects under NGRBA**

Construction stage generally involves equity, safety and public health issues. The construction agencies therefore will be required to comply with laws of the land, which include inter alia, the following:

- **Workmen’s Compensation Act 1923** (the Act provides for compensation in case of injury by accident arising out of and during the course of employment);
- **Payment of Gratuity Act, 1972** (gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years);
- **Employees PF and Miscellaneous Provision Act 1952** (the Act provides for monthly contributions by the employer plus workers);
- **Maternity Benefit Act, 1951** (the Act provides for leave and some other benefits to women employees in case of confinement or miscarriage, etc.);
- **Contract Labor (Regulation and Abolition) Act, 1970** (the Act provides for certain welfare measures to be provided by the contractor to contract labour);
- **Minimum Wages Act, 1948** (the employer is supposed to pay not less than the Minimum Wages fixed by the Government as per provisions of the Act);
- **Payment of Wages Act, 1936** (it lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers);
- **Equal Remuneration Act, 1979** (the Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees);
- **Payment of Bonus Act, 1965** (the Act provides for payments of annual bonus subject to a minimum of 83.3% of wages and maximum of 20% of wages);
- **Industrial Disputes Act, 1947** (the Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment);
- **Industrial Employment (Standing Orders) Act; 1946** (the Act provides for laying down rules governing the conditions of employment);
- **Trade Unions Act, 1926** (the Act lays down the procedure for registration of trade unions of workers and employers. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities);
- **Child Labour (Prohibition and Regulation) Act, 1986** (the Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in Building and Construction Industry);
Inter-State Migrant Workmen’s (Regulation of Employment and Conditions of Service) Act, 1979 (the inter-state migrant workers, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home to the establishment and back, etc.);

The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 (all the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act; the employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for Workers near the workplace, etc.);

The Factories Act, 1948 (the Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours and rendering information-regarding accidents or dangerous occurrences to designated authorities);

Hazardous Wastes (Management and Handling) Rules, 1989 (the Rules govern handling, movement and disposal of hazardous waste);

Manufacture, Storage and Import of Hazardous Chemicals Rules 1989, amended 1994 and 2000 (the Rules provide indicative criteria for hazardous chemicals and require occupiers to identify major accident hazards and prepare on-site and off-site emergency plans)

Summary of Environmental Clearances required is given below in Table 4.1
### Table 4.1: Summary of Environmental Clearances required for the project

<table>
<thead>
<tr>
<th>Components</th>
<th>Act</th>
<th>NOC required</th>
<th>Action Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage treatment plant (STP)</td>
<td>Water (prevention and control of pollution)</td>
<td>Consent to Establishment (CTE) and Consent to Operation (CTO) from Uttarakhand Environment Protection and Pollution control Board (UEPPCB)</td>
<td>Based on project review and site inspection the UEPPCB provides CTE before construction. The disposal standards to be met during the operation will be stipulated. Subsequent to completion of construction, CTO is issued confirming compliance of CTE conditions, if any.</td>
</tr>
<tr>
<td></td>
<td>Air (Prevention and Control of Pollution)</td>
<td></td>
<td>Renewal of CTO during operation</td>
</tr>
<tr>
<td></td>
<td>Act of 1981, Rules of 1982 and amendments</td>
<td></td>
<td>Based on the performance of the STP and its compliance with the disposal standards CTO will be renewed every year.</td>
</tr>
<tr>
<td>Forest Land for STP</td>
<td>Indian forest Act 1980</td>
<td>Diversion of Forest land</td>
<td>According to the Indian forest Act, State of Uttarakhand requires prior approval of MoEF for the use of forest land for non-forest purposes (means the breaking up or clearing of any forest land) or for assigning lease to any private person or agency not controlled by government. The Forest (Conservation) Rules of 2003 issued under this Act, provide specific procedures to be followed for conversion of forest land for non-forest purposes. Conversion of forest lands that are part of National Parks and/or Sanctuaries and Tiger Reserve areas (notified under Indian Wildlife [Protection] Act of 1972) is not permitted. In exceptional case, State of Uttarakhand requires consent of the Indian Board of Wildlife for obtaining approval of the State Legislature for de-notification of the area as a sanctuary. The State or National Wildlife Board under MoEF is the authority which will grant a “No Objection Certificate” for any construction within a sensitive area. Every user agency, who proposes to use any forest land for non-forest purposes and use buffer zone of the wildlife protected areas for other purposes, must apply for forest and/or wildlife clearance.</td>
</tr>
</tbody>
</table>
5. **Baseline Status**

5.1 **Geographical Location**

Muni-ki-Reti Dhalwala lies at the confluence of River Ganga from North & Chandrabhaga River from south. Located in Tehri- Garhwal region of Uttarakhand on the national highway NH-58 at a distance of about 45 km from Dehradun, the Capital City of Uttarakhand, Muni Ki Reti is one of the river side town and important tourist place in Uttarakhand State. The holy city; Rishikesh and Haridwar are located at about 2 km and 27 km respectively away from the town through which holy river Ganga passes.

Muni Ki Reti is a small town in Tehri Garhwal district of Uttarakhand state in India. Situated at an elevation of 356 meters above the sea level, Muni Ki Reti is mistakenly considered an extension of Rishikesh, being very close to it.

The area along the proposed project is Muni ki Reti classified as class IV town and has a Nagar Panchayat. The Muni ki Reti Nagar Panchayat (MNP) was established in 1950. The MNP has 7 wards and 7 elected members, led by a chairperson that is directly elected by the people. The administrative functions are led by Executive Officer (EO). The MNP is responsible for provisions of services as sanitation (community toilets, LCS) street-lighting maintenance of roads, parks, and recreational facilities. Main sources of revenue generation for MNP are property taxes, license fees and rent for market buildings.

Dhalwala is Village (Rural area) in Narendra Nagar Mandal in Tehri Garhwal district, in Uttarakhand State. Dhalwala is 44 km far from its State’s Capital City Dehradun.

Dhalwala GP has 15 wards and each ward has elected members, led by Gram Pradhan. Dhalwala Gram Panchayat (DGP) has the same duties for Dhalwala as MNP has for Muni ki Reti.

Muni Ki Reti is well connected with major destinations of the region like Dehradun (51 km), Rishikesh (3 km), Haridwar (27 km). From Delhi, one has to take NH 58 to Rishikesh from where Muni Ki Reti is another 3 km drive. Nearest railhead is Rishikesh and nearest airport is Jolly Grant (17 km) of Dehradun.

5.2 **Administrative divisions**

Both Muni ki Reti and Dhalwala have an area of 6.00 sq. km. The population of Muni-ki-Reti was 7,881 as per 2001 census and 10,551 as per 2011 census. The population of Dhalwala is 11,755 as per 2001 census and 18,007 as per 2011 census (as per data collected from Statistical department Narendra Nagar). With this the growth rate for Muni Ki Reti and Dhalwala is increasing arithmetically. The Population Density of Muni-ki-Reti is 1,760/km2 & Population Density of Dhalwala is 3,000/km2 for the Year 2011. Copy of census population certified by Muni ki Rete Nagar Panchayat is attached as annexure -3.

5.3 **Ward wise Census Population Data**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Satrughan ward</td>
<td>1185</td>
<td>1428</td>
<td>358</td>
</tr>
<tr>
<td>2</td>
<td>Bhagan Gad ward</td>
<td>1128</td>
<td>1771</td>
<td>411</td>
</tr>
<tr>
<td>3</td>
<td>Ganga Chetra ward</td>
<td>1121</td>
<td>1055</td>
<td>259</td>
</tr>
<tr>
<td>4</td>
<td>Shisumwada ward</td>
<td>1205</td>
<td>1124</td>
<td>136</td>
</tr>
</tbody>
</table>

Client: 
Uttarakhand Peyjal Sansadhan
Vikas Evam Nirman Nigam

Consultants: 
AECOM India Pvt. Ltd., New Delhi
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Veshnav Devi Mandir ward</td>
<td>1133</td>
<td>2376</td>
<td>541</td>
</tr>
<tr>
<td>6</td>
<td>Swami Narayan Basic School ward</td>
<td>1068</td>
<td>1167</td>
<td>252</td>
</tr>
<tr>
<td>7</td>
<td>Dayanand Ashram ward</td>
<td>1041</td>
<td>1630</td>
<td>392</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>7,881</strong></td>
<td><strong>10,551</strong></td>
<td><strong>2,349</strong></td>
</tr>
</tbody>
</table>

Table 5.3: Population of Dhalwala

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of ward</th>
<th>Population 2001</th>
<th>Population 2011</th>
<th>House hold 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ward No.1</td>
<td>647</td>
<td>991</td>
<td>184</td>
</tr>
<tr>
<td>2</td>
<td>Ward No.2</td>
<td>627</td>
<td>960</td>
<td>178</td>
</tr>
<tr>
<td>3</td>
<td>Ward No.3</td>
<td>999</td>
<td>1,530</td>
<td>283</td>
</tr>
<tr>
<td>4</td>
<td>Ward No.4</td>
<td>744</td>
<td>1,140</td>
<td>211</td>
</tr>
<tr>
<td>5</td>
<td>Ward No.5</td>
<td>686</td>
<td>1,051</td>
<td>195</td>
</tr>
<tr>
<td>6</td>
<td>Ward No.6</td>
<td>744</td>
<td>1,140</td>
<td>211</td>
</tr>
<tr>
<td>7</td>
<td>Ward No.7</td>
<td>1,098</td>
<td>1,682</td>
<td>311</td>
</tr>
<tr>
<td>8</td>
<td>Ward No.8</td>
<td>882</td>
<td>1,351</td>
<td>255</td>
</tr>
<tr>
<td>9</td>
<td>Ward No.9</td>
<td>627</td>
<td>960</td>
<td>171</td>
</tr>
<tr>
<td>10</td>
<td>Ward No.10</td>
<td>647</td>
<td>991</td>
<td>177</td>
</tr>
<tr>
<td>11</td>
<td>Ward No.11</td>
<td>744</td>
<td>1,140</td>
<td>204</td>
</tr>
<tr>
<td>12</td>
<td>Ward No.12</td>
<td>940</td>
<td>1,440</td>
<td>257</td>
</tr>
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<td>13</td>
<td>Ward No.13</td>
<td>666</td>
<td>1,020</td>
<td>189</td>
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<td>14</td>
<td>Ward No.14</td>
<td>744</td>
<td>1,140</td>
<td>204</td>
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<tr>
<td>15</td>
<td>Ward No.15</td>
<td>960</td>
<td>1,471</td>
<td>272</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>11,755</strong></td>
<td><strong>18,007</strong></td>
<td><strong>3,302</strong></td>
</tr>
</tbody>
</table>

5.4 Climate

The town experiences cold winters during November – February, with temperatures ranging from 5-8°C and summers from May – June with temperatures varying from 20-30°C. The monsoon period extends from June to September with average rainfall recorded is 435 mm.

5.5 Topography

The Muni Ki Reti-Dhalwala town is at a latitude and longitude of 30°04’N & 78°10’E respectively with hilly terrain slopping towards river Chandrabhaga on the right side of the town and River Ganga along the National Highway. The sacred Ganga river passes through the said town. On average, the town’s altitude is 356 meters above mean sea level. However there is a wide variation in the town’s elevation ranging with a difference of 50 m between the highest and lowest point in the town. The city is surrounded by seven prominent Shivalik hills and a main tourist destination with respect to the sacred river Ganges.

Due to the fragile eco-system and geo-dynamic terrain, Uttarakhand State is highly vulnerable to natural disasters like earthquakes, landslides, forest fires, and cloud burst etc. According to hazard zoning in the Vulnerability Atlas of India, the whole of Uttarakhand falls under “very high” to “high” category earthquake zone. The problems of landslides, subsidence, and erosion are quite common in the hilly regions of the State due to combination of several factors like geological movements, structure, lithology, water seepage, soil cover, vegetal cover, weather, and climatic changes.
5.6 Air Quality

The proposed subproject does not cover industrialized areas, and hence the air pollution is not significant. The main sources of air pollution at present are due to emissions from mobile sources i.e. from minor vehicular traffic and wind-blown dust/sand. Thus, the air quality is considered to be good.

5.7 Noise

The subproject area represents mostly urban area of Muni ki reti and rural area of Dhalawala. The ambient noise levels vary from very low to low in the urban, built-up areas. Near some congested areas of, the noise levels are moderate. The overall impact on the ambient noise level is not significant.

5.8 Water quality

The Central Pollution Control Board (CPCB) with the assistance of Environment Protection and Pollution Control Board Uttarakhand regularly checks the water quality of River Ganga for a considerable time period. BOD, DO, and Faecal Coliforms (FC) normally indicate the biological health of a river. These parameters were selected to study the water quality trend in the River Ganga for the year 2011 in Uttarakhand. Water quality status of River Ganga in Upstream of Laxman Jhula in Uttarakhand in terms of DO, BOD, and FC is shown in Table 5.1 below. The laboratory water quality testing reports of River Ganga and drains in Muni ki Reti area are attached in DPR of Sewerage works.

Table 5.1: River Water Quality in Ganga at upstream of Muni Ki Reti

<table>
<thead>
<tr>
<th>Sr. NO.</th>
<th>Month</th>
<th>Temp °C</th>
<th>pH</th>
<th>DO (mg/L)</th>
<th>BOD (mg/L)</th>
<th>Total Coli form /100ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Jan-2012</td>
<td>13.0</td>
<td>6.84</td>
<td>9.2</td>
<td>1.2</td>
<td>60</td>
</tr>
<tr>
<td>2.</td>
<td>Feb-2012</td>
<td>15.3</td>
<td>7.43</td>
<td>7.8</td>
<td>1.23</td>
<td>70</td>
</tr>
<tr>
<td>3.</td>
<td>March-2012</td>
<td>16.0</td>
<td>7.48</td>
<td>8.8</td>
<td>1.0</td>
<td>110</td>
</tr>
<tr>
<td>4.</td>
<td>April-2012</td>
<td>19.7</td>
<td>7.96</td>
<td>8.8</td>
<td>1.0</td>
<td>70</td>
</tr>
<tr>
<td>5.</td>
<td>May-2012</td>
<td>18.0</td>
<td>8.12</td>
<td>8.0</td>
<td>1.6</td>
<td>80</td>
</tr>
<tr>
<td>6.</td>
<td>June-2012</td>
<td>18.0</td>
<td>8.12</td>
<td>8.4</td>
<td>1.2</td>
<td>160</td>
</tr>
</tbody>
</table>

*Source: River Water pollution Status, January 2012 to June 2012, CPCB.*
Figure 5.1: Trend in biochemical oxygen demand in the River Ganga in Uttarakhand
**WATER QUALITY DATA FOR RIVER GANGA**
(Summer Average: March-June)

<table>
<thead>
<tr>
<th>STATION NAME</th>
<th>DISTANCE</th>
<th>DISSOLVED OXYGEN (DO) (mg/l)</th>
<th>Nitrate (NO₃) (mg/l)</th>
<th>Ammonia (NH₄) (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muni KI Reti</td>
<td>0</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Hardwar/D/S</td>
<td>30</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Garhmukteshwar</td>
<td>75</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Karnaj</td>
<td>430</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Katpur</td>
<td>530</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Allahabad</td>
<td>733</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Varanasi</td>
<td>808</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Varanasi</td>
<td>816</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Patna</td>
<td>1198</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Patna</td>
<td>1198</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Patna</td>
<td>1198</td>
<td>8.1</td>
<td>8.6</td>
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<tr>
<td>Patna</td>
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<td>Patna</td>
<td>1198</td>
<td>8.1</td>
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<td>Patna</td>
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<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
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<tr>
<td>Patna</td>
<td>1198</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>Patna</td>
<td>1198</td>
<td>8.1</td>
<td>8.6</td>
<td>8.9</td>
</tr>
</tbody>
</table>

*Note: Data not available for March-June when temperatures are high and flows are low.*

Source: NW/R, Hardwar

**Client:**
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Vikas Evam Nirman Nigam

**Consultants:**
AECOM India Pvt. Ltd.,
New Delhi
5.9 Drainage

There are 15 nos. of Nala/Natural Drainage in the town that are carriers of sewage and storm water that finally discharge the same into river Ganga. Further, of these Fifteen, Nine (9) are pure storm water carrying channel and are elaborated below:

1. Dhalwala Nala
2. Darshan mahavidhyala Nala
3. Old Hanuman Temple Nala
4. Police Guest house Nala
5. PWD Guest house Nala
6. Omkarnand Public Ghat Nala
7. Public Toilet Nala
8. Asian Gems & Handicraft Nala
9. Shivanand Bhawan Nala

All above Nala used to carry untreated sewage, but with increased coverage of sewerage network and on-site disposal system and also due to efforts made by Uttrakhand irrigation department, discharge of untreated wastewater is stopped in these drains.

Following six drains are carrying untreated wastewater in addition to storm water at present.

1. Khara Sroat Nala:
2. Bus Stand Nala
3. Naw Ghat Nala
4. Shamshan Ghat Nala
5. Ganga Resort Nala
6. Chandreshwar Nala

Bus Stand Nala
Shamshan Ghat Nala

5.10 Biodiversity and Ecological

Uttarakhand the 27th state of Republic of India lies between 28° 44’ & 31° 28’ N Latitude and 77° 35’ & 81° 01’ East longitude. It was carved out of UP on 9th November 2000 with 13 Districts. The geographical area of the state is 53,483 sq. km and the terrain and topography of the state is largely hilly with large areas under snow cover and steep slopes. Uttarakhand is geopolitically also very sensitive state due to its international boundaries in North (Nepal & Tibet). It forms North-Western boundary with Himachal Pradesh, North and North-Eastern boundary with Tibet, Eastern with Nepal and Southern with plains of UP. Whereas, the Southern boundary is artificial, remaining namely Northern, Western and the Eastern boundaries are natural with Tons and Yamuna rivers in West, Kali in the East and the Indo-Tibetan watershed in the North. Thus the state is of immense importance not only for the states, downstream due to soil and moisture conservation but strategically also due to its international border with Nepal & Tibet (China).

Major portion of the state is mountainous and these mountains (Himalayas) are one of the youngest mountain systems of the world (40 million years in age compared to peninsular mountains of 1500-2500 million years old) and hence ecologically very fragile and relatively much more susceptible to earthquakes and landslides. There are four major river systems viz. Ganga, Yamuna, Ramganga & Sharda originating from the state along with their tributaries are major source of water for drinking, irrigation and hydropower. The major wealth of the state is its forests with very rich biodiversity. Therefore, any let up in land management, of which forest management is the core, will have a telling effect on state’s downstream with regard to water supply, soil erosion and consequent floods and impoverishment of agricultural land.

The state has 13 districts as administrative units with 78 Tehsils and 95 community development blocks. The human population of the State is 84.79 lacs (2001) compared to 25.18 lacs in 1951 and that of livestock is 49.4 lacs in 2003 as compared to 41.68 lacs (1993) and 38.692 in 1972. The human and livestock population is largely dependent on forests due to Agrarian economy and age old pastoralism leading to heavy pressure on forests and consequent degradation of ecology and environment of the area.

Although the State of Uttarakhand is well endowed with biological resources, the past decades have seen an increase in pressure on the state’s natural ecosystems. The entire Siwalik ecosystem of Uttarakhand has been virtually degraded of its forest cover, and forested landscape has been pushed to the Upper reaches of the State.
The state is represented by biographic zone 2B Western Himalaya and 7B Shiwaliks consisting of Kumaon and Garhwal two regions. Total geographical area of the state (53,483 sq.km) is 1.6 % of country’s geographical area, out of which 46,035 sq.km is hilly. The state has thus varied terrain, major portion of which is mountainous with unique ecological diversity consisting of high alpine areas to the Sub-tropical and Tropical regions.

Physiographically, the state can be divided into three zones namely, the Himalaya, The Shiwalik and the Tarai Region. The state has a temperate climate except in plain areas where the climate is tropical. The average annual rainfall is 1550 mm.

There are four major river systems viz. Ganga, Yamuna, Ramganga & Sharda originating from the state along with their tributaries which are major source of water for drinking, irrigation and hydropower. The major wealth of the state is its forests with very rich biodiversity. The state ranks sixth among the other states in terms of percentage of recorded forest area.

The hilly State of Uttarakhand has a forest cover of 65 % of its total geographical areas (slightly lower than the stipulated 66.6 % forest cover for hilly states). Muni ki Reti - Dhalwala, is a semi urban area surrounded by hilly forested areas. There is no remaining natural habitat within the developed area of the City.

5.11 Protected Areas

Due to vast biodiversity present in Uttarakhand 12 percent of total geographical area is protected areas which includes 6 National Park & 6 Wildlife Sanctuary. Uttarakhand is home to many rare species of plants and animals, many of which are protected by sanctuaries and reserves. National parks in Uttarakhand include the Jim Corbett National Park (first national park of India) at Ramnagar in Nainital District, and Valley of Flowers National Park and Nanda Devi National Park in Chamoli District, which together are a UNESCO World Heritage Site. A number of plant species in the valley are internationally threatened, including several that have not been recorded from elsewhere in Uttarakhand. Rajaji National Park in Haridwar District and Govind Pashu Vihar National Park and Sanctuary and Gangotri National Park in Uttarkashi District are some other protected areas in the state.

According to scientific studies in the state 102 mammals, 600 of birds, 19 amphibians, 70 reptiles and 124 species of fish are found. In these above mentioned species there are globally endangered species which consists of tiger (Panthera tigers), Asian elephant (Elephas maximus), Guldar (Panthera pardus), Musk deer (Moschus chrysogaster), Snow leopard (Panthera uncia), Monal (Lophophorus impejanus) etc.

Protected areas in Uttarakhand:-

Uttarakhand has 6 National Park and 6 Wildlife Sanctuary and 2 Conservation Reserve, whose details are as follows in Table 5.4 to 5.6:-

<table>
<thead>
<tr>
<th>S. No</th>
<th>Protected Area</th>
<th>Area (km²)</th>
<th>Inauguration year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Corbett National Park</td>
<td>520.82</td>
<td>1936</td>
</tr>
<tr>
<td>2</td>
<td>Nanda Devi National Park</td>
<td>624.60</td>
<td>1982</td>
</tr>
<tr>
<td>3</td>
<td>Valley of Flowers National Park</td>
<td>87.50</td>
<td>1982</td>
</tr>
<tr>
<td>4</td>
<td>Rajaji National Park</td>
<td>820.42</td>
<td>1983</td>
</tr>
<tr>
<td>5</td>
<td>Gangotri National Park</td>
<td>2390.02</td>
<td>1989</td>
</tr>
<tr>
<td>6</td>
<td>Govind National Park</td>
<td>472.08</td>
<td>1990</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>4915.44</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 5.5: Wildlife Sanctuary:-

<table>
<thead>
<tr>
<th>S. No</th>
<th>Protected Area</th>
<th>Area (km²)</th>
<th>Inauguration year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Govind wildlife sanctuary</td>
<td>485.89</td>
<td>1955</td>
</tr>
<tr>
<td>2</td>
<td>Kedarnath wildlife sanctuary</td>
<td>975.20</td>
<td>1972</td>
</tr>
<tr>
<td>3</td>
<td>Askot wildlife sanctuary</td>
<td>599.93</td>
<td>1986</td>
</tr>
<tr>
<td>4</td>
<td>Sonanadi wildlife sanctuary</td>
<td>301.18</td>
<td>1987</td>
</tr>
<tr>
<td>5</td>
<td>Binsar wildlife sanctuary</td>
<td>47.07</td>
<td>1988</td>
</tr>
<tr>
<td>6</td>
<td>Mussoorie wildlife sanctuary</td>
<td>10.82</td>
<td>1993</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>2420.09</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.4: Conservation Reserve:-

<table>
<thead>
<tr>
<th>S. No</th>
<th>Protected Area</th>
<th>Area (km²)</th>
<th>Inauguration year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jhilml Jheel Conservation Reserve</td>
<td>37.84</td>
<td>2005</td>
</tr>
<tr>
<td>2</td>
<td>Aasan Conservation Reserve</td>
<td>4.44</td>
<td>2005</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>42.28</strong></td>
<td></td>
</tr>
</tbody>
</table>

The closest protected area to Muni ki Reti is Rajaji National Park. The park has been created in 1983 by incorporation of three sanctuaries - Rajaji sanctuary (estd. 1948) Motichur sanctuary (estd. 1964) and Chilla sanctuary (estd. 1977) after the name of renowned statesman and freedom fighter Shri C. Rajgopalachariya - The first and last Governor General of independent India popularly known as "Rajaji". The park is spread over an area of 820.42 sq. km in three Districts- Dehradun, Haridwar & Pauri Garhwal of Uttarakhand State, India. The Park has got the largest area representing Shiwalik Eco-system. The Shiwalik trail is 10 million year old and very rich in fossils. Its fossils faunal remains include about 50 species of elephant; one of them is present today. Figure 5.2 shows distance between STP and Nearest National Park.

![Map of Muni Ki Reti and Nearest National Park](image_url)

**Figure 5.2 Location of Nearest National Park to STP location**

The majestic Ganges flows through the National Park for a distance of 24km, besides the innumerable streams and brooks making it rich and diverse. It offers ample opportunities to nature lovers to enjoy the captivating landscape and wildlife. Rajaji is thickly foliated predominantly by the Rajaji is thickly foliated predominantly by the Sal Forest and a number of other forest types which include the Western Gangetic Moist and Northern dry Deciduous and Khair - Sissoo forests. Low Alluvial Savannah Woodlands cover the drier southern margins of the park, in contrast to the Shiwalik Chir-Pine on the high reaches of the hills.
The park is home to the Tiger, Leopard, Himalayan Bear, Cheetal, hog deer, barking deer, Sambar deer, wild boar, antelopes such as the Nilgai, Goral, Jackal, Hyena, Jungle Cat, Leopard Cat, Civets, Himalayan Yellow-Throated Marten, Sloth Bears, Pythons, King Cobra, Common Krait, Indian Cobra and the Monitor Lizard and above All the Asian Elephant.

Figure 5.3 Map of Rajaji National Park

Table 5.7 and Figure 5.4 & 5.5 below gives the distance of STP site from important sensitive receptors

<table>
<thead>
<tr>
<th>Feature</th>
<th>Aerial Distance</th>
<th>Direction WRT proposed site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tirsat Reserved Forest</td>
<td>2.1 Km</td>
<td>South West</td>
</tr>
<tr>
<td>Protected Forest (Dhalwala)</td>
<td>0.0 km</td>
<td>-</td>
</tr>
<tr>
<td>Raidaspur – Residential</td>
<td>1.4 km</td>
<td>South</td>
</tr>
<tr>
<td>Ashutoshnagar</td>
<td>1.3 km</td>
<td>South</td>
</tr>
<tr>
<td>Brahmnada Ashram</td>
<td>1.4 km</td>
<td>South East</td>
</tr>
<tr>
<td>Kailash Ashram</td>
<td>1.7 km</td>
<td>South East</td>
</tr>
<tr>
<td>Muni ki Reti</td>
<td>2.6 km</td>
<td>South</td>
</tr>
<tr>
<td>Rishikesh</td>
<td>1.8 km</td>
<td>South West</td>
</tr>
<tr>
<td>Barkot Reserve Forest</td>
<td>2.0 km</td>
<td>West</td>
</tr>
<tr>
<td>Chandrabhaga River</td>
<td>50 m</td>
<td>South</td>
</tr>
<tr>
<td>Narendra Nagar</td>
<td>4.2 km</td>
<td>North</td>
</tr>
<tr>
<td>River Ganga</td>
<td>3.5 km</td>
<td>South</td>
</tr>
</tbody>
</table>
Figure 5.4: Toposheet showing STP site and nearby features within 3 km and 10 km radius
Flora

The flora of Tehri Garhwal can be divided into six main categories of tropical dry deciduous forests, Sal forests, Chir forests, oak deodar, fir and spruce forests, and finally the Alpine pastures. The variety of forests is perhaps enough to make anyone realize the sheer multiplicity of the flora species. These forests not provide a safe haven for animals but also help the villagers to maintain the ecological balance and give them firewood and food. The scent of damp earth, leaves and the noise of grasshopper are the essence of Garhwali forests.

There are many trees like chir, Oaks, Conifers, Sal, Deodar, Haldu, Yew, Cypress, Rhododendron, Birch, Horse-Chestnut, Cycamore, Willow and Alder are found here. A large variety of medicinal herbs, shrubs and bushes like Brahmi and Ashwagandha and fruits like Cornel, Figs, Kaiphal, Mulberry, Kingora, Raspberry, Blackberry, Currants, Medlars, Gooseberries, Hazelnuts, Apples, Pears, Cherries, Apricots, Plums, Peaches, Oranges, Limes, Bananas, Pomegranates and Walnuts are found in abundance.
As per present site conditions only small shrubs and herbs need to be remove for construction of STP. None of these shrubs and herbs is endangered or rare. There scientific names of shrubs and herbs present at site and nearby area are provided below in table 5.8.

Table 5.8 Common plant (Generally Seasonal herbs and shrubs) found at STP and nearby area

<table>
<thead>
<tr>
<th>S. No</th>
<th>Scientific name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Zizyphus mauritiana</em></td>
<td>Ber</td>
</tr>
<tr>
<td>2</td>
<td><em>Lantana camara</em></td>
<td>Lantana</td>
</tr>
<tr>
<td>3</td>
<td><em>Parthenium hysterophorus</em></td>
<td>Carrot Grass</td>
</tr>
<tr>
<td>4</td>
<td><em>Cannabis sativa</em></td>
<td>Bhang</td>
</tr>
<tr>
<td>5</td>
<td><em>Urtica dioica</em></td>
<td>Bicchu buti</td>
</tr>
<tr>
<td>6</td>
<td><em>Colebrookea oppositifoila</em></td>
<td>Bhirmoli</td>
</tr>
</tbody>
</table>

The present STP site is a barren forest land and no tree cutting is involved in construction of STP. Site photograph are attached as figure 5.6 below.

Figure 5.6 STP Site Photographs

Bird Eye view of STP site along with Chandrabhaga drain

Distance of STP site from nearby habitant area

Distance of STP site from nearby habitant area

Bird eye view of project town Dhalwala
The present STP site is a barren forest land and no tree cutting is involved in construction of STP

**Fauna**

The district of Tehri Garhwal is full of rich animal life which includes mammals, reptiles, Pisceans and birds. The forests are full of animals like Monkey, Langur, Wild-Cat, Goat, Pig, Fox, Wild-Dog, Black Bear and the Flying Squirrel (locally called Rinoola), elephants and critically endangered Musk Deer are found.

A number of carnivore species live in Tehri Garhwal region like the Snow Leopard, Leopard and sometimes Tigers. The Snow Leopard is rare and seriously endangered. The avian species consist of Pheasants, Kali j, Koklas, Cheers, Monal, Wild Fowls, Harial, Parrots, Chatak, Papiha, Haldu, Neelkanth, Pigeons, Partridges, Kala Titar, Chakor and Neora. The reptile population is represented by Cobra, Russell’s Viper, Ancistrodon himalayanus, Rat Snake, Leech and Blood-Sucking Lizard.

![Pair of Hornbill near Muni Ki Reti](image)

The Project Site location and Setting

The land identified for STP Site is forest land. It is a forest land but it is not close to an eco-sensitive area like national park, wild life sanctuary etc. However, to use it for construction of STP it will require Forest Clearance as per Forest (Conservation) Act, 1980 (With Amendments made in 1988) and Forest (Conservation) Rules, 2003 (With Amendments made in 2004).

The project site has sparse vegetation and perennial source of water, at present site is a barren land with seasonal grasses and construction of STP will not involve any tree cutting.

The proposed project site is a forest land with some seasonal herbs bushes only and will not result in loss of income from agricultural land, plantation or other existing land-use. The
construction of proposed project will not require relocation of households or displace any tribal settlement

Project shall not result in reduction of access to traditional and river dependent communities (s). Moreover, there is no tribal settlement in or around the project area. Thus, there will be minimal adverse social impacts due to the project.

5.12 Economical activities

The economy of the town is centred on the agriculture, business and service sectors. A major portion of the town has rural base which makes the people engaged in agricultural activities. Business in the town is mainly centred on retailing goods. Also since the town lies on the Yatra (pilgrimage) routes, the floating population of towns on the holy festivals like Kumbh, Shivratri and Char Dham yatra, in particular is often several times the resident populations during the tourist season which provide tourism another commercial activity of the town. List of Hotels in Muni ki Reti are given below in table 5.9.

Table 5.9: Guest Houses and Hotels

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Name of Hotel/Guest House</th>
<th>Rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Raj Laxmi hotel</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Shri Badrinath Kedarnath Mandir Samiti Yatri Vishram Grah</td>
<td>15</td>
</tr>
<tr>
<td>3.</td>
<td>Hotel Shivlok</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>Dhanventari Bhavan Dharmsala</td>
<td>20</td>
</tr>
<tr>
<td>5.</td>
<td>Andhra Ashram</td>
<td>25</td>
</tr>
<tr>
<td>6.</td>
<td>Bajrang Paying Guest House</td>
<td>8</td>
</tr>
<tr>
<td>7.</td>
<td>Balaji Paying Guest House</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td>Ambika Paying Guest House</td>
<td>6</td>
</tr>
<tr>
<td>9.</td>
<td>Sony Paying Guest House</td>
<td>10</td>
</tr>
<tr>
<td>10.</td>
<td>JNM Thirth Yatri Niwas</td>
<td>5</td>
</tr>
<tr>
<td>11.</td>
<td>Madhban Ashram</td>
<td>25</td>
</tr>
<tr>
<td>12.</td>
<td>Hotel Vasundhara Palace</td>
<td>25</td>
</tr>
<tr>
<td>13.</td>
<td>Tourist Guest House</td>
<td>5</td>
</tr>
<tr>
<td>14.</td>
<td>Shiv Ganga Paying Guest House</td>
<td>6</td>
</tr>
<tr>
<td>15.</td>
<td>Hotel Great Ganga</td>
<td>18</td>
</tr>
<tr>
<td>16.</td>
<td>Onkaranand Gita Sadam</td>
<td>25</td>
</tr>
<tr>
<td>17.</td>
<td>Yogeshwaranand Athithi Ashram</td>
<td>20</td>
</tr>
<tr>
<td>18.</td>
<td>Pure Inn</td>
<td>10</td>
</tr>
<tr>
<td>19.</td>
<td>Onkaranand Ganga Sadan</td>
<td>25</td>
</tr>
<tr>
<td>20.</td>
<td>Ganga Beach Resort</td>
<td>20</td>
</tr>
</tbody>
</table>

Vegetable Market
1. Near 14 Bigha area Dhalwala
2. Vegetable markets of Muni Ki Reti are situated in Rishikesh

5.13 Industrial activities

Uttarakhand has seen strong industrialization during the past five years, but that was mainly in the plains, following the special package announced by the Centre in 2003. Thus an Integrated Industrial Development Policy 2008 was launched in February especially for the industrial development of hilly and remote areas in the state. This policy aims to accelerate industrial development in the industrially backward and remote hill districts of the state, to develop industrial infrastructure, and to encourage entrepreneurial development through market encouragement and financial support to entrepreneurs. The policy aims to provide
assured, good quality, uninterrupted and affordable power for industries and to simplify and rationalize labour laws and procedures in line with current requirements.

Small-scale industries - cottage, Khadi and village industries, handicrafts, and the silk and handloom sectors are most dominant around local villages of Muni ki Reti. Other than theses, tourism is the most popular industry in this area with domestic and international markets. The area attracts tourists for pilgrimages, cultural tourism, nature tourism, adventure tourism, wildlife tourism, eco-tourism, and amusement and leisure tourism.

As per the secondary data collected from the town, Muni ki Reti & Dhalwala does not have any polluting industries.

5.14 Educational activities

There are many educational institutes in the project area. List of some major institutes is provided below:

Details of Educational Institutes in Muni-ki-Reti
a. Puranand Inter college (600-700 Seats)
b. Omkara Inter College (500 Seats)
c. Omkara Institute of Technology (500 Seats)
d. Swami Janardhan School upto Class 8th (250 Seats)

Details of Educational Institutes in Dhalwala
a. MIT College (1000 – 1200 Seats)
b. Saraswati Vidhya Mandir Girls (300-400 Seats)
c. Saraswati Vidhya Mandir Boys (400-500 Seats)

5.15 Cultural activities

The religion and culture urges the people of Muni ki Reti - Dhalwala find an expression in various fairs, which are in turn closely linked to the economic activities of the region. Number of folk songs and dances has been kept alive because of these fairs. In older times, when means of transport weren’t so good these fares were an opportunity for friends and relatives to meet regularly. The fairs and folk festivals of Muni ki Reti - Dhalwala are very colourful and distinctive, and are the blend of various natural, social and cultural factors. The people also celebrate all the major Indian festivals. Basant Panchami, Bhitauli, Harela, Phooldei, Batsavitri, Ganga Dusshera, Diwar Puja, Olgi or Ghee Sankranti, Khatarua, Ghuan Ekadashi and Ghughutia are some of the major festivals celebrated in Muni ki Reti and Dhalwala.

5.16 Religious activities

Traditionally considered the gateway for the Char Dham and Kawad pilgrimage — Badrinath, Kedarnath, Gangotri, and Yamunotri attract many pilgrims, making it a town of religious significance.

The Religious places and Historical important places of Muni ki Reti - Dhalwala are
- Ram Jhula
- Prachin Adi Badrinarayan Shatrughan Mandir
- The Herbal Garden
- Shri Kailash Ashram
- Shri Shivananda Ashram
- Omkarananda Ashram Himalayas
- Swami Dayananda Ashram
- Baba Mastram Gufa
- Mangal Ashram
- Yog niketan Ashram
- Harihar Kailash Gyan pith
- Kailash Ashram
- Sitaram Ashram
- Swatantranand Ashram
- Panchwati Ashram
- Ishwardas Ashram
- Dayanand Ashram
- Avdhooth wara Ashram
- Vitthal Ashram
- Swami Narayan ashram
- Yogpith Ashram
- Madhuwan Ashram
- Shatrughan mandir
- Madhuban mandir
- Kailash Ashram Temple

**Socio Economic Mapping**

There is no specific data available with ULB regarding socio economic status of people in Muni ki Reti – Dhalwala. However, as per discussion with ULB officials, substantial segment of population (about 50%) in Muni ki Reti are engaged in Tourism, and River-rafting. About 30% population earns through Hotel industry. Being termed as holy town, Muni ki Reti has considerable population of Sadhus residing in various Ashrams. Only a small portion (about 5%) is associated with Government services.

In Dhalwala majority of people are either have Government service or associated with tourism industries. There are some small industries, which cater the needs of approximately 5% of population.

Total number 22 Below Poverty line Muni ki Reti and 56 in BPL card holder are in Dhalwala
Graph showing Ward wise Male Female and Children below 6 years ration

Graph showing Ward wise Schedule cast Schedule tribe ratio with Total Population of Muni ki Reti

Graph showing Ward wise literates and illiterate ratio with Total Population of Muni ki Reti

*Source: Census 2011*
6. Environmental and Social Impacts

Pollution abatement projects may prove beneficial for the environment and society or they may have some adverse impacts as well. Planners and decision makers have realized the importance of understanding the consequences of any such projects on both environmental and social sectors, and have started taking steps to avoid any adverse impacts. Based on the major findings obtained from the field visits and secondary data analysis, the possible environmental and social issues with reference to the proposed sewer works in sewerage district ‘C’ of Allahabad city is been discussed in these sections.

6.1 Potential Environmental Impacts

The proposed project of sewer works in Muni ki Reti - Dhalwala would influence the environment in three distinct phases:
- During Designing phase
- During the construction phase which would be temporary and short term;
- During the operation phase which would have long term effects

Consultations with local resident about existing sewer problems
Consultations with religious leader

6.2 Pre-construction Impacts

**Design of the Proposed Components:** The Central Public Health and Environment Engineering Organization manual suggests a design period of 15-30 years. The water supply components were designed following the recommendations of the Central Public Health and Environment Engineering Organization Manual for Waste Water.

Impacts arise from the design of the project including the technology used, scale of operation/throughput, waste production, discharge specification, pollution sources and ancillary services.

**Selection of Sewage Treatment Process:** The strategy for wastewater treatment is adopted to provide appropriate cost treatment with a robust process that takes into account local conditions. Apart from construction and operation and maintenance costs, factors that need to be taken into account in selecting appropriate processes for Muni Ki Reti STP include: (i) Consistent Effluent Quality; (ii) Less Area Requirement; (iii) Process flexibility; (iv) Easy operation and maintenance; (v) Economic Viability; (vi) Aesthetics with Surroundings, and (vi) Odour and Nuisance.
The merits and demerits of various available treatment technologies were evaluated. Based on the comparison, it was found out that Activated Sludge process was found to be more suitable for the present conditions.

Impacts associated with the planning mainly depend on the site selection. Location impacts include on-site biophysical array and encroachment / impact either directly or indirectly on adjacent environments. It also includes the impacts on the people who might lose their homes or livelihoods due to the development of the proposed site. NOC from Dhalwala Gram Panchayat for siting of STP land at Chor Pani area is attached as Annexure -1.

**Sewer Network:** Most subproject components involve simple construction and low operation and maintenance, so it is unlikely that there will be major impacts. The pipeline laying works, the only component that involve considerable construction activity, are located in the City area where there are no sensitive natural habitats. The pipelines are aligned in the vacant land adjacent to the roads within the ROW, so there are unlikely to be any location impacts.

**Sewage Treatment Plant:** It is estimated that the proposed sewage treatment plant requires about 1 Ha of land including that for green buffer areas around the plant. The Uttarakhhand Payjal Sansadhan evam Nirman Nigam has identified a site adjoining the River Chandrabhaga near Chor Pani Area in Dhalwala. This site is a government forest land and it requires diversion of forest land prior start of construction. This land is vacant and unused at present. No tree cutting or any displacement is required for construction of STP on the selected site.

The Chandrabhaga River is not being used as water sources because it carries water only during rainy season. Therefore there will not be any impacts on the River due to disposal of treated water. Actually, the river will be improved due to prevention of raw sewage disposal and since the sewage will be treated to the applicable disposal standards of surface water there will not be any impacts.

**Sewage Pumping Station:** Sewage Pumping Station – i) Existing – Since the capacity of civil works at existing SPS is sufficient; no more land is required to be acquired. II) New SPS – New SPS is proposed in Dhalwala and land required is already identified. The location (14 Bigha area area) has been confirmed by concern ULB official (Gram Pradhan, Dhalwala). No tree cutting is required.

**Climate Change Risk - Potential flooding of STP site:** On the face of the climate change risks, the floods may increase/decrease in its magnitude, and adopting protection measures as in normal practice by taking historical data may not suffice if the river faces potential climate change risks. However, the Chandrabhaga River is rain fed, and therefore the risk of climate change is minimal compared to the rivers fed by glaciers. River is seasonal and flows only during rainy season. Flow is considerable for short duration the rains. River is very shallow and the banks are not well defined. It is therefore important that the STP is designed with probable flood.

Consequently, the STP has been designed with a 100-year high flood level (HFL). Earthen bund and necessary slope protection measures will be provided towards the river side. The detailed engineering aspects will be undertaken by Contractor with the competent authority’s approval.

**Odor nuisance due to STP:** STP will be located in the barren forest zone where no settlement is nearby. The STP has been planned Extended Aeration-SBR process, odour generation will be minimal. In this technology, sludge production is minimal and quality is also not offensive. Only some storage is required and after that the sludge can be utilized as manure in the nearby agricultural fields.
**Green buffer zone:** Sewage Pumping Station units are located in inhabited area hence a green buffer zone has been proposed to be developed around the SPS units to tackle the all nuisances and aesthetic aspect. The tree species will be local species having thick foliage. Also green buffer zone proposed around STP considering future development around premises.

**Grit collection and disposal at STP:** Mechanical course and fine screen will be provided at STP to prevent the grit from entering into process unit. Scraping of deposited grit at regular interval is designed by providing rotating scrapper on the screen. The collected grit being of inert nature and having small quantity will be disposed at identified site within STP premises. There is no chance of other type of solid waste such as plastic; paper, glass etc. enter into the proposed sewerage system.

**Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage:** The disposal of treated sewage will be to Chandrabhaga River through proper outfall. The disposal of untreated/partially treated sewage may deteriorate the quality of receiving water body, the Chandrabhaga River. Therefore it is imperative to treat the sewage to acceptable levels. Since the river is seasonal, minimum dilution will be available and therefore requires stringent disposal standards. Further, as the Muni ki Reti experiences large temperature fluctuations from low temperature during winters to high temperature in summers, the treatment efficiency may affect considerably. Malfunction/overflow of units may cause flooding and nuisance. The following mitigation measures are incorporated in the design:

(i) Selection of treatment process that is suitable and withstands to large temperature fluctuations
(ii) Selection of treatment process that involves simple operation and maintenance.
(iii) Design of STP to meet prescribed CPCB disposal standards.
(iv) Developing continues monitoring system to check the treatment efficiency and developing laboratory facility within the STP.
(v) Preparation of operational manual as a reference guide to maintain the discharge standards.
(vi) Provision of bye-pass arrangement on unit basis to avoid release of untreated sewage, if any.
(vii) Provision of uninterrupted power supply through dedicated power line. In case of power failure, provision of alternate power supply through generator is proposed.
(viii) Design of system to provide for high flows/volumes. Bye-pass arrangements have been made to minimize unexpected overflows. Site selection of sources of materials, Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be included in the design specifications and on plan drawings. Priority would be sites already permitted by Mining Department. If other sites are necessary, these would to be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas even if some distance from construction activities. It will be the construction contractor’s responsibility to verify the suitability of all material sources and to obtain the approval of the Muni ki Reti Nagar Panchayat and Dhalwala Gram Panchayat. If additional quarries will be required after construction is started, then the Construction contractor shall use the mentioned criteria to select new quarry sites, with written approval of local bodies.
6.3 Construction Impacts

Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. Construction impacts are associated with site cleaning, earth works, physical construction related materials movements and works, machinery, vehicles and workers. It also includes the erosion, dust, noise, traffic congestion, and waste production associated with the construction activities.

1. Construction Method

**Sewer Network:** The proposed 29.5 km sewer network, consisting of branch, sub-main and main sewers of 150 mm to 500 mm diameter DI pipes, will be laid within the city area including the high density areas of the core city and low density areas in the outskirts. This network will convey sewage to proposed STP near Chandrabhaga River. As earlier stated, sewers will be laid in the un-used area within the ROW. In narrower roads where there is no land available, the trenches will be dug into the edge of the road. Generally in narrow roads only branch sewers of 200 mm – 500 mm will be required and bigger main sewers are located along the main roads, where generally sufficient vacant land along the road will be available.

Sewers will be buried in trench of 1 to 4 m deep (average is about 3 m) and width between 1000 mm for 150 mm dia sewer to 1200 mm for 600 mm dia sewer. The trenches will be excavated by a backhoe digger substantiated by manual digging. Excavation in CC roads and hard rock surfaces will be carried out by handheld pneumatic drill. Excavated soil will be placed nearby and a bed of sand or gravel - obtained from local quarries, will be prepared at the bottom of the trench. Sewers (brought to site on trucks and stored on unused land nearby) will be placed in the trench over the sand/gravel bed using a small rig or manually. Pipes will be joined by hand, after which excavated soil will be replaced around and on top of the sewers manually and the refilled material will be compacted by a vibrating compressor. Inspection manholes at regular intervals in the network will be constructed in brick masonry and provided with a steel cover for inspection purposes.

**Sewage Treatment Plant:** The STP will be constructed in units of RCC structures. Foundations dug by backhoe, and concrete and aggregate will be tipped in to create the foundations, walls and floor. Large quantities of sand and aggregate will be brought to the site by trucks. Concrete will then be mixed by batch-mixing plant to be installed at the site for construction purpose. The STP equipment and pipelines will be mostly of mild steel, DI pipes which will be arranged by cranes or laid manually. About 50 workers will be employed at the site and therefore temporary labour camp may be required if workers are brought from outside.

**Sewage Pumping Station:** - The SPS will be constructed in units of RCC structures. Foundations dug by backhoe, and concrete and aggregate will be tipped in to create the foundations, walls and floor. Large quantities of sand and aggregate will be brought to the site by trucks. Concrete will then be mixed by batch-mixing plant to be installed at the site for construction purpose. The pumping sets and pipelines will be mostly of mild steel, DI pipes which will be arranged by cranes or laid manually.

**Air Quality:** - Emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality in the construction sites. Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons but temporary and during construction activities only. To mitigate the impacts, construction contractors will be required to:
(i) Consult with Pey Jal Nigam/ Jal Sansthan on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
(ii) Excavate the foundations, wet wells at SPS at the same time as the access roads (if needed) are built so that dug material is used immediately, avoiding the need to stockpile on site;
(iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
(iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and
(v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.

Earthwork involved in STP construction will also be significant. Large quantities of construction materials such as sand, cement, bricks, gravel etc. will be transported, unloaded and handled at the site and therefore there is large potential to generate dust. Although the site is located in the outskirts with no major development, the dust generation may also affect the surrounding agricultural areas. Therefore above measures shall be implemented at the STP site too.

**Surface Water Quality:** Muni ki Reti - Dhalwala receives high intensity rains during monsoons and there are a number of natural and man-made drainage channels criss-crossing the city to carry the runoff safely. Runoff from the excavated areas and material and waste soil stocks likely to contain silt, and this silt runoff will deteriorate the water bodies by silting. Since STP site is located adjacent to the River Chandrabhaga, the runoff from the construction area likely to affect the water body. Large-scale silting is likely to lead to flooding. This impact will however be considered only during rainy season. These potential impacts are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(ii) The soil can be utilised for STP construction, where it appears that it requires a large quantity of soil raise the level to HFL.
(iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with Pey Jal Nigam on designated disposal areas;
(iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(vi) Dispose any wastes generated by construction activities in designated sites;
(vii) Protection of STP site with interception drains, and
(viii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

**Noise Levels:** - There are no health facilities, scheduled or unscheduled historical, archaeological, paleontological, or architectural sites near the construction sites. However, construction works will be on settlements, along and near schools, and areas with small-scale businesses. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by excavation equipment, and the transportation of equipment, materials, and people. Impact is negative, short-term, and reversible by mitigation measures. The construction contractor will be required to:
(i) Plan activities in consultation with Pey Jal Nigam so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
(ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle’s approach;
(iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact on surrounding sensitive receptor; and
(iv) Maintain maximum sound levels not exceeding 80 decibels when measured at a distance of 10 m or more from the vehicle/s.

**Existing Infrastructure and Facilities:** - Excavation works can damage existing infrastructure located alongside roads, in particular water supply pipes. It will be particularly important to avoid damaging existing water pipes. It is therefore important that construction contractors will be required to:

(i) Obtain from Pey Jal Nigam / Jal Sansthan the list of affected utilities and operators; and
(ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services

**Landscape and Aesthetics:** - The construction works will produce excess excavated, excess construction materials, and solid waste such as removed concrete, wood, trees and plants, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Prepare and implement Waste Management List;
(ii) Avoid stockpiling of excess excavated soils;
(iii) Coordinate with UPJN for beneficial uses of excess excavated soils or immediately dispose to designated areas;
(iv) Recover used oil and lubricants and reuse or remove from the sites;
(v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(vii) Request Pey Jal Nigam to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

**Surface and Groundwater Quality:** - Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. To ensure that water will not pond in pits and voids near subproject location, the construction contractor will be required to conduct excavation works on non-monsoon season.

Muni ki Reti receives high rains during the monsoon, and there are a number of natural and man-made drainage channels criss-crossing the City to carry runoff safely. Runoff from the excavated areas, and material and waste soil stocks likely to contain silt, and this silt runoff will deteriorate the water bodies by silting. Large-scale silting can lead to flooding. Since STP site is located adjacent to the River Chandrabhaga, the runoff from the construction area likely to affect the water body. Large scale silting may affect the flow any cause flooding. The following measures are suggested to mitigate the impact:

(i) Avoid excavation activities during monsoon. Ensure that works complete before onset of monsoon.
(ii) Minimize on-site storage of waste soil/material.
(iii) Provide interception drains to avoid submergence of trenches, and dispose the runoff quickly.
(iv) Protection of STP site with interception drains

**Accessibility:** - Hauling of construction materials and operation of equipment on-site can cause traffic problems. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(ii) Schedule transport and hauling activities during non-peak hours;
(iii) Locate entry and exit points in areas where there is low potential for traffic congestion;
(iv) Keep the site free from all unnecessary obstructions;
(v) Drive vehicles in a considerate manner;
(vi) Coordinate with government’s traffic department for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
(vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns and/or complaints.

**Socio-Economic – Income:** - The subproject components will be located in government land. Construction works will impede the access of residents to specific site in limited cases. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to:

(i) Leave spaces for access between mounds of soil;
(ii) Provide walkways and metal sheets where required to maintain access across for people and vehicles;
(iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools;
(iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
(v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns and/or complaints.

**Socio-Economic – Employment:** - Manpower will be required during the 24 months construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

(i) Employ majority of the labor force, or to the maximum extent, local persons within the project area if manpower is available; and
(ii) If available, secure construction materials from local market.

**Occupational Health and Safety:** - Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

(i) Develop and implement site-specific health and safety plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) health and safety training for all site personnel; (d)
documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(iii) Provide medical insurance coverage for workers;
(iv) Secure all installations from unauthorized intrusion and accident risks;
(v) Provide supplies of potable drinking water;
(vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
(vii) Provide health and safety orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
(viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
(ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(x) Ensure moving equipment is outfitted with audible back-up alarms;
(xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
(xii) Disallow worker exposure to noise level greater than 85 decibels for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

Community Health and Safety: - Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. In most of the cases location of project sites at isolated area, hence health and safety risk to community is minimum. Potential impact is negative but short-term and reversible by mitigation measures.

The construction contractor will be required to:
(i) Plan routes to avoid times of peak-pedestrian activities;
(ii) Liaise with Pey Jal Nigam/ Jal Sansthan in identifying risk areas on route cards and/or maps;
(iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure; and
(iv) Provide road signs and flag persons to warn of dangerous conditions, in case of location near the road.

Work Camps: - Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures.

Consultation with Pey Jal Nigam revealed that it is unlikely that work camps are required for this subproject. In the case that it will be needed, the construction contractor will be required to:

(i) Consult with Pey Jal Nigam before locating project offices, sheds, and construction plants;
(ii) Minimize removal of vegetation and disallow cutting of trees;
(iii) Provide water and sanitation facilities for employees;
(iv) Prohibit employees from cutting of trees for firewood;
(v) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(vi) Recover used oil and lubricants and reuse or remove from the site;
(vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(viii) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(ix) Request Pey Jal Nigam/ Jal Sansthan to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

Social and Cultural Resources: - For this subproject, excavation will occur at specific isolated location, so it could be that there is a low risk of such impacts. Nevertheless, the construction contractor will be required to:

(i) Stop work immediately to allow further investigation if any finds are suspected
(ii) Inform Pey Jal Nigam if a find is suspected, and take any action they require ensuring its removal or protection in site; and
(iii) Request Pey Jal Nigam/ Jal Sansthan or any authorized person with archaeological and/or historical field training to observe excavation.

6.4 Operations and Maintenance Impacts

The main operation and maintenance activity involved in this subproject is sewage treatment to applicable standards and clearance of blockages and leaks in the sewer network in order to allow smooth sewage flow. Blockages in the sewers will be removed using sewer jetting equipment or manually. Sewers will be accessed through manholes. Leak repair work will be similar to the sewer laying work as earlier explained. Trenches will be dug to reveal the leaking area and the faulty sewer will be re-fitted, or the sewer will be removed and replaced if necessary.

Recurrence of blockage and leakage problems: Although the impact is likely to be minimal due to new and well design efficient system, it should be ensured that leak/block detection and restoration time is minimized to the extent possible. The project will therefore provide equipment for cleaning the sewers, including buckets and winches to remove silt via the inspection manholes, and diesel-fuelled pumps to remove blockages (jetting machines). In deep sewers and manholes, the blockage/choking may create anaerobic conditions, and produce harmful gases. The workers therefore shall be provided with appropriate personnel protection equipment.

Degradation of environmental quality such as surface water and ground water: Degradation of treatment efficiency may deteriorate the quality of receiving water body, the Chandrabhaga River. Therefore it must be ensured that treated water meets the set disposal standards.

Mitigation Measures
(i) Treated water should meet disposal standard for BOD, TSS, Faecal coliform, etc.
(ii) Conduct regular (daily) wastewater quality monitoring (at inlet and outlet of treatment plant);
(iii) Conduct regular (monthly) quality monitoring of Chandrabhaga River water on the downstream side of disposal point; and
(iv) Conduct occasional (twice-a-year) ambient air quality monitoring.

Occupational Health and Safety of workmen engaged for operation of the plant: STP operation involves handling of large quantities of potentially harmful sewage and sludge. Therefore
workers involved in operation will be at health risk, if appropriate precautions are not in place. 
Mitigation Measures are:

(i) Protective appropriate personal protective gear such as boots, gloves, masks at all the 
workers;
(ii) Eliminate manual handling of wastewater/sludge;
(iii) Provide training for workers in system operation and maintenance and safety related 
aspects; and
(iv) Ensure adequate emergency first-aid facilities in the facility.

Nuisance to the people living adjacent to the SPS & STP: Improper operation and breakdown 
will lead to the accumulation of untreated wastewater at the plant site that may cause 
amalodorous conditions and nuisance to the surrounding population. To minimize this impact, 
Standard Operational Procedures (SOP) detailing the operational procedures, preventive 
maintenance of equipment etc. will be prepared. Regular training shall be provided to the 
workmen and staff. Green buffer zone will help in reducing nuisances and will enhance 
aesthetic condition of area. Dedicated power line will be provided for operation of STP and 
SPS.

6.5 Social Management Plan

Social mitigation plans during construction phase

Based on the identified social issues, doable mitigation plans are proposed. Some of these 
measures are already listed in the DPRs, and some of them are additionally recommended for 
social development of the project and the concerned stakeholders.

<table>
<thead>
<tr>
<th>Social Factor</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of Land</td>
<td>There is no private land acquisition involved in the project. Only govt. will be used for project components</td>
</tr>
<tr>
<td>Land Availability/Requirement</td>
<td>No private land is required for the proposed project.</td>
</tr>
<tr>
<td>Loss of structures</td>
<td>As such no titleholder structure will be affected.</td>
</tr>
<tr>
<td>Loss of livelihood</td>
<td>As such the project will not affect any livelihood. In fact it will open the chances of more livelihoods for the local people.</td>
</tr>
</tbody>
</table>

i. Impact on human health

Mitigation Measure: Acoustic enclosures or hoardings can be constructed at the proposed sites 
Mitigation plan involves the erection of temporary enclosures around construction sites. These 
barriers will help entrap some of the dust that is brought up in digging.

They will also provide safety benefits, to be detailed below. According to the 
interaction/consultation with the key stakeholders, it was said that contractors are doing 
water sprinkling in the construction area.

ii. Traffic Congestion

Mitigation Measure: Re-route traffic whenever possible and employing traffic police to manage 
the traffic movement. Traffic must be re-routed to facilitate ease of movement. Proper signage 
should provide detailed information on the dates and duration of road closures and which 
detours will be available, ideally well in advance of actual construction so residents can plan 
accordingly. Strategic placement of traffic police at critical intersections will also facilitate 
better flow of traffic. Plans and budget for these measures are already included in the DPR.

iii. Impact on livelihood

Sewer constructions will invariably lead to road closures, which will adversely affect shops on
those streets. The first priority is for the contractor to take the necessary measures to ensure that pedestrians always have access to shops, vendors, etc. For mobile vendors, this may include adjusting the location of the cart, etc. to a similar location in the immediate vicinity of the original location for the duration of the project. Projects should also proceed on schedule so as to minimize disruption Additionally, clean-up of debris and clearance of blockages should commence immediately after project completion so as to remove any potential obstacles that might prevent customers from accessing businesses or other disruptions.

In the event that the contractor, despite best efforts, is unable to avoid blockages of the roads and/or disruption of local businesses, some compensation is necessary. The ESMF currently mandates compensation only in the case of permanent livelihood loss or displacement and provides no provisions for livelihood loss of mobile vendors.

Additionally, no regulation, policy, guideline, etc. exists which can provide precedent or guidance in this instance. ESMF clearly states that mobile/ambulatory hawkers: fruit cart vendors, etc. who can easily relocate fall into this category. These vendors are most eligible for a temporary relocation just outside the construction area, and will thus not be eligible for compensation as is the case for this proposed project. However if during the construction of the project any party faces livelihood loss due to the proposed project, then that party should be compensated according to the entitlement matrix given in the ESMF report.

iv. Impact on existing utility services

Mitigation Measure:
- Circulating the layout plans of the existing underground alignment near the work site.
- Contacting the relevant department in case there is any damage to any of the utility services and ensuring prompt fixing/replacing of damaged infrastructure

Temporary shifting of power/water lines for construction purposes is already budgeted for in the DPR. Nevertheless, all construction personnel must receive detailed layout plans of existing underground structures to prevent accidental water/electricity supply disruptions. The relevant departments should also be made aware of the timing and location of digging near supply lines so they can make the necessary preparations to respond swiftly to disruptions.

Safety hazards

Mitigation Measure: Fencing of the excavation site and providing proper caution sign boards. As mentioned above, fencing should be erected around construction sites and appropriately marked with caution signage. These fences/signs should remain in place even if construction is not active, so long as a hazard (e.g. open pit) remains.

vi. Failure to Restore Temporary Construction Sites

As mentioned above, provisions to rehabilitate roads and clear debris are already included in the DPR.

viii. Public Notice: according to the suggestion given by locals during the interview.

Government and contractor should give a prior notice to each and every locality with the details of project, street wise start date of construction and street wise end date of construction, contact person during emergency. This information would help them better adjust to the situation and make necessary adjustments and provisions.

ix. Health Programme for Workers: If un-sanitary conditions prevail at workers camp, health programmes for their well-being should be implemented.
Social mitigation plans during operation phase

Noise pollution due to improper handling of machines: proper O&M should be carried out during the operation phase to ensure least disturbance is caused to the neighbouring residents.

Mitigation measures adopted by locals during similar nature of project activities
From the field surveys and interviewing the locals including shop-owners, residents, mobile vendors, following local adaptive measures have been recorded;
- Using transparent plastic sheets to block entry of dust into shops
- Avoiding opening of windows, especially when the construction is going on
- Taking different routes if possible to avoid areas where construction is happening
- Laying wooden plank over the excavated pits for making access route to house or shops
- Mobile vendors stated that they place their carts at some other place and vacate construction area for the time when construction is on
- Many public institutes like hospitals, schools and colleges reported that they have more than one gate which makes the access easier during construction period.
7. Environment and Social Development Outcomes and Issues

- **Access to sewer network**: This service will cater to the projected population until the year 2045. According to the DPR, population in Muni ki Reti is expected to increase from 13,943 in 2015 to 23,555 by 2045 and from 24,610 in 2015 to 47,117 by 2045 in Dhalwala. In this time, waste water generation is expected to increase from 3.830 MLD to 7,020 KLD. Increased sewerage will prevent outflow of waste water to the Ganga.

- **Better hygienic conditions**: The sewerage network will provide improved environmental conditions due to the contained handling of wastes, leading to improved public health conditions and will likely reduce the average medical expenses of the residents in the project areas. According to DPR this area is completely un-sewered and waste water finds its way into the river through open drains. These areas suffer from powerful odors and greater amounts of flies/mosquitoes, which will be mitigated with the sewerage connection and overall improvement in environment and health is anticipated from this project.

**Increase in household connections**: 100% sewer connection has been proposed for Muni ki Reti – Dhalwala and this will be achieved by 2013.

**Decrease in water pollution**: Because of the sewer line connection, all the waste water will be collected and directed to treatment plant, which only after treatment will be disposed of to the river, hence decreasing the pollutant load in the river. Due to current pollution, water quality in the river Ganga is impaired at the Muni ki Reti Dhalwala.

**Increase in aesthetic value of the project area**: connection to sewer lines enhance the aesthetic value of the area, as there will be more cleanliness and no wastewater discharge to open area. This will also lead to appreciation in the property value. This will eventually lead to increase in standard of living of the people in the project site. The support for this statement comes from the counter-factual scenario observed in areas with only nalas (bad odor, insects, etc.).

Raw sewer is flowing in natural rain water drain (Existing conditions)

**Cultural sentiments**: Proper sewage disposal would increase the river water quality. As the holy river is attached to many rituals and customs, enhanced river water quality would connect to sentiments of the people. Especially during 'Kumbh Mela' better water quality for bathing would be boon for pilgrims.
7.1 Social Development Issues in Project Vicinity and Social Services to be provided by the project

The social benefits of the proposed project are given above. The social services required to ensure that these benefits are realized are given below:

**Ensure backward section of the society gets the facility:** Some residents complained that they did not feel they personally would benefit from the project as their houses did not have sewer connection. Thus, increasing household connections will ensure that project benefits are equitably distributed. Special care should be taken to ensure access for backward and vulnerable sections of the society. Full benefits of the facilities proposed under DPR cannot be realized unless a programme to improve coverage of branch sewers and household connection is carried in parallel.

**Increasing public toilet facilities:** Similarly increasing public toilet facilities will ensure that residents of Muni ki Reti - Dhalwala without permanent housing and tourists (especially visiting during 'Kumbh Mela and Char Dham Yatra' are able to benefit from the increased sewerage access. Increasing toilet access will decrease practices such as Open Defecation. This eventually would lead to better water quality and would have better environment and social ramifications.

**Targeting of economically weaker communities:** for construction jobs related to sub-project: In order to ensure that the economic benefits of the sub-project is felt by those in need, those from backward communities should be specifically targeted for relevant jobs.

**Proper clean-up of project debris:** In order to maximize aesthetic benefits and ensure that debris does not clog sewer path, proper clean-up of project areas must be performed after the project is completed. Collection and disposal of debris is essential for proper function of other essential processes like traffic routing, pedestrian pathways, and clearance of dust and particles causing pollution. Clean area will also enhance the aesthetic value and increase the property rate of the area.
**Table 7.1: Anticipated Impacts and Mitigation Measures – Pre-construction Environmental Mitigation Plan**

<table>
<thead>
<tr>
<th>Field</th>
<th>Anticipated Impact</th>
<th>Mitigation Measures</th>
<th>Responsible for Mitigation</th>
<th>Monitoring of Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental clearances</td>
<td>CTE and CTO are required from the SPCB in order to implement the project. Land allotment letter required. If not pursued on timely basis, this can delay the project.</td>
<td>Pursue all clearances and follow up with relevant authorities</td>
<td>Pey Jal Nigam</td>
<td>Pey Jal Nigam to follow up with SPCB on clearances</td>
</tr>
<tr>
<td>Utilities</td>
<td>Telephone lines, electric poles and wires, water and sewer lines within the existing bridge right-of-way (ROW) may be damaged.</td>
<td>(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.</td>
<td>Pey Jal Nigam</td>
<td>(i) List of affected utilities and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions</td>
</tr>
<tr>
<td>Social and Cultural Resources</td>
<td>Ground disturbance can uncover and damage archaeological and historical remains</td>
<td>(i) Consider alternatives if the site is found to be of medium or high risk; (ii) Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and (iii) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.</td>
<td>Pey Jal Nigam</td>
<td>Chance Finds Protocol</td>
</tr>
<tr>
<td>Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.</td>
<td>Disruption to traffic flow and sensitive receptors</td>
<td>(i) Prioritize areas within or nearest possible vacant space in the subproject sites; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation,</td>
<td>Pey Jal Nigam to determine locations prior to award of construction contracts.</td>
<td>List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.</td>
</tr>
</tbody>
</table>

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**Notes:**

- **ESAMP REPORT OF SEWERAGE SYSTEM:**
  - **MUNI KI RETI - DHALWALA**

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**Client:**
- **Uttarakhand Pey Jal Sansadhan**
- **Vikas Evam Nirman Nigam**

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**Consultants:**
- **AECOM India Pvt. Ltd., New Delhi**

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### Field | Anticipated Impact | Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation
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<tbody>
<tr>
<td><strong>Air Quality</strong></td>
<td>Emissions from construction vehicles, equipment, and machinery used for excavation and construction resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons)</td>
<td>(i) Consult with Pey Jal Nigam/ Jal Sansthan on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.</td>
<td>Construction Contractor</td>
<td>(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (iv) vehicular emissions such as sulphur dioxide (SO2), nitrous oxides (NOx), carbon monoxide (CO), and hydrocarbons</td>
</tr>
<tr>
<td><strong>Surface water quality</strong></td>
<td>Mobilization of settled silt materials, run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality.</td>
<td>(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with Pey Jal Nigam/ Jal Sansthan on designated disposal areas; (iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iv) Place storage areas for fuels and lubricants away</td>
<td>Construction Contractor</td>
<td>(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface water quality inspection; (iv) effectiveness of water management measures; (v) for inland water: suspended</td>
</tr>
<tr>
<td>Field</td>
<td>Anticipated Impact</td>
<td>Mitigation Measures</td>
<td>Responsible for Mitigation</td>
<td>Monitoring of Mitigation</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Noise Levels</td>
<td>Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people</td>
<td>(i) Plan activities in consultation with Pey Jal Nigam/ Jal Sansthan so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Require horns not to be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dB)A when measured at a distance of 10 m or more from the vehicle/s.</td>
<td>Construction Contractor</td>
<td>(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) equivalent day and night time levels</td>
</tr>
<tr>
<td>Existing Infrastructure and Facilities</td>
<td>Disruption of service and damage to existing infrastructure located alongside roads, in particular water supply pipes and sewer lines.</td>
<td>(i) Obtain from Pey Jal Nigam/ Jal Sansthan the list of affected utilities and operators; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services;</td>
<td>Construction Contractor</td>
<td>(i) Existing Utilities Contingency Plan;</td>
</tr>
<tr>
<td>Landscape and Aesthetics</td>
<td>Solid wastes as well as excess construction materials</td>
<td>(i) Prepare and implement Waste Management Plan; (ii) Avoid stockpiling of excess excavated soils; (ii) Coordinate with Local body for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary</td>
<td>Construction Contractor</td>
<td>(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) Pey Jal Nigam/ Jal Sansthan to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.</td>
</tr>
<tr>
<td>Field</td>
<td>Anticipated Impact</td>
<td>Mitigation Measures</td>
<td>Responsible for Mitigation</td>
<td>Monitoring of Mitigation</td>
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<td></td>
<td></td>
<td>structures (such as buildings, shelters, and latrines) which are no longer required; and (vii) Request Pey Jal Nigam/ Jal Santhan to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.</td>
<td>Construction Contractor</td>
<td>(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii) number of signages placed at subproject sites.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessibility</td>
<td>Traffic problems and conflicts in right-of-way (ROW)</td>
<td>Construction Contractor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Local Body/ traffic department for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and (vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Socio-Economic</td>
<td>Impede the access of residents and customers to nearby shops</td>
<td>Construction Contractor</td>
</tr>
<tr>
<td></td>
<td>Income.</td>
<td>(i) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Employment</td>
<td>Generation of contractual employment and increase</td>
<td>(i) Employ at least 50% of the labor force, or to the maximum extent, local persons within the 2-km area.</td>
<td>Construction Contractor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(i) Employment records; (ii) records of sources of materials</td>
</tr>
<tr>
<td>Field</td>
<td>Anticipated Impact</td>
<td>Mitigation Measures</td>
<td>Responsible for Mitigation</td>
<td>Monitoring of Mitigation</td>
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</tr>
<tr>
<td>Occupational Health and Safety</td>
<td>Occupational hazards which can arise from working in infrastructures like roads and bridges</td>
<td>(i) Develop and implement site-specific Health and Safety (Hands) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) Hands Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iii) Provide medical insurance coverage for workers; (iv) Secure all installations from unauthorized intrusion and accident risks; (v) Provide supplies of potable drinking water; (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) Provide H &amp; S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (x) Ensure moving equipment is outfitted with audible back-up alarms; (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with</td>
<td>Construction Contractor</td>
<td>(i) Site-specific Health and Safety (Hands) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of HandS orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.</td>
</tr>
<tr>
<td>Field</td>
<td>Anticipated Impact</td>
<td>Mitigation Measures</td>
<td>Responsible for Mitigation</td>
<td>Monitoring of Mitigation</td>
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</tbody>
</table>
| Community Health and Safety | Traffic accidents and vehicle collision with pedestrians. Work site safety          | (i) Plan routes to avoid times of peak-pedestrian activities.  
(iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.  
(iv) Provide road signs and flag persons to warn of dangerous conditions.  
(v) Provide fences to keep public out of work areas and ensure no trespassing for community safety | Construction Contractor              | (i) Traffic Management Plan; (ii) complaints from sensitive receptors                          |
| Work Camps                 | Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants | (i) Consult with Pey Jal Nigam/ Jal Santhan before locating project offices, sheds, and construction plants;  
(ii) Minimize removal of vegetation and disallow cutting of trees;  
(iii) Provide water and sanitation facilities for employees;  
(iv) Prohibit employees from poaching wildlife and cutting of trees for firewood;  
(v) Train employees in the storage and handling of materials which can potentially cause soil contamination;  
(vi) Recover used oil and lubricants and reuse or remove from the site;  
(vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;  
(viii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and | Construction Contractor              | (i) Complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) Pey Jal Nigam/ Jal Santhan report in writing that the camp has been vacated and restored to pre-project conditions |
## Table 7.3: Anticipated Impacts and Mitigation Measures – Operation and Maintenance Environmental Mitigation Plan

<table>
<thead>
<tr>
<th>Field</th>
<th>Anticipated Impact</th>
<th>Mitigation Measures</th>
<th>Responsible for Mitigation</th>
<th>Monitoring of Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(ix) Request Pey Jal Nigam/ Jal Sansthan to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social and Cultural</td>
<td>Risk of archaeological chance finds</td>
<td>(i) Strictly follow the protocol for chance finds in any excavation work;</td>
<td>Construction Contractor</td>
<td>(i) Records of chance finds</td>
</tr>
<tr>
<td>Resources</td>
<td></td>
<td>(ii) Request Pey Jal Nigam/ Jal Sansthan or any authorized person with archaeological field training to observe excavation;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) Stop work immediately to allow further investigation if any finds are suspected; and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iv) Inform Pey Jal Nigam/ Jal Sansthan if a find is suspected, and take any action they require ensuring its removal or protection in situ.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Water Quality

- **Field**: Water Quality
- **Anticipated Impact**: deterioration of surface and groundwater quality
- **Mitigation Measures**: (i) Ensure treated water complies with GOI Standards for Discharges to Inland Waters and Land for Irrigation
- **Responsible for Mitigation**: Jal Sansthan and O & M Contractors
- **Monitoring of Mitigation**: (i) Inland parameters: colour and odour, suspended solids, particle size of suspended solids, pH value, temperature, oil and grease, total residual chlorine, ammonical nitrogen, total Kjeldahl nitrogen, free ammonia, biochemical oxygen demand, chemical oxygen demand, heavy metals, cyanide, fluoride, dissolved phosphates, sulfide and phenolic compounds.
- **Details**: (ii) Land for Irrigation: colour and odour, suspended solids, pH value, oil and grease, biochemical oxygen demand,
<table>
<thead>
<tr>
<th>Field</th>
<th>Anticipated Impact</th>
<th>Mitigation Measures</th>
<th>Responsible Mitigation</th>
<th>Monitoring of Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupational Health and Safety</td>
<td>Adverse impacts on the appearance of surrounding environment and exposure of workers to hazardous debris and gases from sewage pipeline</td>
<td>(i) Ensure persons employed will be provided with suitable equipment (such as shovels and wheelbarrows); and (ii) Ensure all removed material will be deposited in the municipal waste storage bins. (iii) Arrangement of oxygen and PPE for laborer during repairing work.</td>
<td>Jal Sansthan and OandM Contractors</td>
<td>(i) Records of training; (ii) HandS Plan Management Plan approved by Jal Sansthan</td>
</tr>
<tr>
<td>General maintenance</td>
<td>may cause disturbance to sensitive receptors, dusts, increase in noise level</td>
<td>(i) Refill and re-compact trenches soil and backfilled sand will be removed to expose the leaking junction or pipe; (ii) Conduct work during non-monsoon period; and Cover or wet excavated material to prevent dusts.</td>
<td>Jal Sansthan and O &amp; M Contractors</td>
<td>Complaints from sensitive receptors</td>
</tr>
<tr>
<td>Economic Development</td>
<td>Impediments to residents and businesses</td>
<td>(i) Inform all residents and businesses about the nature and duration of any work well in advance so that they can make preparations if necessary; (ii) Conduct these works to provide wooden walkways across trenches for pedestrians and metal sheets where vehicle access is required; and (iii) Consult the local police regarding any such work so that it can be planned to avoid traffic disruption as far as possible, and road diversions can be organised if necessary. (iv) Supply of sewage sludge from STP to farmers for use in farming – economic development through utilization of waste material</td>
<td>Jal Sansthan and O &amp; M Contractors</td>
<td>Complaints from sensitive receptors</td>
</tr>
<tr>
<td>Social and Cultural Resources</td>
<td>Temporary disruption of activities</td>
<td>(i) Consult the town authorities to identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity; (ii) Complete work in these areas quickly; (iii) Provide wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required; and (iv) Consult municipal authorities, custodians of</td>
<td>Jal Sansthan and O &amp; M Contractors</td>
<td>Complaints from sensitive receptors</td>
</tr>
</tbody>
</table>
### Field
<table>
<thead>
<tr>
<th>Anticipated Impact</th>
<th>Mitigation Measures</th>
<th>Responsible for Mitigation</th>
<th>Monitoring of Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.</td>
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</tbody>
</table>
### Table 7.4: - Environmental Monitoring Plan

<table>
<thead>
<tr>
<th>Environmenta l component</th>
<th>Project stage</th>
<th>Parameters to be monitored</th>
<th>Location</th>
<th>Frequency</th>
<th>Standards</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air Quality</td>
<td>A. Pre-construction stage (The project once assigned to contractor)</td>
<td>PM$<em>{10}$, PM$</em>{2.5}$, SO$_2$, NO$_x$, SPM, CO along with Meteorological data-temperature Humidity, wind speed, wind direction</td>
<td>Inside and outside (0.5 km) of the proposed STP</td>
<td>One time</td>
<td>National Air quality standards of CPCB</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>B. Construction Stage</td>
<td>PM$<em>{10}$, PM$</em>{2.5}$, SO$_2$, NO$_x$, SPM, CO along with Meteorological data-temperature Humidity, wind speed, wind direction</td>
<td>Inside and outside (0.5 km) of the proposed STP</td>
<td>Two times (once in a year)</td>
<td>National Air quality standards of CPCB</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>C. Operation Stage</td>
<td>PM$<em>{10}$, PM$</em>{2.5}$, SO$_2$, NO$_x$, SPM, CO along with Meteorological data-temperature Humidity, wind speed, wind direction</td>
<td>Inside and outside (0.5 km) of the proposed STP</td>
<td>One time</td>
<td>National Air quality standards of CPCB</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td>2. Water Quality</td>
<td>A. Pre-construction stage (The project once assigned to contractor)</td>
<td>EC, TSS, DO, BOD, PH, Oil and grease, Pb,</td>
<td>Nearest downstream handpump /well around the STP and SPS</td>
<td>One time</td>
<td>National water quality standards of CPCB</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>B. Construction Stage</td>
<td>EC, TSS, DO, BOD, PH, Oil and grease, Pb</td>
<td>Nearest downstream handpump /well around the STP and SPS</td>
<td>Three times/year</td>
<td>National water quality standards of CPCB</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>C. Operation Stage</td>
<td>EC, TSS, DO, BOD, PH, Oil and grease, Pb</td>
<td>Nearest downstream handpump /well around the STP and SPS</td>
<td>Yearly</td>
<td>National water quality standards of CPCB</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
</tbody>
</table>

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**Client:**
Uttarakhand Peyjal Sansadhan
Vikas Evam Nirman Nigam

**Consultants:**
AECOM India Pvt. Ltd.,
New Delhi
<table>
<thead>
<tr>
<th>Environmenta l component</th>
<th>Project stage</th>
<th>Parameters to be monitored</th>
<th>Location</th>
<th>Frequency</th>
<th>Standards</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Noise/ Vibration</td>
<td>A. Pre-construction stage (The project once assigned to contractor)</td>
<td>Noise level (dB level)</td>
<td>Inside and outside (0.25 km) of the proposed the STP and SPS</td>
<td>A single time</td>
<td>CPCB standards for Noise vibrations</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>B. Construction Stage</td>
<td>Noise level (dB level)</td>
<td>Inside and outside (0.25 km) of the proposed the STP and SPS</td>
<td>2 times/year</td>
<td>CPCB standards for Noise and vibrations</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>C. Operation Stage</td>
<td>Noise level (dB level)</td>
<td>Inside and outside (0.25 km) of the proposed the STP and SPS</td>
<td>3 times/year</td>
<td>CPCB standards for Noise and vibrations</td>
<td>Contractor by NABL accredit laboratory</td>
<td>O &amp; M Contractor/ Jal Sansthan</td>
</tr>
<tr>
<td>4. Soil</td>
<td>A. Pre-construction stage (The project after assign to contractor)</td>
<td>PH, Sulfate (SO₃), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Content</td>
<td>Inside and outside (just close to the proposed site, 2 locations) of the proposed the STP and SPS</td>
<td>A single time</td>
<td>As per CPCB standards</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>B. Construction Stage</td>
<td>PH, Sulfate (SO₃), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Content</td>
<td>Inside and outside (just close to the proposed site, 2 locations) of the proposed the STP and SPS</td>
<td>Two times</td>
<td>As per CPCB standards</td>
<td>Contractor by NABL accredit laboratory</td>
<td>Contractor/ Pey Jal Nigam</td>
</tr>
<tr>
<td></td>
<td>C. Operation Stage</td>
<td>PH, Sulfate (SO₃), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Content</td>
<td>Inside and outside (just close to the proposed site, 2 locations) of the proposed the STP and SPS</td>
<td>A single time</td>
<td>As per CPCB standards</td>
<td>Contractor by NABL accredit laboratory</td>
<td>O &amp; M Contractor/ Jal Sansthan</td>
</tr>
</tbody>
</table>
7.2 EMP Costs

Most of the mitigation measures require the Construction Contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs of mitigation by the construction contractors or Pey Jal Nigam/ Jal Sansthan are included in the budgets for the civil works and do not need to be estimated separately here.

The remaining actions in the EMP are the various environmental monitoring activities to be conducted by the Environmental Monitoring Specialist. These have not been budgeted elsewhere, and their costs are shown in Table 7.5. The figures show that the total cost of environmental management and monitoring for the subproject as a whole (covering design, 2 years of construction and the first five years of operation) is INR 6,94,000.00.

Table 7.5: Environmental Management and Monitoring Costs (INR) for Pre-construction and construction Phase (as per table 7.4)

<table>
<thead>
<tr>
<th>Item</th>
<th>Nos</th>
<th>Total Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality Monitoring &amp; Metrological data at 3 locations</td>
<td>4</td>
<td>12</td>
<td>11,500</td>
<td>1,38,000.00</td>
</tr>
<tr>
<td>Water Quality Monitoring at 3 locations</td>
<td>7</td>
<td>21</td>
<td>4,000</td>
<td>84,000.00</td>
</tr>
<tr>
<td>Noise / vibration at 3 locations</td>
<td>5</td>
<td>15</td>
<td>2,000</td>
<td>30,000.00</td>
</tr>
<tr>
<td>Soil analysis at 3 locations</td>
<td>4</td>
<td>12</td>
<td>3,500</td>
<td>42,000.00</td>
</tr>
<tr>
<td>Environmental mitigation measures including buffer zone development-</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>plantation near STP and SPS</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>6,94,000.00</td>
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</tbody>
</table>
8. Conclusion

The environmental impacts of all elements of the infrastructure proposed under the Muni ki Reti - Dhalwala Sewerage and Sanitation Subproject were assessed. Potential negative impacts were identified in relation to both construction and operation of the improved infrastructure, but no major impacts were identified as being due to either the project design or location. Only for construction of STP diversion of forest land is necessary. Mitigation measures have been developed in generic way to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the outline designs for the infrastructure. This means that the number of impacts and their significance has already been reduced by amending the design.

During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil and import a similar amount of sand to support the pipes in the trenches; and from the disturbance of residents, businesses, traffic and important buildings by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation.

Once the system is operating, most facilities (STP, pumping house) will operate with routine maintenance, which should not affect the environment. Leaks in the sewage network will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. It will also be conducted in areas that have already been excavated, so there will be no need to protect archaeological material.

The regular removal of sludge from the treatment reactor ponds should also have no environmental impacts, and if tests show that the drying procedure removes bacterial contamination the material should be sold to farmers to fertilize soil, as this will provide an environmental gain and some cost recovery.

The main impacts of the operating sewerage system will be beneficial as human waste from those areas served by the new network will be removed rapidly and treated to an acceptable standard. This will improve the environment and appearance of these areas, and the health and quality of life of the citizens. Diseases of poor sanitation should be reduced, which should lead to economic gains as people will be away from work less and will spend less on healthcare, so their incomes should increase.

Mitigation will be assured by a program of environmental monitoring conducted during both construction and operation to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the Pey Jal Nigam. There will also be longer-term surveys to monitor the quality of discharged treated effluent and health status in vicinity of the facility.
NOC from Dhalwala Gram Panchayat for STP land

Annexure -1
Preparation of DPR of Sewerage, Non Sewerage Schemes including Preparation of Feasibility Report & City Sanitation Plan – Package -2

ESAMP REPORT OF SEWERAGE SYSTEM:
MUNI KI RETI - DHALWALA

Client:
Uttarakhand Peyjal Sansadhan
Vikas Evam Nirman Nigam

Consultants:
AECOM India Pvt. Ltd.,
New Delhi

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Annexure - 2

Minutes of Meeting with Muni ki Reti Nagar Panchayat and Dhalwala Gram Panchayat

मुनि की रेती नगर एवं आसामा के सीटेलाईट टाइप की राष्ट्रीय यांगा नदी बेसिन प्राधिकरण
कार्यक्रम के अन्तर्गत सीटेलाईट, एकेजॅय, त्रिपोस्टोर आदि के सम्बन्ध में।

उपरोक्त विषयक कार्यक्रम के अन्तर्गत आयोजन तिथि 13-08-2012 को अभिषेकविजयी नगर पंचायत मुनि
की रेती की अवधात्रा में एक बैठक का आयोजन नगर पंचायत के समागम में किया गया। जिसमें गानीखी
सन् नागरिक पंचायत मुनि की रेती, श्री नवजीय संस्थापति, परिवेशण अभियान, श्री एचएसएस हिंद, राजकुमार
प्रत्योज्य कार्यकर्ता, श्री टीएस नौकुरी, शहीद अभियान, किसान बंधन, गानिखी, जनसहायक, एवं
बनधेदेली दो साथ करें रद्द हर क्रम के प्रतिनिधित्व करने हुए।

उपरोक्त विषयक बौद्धिक मंत्रालयों से सम्बन्धित विषयों पर विचार किया गया श्री कर्मकांड प्रश्नापन अभियान एवं
सीटेलाईट श्री अनुभव सिंह टीजा एजीन सिमिच्या प्राथमिक विवाद द्वारा मुनि की रेती के लिए जो बोलना
से संबंधित समस्याएँ का प्राधिकरण अवहेल िनिर्णय कर दिया जायेगा तथा उनके युक्ति को भी
बोलना में सहायता कर दिया जाएगा। मुख्य प्रस्ताव निम्नवर्तमान है –

प्रमित -प्रमित से सम्बंधित समस्याओं के स्वरूप में माननीयों द्वारा अस्वीकार कराया गया कि क्षेत्र में गुरुमी
हालों गाँव सीरीज लाइन की यमना वर्तमान आयाहों के आधार पर संबंधित अपर्याप्त हैं तथा लाइनों भी विशेषतः
प्रतिदिन होती है। अतः इसके लिए नई बौद्धिक कार्यक्रम अवहेल है तथा अनुपाक व्यक्तियों एवं
समस्याओं द्वारा संबंधित किये जाएँ। उपरोक्त के अनुसार जो क्षेत्र सीरीज लाइन से विरोध इस गया है उनमें नई सीरीज स्वैक्षण
किया जाए। उनके आधार ही मुख्य निर्णय रखा गया कि क्षेत्र के निवासी भूस्तान के लिए जो भी सीरीज लाइन से
व्यवस्थित किया जाए।

सीटेलाईट वैश्विक निकटतापूर्व वैश्विक वैश्विक निकटतापूर्व के अन्तर्गत कार्य के विशेषता हंदो आवाज़ की द्वारा क्रूि
एकत्रीक्षण से लेकर निर्णय आयोजन तक से संबंधित यथार्थ संबंधों का विकास कराने दिया गया। इस सम्बन्ध
में माननीयों द्वारा यह विचार उपविचार गया गया कि इस द्वारा उपलब्ध रक्ष-संस्थाएँ के अलावा अन्य अधिकारियों के
लिए अवसर बनाए जो मुत्तम में प्रस्ताव किये जाए। वर्तमान में जो लैटिन जोड़ [लारा रूट एवं फंड] उपयोग में लाए जा रहा है वही कृपया
योग्य में प्रस्ताव किया जाए।

सरकारी श्रीमान्-सरकारी गृह मंत्री श्रीमान्-सरकारी गृह मंत्री से संबंधित प्रश्न के अन्तर्गत विवाद निम्नवर्तमान में वह निर्णय
किया कि नगर पंचायत क्षेत्र में मुख्य उपलब्ध न होने से कारण अनुपाक व्यक्तियों को कामेश्वर कम्पलेक्स का प्रश्न किया
जाना अवरोध नहीं है। अतः गोबायद श्रीमान्-सरकारी गृह मंत्री श्रीमान्-सरकारी गृह मंत्री जी को कामेश्वर कम्पलेक्स का
प्रश्न किया जाए। व्यावस्था क्षेत्र में गोबायद श्रीमान्-सरकारी गृह मंत्री के अनुपाकक का भुमि से संबंधित प्रश्न किया जाए।
शहदां ग्राम (केंद्रीय)– शहदां ग्राम (केंद्रीय) के समन्वय में यह विचार निर्धारित किया गया कि दर्जनाल ग्राम-दाद रूप स्थान के समीपस्थ क्षेत्र में ही उन्मत किर्म का केंद्रीय बनाया जाए।

शहदां ग्राम-दाद रूप स्थान–शहदां ग्राम-दाद रूप स्थान के अन्तर्गत घाटों के अवसरों निर्माण कार्य एवं सौंदर्यकरण का कार्य प्राक्कलन में समर्थित किया जाने के लिए हेतु प्रस्तावित किया गया।

अतै में समस्त माननीयों द्वारा यह विचारक व्यक्त किया गया कि स्वच्छता एवं गंगा नदी के प्रदूषण की पूर्ण रोकथाम के लिए संचेत्त होकर पूर्ण सजगता के साथ प्रस्तावित योजना में आवश्यक सभी कार्य समर्थित किए जाए।

धन्यवाद संहिता।

भवदीय,

(अनुष्ठ सिंह)
टीम लीडर
                                                        एचपी एनई इंजीनियर प्रौढ़ सिंधु

संलग्न: वैज्ञानिक उपराष्ट्र सदस्यों की सूची
Preparation of DPR of Sewerage, Non Sewerage Schemes including Preparation of Feasibility Report & City Sanitation Plan – Package -2

ESAMP REPORT OF SEWERAGE SYSTEM:
MUNI KI RETI - DHALWALA

Client:
Uttarakhand Peyjal Sansadhan
Vikas Evam Nirman Nigam

Consultants:
AECOM India Pvt. Ltd.,
New Delhi
## Census Population of Muni ki Reti

### NAGAR PANCHAYAT MUNI KI RETI POPULATION AS PER CENSUS 2011

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Source: [http://tehri.nic.in](http://tehri.nic.in)
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