EXECUTIVE SUMMARY

For

Proposed Mangalwedha Lift Irrigation Scheme at Taluka Mangalwedha, District Solapur

by

Ujjani Canal Division No. 9, Talikua Mangalwedha.

**(Gross Command Area (GCA) 22507.916 Ha.,
Culturable Command Area (CCA) of 21725.482 Ha.
with Irrigable Command Area (I.C.A.) of 17187.2752 Ha)**

EIA CONSULTANT

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NABET QCI

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Extension letter : QCI/NABET/ENV/ACO/24/3384 valid till 13.01.2025

A. BRIEF DESCRIPTION PROJECT

Sr. No	ITEM	PARTICULARS		
1	**Project Name**	Mangalwedha Lift Irrigation scheme		
2	**Project Proponent**	M/s. Ujjani Canal Division no. 9, Mangalwedha		
3	**Scope**	Mangalwedha Lift Irrigation scheme consists of feeding through URBC Km.95 Ch.94/300 & lifting the water from Gunjegaon PH-1 Forebay in 3 Stages. This scheme consists of irrigating 17187.28 Ha. (2068.8 Ha. area in Ist Stage & 2810.55 Ha. area in IInd stage and 12307.93 Ha. area in IIIrd stage) in Mangalwedha Taluka Dist-Solapur		
4	**Source**	Water available 1.01 TMC from saving of water in deep black cotton soil in Mangalwedha taluka under URBC command area. And 1.03 TMC from Overlap command of 29 K.T. Weirs of Bhima Ujjani Project		
5	**Location**			
	Stage	Maharashtra		
	Region	Western Maharashtra		
	District	Solapur		
	Taluka	Mangalwedha		
	Village	Gunjegaon		
	Toposheet Nos.	47 O/7, 47 O/8, 47 O/11, 47 O/6		
	Latitude	17° 30’ 49.95”		
	Longitude	75° 19’ 49.836”		
6	Hydrology			
	i) Average Rainfall	508 mm		
	ii) Bed Slope	1 in 1925		
	Annual utilization of the project (TMC)	2.04		
7	Details of Lift			
	Item	**Particular**		
		Stage-I	**Stage-II**	**Stage III**
	a) I.C.A.	2068.8	2810.55	12307.93
	b) Lift level	From 466.688 to 514.500	From 514.500 m to 538.500	From 538.500 m to 558.500m
	c) Design discharge	5.496	4.834	3.935
	d) Rising Main	1 Row 1830 mm dia. 12 mm thick L=6.130 km.	1 Row 1725 mm dia. 10 mm thick L=5.830 km	1 Row 1550 mm dia. 10 mm thick L=5.498 km
	e) Static head	45.6	24.17	20.17
	f) Pumps	4800	2632	1912
	g) HP per pump	1200	658	478
	h) no. of Pumps	4	4	4
	j) Length of Inlet channel	30	-	-

<table>
<tr><td>8</td><td>Canal</td><td colspan="4">Pipe Distribution Network (PDN)
This lift irrigation scheme is proposed for irrigation of 17187.28 Ha through URBC Km. 95 Ch.94/300 & lifting the water from Gunjegaon PH-1 Forebay in 3 Stages. This scheme consists of irrigating 17187.28 Ha. (2068.8 Ha. area in Ist stage, 2810.55 Ha. area in IInd stage and 12307.93 Ha. area in IIIrd stage) in Mangalwedha Taluka Dist-Solapur by PDN.</td></tr>
<tr><td rowspan="5">9</td><td colspan="5">Command area in Ha.</td></tr>
<tr><td rowspan="2">Item</td><td colspan="3">Particulars</td><td rowspan="2">Total</td></tr>
<tr><td>Stage I</td><td>Stage II</td><td>Stage III</td></tr>
<tr><td>GCA</td><td>2314.526</td><td>3905.22</td><td>16288.17</td><td>22507.916</td></tr>
<tr><td>CCA</td><td>2244.072</td><td>3718.15</td><td>15763.26</td><td>21725.482</td></tr>
<tr><td>ICA</td><td>2068.8</td><td>2810.55</td><td>12307.93</td><td>17187.2752</td></tr>
<tr><td rowspan="4">10</td><td rowspan="4">No. of Villages Benefited</td><td colspan="4">Stage I – 3 Villages</td></tr>
<tr><td colspan="4">Stage II – 4 Villages</td></tr>
<tr><td colspan="4">Stage III – 20 Villages</td></tr>
<tr><td colspan="4">Total – 24 Villages</td></tr>
<tr><td>11</td><td>Total Cost of Project (Rs. In Crores)</td><td colspan="4">Rs. 697.71 Crore</td></tr>
<tr><td>12</td><td>Cost per Ha/ of ICA = 17187 Ha</td><td colspan="4">Rs.4.06 Lakh/ Ha</td></tr>
<tr><td>13</td><td>B.C Ratio</td><td colspan="4">3.68</td></tr>
</table>

B. ENVIRONMENTAL SETTINGS OF THE AREA

Sr. No.	Salient Features / Environmental features	Name	Aerial distance (km) within 10 km buffer of the Command Boundary	Direction from Command Boundary
1	National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves, Eco-Sensitive Zone, Protected Areas	NA	NA	NA
2	Historical places / Places of Tourist importance / Archeological sites	NA	NA	NA
3	Critically Polluted area	NA	NA	NA
4	Defence Installation	NA	NA	NA
5	Reserve forest/Protected Forest	RF near Hangirage	8.67	SW
6	Water Body	Shirnandgi Talav	2.8	S
7		Man river	2.90	N
8	Interstate Boundary	Maharashtra-Karnataka	6.17	E
9	Seismic zone as per IS-1893	Zone III	-	-
10	Nearest railway station	Bamani railway station	7.6 Km	
11	Nearest Airport	Solapur Airport	51 Km	

12	Highway	NH-166		N
13	Interstate boundary	Maharashtra-Karnataka interstate boundary	6.17 kms	

C. BACKGROUND OF PROPOSED PROJECT

Ujjani Canal Division No. 9, Mangalwedha proposes to implement Mangalwedha Lift Irrigation Scheme (L.I.S.) project. The Gross Command Area (GCA) 22507.92 Ha., Culturable Command Area (CCA) of 21725.48 Ha. with Irrigable Command Area (I.C.A.) of 17187.28 Ha. has been proposed to be irrigated under this L.I.S. The Mangalwedha L.I.S. comes under the Activity 1(c) Category B1 of EIA Notification 2006 and its subsequent amended dated 14th August 2018 [Major irrigation system (≥10,000 to < 50,000 ha)]. Accordingly, an Environmental Impact Assessment (EIA) Study has been conducted to assess the feasibility of the proposed Lift Irrigation Scheme by assessing the impacts on the surrounding environment in accordance to the procedure stated in the EIA Notification dated 14th September, 2006.

Initially, the Mangalwedha Lift irrigation Scheme project was proposed for implementation on an area of 21357 Ha. of CCA with ICA of 11820 Ha. in two (2) phases benefitting 24 villages. The scope of the L.I.S. comprised of feeding from Gunjegaon barrage through URBC & lifting the water from Gunjegaon barrage in two stages. The scheme proposed irrigating 2730 Ha. area in Ist stage through two canals of length 24.48 Km. from D.C.-I & 9090 Ha. area in IInd stage through four (4) canals of 49 Km. in length from D.C.-II. in Mangalwedha taluka. The barrage was proposed to be constructed on the Mann river near Gunjegaon village with gated weir of length 270 m and 8 vertical gates. The land requirement for the scheme was estimated to be 57.55 Ha. for construction of feeder channel, pump house, inlet Channel, switch yard including left and right embankment of barrage.

Whereas, the present proposal of Mangalwedha Lift irrigation Scheme constitutes a G.C.A. of 22507.92 Ha, C.C.A. of 21725.48 Ha and I.C.A. of 17187.28 Ha. for irrigation in three (3) phases by lifting water from Gunjegaon Pump House (PH)-1 and further distributing it through Pipe Distribution Network (PDN). The purpose of this L.I.S. is to provide water to facilitate irrigation in the 24 villages of drought prone area of Mangalwedha taluka.

Table no. 1 : Village Wise Command Area details of Mangalwedha L.I.S

Sr. No.	Village Name	G.C.A (Ha.)	Net CCA (Ha.)	I.C.A. (Ha.)
1.	Laxmi Dahiwadi	1189.797	1154.53	1064.14
2.	Andhalgaon	2176.76	2074.19	1697.58
3.	Shelewadi	313.67	309.10	285.02
4.	Khupasangi	1612.31	1524.73	1127.97
5.	Lendave-Chinchale	736.33	711.51	537.83
6.	Gonewadi	1191.49	1141.27	843.51
7.	Nandeshwar	1465.78	1412.95	998.93
8.	Radde	1851.82	1800.02	1314.93
9.	Siddhankire	477.21	459.37	387.99
10.	Khadaki	890.40	835.20	663.92
11.	Jalihal	1459.47	1408.81	1189.90
12.	Nimboni	1083.47	1066.31	900.62
13.	Bhalwani	1298.34	1260.07	1064.27
14.	Jitti	612.72	605.06	511.04
15.	Hajapur	769.92	742.45	627.09
16.	Metkarwadi	158.96	156.71	122.22
17.	Dongargav	260.74	258.87	218.65
18.	Hivargaon	441.17	425.89	359.71
19.	Khave	494.38	480.74	406.04
20.	Talsangi	271.50	262.58	221.77
21.	Yedrav	281.40	276.13	233.22
22.	Junoni	952.61	882.4	626.50
23.	Pathkal	1002.51	985.42	777.27
24.	Bhose	1515.16	1491.18	1007.15
Total Area (Ha.)		**22507.916**	**21725.482**	**17187.2752**

D. LOCATION OF THE PROJECT

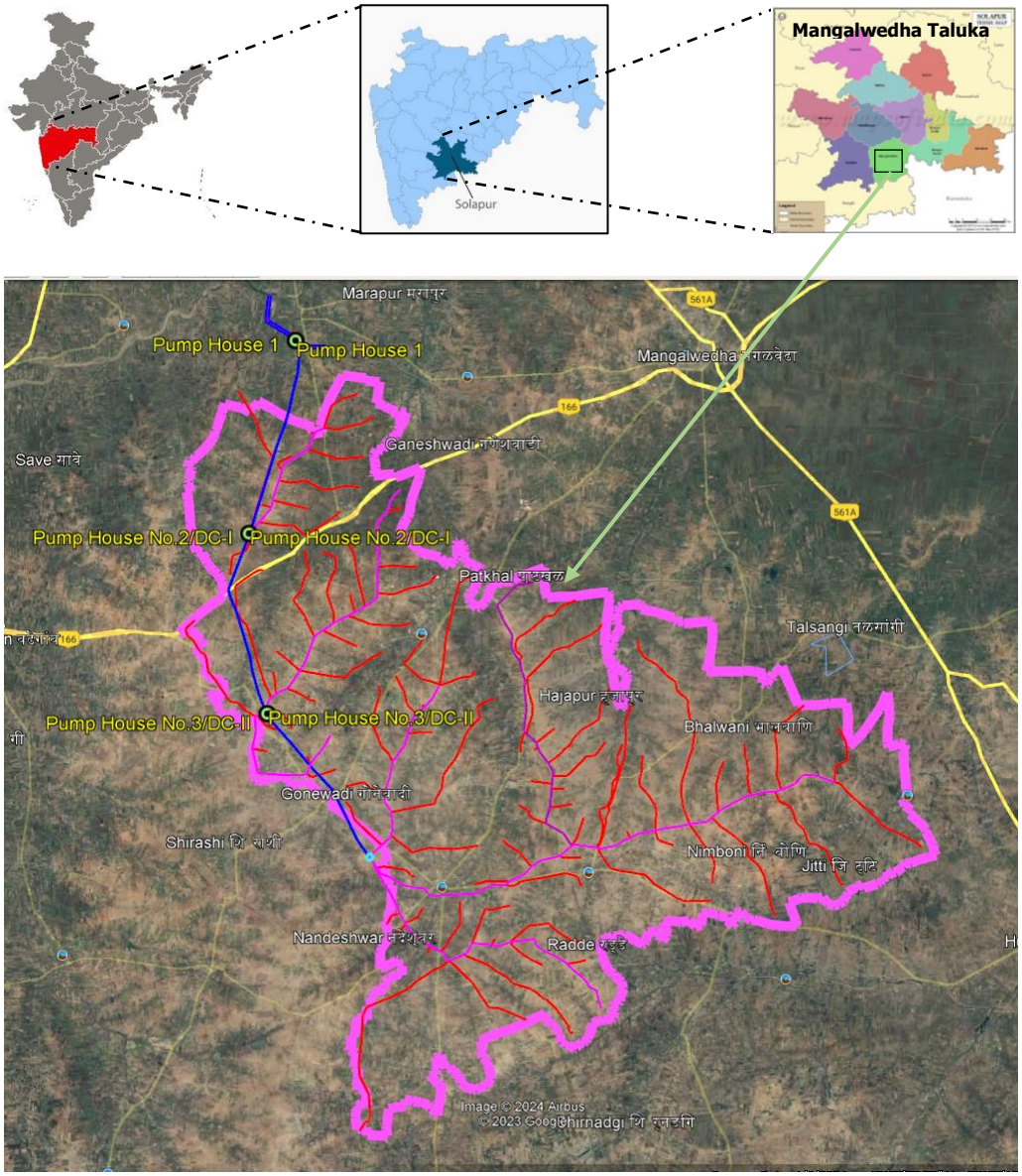
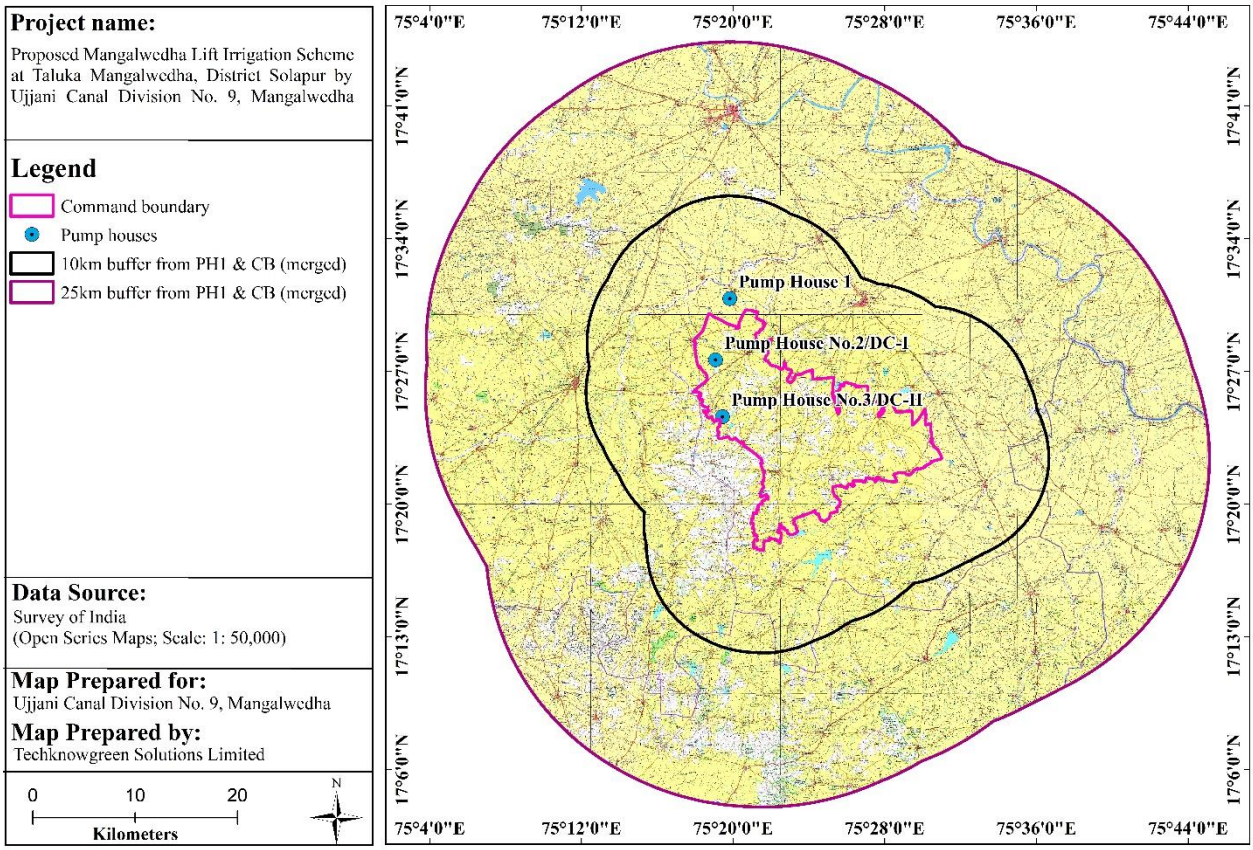


Figure 1.1. Location of the proposed project

TOPOSHEET MAP FOR THE STUDY AREA



A map of boundary of the project site in the vicinity of 25 km of project location

E. BASELINE STATUS OF ENVIRONMENT

Parameter	Location	Results	Standards
Ambient Air Quality	**8 location**	Particulate matter (PM10) March, 2024 to May, 2024 - 60.23 µg/m³ to 94.54 µg/m³ October, 2024 to December, 2024 - 53.26 µg/m³ 94.85 µg/m³	PM10: 100 µg/m3
		Particulate matter (PM2.5) March, 2024 to May, 2024 -20.55 µg/m³ to 41.88 µg/m³ October, 2024 to December -15.42 µg/m³ to 43.88 µg/m³	PM2.5: 60 µg/m3
		Sulphur Dioxide (SO2) March, 2024 to May, 2024 -9.07 µg/m³ to 10.87 µg/m³ October, 2024 to December - 6.56 to 17.90 µg/m³	SO2: 80 µg/m3
		Oxides of Nitrogen (NOx) March, 2024 to May, 2024 -11.43 µg/m³ to 16.01 µg/m³ October, 2024 to December -.7.59 µg/m³ to 18.74 µg/m³	NOx: 80 µg/m3
		March, 2024 to May, 2024:	

Noise Level	**11 location**	Day – 40.7 to 53.2 dBA Night – 30.3 to 41.9 dBA October, 2024 to December: Day – 39.2 to 52.7 dBA Night – 30.1 to 42.5 dBA	Day – 55 dBA Night- 45 dBA
Water Quality	**Ground water -10**	March, 2024 to May, 2024: pH: 7.2 to 8.3 TDS: 872 to 1542 mg/lit Total Coliform: 34 to 1000 MPN/100ml E. Coli: <2 to 21 MPN/100ml October, 2024 to December: pH: 7.3 to 8.2 TDS: 841 to 1368 mg/lit Total Coliform: 21 to 900 MPN/100ml E. Coli: < 2 to 50 MPN/100ml	pH: 6.5 to 8.5 TDS: 2000 mg/lit Total Coliform: ND E. Coli : ND
	Surface water – March, 2024 to May, 2024 (02 locations) October, 2024 to December (07 locations)	March, 2024 to May, 2024: pH: 7.5 to 7.7 TDS: 520 to 590 mg/lit Dissolved oxygen (DO): 4.8 to 5.3 mg/lit Chemical Oxygen demand (COD): 17.5 to 19.6 mg/lit Biochemical Oxygen Demand (BOD) : 3.5 to 4.4 Total Coliform: 130 to 240 MPN/100ml E. Coli: 50 to 80 MPN/100ml October, 2024 to December: pH: 7.5 to 7.9 TDS: 426 to 625 mg/lit Dissolved oxygen (DO): 5.2 to 6.9 mg/lit Chemical Oxygen demand (COD): 9.5 to 19.8 mg/lit Biochemical Oxygen Demand (BOD): 1.8 to 3.5 mg/lit Total Coliform: 110 to 900 MPN/100ml E. Coli: 24 to 140 MPN/100ml	-
Soil Quality	**28 Location**	March, 2024 to May, 2024: Soil Texture: Clay Bulk Density: 1.1 to 1.98 gm/cm³ Water Holding Capacity 44.28 to 56.99 % Available Nitrogen: 96.55 to 189.74 kg/ha Available Phosphorous: 3.33 to 11.71 kg/ha Available Potassium: 179.26 to 388.96 kg/ha Organic Carbon: 0.66 to 1.1 % October, 2024 to December: Soil Texture: Clay Bulk Density: 1.15 to 1.76 gm/cm³ Water Holding Capacity 40.26 to 66.25 % Available Nitrogen: 90.14 to 203.74 kg/ha Available Phosphorous: 3.68 to 21.12 kg/ha Available Potassium: 159.26 to 396.14 kg/ha Organic Carbon: 0.65 to 1.15 %	

F. ANTICIPATED IMPACT

Air environment

Anticipated impacts on ambient air quality

The probable sources of impacts on the ambient air quality as well as at ground level are delineated in the table as under

Type of Sources	Anticipated Sources	
	Construction Phase	**Operational Phase**
Point Sources	DG set; land excavation for construction of Pump houses, Delivery Chambers cum Balancing Tank and pipeline deployment; emissions from construction machineries	Emissions from agricultural equipments such as tractors due to fuel combustion
Line Sources	Movement of heavy machineries, trucks on unpaved roads carrying construction material and muck; transportation of construction materials	Movement of trucks and vehicles on unpaved roads due to transportation of agricultural produce for trade purposes;
Area Sources	Fugitive emissions from open storage of transportation material and generated muck	Burning of post-harvest agricultural residues

During Construction Phase of the project

- The combustion of fuel for operation of heavy machineries and DG sets will emit NOx, SOx and Particulate Matter (PM); thereby, elevating the pollutants concentration in the ambient air as well as at ground level during construction phase of the project. The magnitude of emissions will depend considerably on the type of fuel used.
- Open storage and transportation of construction material such as cement, sand, aggregates etc., resuspension of soil particles due to movement of trucks and heavy machineries on the kuchcha/unpaved roads in large numbers, excavation and open stockpiling of the generated muck are likely to be the major sources of fugitive emissions resulting in elevated concentration of Particulate Matter (PM10 & PM2.5) in the region.

A forest land is present in the vicinity of the proposed Pump House-2 location in the Eastward direction. The particulate matter due to wind entrainment is likely to settle on the leaves of the plants hindering photosynthetic activity. There are no major habitation in the direct proximity of the construction location for pump houses and delivery chambers cum balancing tanks; however, few households have been identified to exist at a distance of 90m to 150m. Prolonged construction phase may cause inconvenience and health implications such as

breathing difficulties to the inhabitants. The prolonged and continual dry or wet deposition of SOx, NOx and particulate matter may alter the soil pH and other physico-chemical characteristics. The historical windrose data as well as the windrose data for the present monitoring duration states that, the wind direction has been predominantly from Eastern or South south-eastern direction in the range 2 – 4m/s. The impacts envisaged are predominantly during construction of pump houses and delivery chambers cum balancing tanks and are therefore, temporary and short-term.

During Operational Phase of the Project

The increase in agricultural yield during the operational phase will result in increased agricultural waste generation. Burning of agricultural residues after harvesting of crops is a commonly practised in rural settings. This will lead to increase in SOx, NOx, particulate matter along with other air pollutants such as CO, CH4, NH3. Further, pesticides and insecticides are commonly used for pest management and improving farm productivity. Some of the pesticides used are persistent organic pollutants (POPs) i.e. these chemicals have the tendency to bioaccumulate and interfere with the normal biological functions. With increase in agricultural land area and farm productivity, the usage of pesticides and insecticides are likely to increase. While burning of agricultural residues, the POPs present in the residues or on soil will be emitted in the atmosphere.

The boost in agricultural productivity will facilitate trade in the major markets leading to frequent movement of vehicles for transportation of agricultural produce. Emission of SOx, and NOx from vehicles due to fuel combustion and resuspension of dust from unpaved roads due to vehicular movement are envisaged. However, over a period of time, better road infrastructure may be developed to facilitate transportation and trade in the region.

Anticipated impacts on micro-climate

Positive Impacts

The year-round supply of water for irrigation purposes in the area will increase the area coverage under agriculture by almost two-fold; thereby increasing the moisture content in the atmosphere and soil. The evapotranspiration from vegetation and agricultural fields will be enhanced leading to subsequent improvement in the precipitation potential. As provision of water will be made, the extraction of water from groundwater reserves will be reduced and the interaction of soil moisture with groundwater will be enhanced; subsequently, improving the groundwater levels in the region. The increase in vegetative cover due to greenbelt development and increase in the agricultural area will have a cooling effect. Additionally, increase in humidity will aid in temperature regulation and microclimatic stability. The increased vegetative cover will also help in reducing the regional carbon footprint through carbon sequestration.

Negative Impacts

The increase in dust and other air pollutants as a resultant of construction activities, movement of vehicles on the unpaved roads, burning of agricultural residues for a prolonged period may hinder the air quality and may facilitate absorption of solar radiation leading to increase in regional temperature. However, these impacts are subjected to the magnitude and time duration of the activities and can be reversed by adopting appropriate mitigation measures. Further, the impacts on the micro-climate due to infrastructure development such as pump houses, delivery chamber cum balancing tanks, laying of pipelines are envisaged to be minimal.

Noise Environment

Anticipated impacts on noise levels

The Mangalwedha Lift Irrigation Scheme (LIS) aims to irrigate 17,187 hectares of drought-prone land in Solapur district, Maharashtra, through a three-stage water lifting system. Given the nature of the project, noise impacts are expected to be minimal and localized, primarily during the construction and operational phases.

During Construction Phase of the project

Sources of Noise:

- Use of construction equipment such as excavators, cranes, and concrete mixers.
- Vehicular movement for material transportation.
- Expected Noise Levels:
- Noise levels could reach 75–90 dB(A) near active construction zones, potentially exceeding the ambient standards in rural areas of 55 dB(A) (day) and 45 dB(A) (night) as per CPCB norms, but the impact is going to be within 100 meters of the localised area where the construction is in progress.

During Operational Phase of the Project

Sources of Noise:

- Pumping stations with high-capacity pumps (1200 HP for Stage I, 658 HP for Stage II, and 478 HP for Stage III).
- Expected Noise Levels:
- Noise levels at pumping stations may range from 65–75 dB(A) within close proximity. The pumps are going to be installed inside the Pump house due to which the Noise Levels outside are not going to be very high. Water irrigation pumps generate SPLs close to 88~90 dBA at 1 meter distance. Outside the building, SPL will be less than 70 dBA.

Water Environment

Anticipated impacts on groundwater

During Construction Phase of the project

The construction phase of the project comprises of land excavation for development of Pump Houses and Delivery Chambers cum Balancing Tanks and laying of pipelines. The impacts envisaged on the groundwater reserves in the study area during construction phase of the project are changes in groundwater quality due to infiltration of pollutants such as Oil from

runoff from construction site and washing of construction equipments and vehicles, intersection of groundwater reserves.

Mangalwedha Taluka is a drought prone region with a decadal average annual rainfall of 407mm from 2010-2019. The water level during pre-monsoon season (May, 2017) predominantly varied in the range 5 to 10mbgl in the Mangalwedha Taluka followed by 10 to 20mbgl in the southern, north-western and north-eastern parts of the taluka. During post-monsoon (November, 2017), the water level predominantly varied in the range 2 to 5mbgl in most of the taluka followed by 5 to 10mbgl. Further, the declining trend of water level up to 0.2m/year during pre-monsoon as well as post-monsoon has been recorded in the entire taluka (CGWB, 2021). Thus, the impact envisaged on the groundwater reserves due to runoffs from construction site or intersection of groundwater reserves during construction phase of the project is insignificant.

During Operational Phase of the Project

Year-round supply of water for agriculture through the proposed L.I.S. will reduce the usage of groundwater reserves; thereby facilitating groundwater recharge. Therefore, no impact on the groundwater table is envisaged. However, the increased agricultural productivity is likely to result in increased usage of fertilizers, pesticides and insecticides in the region. Over usage and continued usage of fertilizer and pesticides may lead to its infiltration into the groundwater reserves and subsequent alteration of the physico-chemical characteristics of the groundwater in the region. Considering, the conveyance of water to be through closed Pipe Distribution Network (PDN), the impacts envisaged due to seepage of water is insignificant. Irrigation will be practised under controlled manner through drip or micro-irrigation. Also, the region has semi-dendritic drainage pattern with high drainage density. Therefore, the possibility of waterlogging and the impact on the groundwater reserves due to water-logging is negligible

Anticipated impacts on surface water

During Construction Phase of the project

The runoffs from construction site, open storage of muck and construction material and washings from construction equipments may enter into the water bodies leading to alteration of its physico-chemical characteristics viz. TDS, TSS, conductivity, metal content. Further, the domestic wastewater generated during construction phase of the project, if not properly managed, is likely to contaminate the surface water bodies owing to its high organic content. This may increase the nutrient content, organic matter, coliform count and cause eutrophication of the waterbodies. Besides, the workers will be employed from the nearby villages and hence, no construction camps or labour colonies will be constructed.

The construction activity predominantly comprises of laying of pipelines and will be restricted to a designated location in the command area. Therefore, the requirement of water and the

generation of wastewater is minimal. Further, the command area does not constitute any prominent surface water bodies and the water bodies present in the study area lies in the 10km buffer zone. In view of the aforementioned considerations, the impacts envisaged on the surface water bodies in the study area is insignificant.

During Operational Phase of the project

The increase in the agricultural land facilitated by the provision of water for irrigation will result in increased usage of fertilizers and pesticides. Runoff of excess water from agricultural fields or storm water runoff will enter into the nearby water bodies leading to increased concentration of nutrients. Prolonged inputs of nutrient rich runoffs will subsequently alter the physico-chemical as well as biological characteristics of the waterbodies.

Anticipated impacts on natural drains/ streams/ nallas in the command area

The command area does not constitute any major or perennial natural drains or streams. However, few discontinuous ephemeral minor streams are present in the command area. These streams are in dried state for maximum duration and are likely to be filled with water during peak monsoon periods. The pipelines for water conveyance through closed Pipe Distribution Network (PDN) will be laid underground. Owing to the shallow nature of the ephemeral streams with an average depth of approx. 0.5m, the possibility of intersection of the pipelines with the naturally occurring streams are negligible and thereby, impacts concerning the alteration of the natural flow is insignificant.

Land environment

During the construction activities

Temporary loss of soil will be envisaged during the construction phase, if construction site, temporary offices, workers camps, stockyards, borrow areas, etc., are located on fertile areas and if haul roads and traffic during construction etc., are routed through agricultural lands.

Soil Compaction- Heavy machinery and equipment used during construction can compact the soil, reducing its porosity and permeability

Soil Erosion- The main activities that will disturb the topsoil and subsoil and exposed to erosion will be clearing of the protective ground cover to construct the canal, drains, and headwork structures and quarrying to obtain construction materials.

Top Soil Loss- The site clearance process includes excavation and vegetation clearance which ultimately induces vegetation loss as well as loss of top soil. The activities associated with the site preparation and excavation plus movement of vehicles and equipments can changes in soil density and porosity.

Soil Contamination- Contamination of soil will take place due to maintenance of machinery, operation of DG sets, oil spills from the operation of mechanical works, etc., construction activities can lead to changes in soil pH, particularly if cement or other alkaline materials are used.

Biological Impacts

Soil Microbial Community Disruption- Construction activities can disrupt the soil microbial community, leading to changes in soil fertility and ecosystem function.

Soil Fauna Disruption- Construction activities can disrupt soil fauna, such as earthworms and insects, which play important roles in soil ecosystem function.

Water logging and Salinity- Improper drainage system in the agricultural fields of end users leads to water logging thereby affecting soil salinity, crop yield.

Geology

Anticipated impact on land use and land cover

Change in cropping pattern: There would be change in cropping pattern. More area would come under crops because of facilitation of irrigation system. Currently vacant land parcels will be brought under cultivation. Apart from additional crops, project will also have positive impacts in terms of improved efficiency leading to bumper crops in otherwise water scarce area. Consequently, the use of pesticides and insecticides will also increase which will result in loss of fertility of the soil

Ecology and Biodiversity

Anticipated impact on Ecology and Biodiversity

During Construction Phase of the project

- Loss of herbaceous and shrub flora and topsoil and consequently habitat for small fauna and soil organisms.
- Disturbance to fauna during construction due to noise.
- Dust from construction activity will settle on nearby vegetation and hamper photosynthetic activity.
- Hunting or disturbing of animals and birds, encroachment into forest areas and cutting of wood for fuel by construction workers and staff

During Operational Phase of the Project

- Reliable water availability in the area will lead to change in cropping pattern and will lead to increased cultivation of cash crops like Sugarcane. This will have an impact on the diversity of birds that feed on grain.
- Availability of water will lead to currently fallow agricultural land coming under cultivation. This will reduce habitat availability of insects and birds that rely on grassy habitat that is currently seen in fallow fields.
- Availability of water will lead to more intensive agriculture with increased use of chemical fertilizers and pesticides. This will lead to reduction in populations of beneficial and non-pest insects with an impact on pollination services and also bird diversity.

Increased use of chemical fertilizers and pesticides will increase pesticide and fertilizer levels in local waterbodies thus affecting the aquatic life negatively.

Land Environment

Construction Phase

The probable impacts on land use/land cover in the surrounding 10 km study area during the construction phase include:

Muck Generation

The proposed system is a closed conduit system up to the end-user level. Muck generation is a significant impact on the land environment, as the project involves laying underground pipelines of MS, HDPE, and PCCP pipes of various diameters. To understand the impact of muck generation, the muck volume generated from excavation for pipeline installation was quantified by adding a swell factor of 25% and subtracting the quantity of backfilling. The resultant quantity represents muck requiring disposal.

Waste Generation

Construction waste includes three types of waste generation:

- Construction and demolition waste
- Hazardous waste
- Municipal solid waste from labour camps/colonies

Contamination of land due to seepage or leakage of construction wastewater and debris is a concern.

Operation Phase

The major anticipated impacts on land during the operation phase include:

Land Requirements and Change in Land Use:

The proposed scheme is not a storage scheme, so no land will be submerged, and no land will be permanently acquired for the pipeline system. Land will only be acquired for the pump house, rising main, approach road to the pump house, and building construction. This change in land use for laying pipelines is temporary, as the land will be restored to its original use. Therefore, no significant impact is expected, and no permanent change in land use will occur due to the project.

Change in Cropping Pattern:

The project will increase the area covered by the Livelihood Improvement Scheme (LIS), leading to changes in cropping patterns, such as the inclusion of Tur dal in the Kharif season and the exclusion of gram in the Rabi season, resulting in increased cropping percentages. This project will positively impact efficiency, leading to bumper crops in otherwise water-scarce areas. However, groundwater pollution due to intensified agriculture related to increased pesticide and fertilizer use may cause long-term soil contamination.

Impacts on Soil Environment

Construction Phase

Excavation: The project involves the excavation of earth for laying underground pipelines of MS, HDPE, and PCCP pipes of various diameters.

Operational Phase

Irrigation Source Water Quality: Parameters such as Electrical Conductivity (EC), Sodium Adsorption Ratio (SAR), residual sodium carbonates, and toxicity can lead to sodic soils, affecting nutrient availability and moisture retention, which in turn limits the types of cultivable crops. Leaching may also contaminate groundwater.

Over/Under Irrigation: Poorly managed irrigation can cause waterlogging, increase susceptibility to crop diseases, and create alkalinity-salinity issues, ultimately leading to soil degradation.

Pipe Laying and Road Construction: These activities may obstruct both surface and subsurface natural drainage.

Natural Processes

Uneven Non-Seasonal Rains: Soil erosion along hill slopes can occur due to irregular rainfall patterns.

Water Shortage During Dry Seasons: This can exacerbate existing soil and agricultural challenges.

Impacts on Socio-Economic Environment

Pre-Construction Phase

- Land will be acquired only for the pump house, rising main, approach road, and related construction.
- Employment opportunities will be generated for local workers during land clearing for pipeline installation.
- Private land acquisition is proposed for the rising main, inspection road, pump house, and access road.

Construction Phase

Positive Impacts:

- The local market will benefit from the demand for steel, sand, cement, and aggregates.
- Local vehicle owners will benefit from the transportation of construction materials.
- The irrigation scheme aims to improve the social and economic structure of the project area without affecting homestead land or residential areas, thus avoiding physical resettlement.
- The pipeline will be underground, creating temporary employment during installation.

Operation Phase

Positive Impacts:

- The project is expected to raise groundwater levels, extending the duration of groundwater availability.

- Farmers may adopt a multi-crop pattern due to improved water availability, including crops like sugarcane, vegetables, and horticulture.
- Increased agricultural activity will boost demand for agricultural workers, potentially raising their daily wages.
- Local markets will benefit from increased demand for fertilizers and agricultural equipment.

Negative Impacts:

- Changes in crop patterns may lead to increased water consumption, especially for crops like sugarcane and horticulture.
- An increase in fertilizer use could impact soil health and chemical content in crops, posing potential health risks.
- In drought years, crops may suffer from reduced water availability.
- Farmers with access to wells may benefit more from the irrigation facilities, while those without may have to wait for canal water release.
- The lift irrigation scheme may increase maintenance costs for water lifting and require more power and expensive machinery.

Impacts on Public Health

Health risks may arise from vector-borne diseases due to inadequate sanitation facilities at construction sites and labour camps. Mitigation measures include providing adequate sanitary and waste disposal facilities. The water sourced from the Gunjegaon PH-1 will be delivered through a closed conduit system, minimizing the risk of waterlogging and related vector-borne diseases. Coordination with Primary Health Centres (PHCs) in the command area for anti-malarial operations is recommended. A public health management plan will be part of the Environmental Management Plan

G. ENVIRONMENTAL MANAGEMENT PLAN

Ambient air quality management plan

Mitigation measures

During Construction Phase of the project

- Reduction of emission from DG sets by installing retrofitted emission control equipment (RECD) in accordance to the CPCB norms.
- Usage of Ultra-low Sulphur Diesel (ULSD) with sulphur-content of less than 10 ppm for heavy machineries and DG sets, as applicable.
- Fencing the construction site including the storage area of construction material with coverings of appropriate height to mitigate dispersion of air pollutants.

- The construction materials and muck when transported shall be covered with tarpaulin sheets.
- The excavated material or the muck generated shall be stored at a dedicated space and covered with sheets to mitigate fugitive emissions.
- Frequent sprinkling of water shall be undertaken at construction sites.
- The heavy machineries and the vehicles used shall be well-maintained, frequently inspected and shall possess valid Pollution Under control (PUC) certificate.
- Speed limit shall be lowered for movement of vehicles or heavy machineries on the unpaved roads

Personal protective equipments (PPE) with mask shall be provided to the construction workers who are directly exposed to dust

During Operational Phase of the Project

- Awareness campaigns and workshops for sensitization shall be held with the farmers to encourage organic farming methods or usage of organic insecticides and pesticides.
- Alternate methods for management of agricultural residues shall be adopted in consultation with the regional agricultural department. One of the potential methods could be usage of organic waste convertors; wherein the agricultural waste will be converted into manure for its subsequent utilization in agriculture field; thereby promoting circular economy.
- Greenbelt development shall be undertaken along the unpaved and approach roads.

Mitigation Measures – Microclimate

- Greenbelt development along the approach roads and in the forest land shall be undertaken by planting indigenous species in consultation with the forest departments.
- Organic farming shall be promoted to lessen the dependency on harmful insecticides/ pesticides.
- Agroforestry can be practiced to improve soil health and structure, increase crop yield, and stabilize microclimatic changes.
- Trend in micro-meteorological attributes such as temperature, humidity, and precipitation shall be monitored on yearly basis to evaluate any significant positive, negative changes.
- Water use efficiency shall be maximized by promoting efficient irrigation practices through drip irrigation and water conservation methods.
- Frequent monitoring of groundwater levels and its physico-chemical characterization shall be undertaken in consultation with the regional Central ground Water Board for trend analysis.

- Appropriate waste management methods and practices shall be adopted for agricultural waste residues at an individual and gram panchayat level to refrain from open waste burning.

Noise management plan

Mitigation measures – Noise

During Construction Phase of the project

- Use of well-maintained equipment.
- Limiting construction to daytime hours.
- Providing PPE, such as earplugs, to workers.

During Operational Phase of the Project

- Mitigation Measures:
- Enclosing pumps within acoustic enclosures of 10~15 dB TL Rating.
- Regular maintenance to prevent excessive noise

Water management plan

During Construction Phase of the project

- The construction material shall be stored at a designated space covered with impermeable sheets when not in use.
- Appropriate and timely management of the excavated earth shall be done.

During Operational Phase of the Project

- Periodic monitoring of groundwater reserves and surface water bodies in the region may be conducted pertaining to its physico-chemical characteristics, coliform assessment, water table etc. and the data obtained shall be subjected to statistical analysis for trend assessment.
- Controlled usage of water shall be promoted through drip or micro-irrigation practices and covering of crops, as deemed suitable, shall be undertaken to minimize evaporation for efficient water management. This will further increase water infiltration, facilitate groundwater recharge and prevent runoff of excessive water from agricultural fields.
- The Mangalwedha taluka is categorized as ‘semi-critical’ (GCWB, 2021) and therefore, groundwater recharge shall be promoted in the region through development of several rainwater harvesting system at gram panchayat level, percolation tanks, check dams etc. for its reuse.
- Conservation methods for surface water bodies through plantation of native plants along the littoral zone of the lake, restricting the input of nutrient rich runoffs from agricultural fields, facilitating phreatic groundwater recharge, practising soil conservation.

- Agroforestry shall be promoted in the region and suitable agroforestry practices shall be adopted at individual as well as village level so that the moisture retention capacity of the soil is increased and will facilitate infiltration of water into the groundwater reserves.

Organic farming methods shall be promoted to reduce the usage of synthetic pesticides and fertilizers and thereby, reduce chemical contamination

Soil management plan

Mitigation Measures to prevent Soil Compaction

- The movement of construction vehicles and equipments will be restricted to designated route only.
- Avoid operating machine on wet or moist soil.
- Temporary paved road will be providing for vehicular movement.

Mitigation Measures to Control Soil Erosion

- Avoid damaging soil structure when removing vegetation.
- Limit soil disturbance to only necessary areas for construction
- Use geotaxtiles, mulch to stabilize soil and it helped to prevent erosion.
- Use silt fences to prevent capture sediment and prevent it from entering water ways.
- Replanting right species of trees, shrubs and grasses on disturbed areas by headwork and canal construction, Erosion prone areas

Mitigation measures - Top Soil

- Upon implementation of the project drought prone areas of the command area will be converted into irrigated land which leads to restoration/improvement of Land use and land cover of the region.
- In order to minimize the impact on soil fertility the top soil will be preserved separately and will be reused for landscaping, grass turfing and site restoration work.
- The top soil will be stripped to a specified depth of 150 mm and stored in stockpiles of height not exceeding 2m, away from water ways and the heap of the top soil will be covered with tarpaulin or turfed to cease washing out of soil especially during rains.
- The stored topsoil will be spread back to maintain the soil physico-chemical and biological activity. The preserved top soil will be used for restoration of sites, in landscaping and avenue plantation.
- The preserved top soil should be used for plantation as soon as possible to prevent loss of quality and quantity.

Mitigation Measure- Soil Contamination

- Vehicle will be maintained on time and in designated area to prevent soil contaminations.

- Cement mixture material will be prepared on mixture machine and directly used in construction.
- It’s a piped irrigation scheme in which no major use of cement.

Excavated Muck: Any leftover muck should be spread in nearby low-lying areas for the construction of village roads or to fill undulating areas. Out of the total 493376 cum, the top fertile soil will be scientifically separated, stored and spread on adjoining farm fields, with farmer’s concern, similarly the of while the remanent major excavated earth quantity of 344589 cum shall be used for constructing service roads along the rising main and gravity main lines, backfill at the construction of pump houses and the distribution chambers, construction of inspection roads, approach roads for carrying pipes at the site and preparation of platform for crane or so. Any muck still leftover shall be spread in nearby low-lying areas for construction of village roads, undulating areas etc.

Water Quality of irrigation source has been evaluated and presented in respective section. The water quality is to be pre-treated and prepared if found unacceptable.

Hence continuous monitoring of reservoir is essential

Irrigation Water Quality: Water quality should be evaluated and pre-treated if found unacceptable. Continuous monitoring of the reservoir is essential.

Stakeholder Training: Farmers should be trained and made aware of the irrigation system's advantages and drawbacks, particularly concerning water management.

Natural Drainage Planning: Pipe laying and service roads should be planned considering the existing natural drainage and hydrology of the project site.

Overall impacts from various project-related or natural processes can be summarized as follows:

Improving Soil Structure: Enhancing EC, nutrient levels, and ionic compositions is vital for soil conservation.

Vegetation Cover: Improved soil structure and fertility can promote vegetation, with roots acting as barriers to hold soil particles. Techniques such as terrace farming with bunds can be beneficial.

Farming Practices: Effective crop management, terrace farming on slopes, and precise fertilizer applications can help conserve soil.

Ecology Biodiversity management plan

Mitigation measures – Terrestrial Ecology and Biodiversity

During Construction Phase of the project

- Top soil should be conserved from the construction site and later used in plantation activities. Native shrubs and trees should be planted around the pumphouse, along the pipeline and along other irrigation land in the vicinity.
- Construction activities have to be halted before late evening and resumed only after early morning hours so as to not cause disturbance to bird and other faunal activity.
- Dust mitigation measures should be used to take care that the surrounding flora is not affected.
- Construction workers and staff need to be sensitized about not harming or disturbing local fauna and not entering forested areas. Fuel like LPG cylinders should be provided to construction workers staying at the site and they should be prohibited from cutting fuelwood.
- The pumphouse number 2 is close to reserve forest area with presence of blackbuck which is schedule 1 species. Signboards should be put up indicating NO ENTRY into forest area and also for SILENCE ZONE near the forest area.
- Proper management of waste material at the site should be done.

During Operational Phase of the Project

- Plantation of native and local trees should be undertaken around the pumphouses, along the main pipeline and other areas so as to enhance the floral diversity of the area and provide habitat for birds and other fauna.
- Grassy and scrub habitats should be created along the canal, rivers and other available land with the irrigation and forest department. Native trees and grasses should be planted in these areas so as to support the faunal species dependent on scrub and grassland habitats.
- Organic farming should be promoted among the farmers and awareness should be created regarding excessive use of chemical fertilizers and pesticides.
- Mixed and diverse cropping should be promoted and supported by policy so that monoculture of cash crops is avoided.

Water logging and Salinity

Mitigation Measures- Irrigation increases cropping intensity and contributes to expansion in cropped areas. It increases yields, stabilizes output, enables crop diversification, reduces risk and increases farm incomes and employment. Some of the benefits are as-

- It’s a piped irrigation project so it will not create soil salinity.
- Piped irrigation systems that minimize water loss and optimize water use can help reduce the risk of soil water-logging and salinization.

- Implementing soil conservation measures, such as mulching and contour farming, can help reduce soil erosion and improve soil health.
- Implementing irrigation scheduling techniques, such as soil moisture monitoring, can help optimize water use and reduce the risk of soil water-logging and salinization.

Land Use and Land Cover management plan

Mitigation measures – Land Use & Land Cover

- To reduce soil acidity, reduce the addition of artificial chemicals and adding alkaline substances like lime.
- Planting leguminous plants to improve soil structures and nutrients.

Mitigation Measures for Waste Management: Construction phase

- Construction and demolition waste will be managed according to the guidelines in the Construction and Demolition Waste Management Rules, 2016.
- The contractor will be responsible for the segregation and management of construction and demolition waste in consultation with local authorities.
- Waste construction material will be recycled as much as possible; remaining waste will be disposed of at designated sites in consultation with local authorities.
- The contractor will ensure no littering or deposition of waste obstructs traffic, public access, or drainage.
- Hazardous waste generated on-site, such as waste oil and used batteries, will be disposed of according to the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Logbooks will be maintained for hazardous waste disposal and submitted with compliance reports.

Municipal solid waste generated from labour camps will be disposed of at designated sites in consultation with local authorities.

Mitigation Measures -Operation phase

- Muck Disposal: Muck will be used to construct service roads along rising mains, gravity main lines, pump houses, and distribution chambers. During excavation, top fertile soil will be set aside and not used for backfilling after laying pipelines. This topsoil will be spread on adjoining fields with farmers' consent, while other soil will be spread on low-lying fields with their consent. Any excess muck will be managed by spreading it in low-lying areas. If necessary, dug-out material can be spread on private cultivator land only with their consent. The muck may also be used by nearby Gram Panchayats for constructing village roads. Any remaining muck will be spread over available government waste land in the command area.

- During excavation, care will be taken to keep top fertile soil aside, which will not be used for backfilling. This topsoil will be spread on adjoining farming fields with farmers' consent.
- Land acquisition will be initiated only after obtaining necessary approvals from the Hon. District Collector, Pune.
- A proper sprinkling system will be implemented to reduce dust during excavation and muck removal.
- Excavated earth/sand will be stored in stockpiles covered with plastic or tarpaulin sheets for reuse.
- Labor accommodations for construction workers will be provided with adequate sanitation facilities, including mobile STPs and solid waste collection and disposal facilities.

During the operational phase, soil analysis will be conducted to monitor changes and manage potential problems due to soil acidification

Socio-Economic Environment management plan

Mitigation Measures

- Local people should be prioritized for construction jobs where suitable.
- Distribution of personal protective equipment (PPE) kits to workers during the construction phase.
- Regular soil health checks and analyses to monitor chemical content in agricultural land.
- Timely water supply during summer to enhance agricultural production and farmers' income.
- Local NGOs and agricultural departments should facilitate environmental awareness programs focusing on organic fertilizers.