

EXECUTIVE SUMMARY



सिंचनात् राष्ट्रदेव्यार :

Maharashtra Krishna Valley
Development Corporation

Proposed Khadakwasala-Fursungi Tunnel Project Substitute to New Mutha Right Bank Canal KM 1 to KM 34, Dist. Pune

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Executive Summary

1.1. Preamble:

The Khadakwasla Irrigation Project comprises 4 Dams the Panset dam (10.65 TMC) (Ambi River), the Varasgaon Dam (12.82TMC) (Mose River), & Temghar Dam (3.71 TMC) (Mutha River) the Khadakwasla Dam (1.97 TMC) (Mutha river). The main canal - New Mutha Right Bank Canal (NMRBC) is a 202 km long contour canal, serving a projected irrigation area of about 62146 Hectares. Storage capacity of four reservoirs is 29.15 TMC

The Tunnel is substitute to New Mutha Right Bank Canal Km. 1 to 34 and proposed in upstream of Khadakwasla dam in Pune district of Maharashtra. The proposed Intake site is in upstream of Kadakwasla Dam and outlet at in Canal CH-34/00. The outlet site is located at Fursungi village, which is about 20 km from Pune city.

Khadakwasla dam on the Mutha River situated 21 km from the City of Pune. This dam is one of the main sources of water for Pune city as well as for irrigation in Daund, Indapur, Haveli, Baramati Taluka.

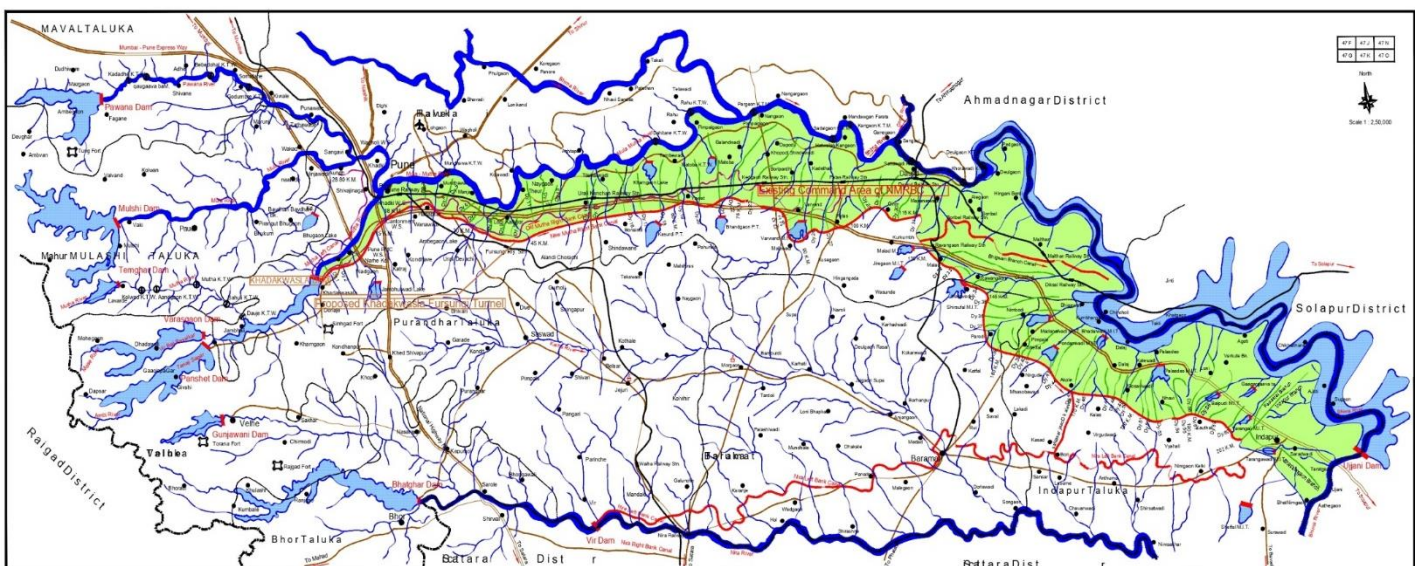


Figure 1- Index Map of the Project

1.2. Administrative Approvals & Financial Aspects:

(Amount in Lakhs.)

Sr. No.	Approvals	Amount	Remarks
Khadakwasala Complex			
1	Original Approval Government Resolution	1054.59	GOM vide letter No. K. MID/1158/J dated 10/06/1958
2	Revised Government Resolution	2966	GOM letter No. Khadak/1168/35567/ IP-4/ Dt.17/06/1972
3	Revised Government Resolution	3822	GOM letter No. Khadak/1104/85964/ IP-4/Dt.28/10/1974
4	Government Resolution	10858	GOM letter No. Khadak/ 1081/ 522/ (1962)MA-Dt.21/01/1982
Khadakwasala- Fursungi Tunnel Project			
5	Govt. of Maharashtra	219047	Khadakwasala- Fursungi Tunnel Project is administratively approved by Govt of Maharashtra vide resolution GR. No. प्रमाप्र-2023/(प्र.क्र.294/2023)/सिंब्य(कामे) dated 05/09/2024.

1.3. Salient features of Existing Project

Sr.No.	DAM	Khadakwasla Dam
	Name of Project	Khadakwasla
	Location	Khadakwasla
	Village	Khadakwasla
	Taluka	Haveli
	District	Pune
	Latitude	18 ⁰ 28'
	Longitude	73 ⁰ 46'
	Purpose	Irrigation and Non Irrigation
	River	Mutha
	Area of Catchment	501.80 Km2
	Mean annual Runoff in the Catchment	1088.45 Mcum
	Mean annual Rain fall	800 mm
	Year of commencement of construction work	1874
	Year of completion	1879
Dam		
	Type of Dam	Composite Dam
	Bed Rock	Basalt
	TBL RL	586.13 M
	MWL RL	583.38 M
	FRL RL	582.47 M
	SPILLWAY CREST RL	578.37M
	LOWEST RIVER BED RL	554.45 M
	MDDL RL	574.30 M
	Maximum height of Dam	36.09 M

Sr.No.	DAM	Khadakwasla Dam
	Length at top of dam in Metre	1539 M
	Total volume content	
	Earthen	290.90 TCuM
	Concrete	
	Masonry	
Spillway		
	Type of spillway	Ogee Crested Spillway
	Length of spillway	169 M
	Energy Dissipator	Stilling Basin With Friction Block
	Design Flood Adopted	2974.82 Cumecs
	Maximum Discharge capacity In Cumecs	2565.00 Cumecs FRL
	Type nos and size of gate	Radial gate 11 nos Size - 12.19 mX4.27 m
Reservoir		
	Area at full reservoir level	13836 TSqM
	Gross storage capacity	86.00 MCUM
	Effective (Live) storage capacity	56.00 MCUM
	Area under submergence	1480.00 Ha
	No of Villages under submergence	21 No
Canal		
	Length of canal	New Mutha Right Bank Canal 202 KM and Old Mutha Right Bank Canal 109 KM.
	Capacity	39.63 Cumecs + 4 Cumecs
	Gross Command area	117837 Ha
	Culturable command Area	101688 Ha
	Irrigable command Area	62146 Ha
	Village Under Command	107
	District	Pune
	Taluka	Haveli ,Daund , Baramati, Indapur
Power		
Point	Haydraulic Design Head	5 m
	Design Discharge	15 cumecs/per
	Installed Capacity	2 X 600 KW
Generating		
Unit	Type	Not Yet Commissioned
	Number	
	Capacity	

1.4. Proposed Project

A tunnel between Khadakwasala- Dam to Fursungi is proposed substitutes for New Mutha Right Bank Canal Km 1 to 34. Total Length of this Tunnel (Tunnel+ Cut & Cover + Channel) is 26.667 Km. Salient Features of Khadakwasala Fursungi Tunnel is as following

1.	Project Proposal	Khadakwasla – Fursungi Tunnel
2	Source	Khadakwasla Dam
3	Type of Canal	Perennial
4	Actual Discharge through Tunnel	42.76 Cumecs (1510 Cusecs)
5	Water Saving	2.18 TMC
6	Details of Tunnel Project	
	Intake Level	567.300 m
	Outlet level	566.670 m
	Tail Water Level	570.700 m
	FRL	582.640 m
	MDDL	578.000 m
	Diameter of Tunnel	6.3 m
	Velocity of Tunnel	1.3 m/sec
	Length of Tunnel Project	
	Tunnel	23.450 km
	Cut & Cover	2.350 km
	Open Channel	0.867 km
	Total Length of Project	26.667 km
	Method Of Construction	Drill & Blast Method
	Shape of Tunnel	Horse Shoe
	No. of Shafts	06
7.	Area to be restored from existing command Area	3471 Ha.

1.5. Status of Clearances

Environmental Clearance: - The original Khadakwasla Dam Construction work was started in 1860 and completed in 1878. Hence Environmental Clearance was not applicable to existing project. As per the Gazette Notification dated 14 th Sep, 2006 and its subsequent amendments, a tunnel between Khadakwasala Dam to Fursungi is proposed substitutes for New Mutha Right Bank Canal Km 1 to 34 is applied for Environmental Clearance.

Government of Maharashtra approval: - Khadakwasala- Fursungi Tunnel Project is administratively approved by Govt of Maharashtra vide resolution GR. No. प्रमाप्र-2023/(प्र.क्र.294/2023)/सिब्य(कामे) dated 05/09/2024.

Forest Clearance: Total area of forest affected due to project is 0 8064 ha Actual acquisition of this area is not required The proposal for forest land is submitted on parivesh with application no FP/MH/Minor Canal/ 460637/2024.

Land Acquisition: Total Land required for New Mutha Right Bank Canal Km 1 to 34 PR is 23.8364 Ha. Details of Land acquisition is given in below table:

Land Acquisition details

Private land	23.03 Ha			
Government land/Forest Land	0.8064 Ha			
Submergence area/Reservoir area	NA			
Land required for project components	Nature of Land involved in (Ha)	Private land (Ha)	Forest/Govt. land (Ha)	Total Area required (Ha)
	Tunnel + Cut & Cover and Open Channel	23.03	0.8064	23.8364 Ha
	Submergence	0	0	0
	Total	23.03 Ha	0.8064 Ha	23.8364 Ha

1.6. Brief Description and Nature of the Project

The details of Proposed tunnel are as below

- | | |
|---------------------------------|--------------------|
| 1. Design Full Supply Discharge | 42.76 Cumec (1510) |
| 2. The Length | 23.5 Km |
| 3. Inner diameter | 6.3 M |
| 4. Type of Tunnel | Horse Shoe Type |
| 5. Inlet level | 567.300 m |
| 6. Outlet level | 566.670 m |

Alignment of Tunnel

From conceptualization stage till date, six alternative schemes have been studied for the project with one scheme proposed by the department (Alternate-IIA) and additional five alternative studies are envisaged by the consultant. Suitability of the schemes is evaluated based on following parameters:

- Length of the tunnel
- Rock Cover
- Length of the Cut and Cover portion
- Length of the Adits/ Shaft Location
- No. of opening possible
- Intersection with waterbodies.
- Avoiding urban area
- Suitable construction method

- Interference with railway line

Alternative-IIA

- The tentative approximate **length of tunnel** is 26.7 km
- Proposed alignment does not pass through densely populated area.
- A smooth transition curve is formed at the junction point of proposed alignment & New Mutha Right Bank Canal.
- Average Rock cover for proposed alignment is good.
- Availability of good shaft locations.
- At railway crossing (Km.25/235 to Km.25/285) average overburden/ rock cover is 14.372m above the crown level of tunnel.
- No need of deep cut as cut & cover is possible
- Minimum disturbance & surface subsidence.
- Walkthrough survey/ ground level study i.e. avoiding important structure/ building etc. was carried out for different alternatives & proposed alignment is found most suitable.

A. Component of Tunnel

The major components of the project as being executed are as follows.

Coffer Dam

The coffer dam is providing to facilitate construction work at intake. The Khadakwasla Dam Reservoir water level is higher than the intake level of tunnel, so for construction of intake we have provided coffer dam in the periphery of intake to control reservoir water in the construction area. The maximum water level in Khadakwasla reservoir is EL 583.4 m. The top of the coffer dam, accordingly, is proposed at EL 584.4 m with provision for a 1.0 m free board. As such, the maximum height of coffer dam comes out to 12.4 m. It is proposed to construct a concrete faced rock filled coffer dam with 200 mm thick M20 grade concrete in Khadakwasla Reservoir area site. The top width has been kept as 3.0 m for vehicular movement. The upstream slope is kept 1V:1.5H. The downstream face has been provided in steps of 1V: 1.5H. The vertical drops will act as energy dissipater in case of overflow. To reduce seepage, a 1000 mm thick and 127 m long clay blanket has been provided upstream of the heel. For the protection of seepage, a cut off wall also provided in Khadakwasla reservoir area site.

Intake Structure

The intake is located in the about 972 m upstream of Khadakwasla dam at an elevation 567.30 mm (invert) and El-587.0 m at top. It is suitable from the aspects of geological considerations, hydraulic considerations of drawl of water from relatively undisturbed zone in the reservoir and sediment. Also, since the bank slope in this area is relatively mild, it would provide for adequate space on the hill slope with nominal excavation volume to locate the intake structure. It also meets the primary concerns for an optimally designed intake structure primarily meant for drawing of the requisite quantum of relatively silt free discharge with minimal maintenance requirements. The proposed intake has one bays of 30m width to accommodate a trash rack length of 13 m. One gates of size 7.0m x 7.0m were proposed. The intakes were feeding directly tunnel. The trash rack has been taken up to the top of intake i.e. El. 587 m. The gate size of intake is 7.0 m x 7.0 m. The invert of intake is kept at EL 567.30.

Intake Gate

Two number of gates are provided at intake location. The first one used for regular operation and second one used for Emergency purpose or maintenance purpose.

From design conclude

Type of Gate	:	Vertical Lift Fixed Wheel type
Clear width of opening	:	5500 mm
Clear Height of opening	:	6300 mm
C/C of Side seal	:	5650 mm
C/C of Wheel track	:	6200 mm
Design head	:	16.1 m
No of gate unit	:	2 no
Thickness of skin plate	:	14 mm
Corrosion allowance	:	1.5 mm
Wheel diameter	:	400 mm
No of wheel	:	4 no. at each unit
Total weight of gate	:	22 tone
Hoisting capacity	:	45 tone

Tunnel

Purposed Tunnel is designed for 42.76 Cumec discharge when reservoir elevation at MDDL (578.0 m) & velocity through tunnel is 1.3 m/sec. having inner diameter of 6.3 meter. According to rock class System thickness of shotcrete is varies from 0.05 m to 0.20 m. Concrete lining of 300 mm will be provided to purposed tunnel throughout its length. Also 100 mm thick

payline thickness will be provided. 25 mm diameter 4 m long rock bolts will be used in the construction of purposed tunnel along with ISMB 150 @ 750 c/c Steel ribs will be used.

Shaft

The purpose of the vertical shaft is to facilitate advancement of tunnel and mucking during construction. A total of 6 vertical shafis are proposed at different chainages. The diameter of the shaft is 7.5 m.

Shaft	Depth of Shaft (m)	RD
Shaft 1	45	2460
Shaft 2	70	5780
Shaft 3	115	9290
Shaft 4	118	12200
Shaft 5	115	15050
Shaft 6	68	18000

Thickness of shotcrete in shaft varies from 50 mm to 100 mm depending upon the class of rock. For construction of shaft steel ribs will be used with specification of ISMB 150 @ 500 cic & ISMB 150 @ 750 c/c. rock bolts of 25 mm diameter and 4 m long will be used for stabilization of rock excavation.

Cut & Cover

Purposed cut & cover begins from Ch. 23500 and ends at Ch. 25800 i.e. total length of this portion is 2.3 km and height is 7.7 m. In this portion rock bolts of 25 mm diameter 3.5 m long will be used for stabilization of rock excavation. PCC of 100 mm thickness is provided at the bottom of cut & Cover portion.

1.7. Benefit Cost Ratio

$$\begin{aligned}\text{Benefit Cost ratio} &= (\text{Annual Benefits/ Annual Cost}) \\ &= (292.41/182.34) \\ &= 1.60 > 1\end{aligned}$$

So, Benefit Cost Ratio for this project is 1.60 which is more than one. The project is Beneficial from Financial and technical point of view.

Benefits of Project:

1. 2.18 TMC water will be saved and can be used for Irrigation and Non-Irrigation purpose.

2. Increasing demand for drinking and industrial purposes in Pune city and surroundings, leakage in canals etc. Due to these reasons, the stress on the irrigation sector can be reduced through this saving. Also, additional water may be available for drinking.
3. Total 3471 Ha command area has been restored due to saved water.
4. Land acquisition will not require except for tunnel shafts, approach road, open channel and cut & cover portion (11.71 Ha). So, as there will be no question of rehabilitation.

1.8. Irrigation facilities in the project command area

Irrigation in downstream of Khadkwasla Dam was carried out using New Mutha Right Bank Canal. Also, the New Mutha Right bank canal is used for water supply.

New Mutha Right Bank Canal: - Khadakwasla Project having canal namely New Mutha Right Bank canal (NMRBC) is 202 KM. along counter with a proper distribution system. The head of a canal is designed for flowing 1650 Cusecs of water. The first 30 Km. length of the canal is flowing through a densely populated area of Pune City.

Pre and post Irrigation Cropping Pattern

The major crops grown in pune are Rice, Jowar, Jowar, Tur, Wheat, Tur, Groundnut, Urad, Gram, and other pulses. The main crops grown by using New Mutha right bank canal are Paddy sugarcane. Sugar cane is a Cash crop.

Cropping Pattern: Cropping pattern approved by Directorate of Agriculture (No. Sinchan 2211993149-59-dt. 08/07/1993 KDK Project)

As per DPR for area 3471 Ha							
Pre irrigation				Post irrigation			
Sr.No.	Crop	Yield TPA	Area	Crop	Yield TPA	Area	Total Production
1	Sugarcane	139	65	Sugarcane	139	174	24186
2	Cotton	1.7	12	Cotton	1.7	174	295.8
3	Paddy - drilled	1.5	12	Paddy – drilled	4	208	832
4	Paddy tp	1.5	99	Paddy tp	4	69	276
5	kh.Bajri	3	78	Bajari	3	174	522
6	Ground nut	2.2	44	Ground nut	2.2	521	1146.2
7	Maize local	1.8	31	Maize local	0	0	0
8	Jowar	1	59	Jowar	4	868	3472
9	Wheat	2.2	2759	Wheat	4	521	2084
10	Tomato	26	242	Chillies	10.7	243	2600.1

As per DPR for area 3471 Ha							
Pre irrigation				Post irrigation			
11	Oil seeds	1.5	70	Green manure	1.8	521	937.8
			3471			3473	

Command Area

General

The Khadakwasla irrigation Project comprises four Dams the Panshet Dam (Ambi River), the Varasgaon Dam (Mose River), Temghar Dam (Mutha River) & the Khadakwasla Dam (Mutha River). The main canal - new Mutha right bank canal (NMRBC) is a 202 km long contour canal, serving a projected irrigation area of about 62146 hectares. Storage capacity of four reservoirs is 29.61 MCum.

The Tunnel is substitute to New Mutha Right Bank Canal Km. 1 to 34 and proposed in upstream of Khadakwasla dam in Pune district of Maharashtra. The project is envisaged as an irrigation tunnel project with project area lying between longitudes 73° 46' 15" East and 74° 01' 01" East and latitudes 18° 26' 02" North and 18° 27' 44" North. The proposed Intake site is in upstream of Khadakwasla Dam and outlet at in Canal CH-34+00, a large village in the area. The outlet site is located at Fursungi village, which is about 15 km from Pune city.

Khadakwasla Project having canal namely New Mutha Right Bank canal (NMRBC) is 202 KM. along counter with proper distribution system. At the head of canal is designed for flowing 1650 Cusecs of water. The first 30 Km. length of canal is flowing through densely populated area of Pune City.

Canal Wise/Taluka Wise Command Area

New Mutha Right Branch Canal	Taluka	GCA (Ha)	CCA (Ha)	ICA (Ha)
	Haveli	10968	9465	5785
	Baramati	1859	1604	980
	Daund	53090	45814	27999
	Indapur	51920	44805	27382
	Total	117837	101688	62146

Out of 2.18 TMC water 1.00 TMC water will be supplied for industrial use and balance 1.18 TMC water will be made available for irrigation propose. Considering Khadakwasla project cropping pattern, 0.34 TMC of water can irrigate 1000-hectare area. So 1.18 TMC water will irrigate 3471 Ha. area in command. Considering crop rates used in latest DPR of Chaskaman and Kalmodi project and crop pattern of Khadakwasla Dam, pre-irrigation agriculture produce

will be Rs. 10.01 crore and post-irrigation agriculture produce will be Rs. 22.09 crore. So net annual benefit from irrigation water use is Rs. 12.08 Crore. Hence, there is no change in command area

1.9. Protected Area

Sr. No.	Name	Area	Tahsil	Distance	Direction
1	Ghera Sinhagad Village	ESA Western Ghat	Haveli	3.65 km	SW
2	Rajiv Gandhi Zoological Park and Wildlife Research Center, Katraj	-	Haveli	1.65 km	N

The EIA EMP report has been prepared as granted Terms of Reference (ToR) vide **File No: J-12011/16/2024-IA-I(R)** Dated **03/12/2024**

1.10. Description of the Environment

1.10.1. Study Area

Study area includes 10 km radius from the tunnel.

Environmental Setting of the Study Area

SI	Particulars	Description																		
1.	SoI Toposheet	Topo sheet : 47 F/10, 47 F/11, 47 F/14, 47 F/15, 47 J/2, 47 J/3																		
2.	Nearest Major Town	Pune																		
3.	Nearest Railway station	Pune Railway Station : 16 km																		
4.	Nearest airport	Pune International Airport : 16 km																		
5.	Nearest IMD station	IMD station Pune - Shivajinagar, Agricultural College farm																		
6.	Any Archaeological monuments	No within 10 km Radius																		
7.	Ecological sensitive area / Reserve Biosphere within 10 km / Reserve Forest	Following Sacred groves/ESA/Wildlife Sanctuary present in the Study Area <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sr. No.</th> <th>Name of the Grove/Wildlife Sanctuary/ESA</th> <th>Deity</th> <th>Tahsil</th> <th>Distance</th> <th>Direction</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Ghera Sinhagad Village</td> <td>ESA Western Ghat</td> <td>Haveli</td> <td>3.65 km</td> <td>SW</td> </tr> <tr> <td>2</td> <td>Rajiv Gandhi Zoological Park and Wildlife Research Center</td> <td>-</td> <td>Pune</td> <td>1.65 km</td> <td>N</td> </tr> </tbody> </table>	Sr. No.	Name of the Grove/Wildlife Sanctuary/ESA	Deity	Tahsil	Distance	Direction	1	Ghera Sinhagad Village	ESA Western Ghat	Haveli	3.65 km	SW	2	Rajiv Gandhi Zoological Park and Wildlife Research Center	-	Pune	1.65 km	N
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1	Ghera Sinhagad Village	ESA Western Ghat	Haveli	3.65 km	SW															
2	Rajiv Gandhi Zoological Park and Wildlife Research Center	-	Pune	1.65 km	N															
8.	Seismic Zone	III																		

1.10.2. Study Period:

The data collected was divided, for analytical convenience, in to the following 3 Seasons:

1. Season 1 - March to May 2024 (Pre-Monsoon Season)
2. Season 2 - June to August 2024 (Monsoon Season)
3. Season 3 - October to December 2024 (Post-Monsoon Season)

1.10.3. Meteorology

The Meteorological data of IMD Pune used.

Temperature: The average maximum temperature is 43.3°C and average minimum temperature is 1.7°C recorded

Humidity: Annual Average or Mean maximum and minimum humidity is 74 & 47 % respectively

Rainfall: The average annual rainfall observed to be 803 mm

Wind Speed: The average wind speed in the region is observed to be in the range of 2.5 to 9.2 kmph.

1.10.4. Seismology:

Project area falls in Seismic Zone III. It suggests that the area is a moderately affected

1.10.5. Ambient Air Quality:

Air quality study was conducted at 8 locations in the project area. The amount of dust PM10 and PM2.5 sulfur dioxide, oxides of nitrogen in the project area was found to be limited as per National Ambient Air Quality (NAAQ) standards.

1.10.6. Ambient Noise Level:

Noise levels were studied at 10 locations in the project area. During the study period, the noise level was recorded as 51.2 decibels to 69.4 decibels during the day and 40.6 to 60.6 decibels at night.

1.10.7. Water Quality Study:

A total of 16 samples including 4 of surface water and 12 of ground water were collected.

- It was found in the range of 6.58 to 7.95 for surface water and 7.02 to 7.69 for ground water.
- The amount of dissolved oxygen in surface water was found to be 3.2 to 6.2 mg/L.

Most of the physico-chemical parameters are found well within prescribed limits of IS 10500:2012.

1.10.8. Soil Quality:

A total of 12 samples were tested in the project area to check the soil quality.

- Soil content of the area was found to be limited from 7.21 to 8.05.
- Conductivity of soil was found to be 401.4 to 1014.16 $\mu\text{mho/cm}$.
- Soil organic matter content was found to be limited.
- Soil quality is good for agriculture

1.10.9. Ecology and Biodiversity:

During the brief survey total 280 species of flora, in faunal diversity 161 species of birds, 10 Mammals, 62 fresh water fish, 17 reptiles, 31 Amphibians and 22 Butterfly species were recorded. As per Indian Wildlife Protection Act, 1972 (as amended up to 2022; IWPA), out of total four Schedules, Floral and Faunal species are protected in Schedule I-IV. During the field survey 23 species listed under Schedule I of the Act.

1.10.10. Land Use Land Cover Study

Land is classified as Agriculture, built-up area, Reserve Forest, Scrub Land, & water bodies, etc. classes. Land use of the study area varies, and is predominantly agricultural as seen from *below table*

LULC Class	Area ha	Area sq.km.	In %
Agriculture	34057.22	340.57	40.14
Built up	19090.91	190.91	22.50
Reserve Forest	8211.57	82.12	9.68
Scrub land	21731.19	217.31	25.61
Waterbody	1762.60	17.63	2.08
Grand Total	84853.49	848.54	100.00

1.10.11. Socio Economic

The study area comprises of 87 villages

Demography Haveli Tehsil has the highest number of villages in the study area followed by Pune City Tehsil. Whereas Haveli tehsil has the highest household followed by Pune City Tehsil

Literacy Status: On an average 73% population is literate while 27% of the population is reported to be illiterate

1.11. Management

The mitigation measures to be taken-up during the construction and operational phases are suggested below.

Ambient Air Quality

To control the fugitive dust emission during construction phase regular sprinkling of water suggested. However, during construction and operation phase regular upkeep and maintenance of vehicles is suggested to keep the air pollution level within the permissible limit

Ambient Noise Level

During operation phase all the construction activities will be over and the impact on ambient noise levels during this phase will be marginal limited to vehicle movement in the project area.

Water Quality

- ❖ Care should be taken in not to cut vegetation from the project activity area to avoid;
- ❖ A regular monitoring programme of water quality in and around the periphery should be undertaken to evaluate the actual alterations of water quality and their effects
- ❖ In addition to the above, ground water quality and water table fluctuations in the vicinity of the project, should be monitored.

Ecology & Biodiversity

- ❖ The judicious sequencing of construction, operation and appropriate location of labour camps, project colony etc.
- ❖ The movement of vehicles should be strictly monitored and excessive blowing of horn and lighting in the night should be avoided. Such activities may cause disturbance to the local fauna.
- ❖ Strict law enforcement should be undertaken for conservation of wildlife; and
- ❖ Awareness program among the, drivers, school children & local community about the ecology & biodiversity.
- ❖ sign boards/ Notice Boards at the site like, NO HORN PLEASE, SILENCE ZONE etc. will be fixed.
- ❖ As a corporate social responsibility, project authorities should undertake plantation of native species in the vicinity.
- ❖ Control of Poaching; taxidermy and Illegal Trade in Wild Animal and Plant Species is strictly prohibited as per the various laws related to the Wildlife Protection. In cases any of such things are noticed, it is required to be brought to the notice of the forest officials.

- ❖ The movement of the project vehicles should be strictly monitored and excessive blowing of horn, lighting in the night should be banned. Such activities may cause disturbance to the local fauna.
- ❖ Adequate allocation for the financial resources required to be made to implement the wildlife management plan.

Greenbelt should be developed in the following areas:

- ❖ Plantation along the Shafts;
- ❖ Plantation at Office and colony area
- ❖ Plantation along approach roads; village area and
- ❖ Afforestation

1.12. Budgetary Allocation for Environment Management

Costing for Environment Management

Sr. No	Pollution Control & Other Environment Infrastructure	Capital Cost Rs. Lakhs	Recurring Cost (per annum) Rs. Lakhs
1.	Ambient Air Quality	-	18.00
2.	Noise Level	-	12.00
3.	Surface and Ground Water Quality	-	25.00
4.	Soil Quality	-	15.00
5.	Solid/ hazardous wastes	03.00	15.00
6.	Green Belt Development	207.00	50.00
7.	Fisheries Conservation & Management Plan	15.00	
8.	Labour Management Plan	25.00	
9.	Wildlife Conservation Plan	70.00	
10.	Muck Management Plan	25.00	
11.	Health & Safety	-	25.00
12.	Command Area Development Plan	12050.00	
13.	Corporate Environmental Responsibility	1095.00	-
Summary of allocation of fund for EMP			
1.	EMPs: (eg.: Air Environment, Water Environment)		193.00 L
2.	Capital Cost (in Cr.)		2190.47
3.	Recurring Cost per annum (In Lakhs)		160.00 L