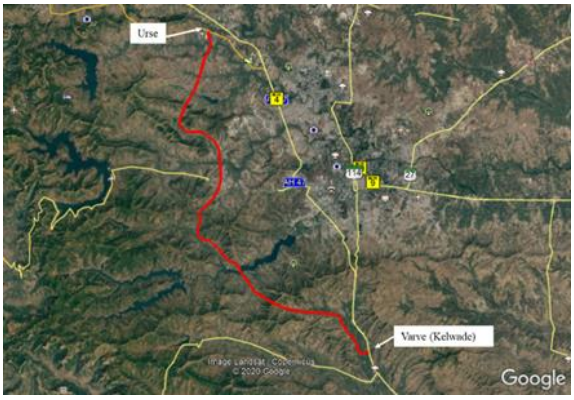
Executive Summary of Draft Environmental Impact Assessment Report

for

Proposed Pune Ring Road Western Alignment (68.8 km) Start from Urse Village Ch-0+00 and Ends at Varve (Kelwade) Ch- 68+80 Village



[SCHEDULE 7(f) - CATEGORY B]

SEIAA-STATEMENT-0000000704

Submitted to

Maharashtra State Pollution Control Board (MPCB)

Environmental Consultant

Building Environment (India) Pvt. Ltd
Dakshina Building, Office No-401,4th Floor,
Beside Raigad Bhavan, Sakal Bhavan Rd,
Sector 11, CBD Belapur,
Navi Mumbai, Maharashtra 400614
Telefax: 022 4123 7073/2757 8554
Web: www.beipl.co.in

Submitted by

Maharashtra State Road Development Corporation Limited. (MSRDC)
Bandra Worli (Rajiv Gandhi) Sea Link Project Office, Opp. Bandra Reclamation Bus Depo, Near Lilavati Hospital,
Bandra (W), Mumbai 400050,
Maharashtra, India

Monitoring Laboratory:

Horizon Services
(Lab Approved by MoEF, New Delhi, Lab NABL 17025:2017)
Shree K 3/4, S. No. 10, Erandawane Housing Society,
Opposite Deenanath Mangeshkar Hospital, Pune,
Maharashtra 411004

Study Period: 15th December 2019 to 15th March 2020

[ToR: File No. SEIAA-STATEMENT-0000000704 dated 10th February,2021]

NABET/EIA/1821/RA0133, Valid Till- 28.11.2021
June, 2021

Executive Summary

1. Introduction

Area wise Pune District is the second largest district in the state of Maharashtra (15643 sq. km.). Population wise, it is the most populated district in the State (94,26,959 as per 2011 Census). Pune is at the junction of three major highways, NH-4, NH-50 and NH-9 from which heavy outbound traffic passes through each day, that severely affects the infrastructure and traffic situation in the city. The traffic in and around Pune City has been increasing at high rate due to industrial and other socioeconomic developments in and around Pune City. As a result, roads radiating from the city in all directions are required to be widened to 4 lane/ 6 lanes. Besides, the vehicles that are required to bypass the city are also passing through the city, thereby, creating traffic congestions. Such passing traffic, if diverted through road network outside the city limits will ease the traffic congestion within the city. In absence of such peripheral connections, the load of external floating traffic is ever increasing on the intra city road network. To avoid the traffic congestion in Pune, Maharashtra State Road Development Corporation (MSRDC) initiated to take up the development of an Outer Ring Road Corridors for the City of Pune under three packages viz

a) Eastern Alignment [**approximate length 100 Km**] starting from Urse on Mumbai-Pune Expressway and culminating at Khed Shivapur on NH-48 [Popularly known as Satara road] via Talegaon [Old Mumbai-Pune Ring Road – NH48], Kuruli [Nashik Road, Lonikand [Ahmednagar Road], Theur [Solapur Road], Wadki [Saswad road] and Bhivari [Pune Baramati road] and ends at Varve (Kelwade) on Satara road (NH 48)

b) Western Alignment [**approximate length 66.100 Km**] starting from Urse at Mumbai-Pune Expressway Toll Naka. YCEW, and traverses through number of villages/towns viz. Parandwadi, Dhamne, Bebadohal, Chandkhed, Pachane, Pimploli, Kemsewadi, Javal, Padalgharwadi, Rihe, Ghotavade, Amedveth, Bhare, Kasar Amboli, Urwade, Ambegaon, Marnewadi, Mutha, Katavi, Bahuli, (Bhagwatwadi), Sangrun, Mandvi Budruk, Wardade, Mulkhed , Khamgaon Maval , Ghera Sinhgad, Kalyan, Rahatvade, Ranje, Kusgaon, Kanjale and ends on ends at Varve (Kelwade) at Satara Road [NH-48].

Application for the Terms of Reference (ToR) for Western Alignment (66.100 km) starting from Urse Village, Maval Taluka, Pune District and ending at Khed Shivapur at Satara Road, was submitted in December,2016 on PARIVESH portal and 27th September 2017 through MPCB portal and ToR was granted in 143rd Meeting of SEAC-I, Maharashtra in October,2017.

During finalization of detailed design, the alignment was refined with social considerations, which resulted in increased in length of the alignment. Further, there were changes in the number of major and minor bridges due to interconversion. The refinement in the alignment also led to increase in number of tunnels from 7 to 8. Considering these changes, it was required to reapply for the ToR which was within its validity period.

For administrative purpose, MSRDC has further split the project in 3 packages from the original two packages. PRR Eastern Alignment is now having two packages namely Part-1 and Part-2.

- Eastern Alignment (Part-1): Starting from Urse and Ends at Solu – 38.340 km
- Eastern Alignment (Part-2): Starting from Solu and Ends at Varve (Kelawade) near Satara highway- 66.560 km

- **Western Alignment: Starting from Urse Village and Ends at Varve (Kelwade) on Satara road Via Parandwadi, Paud road, Mula road, Mutha road- 68.800 km.**

The revised alignment of the proposed Pune Ring Road-West starts from Urse village, Maval Taluka, Pune District at CH 0/00 km and ends at Varve (Kelwade) village, Bhor Taluka, Pune District at CH 68+800 km directly connecting 4 talukas and 38 villages.

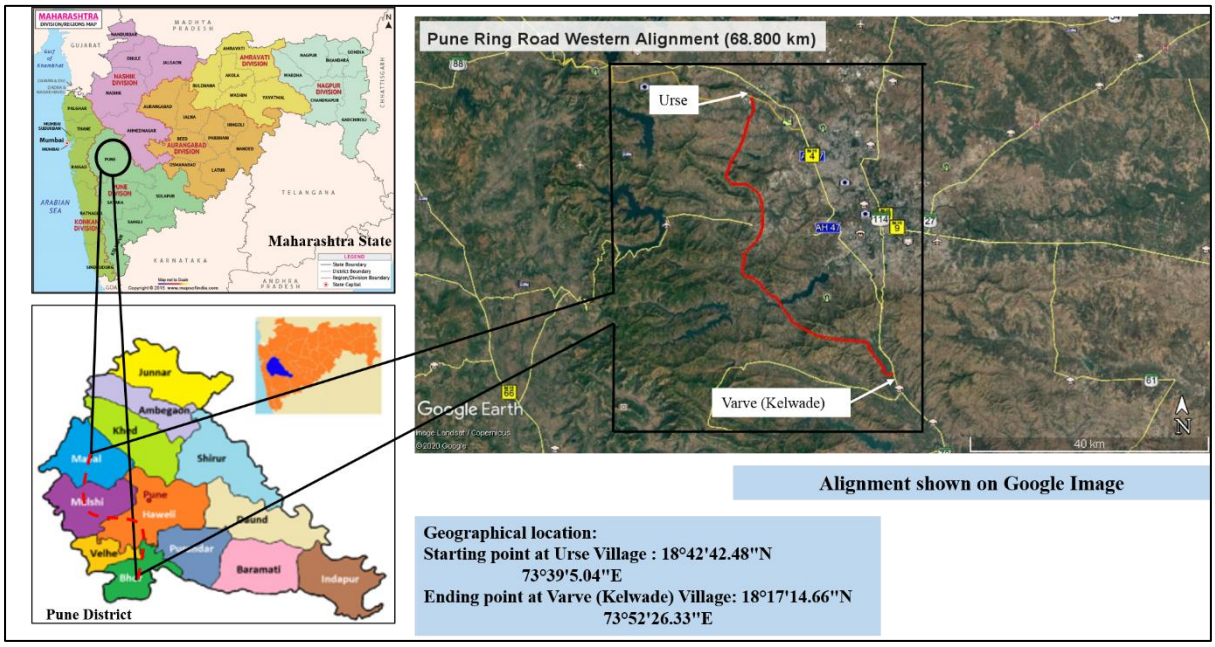


Figure *Error! No text of specified style in document.*-1: Pune Ring Road West Project Plan

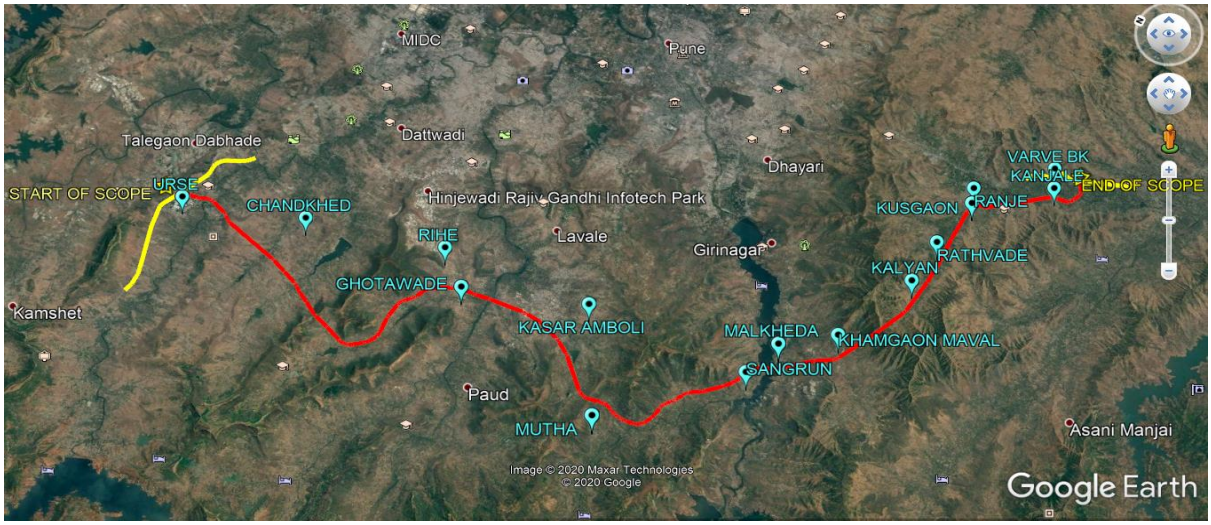


Figure *Error! No text of specified style in document.*-2: Pune Ring Road West Project Location-Google Image

2. Project Description

The proposed Western alignment of Pune Ring Road is a green field road development passing through agricultural / barren / forest land and starts from Ch 0+00 at Urse on Mumbai-Pune Expressway (18°42'42.48"N latitude and 73°39'5.04"E longitude) and ends at Ch 68+800 section at Varve (Kelwade) on NH-4 (at 18°17'14.66"N latitude and 73°52'26.33"E longitude)

via Ghotavade Phata (Paud Road), Mutha Village (Pune-Lavasa Road) and Malkhed (Pune-Panshet Road). This alignment covers 4 tehsils i.e., Bhor, Haveli, Mulshi and Maval in Pune District.

Table *Error! No text of specified style in document.*-1:Features of the Proposed project

Particular	**Proposed Amendment**	
Alignment	Starts from Ch 0+00 at Urse on Mumbai-Pune Expressway and ends at Ch 68+800 section to Varve (Kelwade) on NH-4 covering four tehsils i.e., Bhor, Haveli, Mulshi and Maval in Pune District.	
Geographical Coordinates	**Start Point:** 18°42'42.48"N and 73°39'5.04"E (Urse Village) **End Point:** 18°17'14.66"N and 73°52'26.33"E Verve (Kelwade)	
Connecting villages	38 Nos. of Villages	
Length of the alignment	68.800 km	
Proposed Project Location	**District:** Pune; **State:** Maharashtra	
Civil cost of the Project	Total estimated cost - ~11509.90 Cr. & civil cost - ~ 6914.06 Cr.	
Total land	764.87 Ha	
	Non-Forest Land:717.09 Ha	**Forest land**: 47. 78 Ha
Carriageway	The project road shall be a 3+3-lane highway to be developed with expressway standard with provision of future (1+1)-lane.	
Design Speed	**Main carriageway:** 120 km/hr **Tunnel:** 80 km/hr	
Proposed ROW	110 m	
Median	15 m	
Bridges	**Major bridges:** 3 Nos.	**Minor bridges:** 16 Nos.
Tunnels	8 Nos. with total length of 11.290 km	
Viaduct	2 Nos.	
Underpasses & Overpasses	**VUP**: 20	**LVUP:** 6
	PUP: 7	**VOP**:24
Proposed Interchanges	6 nos. of interchanges	
Toll Plaza	3 no. at Ghotawade (Ch.22/900), Kelwade (Ch. 68/500) and Toll booth at interchange	

Site Sensitivity

The project alignment passes through agricultural / barren / forest land and greenfield areas. This corridor crosses three major rivers of Pune viz. Pawana near Parandwadi, Mula [near Ghotavade Phata] & Mutha [near village Sangrun]. Sinhgad fort is a major tourist attraction along this road besides the manu ocal spots visited by the local population. The project corridor also crosses roads leading to the famous Panshet/ Warasgaon/ Temgarh/ Mulshi Dams, Lawasa city, Sinhgad fort. It also passes through an Industrial Belt at Pirangut, Hinjewadi which is a fast developing Industrial cum Residential Township & software hubs of the India respectively. The key sensitive receptors identified in the study area are – Forest area, Dams, Rivers, Historically/ Archeological Important sites, Residential & Commercial area & agricultural presented in Error! Reference source not found..

Table *Error! No text of specified style in document.*-2:Site Sensitivity

Sensitivity Categories	**Receptor**	**Distance form Project site (Km)**
Rivers	Mula River	Alignment Crossing at chainage 24+250

Sensitivity Categories	Receptor	Distance form Project site (Km)
	Pawana River	Alignment crossing at chainage 2+400
Lakes, reservoirs, dams	Panshet Dam	~ 7.74 km
	Varasgaon Dam	~ 7.16 km
	Temghar Dam	~ 10.36 km
	Khadakwasla Dam (Mutha River)	Alignment is crossing Khadakwasla dam between chainage 44+090 to 44+640.
	Adhale dam	~1.31 km minor bridge is proposed (Ch. 6+890)
	Kusagoan Dam	~ 0.90 km minor bridge is proposed (Ch. 9+660)
	Pimpoli Dam	~ 0.36 km
	Rihegaon Dam	~0.42 km
	Pirangut Lake	~ 0.11 km
Religious and historic places	Sinhagad fort	Alignment is passing near the Sihagad fort (2.12 km) between chainage 49+400 to 52+225.
Highways	NH-48	

Site Connectivity

The project road starts from Urse near Mumbai-Pune Expressway Toll Naka , traverses through number of villages/towns viz. towns/villages like Urse, Parandwadi ,Dhamne, Bebadohal, Chandkhed, Pachane, Pimploli, Kemsewadi, Javal, Padalgharwadi, Rihe, Ghotavade, Materewadi,Amedveth, Bhare, Kasar Amboli, Urwade, Ambegaon,, Bharekarwadi, Morewadi, Katvadi, Bahuli, Bhagwatwadi, Sangrun, Mandvi Budruk, Wardade, Mulkhed, Khamgaon Maval , Ghera Sinhgad, Moredarwadi, Kalyan, Rahatvade, Ranje, Kusgaon, Khopi, Kanjale and ends at Kelwade

Project Utilities

Manpower

During the construction phase of the project, about 1,171 persons per day, which includes, highly skilled (657 Nos.), skilled (204 Nos.), semi-skilled (310 Nos.) labours will be hired. In the post construction phase, it is expected that the project will provide social benefits to about 800 people in terms of direct employment by way of better commercial and industrial development of the area.

Water Requirement

Total water requirement for the construction purpose will be 700 KLD and for the domestic purpose will be 158.10 KLD. Water required for construction activities will be obtained from the nallas and will be stored at number of dead quarries / depressions/borrow areas which are nearby the proposed alignment.

Waste Generation and Management

The project is likely to generate 526.95 kg/day of municipal solid waste during construction phase out of which, 210.78 kg/day will be biodegradable, and 316.17 kg/day will be non-biodegradable waste. The waste will be segregated at source by providing separate bins on site and will be handed over at municipal recycling centers for further processing. The construction

waste generated from site is estimated to be 32927268 cum from cut and fill, muck (525652.02 cum) and sludge (92762.11 cum) from the piling in major and minor bridges and cutting soil from earthwork area. The demolition waste will also be generated from demolition of 289 buildings coming in the RoW of the proposed project and utility shifting,

Power requirement

The power requirement of the proposed project during the construction phase will be met through 15 no. of DG sets of different capacities, required for running of machineries and illumination purpose at night.

3. Description of Environment

The baseline environmental study has been carried out in post-monsoon season from December 2019 to March 2020. Baseline monitoring was carried out considering nature and magnitude of project activity. Also, the environmental setting and potential receptors of the impact were considered for determining monitoring locations. The study area covers an area within 500 meters of each side of proposed alignment. The parameters considered for the description of the environment are given below:

Table *0*-3:Description of Environment

S.No.	Parameters	Observations and Inferences
1.	Physiography	Physiographically, the Pune district can be divided in to three distinct belts i.e. The western belt stretching from 16 to 31 km east of Sahyadri- an extremely rugged country cut by deep valleys, divided and crossed by hill ranges. The central belt extending for about 30 km east of western belt across the tract whose eastern belt is roughly marked by a line drawn from Pabal in the north to south up to Purandhar through Pune. In this belt a series of small hills stretch in to valleys and large spurs from Plateau The eastern belt with a rolling topography and low hills sinks slowly in to the plains with relatively broader valleys.
2.	Geology and Geomorphology	Study area within RoW comprise Deccan Trap Basalt deposited in Late Cretaceous to Paleocene Age. Fourteen basaltic flows of Vesicular and Amygdaloidal zeolitic basalt and massive basalt of Indrayani, Karla, Diveghat, Purandargarh, Mahabaleshwar formation of Sahyadri Group also occurs in study area.
3.	Hydrogeology	The entire area of the Pune district is underlain by the basaltic lava flows of upper Cretaceous to lower Eocene age. The shallow alluvial formation of Recent age also occurs as narrow stretch along the major rivers flowing in the area. The ground water in the district occurs under phreatic, semi – confined and confined conditions. Generally, the shallower zones down to the depth of 20 to 22 m bgl form the phreatic aquifer. The water bearing zones occurring between the depth 20 and 40 m bgl when weathered or having shear zones yield water under semi-confined condition. The deep confined aquifers generally occur below the depth of 40 m bgl. The depth of ground water level in the district is • Pre-monsoon-0.40 to 20.10 m bgl • Post monsoon-0.09 to 14.65 m bgl

S.No.	Parameters	Observations and Inferences
4.	Seismology	The study area falls in Zone III, this is Moderate intensity zone as per BMTPC Vulnerability atlas
5.	Landuse/Landcover	Landuse/Landcover of the 10 km radius around the project alignment was studied. Out of total area of 1560 sq. km, 32 sq. Km (2%) area comes under built-up land class. 92 sq. Km (6%) area comes under forest vegetation. Water bodies are spatially distributed in 0.8 sq. km area which is 1 % of total study area. Within study area total 836 sq. km. areas come under Open Land class which is 54% of total area and out of total area 1560 sq. km area 169 sq. km of the area (11%) is found under fallow land. 197 sq. km area (13 % of the total area) found under hill slopes and 139 sq. km is under barren land area which is 9 % of total study area.
6.	Soil Quality	Soil quality was monitored at 5 locations in total within the RoW The pH of the samples varied from 6.88 to 7.28. The pH of samples collected was moderately alkaline for all location except for S2 (Near Wardade village, (Bank of Khadakwasala) which was slightly acidic as per the ranges and classification of pH given by Department of Agriculture. (Source: Method Manual, Soil Testing in India, 2011). The Collected Soil samples were salt free. Electrical Conductivity value ranges from 0.054 µs/cm to 0.078 µs/cm The porosity of soil was in the range of 32.44 to 45.20 %. The magnesium concentrations were in the range of 46.10 to 58.00 mg/kg whereas sodium and potassium are in the range of 34 to 45.14 mg/kg and 32.40 to 48.34 mg/kg respectively. Organic matter, total nitrogen and phosphorous are found to be in the range of 0.53 to 1.78 %, 13.48 to 45 kg/ha and 10.38 to 17.00 kg/ha respectively These soils are rich in organic matter and suitable for Agricultural and Horticultural practices
7.	Air Quality	Ambient Air quality were monitored at 10 locations in total and it was observed that Maximum concentrations of PM10, PM2.5, SO2, NOx, CO, O3 are well within the respective National Ambient Air Quality Standards for Industrial, Residential, Rural and Other area as given by Central Pollution Control Board (CPCB) and found that all values at all monitoring locations during the study period for gaseous pollutants are well within limits prescribed in NAAQ, 2009 standards by CPCB.
8.	Ambient Noise and Vibrations	The noise levels observed at the 10 noise monitoring locations are well within CPCB limits at all locations, except Jatede (NQ5) and Urse near Indira College (NQ10) during daytime. Noise level in these 2 locations is observed above the allowable CPCB limits due to proximity of roads to Mumbai Pune expressway nearby location NQ10 and Mulshi Paud road nearby to location NQ5.
9.	Surface Water Quality	Surface water quality was monitored at 6 locations in total and it was seen that water quality was within permissible limits for portable water for all the parameters except coliform content as per the limits prescribed by the pollution control board. The water from the monitoring location is not fit for drinking purpose

S.No.	Parameters	Observations and Inferences
		and should be treated before use. The possible sources of pollution might be the unmonitored use of the riverbank for sanitation purposes and discharge of untreated wastewater from the adjoining areas.
10.	Ground Water Quality	Ground Water quality were monitored at 6 locations. The ground water pH ranges from 7.18 to 7.77, Total dissolved solid found to be in the range of 835 to 948 mg/l. Total hardness is in the range of 422 to 434 mg/l. Chlorides and Sulphate are in the range of 51 - 854 mg/l. Nitrates are in the range of 12 mg/l to 16.44 mg/l. The results indicate that the physico - chemical parameters of TDS is above the specified standards as per IS 10500:2012. E. coli also present in the sample. Hence the water samples are Chemically Unpotable for drinking purpose
11.	Ecology and Biodiversity	The alignment starts from Urse village and ends at Varve (Kelvad). The surface area of the alignment is having 4.99% of reserved as well as private forest cover (37.73 Ha) and 95% of non-forest area (717.09 Ha) which is having vivid landuse (agriculture/ barren/lake etc.) There are reservoirs like Panshet Dam, Varasgaon Dam, Temghar Dam, Pimpoli Dam, Rihegaon Dam, Pirangut lake along the proposed alignment. Alignment crosses Adhale dam (Ch. 6+890), Kushgaon dam (Ch. 9+660), Mula river (24+250) and Pawna river (2+400). The alignment is crossing Khadakwasla dam between chainage 44+090 to 44+640.Grassland/scrub vegetation and agricultural fields were observed in many parts of the alignment near the main water bodies along the project alignment. Near rivers, dams and residential areas floriculture activities were seen. Some stretches of the alignment (like At Bebedohal (Ch 0.00 - 1.00 km) pass through barren land and some through hills which show activity of grassland birds like larks, pipts, babblers, etc. (birds that are depend on grassland habitat). Plantation of *Gliricidia sepium* were observed at the starting point of tunnel location has been proposed. The Only 10% of the stretch is passing through 5% forest area and 95% non-forest area which includes built-up areas, agricultural and barren areas. Ecological assessment of the area assumes more importance as the forest patches under scrutiny are under reserved and private forest. The vegetation is mix of deciduous and evergreen species. Floral composition as represented in Figure 3-29 shows 53% of trees, 29% of herbs, 14% of shrubs and 4% of grass recorded from study area. Faunal composition is represented in Figure 3-30 where it included 47% of birds, 23% of Butterflies, 5% of Dragonflies, 3% reptiles, 17% Insects, 5% spiders were recorded from the study area.

S.No.	Parameters	Observations and Inferences
12.	Socio-Economic Profile	Traffic in Pune city is characterized by significant presence of both inter and intra city traffic. Such passing traffic, if diverted through road network outside the city limits, will solve/decongest the traffic problem in both inter and intra-city. The development will provide connectivity of villages of the four talukas (Bhor, Haveli,Mulshi and Mawal) to the main road which will lead to decongestion of the traffic on the existing roads which is currently being used by the villages for transportation of the agricultural products to the main market of the city for selling. Ancillary development is also expected in the surrounding areas which will lead to better infrastructure and institutional facilities and increased job opportunities for the villagers. The development of the project will also lead to ease in accessibility to the places in Mulshi and Maval regions and areas having second home like Amby Valley and Lavasa which are connected through major roads like Paud Road, Mutha Road, Panshet Road, NH-48.

4. Anticipated Impacts and Mitigation Measures

This proposed alignment passes through the western part of the Pune District, which is passing through environmentally sensitive areas compare to the eastern part of the district. Many water bodies are located in the vicinity of the alignment and there is sizeable vegetation cover close to these water bodies. Water being available, agriculture as well as floriculture activities are also being practiced abundantly in the area compare to the eastern areas. However, due to hilly terrain and large area being forest the population density is lower in the western region.

The anticipated environmental impacts, hence, are more on ecology and water regime compare to socioeconomic, air and noise.

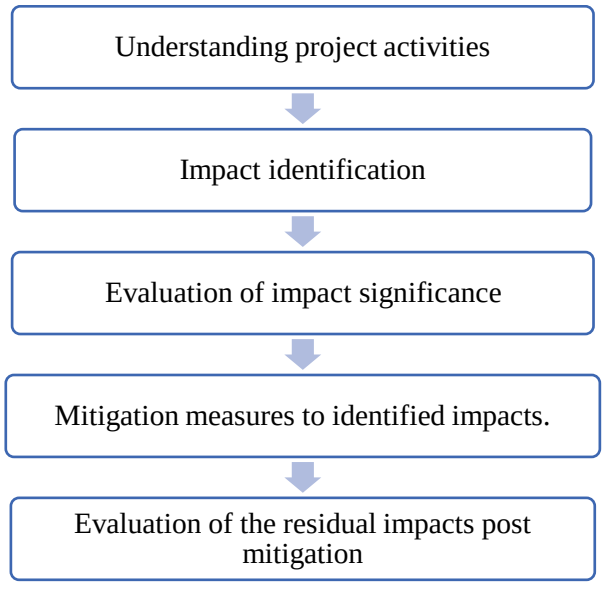


Figure *0*-3:Impact Assessment process

Table *0*-4:Impact Evaluation and Mitigation Measures

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
Pre-construction Stage													
Site survey & demarcation	Loss of vegetation	The removal of vegetation may increase surface run-off during monsoon which in turn lead to erosion of productive soil.	3	1	3	3	27 (Moderate)	As such mitigation can't be provided at this stage, the survey team is advised to keep the vegetation clearance to the bare minimum.	3	1	3	3	27 (Moderate)
Land acquisition	Involuntary Displacement	Loss of land and properties	3	3	3	3	81 (High)	The compensation is being provided as per the conditions of LAAR Act,2013 The actual compensation is being offered much more than the existing market price for the land. This will allow the affected person to comfortably buy suitable land in the vicinity and maintained the source of livelihood.	1	3	3	1	9 (Low)
	Land Diversion	Out of 754.82 Ha. of land, forest land 37.73 Ha (5%)	3	1	3	3	27 (Moderate)	Tunnels have been proposed in the forest areas to avoid loss of forest areas and maintaining the road requirements for smooth movement of vehicles. The entry and exit of tunnels is through non-forest areas resulting in no loss of forest land. However, CA land will be allotted against the forest area which will be kept intact above the tunnels. Other than tunnels, forest land is required for the construction of the road where total 688 trees are required to be cut for which afforestation will be carried out on the CA land after obtaining Forest Clearance.	1	1	1	1	1 (Low)
		Agricultural land 440.78 Ha (58 %) – Loss of income	3	1	3	3	27 (Moderate)	The compensation is being provided as per the conditions of LAAR Act,2013 The actual compensation is being offered much more than the existing market price for the land. This will allow the affected farmers to	2	1	2	3	12 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								comfortably buy suitable land in the vicinity and maintained the source of livelihood by continuing agricultural practices. However, the loss of agricultural land remains and it will impact negatively on overall productivity of the region.					
		Agricultural land 440.78 Ha (58 %) – Loss of agricultural productivity	3	1	3	3	27 (Moderate)	The compensation is being provided as per the conditions of LAAR Act,2013 The actual compensation is being offered much more than the existing market price for the land. This will allow the affected farmers to comfortably buy suitable land in the vicinity and maintained the source of livelihood by continuing agricultural practices. However, the loss of productivity will remain and it will impact negatively on overall productivity of the region.	2	1	2	3	12 (Low)
		Barren land 276.26 Ha (37%)- Loss of habitat	3	1	3	3	27 (Moderate)	It is not possible to mitigate this impact however, the in the Corporate Environmental Responsibility (CER) activity the impacts can be substantially reduced by funding habitat enhancement projects which may be taken up by local NGOs which will also involve local population actively in the environmental conservation	2	3	1	2	12 (Low)
		Barren land 276.26 Ha (37%)- Loss of landcover	1	1	1	1	1 (Low)	No mitigation required	1	1	1	1	1 (Low)
	Tree felling or cutting	688 trees in forest areas to be cut out of which 530 trees are exotic species	2	1	3	3	18 (Low)	CA land will be allotted against the loss of forest area	1	1	3	3	9 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
		About 7020 trees proposed to be cut in non-forest areas (as per tree enumeration done in 2016) for Site levelling and road development	3	1	3	3	27 (Moderate)	As per Green Highway Policy 2015, (Plantation, Transplantation, Beautification & Maintenance) 21060 nos. of trees are going to be planted against trees cut (1:3) along the PRoW. Additionally, shrubs will be planted along the median.	1	1	3	3	9 (Low)
		The removal of vegetation may cause erosion on hill slopes, and increase surface run-off would in turn may lead to erosion of productive soil	3	1	3	2	18 (Low)	The project will be designed at design gradients of 1:2. High embankment section of the road shall be suitably truffled by stone pitching or any other suitable material; Adequate slope protection measures are proposed as part of engineering design; All the topsoil to be preserved separately and covered to avoid mixing with other raw materials and site runoff. Proper conservation plan for the conservation of top soil to be done by the contractor constructing the road. The topsoil to be reused for grass turfing at embankment slopes/plantation along RoW and at median within one year of generation. The balance quantity of topsoil to be reused for rehabilitation of borrow pits (as mentioned in Table 2 34 of Chapter 2) to restore the biological characteristics of the area.	2	1	2	2	8 (Low)
Demolition activities and utility shifting	Generation of Noise and Vibrations	Demolition activity will be for short period & there are no long-term impacts of these activities	3	2	1	3	18 (Low)	High noise generating machines to be equipped/ fitted with silencers to reduce the noise levels; PPE (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines	2	2	1	2	8 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								Temporary barricading to be provided for high noise producing machineries					
	Dust emissions from demolition activities	Air quality deterioration from dust generation; though the gaseous emissions may not significantly increase, the values of PM_{10}, $PM_{2.5}$ and total suspended particles will go significantly high. On source mitigation can significantly reduce the values. However, there would be impact on health due to inhalation of dust to certain extent.	3	1	1	2	6 (Low)	Demolition to be carried out in the phased manner, inner structures to be demolished first; PPE (face masks) will be provided to the workers operating on site Temporary barricading to be provided	2	1	1	2	4 (Low)
	Demolition waste generation	Unplanned dumping of debris generated from the construction and demolition activities may lead to dust generation, there would be impact on health due to inhalation of dust to certain extent. Also, it may affect water and soil quality.	3	3	3	2	54 (Moderate)	Waste to be stored at the designated site and to be disposed according to C&D waste rules 2016.	2	3	3	2	36 (Modorate)
Material Transportation	Dust and vehicular emissions from loading and unloading of materials	Air quality deterioration from dust generation; though the gaseous emissions may not significantly increase, the values of PM_{10}, $PM_{2.5}$ and total suspended particles will go significantly high. At source mitigation can significantly reduce the values. However, there may be impacts on health due to inhalation of dust to certain extent.	3	3	2	2	36 (Moderate)	Material transportation vehicles to be covered with tarpaulin sheets to minimize dust emission; Idling of the delivery trucks during unloading or other inactive periods is to be prevented; Material carrying vehicles to be routinely serviced and maintained with a valid Pollution Under Control (PUC) Certificate in accordance with the Motor Vehicles Act, 1988; As far as practicable, loading unloading activity to be halted during the periods of strong winds; Road surface to be kept wet by regular water sprinkling for dust suppression; Maintaining minimum possible drop height while unloading /screening of material.	2	2	2	2	16 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
	Generation of Noise and Vibrations	Noise generation due to the vehicular movement will remain throughout the construction phase, Exposure of loud noise can cause disturbance to the surrounding receptors, thereby causing physical or psychological impairments	3	3	2	3	54 (Moderate)	Instructions to be given to contractors to ensure no unnessary honking near settlements. Road signages to be provided & areas near settlements may be provided with temporary barricading to reduce impacts of the noise. Restriction on vehicular movement during night time.	2	2	2	3	24 (Low)
	Accidental spillage of the oil and other hazardous materials	Contamination of the soil	3	3	3	2	54 (Moderate)	The vehicles to be routinely serviced and maintained; Regular checking of fuel tanks for leakage detection. Over loading of the transporting material to be avoided to prevent accidental spillage; Designated areas to be provided for vehicle washing with oil traps.	2	3	3	2	36 (Moderate)
		Contamination of surface water Mutha [near village Sangrun, Khadakwasla dam] (alignment crossing at 44/090 to 44/640), Mula [near Ghotavade Phata] (alignment crossing at 24/260) & Pawana near Parandwadi (alignment crossing at chainage 2/400).	3	3	2	2	36 (Moderate)	The vehicles to be routinely serviced and maintained; Regular checking of fuel tanks for leakage detection. Over loading of the transporting material to be avoided to prevent accidental spillage; Designated areas to be provided for vehicle washing with oil traps.	2	2	2	2	16 (Low)
		Contamination of ground water due to seepage	3	3	2	2	36 (Moderate)	The vehicles to be routinely serviced and maintained; Regular checking of fuel tanks for leakage detection.	2	2	2	2	16 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								Over loading of the transporting material to be avoided to prevent accidental spillage; Designated areas to be provided for vehicle washing with oil trap					
	Vehicle parking and servicing	The sites where transportation vehicles are parked and serviced are likely to be contaminated because of leakage or spillage of fuel and lubricants.	3	3	2	2	36 (Moderate)	The vehicles to be routinely serviced and maintained; Regular checking of fuel tanks for leakage detection. Over loading of the transporting material to be avoided to present accidental spillage; Designated areas to be provided for vehicle washing; Overflow of service and washing areas shall be pass through oil interceptors.	2	2	2	2	16 (Low)
Construction Stage													
Storage and handling of raw material	Dust emissions from loading and unloading of loose materials	Air quality deterioration from dust generation; though the gaseous emissions may not significantly increase, the values of PM_{10}, $PM_{2.5}$ and total suspended particles will go significantly high. On source mitigation can significantly reduce the values. However, there would be impact on health due to inhalation of dust to certain extent.	3	2	2	3	36 (Moderate)	Frequently sprinkling water in the dust prone areas; 7-8 feet high fencing to be provided around material storage space; Prohibition of excavation soil heaps in the downwind direction; Down washing of trucks prior to departure; Maintaining minimum possible drop height while unloading /screening of material;	2	1	2	2	8 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								Cleaning of paved roads regularly and stabilizing & watering of un-paved regularly; The Contractor will be required to: Conduct regular water spraying on earth piles, trenches, and sand piles. Conduct regular visual inspection along alignments and construction zones to ensure no excessive dust emissions.					
		Impact on photosynthesis of plants due to stomatal clogging from fine dust	3	2	2	3	36 (Moderate)	Frequently sprinkling water in the dust prone areas; 7-8 feet high fencing to be provided around material storage space; Prohibition of excavation soil heaps in the downwind direction.	2	1	2	2	8 (Low)
	Accidental spillage of the oil and other hazardous materials	Contamination of the soil	3	3	3	2	54 (Moderate)	Handling of spent wash from equipment and vehicle service station by providing catch pit and soak-pits around the service station to avoid contamination of land adjacent to those sites.	2	2	3	2	24 (Low)
		Contamination of surface water Mutha [near village Sangrun, Khadakwasla dam] (alignment crossing at 44/090 to 44/640), Mula [near Ghotavade Phata] (alignment crossing at 24/260) & Pawana near Parandwadi (alignment crossing at chainage 2/400).	3	3	2	2	36 (Moderate)	The vehicles to be routinely serviced and maintained; Regular checking of fuel tanks for leakage detection. Over loading of the transporting material to be avoided to prevent accidental spillage; Designated areas to be provided for vehicle washing with oil trap	2	2	2	2	16 (Low)
		Contamination of ground water due to seepage	3	3	2	2	36 (Moderate)	The vehicles to be routinely serviced and maintained; Regular checking of fuel tanks for leakage detection.	2	2	2	2	16 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								Over loading of the transporting material to be avoided to prevent accidental spillage; Designated areas to be provided for vehicle washing with oil trap					
	Noise generation while loading and unloading of the materials.	Noise & vibration generation may be nuisance to local inhabitants of the area, damage structures, affect human health	2	1	1	2	4 (Low)	PPE (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines; Construction yards to be located away from settlement areas preferably on the down wind direction of sensitive areas such as schools, hospitals or human settlement etc.; In unavoidable circumstances, the time of the operation of the plant shall be limited; The necessary permission should be obtained from the local government officials.	2	1	1	1	2 (Low)
RMC Plant Operations (between Ch 4+150 and 4+ 250, Ch 28+600 and 28+700 and Ch 46+950 and 47+000)	Dust & air emission	Air quality deterioration from dust generation; though the gaseous emissions may not significantly increase, the values of PM_{10}, $PM_{2.5}$ and total suspended particles will go significantly high. On source mitigation can significantly reduce the values. However, there would be impact on health due to inhalation of dust to certain extent.	3	2	2	3	54 (Moderate)	Site selection for RMC plant operation should be done considering criteria given in section 2.12.2 of chapter 2. Regular water sprinkling to be carried out for dust suppression; Spraying of water on the stones while unloading from the truck/dumper; Spraying of water at the primary crusher feeder chut; Spraying of water at the transfer points from one belt conveyor to another;	2	1	2	2	8 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								Silt curtains recommended for tapping the dust emissions from RMC plant; Placing of dust arresters surrounding the crusher and the construction yards will prevent the dispersion of the dust to a great extent.					
		Dust generation on leaves will affect the respiration of plants due to blockage in stomata impacted on photosynthesis of plants	3	2	2	3	36 (Moderate)	Site selection for RMC plant operation should be done considering criteria given in section 2.12.2 of chapter 2. Regular water sprinkling to be carried out for dust suppression. Spraying of water on the stones while unloading from the truck/dumper; Spraying of water at the primary crusher feeder chute; Spraying of water at the transfer points from one belt conveyor to another; Silt curtains recommended for tapping the dust emissions from RMC plant; Placing of dust arresters surrounding the crusher and the construction yards will prevent the dispersion of the dust to a great extent.	2	1	2	2	8 (Low)
	Generation of large number of test cubes of concrete	Unplanned dumping of debris generated from the construction and demolition activities may lead to dust generation, soil, and water contamination	3	2	2	3	36 (Moderate)	Test cubes can be reused in Landscaping, pavements and shoulders. Curing water should be stored in settling tank. After initial settlement, settled materials to be sent to landfill site & water can be used for construction purpose; Settling tank should be covered with tarpaulin to prevent mosquito breeding	2	1	2	2	8 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
	Run-off from plant washing	Contamination of surface water Mutha [near village Sangrun, Khadakwasla dam] (alignment crossing at 44/090 to 44/640), Mula [near Ghotavade Phata] (alignment crossing at 24/260) & Pawana near Parandwadi (alignment crossing at chainage 2/400). Disturbance to aquatic fauna	2	2	2	3	24 (Low)	Direct run-offs should be prevented from the plant site near drinking water bodies; Plant sites should be protected by bunds at sites where large amount of soil may be washed off to the nearby waterbodies. Contour trenching shall be provided wherever land is undulating on the downstream side. Facilities like drainage system at plant site to avoid stagnant water pools.; The plant wash water will be sent out to settling pits and once settled the water will be used for dust suppression. The settled material will be disposed to disposal sites approved by local authorities.	1	1	2	2	4 (Low)
		Increased turbidity reduces euphotic zone of the water column which affects light penetration and decreases aquatic producer. Also increased turbidity affects filter feeding organisms such as zooplankton Increased sedimentation may disturb aquatic lifeforms sedimentation and habitat modification may deviate fish from construction areas Reduction in microbial activity slows down remineralization of organic matter which affects food chain Suspended solids may affect aquatic organisms by clogging and damaging their feeding and breathing organs.	3	2	3	3	54 (Moderate)	Direct run-offs should be prevented from the plant site near drinking water bodies; Plant sites should be protected by bunds at sites where large amount of soil may be washed off to the nearby waterbodies. Contour trenching shall be provided wherever land is undulating on the downstream side. Facilities like drainage system at plant site to avoid stagnant water pools.; Plant wash water will be sent out to settling pits and once settled the water will be used for dust suppression.	2	2	3	2	24 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								The settled material will be disposed to disposal sites approved by local authorities.					
		Contamination of ground water due to seepage	3	2	3	3	54 (Moderate)	Direct run-offs should be prevented from the plant site near drinking water bodies; Plant sites should be protected by bunds at sites where large amount of soil may be washed off to the nearby waterbodies. Plant wash water will be sent out to settling pits and once settled the water will be used for dust suppression. The settled material will be disposed to disposal sites approved by local authorities.	2	2	3	2	24 (Low)
		Contamination of the soil due to seepage	3	2	3	3	54 (Moderate)	Direct run-offs should be prevented from the plant site near drinking water bodies; Plant sites should be protected by bunds at sites where large amount of soil may be washed off to the nearby waterbodies. Plant wash water will be sent out to settling pits and once settled the water will be used for dust suppression. The settled material will be disposed to disposal sites approved by local authorities.	2	2	3	2	24 (Low)
	Noise generation during plant operation	Noise & vibration may be nuisance to local inhabitants of the area, damage structures, affect human health	3	2	3	3	54 (Moderate)	Regular maintenance and servicing of machinery and equipment to minimize its operational noise. Noise level will be one of the considerations in equipment selection	2	1	3	2	12 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								which will favor lower sound power levels. PPE (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines. The time of the operation of the plant shall be limited. The necessary permission should be obtained from the local government officials. Diesel Generator Sets are supposed to have Sound Pressure Levels of lesser than 75 dBA when measured at 1 meter distance. However, these DG sets are not going to be kept close to one another. The 5 nos. of DG Sets of 650 KVA Capacity are recommended with a minimum Transmission Loss Rating of 30 dBA; DG sets having acoustic enclosure along with sufficient stack height of 3 m to be used at construction site complying with emissions norms notified by MoEF&CC / CPCB.; Noise barrier to be provided;					
Casting of Structures at Casting Yards	Air emission from operation of DG sets, Cranes, construction machineries; vehicles and equipment	Air quality deterioration from dust generation; though the gaseous emissions may not significantly increase, the values of PM_{10}, $PM_{2.5}$ and total suspended particles will go significantly high. at source mitigation can significantly reduce the values. However, there would be impact on health due to inhalation of dust to certain extent.	3	2	3	3	54 (Moderate)	DG sets having acoustic enclosure along with sufficient stack height of 3 m to be used at construction site complying with emissions norms notified by MoEF&CC / CPCB. As far as practicable, plant activity to be halted during the periods of strong winds.	2	1	3	2	12 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								Regular water sprinkling to be carried out for dust suppression. Placing of dust arresters surrounding the crusher and the construction yards will prevent the dispersion of the dust to a great extent. Spraying of water on the stones while unloading from the truck/dumper. Spraying of water at the primary crusher feeder chute. Spraying of water at the transfer points from one belt conveyor to another. Barricading to be provided.					
	Noise generation from operation of DG sets, Cranes, construction machineries; vehicles and equipment	Noise & vibration generation may be nuisance to local inhabitants of the area, damage structures, effect on human health	3	2	3	3	54 (Moderate)	Casting yards to be located away from settlement areas. Aggregate crushing plants shall be located on the down wind direction of sensitive areas such as schools, hospitals or human settlement etc. In unavoidable circumstances, the time of the operation of the plant shall be limited. A vegetative barrier will be suitably less expensive for a casting yard. The native species is always preferable. DG sets having acoustic enclosure along with sufficient stack height of 3 m to be used at construction site complying with emissions norms notified by MoEF&CC / CPCB. Diesel Generator Sets are supposed to have Sound Pressure Levels of lesser than 75 dBA when measured at 1 meter	2	2	3	2	24 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								distance. However, these DG sets are not going to be kept close to one another. The 5 nos. of DG Sets of 650 KVA Capacity are recommended with a minimum Transmission Loss Rating of 30 dBA; Noise barrier to be provided.					
Pilling Ch. 2/400, Ch.24/260, Ch. 44/090 to 44/640) and 16 minor bridges (addressed in Table 2-12 of Chapter 2)	Generation of Noise and Vibrations	Noise & vibration may be nuisance to local inhabitants of the area, damage structures, affect human health	3	2	3	3	54 (Medium)	Regular maintenance and servicing of machinery and equipment to minimize its operational noise; PPE (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines; Compressors with pre-installed Acoustical Canopy should be chosen so that the noise generated at the source itself is lesser than 85 dB; The contractor should carefully choose the above equipment to meet with the CPCB Norms; Hydraulic pumps and compressors should be covered with Acoustical Enclosures with 20 dB Transmission Loss Rating in order to reduce the noise; Valves should be covered with Removable Acoustical Blankets; Maintenance of the pilling rigs to reduce noise and air emissions; Noise barrier to be provided	2	1	2	2	8 (Low)
	Surface run-off	Contamination of surface water Mutha [near village Sangrun, Khadakwasla dam] (alignment crossing at 44/090 to 44/640), Mula [near Ghotavade Phata]	3	2	3	3	54 (Moderate)	Piling in the waterbodies shall be done within encasement to reduce turbidity.	2	1	3	2	12 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
		(alignment crossing at 24/260) & Pawana near Parandwadi (alignment crossing at chainage 2/400). Disturbance to aquatic fauna						The impact of increase in turbidity and siltation can be mitigated by providing coffer dams and silt trap around the foundation site before start of piling/drilling works. Checking of the samples of riverbed sediment.					
		Increased turbidity reduces euphotic zone of the water column which affects light penetration and decreases aquatic producer Release of heavy metals and pollutants from the sediments Also increased turbidity affects filter feeding organisms such as zooplankton Increased sedimentation may disturb aquatic lifeforms Release of heavy metals & pollutants may lead to increasing in undesirable species biota Suspended solids may affect aquatic organisms by clogging and damaging their feeding and breathing organs.	3	2	3	3	54 (Moderate)	Piling in the waterbodies shall be done within encasement to reduce turbidity. The impact of increase in turbidity and siltation can be mitigated by providing coffer dams and silt trap around the foundation site before start of piling/drilling works. Checking of the samples of riverbed sediment.	2	1	3	2	12 (Low)
	Muck generation (Pilling activity for major Bridges at Ch. 2/400, Ch.24/260, Ch. 44/090 to 44/640) and 16 minor bridges (addressed in Table 2-12 of Chapter 2)	The generated muck (525652.02 cum) if disposed [2 location between Ch. 33+900 to 34+300 and between Ch.42+100 to 42+200)] without treatment will lead to contamination of the soil	3	2	2	3	36 (Moderate)	Excavated soil, if contaminated to be disposed at secured landfills, whereas non-contaminated soil will be reused for filing of borrow areas (locations as mentioned in Table 2-34 of Chapter 2); muck will be disposed at 2 location between Ch. 33+900 to 34+300 and between Ch.42+100 to 42+200).	2	1	2	2	8 (Low)
Leveling, compaction & paving of road	Air emission from operation of construction	Air quality deterioration from dust generation; though the gaseous emissions may not significantly increase, the values of PM_{10}, $PM_{2.5}$ and total	3	2	3	3	54 (Moderate)	Frequently sprinkling water in the dust prone areas;	2	1	3	2	18 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
	machineries; vehicles and equipment	suspended particles will go significantly high. On source mitigation can significantly reduce the values. However, there would be impact on health due to inhalation of dust to certain extent.						The Contractor will be required to: Conduct regular water spraying on earth piles, trenches, and sand piles. Conduct regular visual inspection along alignments and construction zones to ensure no excessive dust emissions.					
	Noise generation from machineries	Noise & vibration generation may be nuisance to local inhabitants of the area, damage structures, affect human health	3	2	3	3	54 (Moderate)	In unavoidable circumstances, the time of the operation of the plant shall be limited. Regular maintenance and servicing of machinery and equipment to minimize its operational noise. PPE (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines; Compressors with pre-installed Acoustical Canopy should be chosen so that the noise generated at the source itself is lesser than 85 dB The contractor should carefully choose the above equipment to meet with the CPCB Norms.	2	2	3	2	24 (Low)
Construction of bridges	Soil erosion	Elevated sections of road, particularly all high embankments along the 3 major bridges at (Ch. 2/400, Ch.24/260, Ch. 44/090 to 44/640) and 16 minor bridges (addressed in Table 2-12 of Chapter 2) and the interchanges at (Ch. 0/00, 1/900, 26/710,34/650, 44/990.68/819) may be vulnerable to erosion	3	2	3	3	54 (Moderate)	Securing slopes with suitable methods like retention walls, gabion, etc. Contractor to identify suitable locations for storing of excavated soil and later they may sell it to nearby nurseries.	2	2	3	2	24 (Low)
	Surface run-off	Surface water contamination of Mutha [near village Sangrun, Khadakwasla dam] (alignment crossing at 44/090 to 44/640), Mula [near Ghotavade Phata] (alignment crossing at 24/260) & Pawana near Parandwadi (alignment crossing at chainage 2/400).	3	2	3	3	54 (Moderate)	Direct run-offs should be prevented from the road near drinking water bodies;	2	1	3	2	12 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
		Disturbance to aquatic fauna due to resuspension of sediment						The construction sites should be protected by bunds at sites where large amount of soil may be washed off to the nearby waterbodies. Coffer dams to be provided around the work site while working in the waterbodies. The remaining water shall be drained before removal of Coffer dams.					
		Increased turbidity reduces euphotic zone of the water column which affects light penetration and decreases aquatic producers Release of heavy metals and pollutants from the sediments Also increased turbidity affects filter feeding organisms such as zooplankton Increased sedimentation may disturb aquatic lifeforms Release of heavy metals & pollutants may leads to increasing in undesirable species biota Suspended solids may affect aquatic organisms by clogging and damaging their feeding and breathing organs.	3	2	2	3	36 (Moderate)	The construction sites should be protected by bunds at sites where large amount of soil may be washed off to the nearby waterbodies. Coffer dams to be provided around the work site while working in the waterbodies. The remaining water shall be drained before removal of Coffer dams.	2	1	3	2	12 (Low)
	Air emission from construction machinery	Air quality deterioration from dust generation; though the gaseous emissions may not significantly increase, the values of PM_{10}, $PM_{2.5}$ and total suspended particles will go significantly high. On source mitigation can significantly reduce the values. However, there would be impact on health due to inhalation of dust to certain extent.	3	2	3	3	54 (Moderate)	The Contractor will be required to: Conduct regular water spraying on earth piles, trenches, and sand piles. Conduct regular visual inspection along alignments and construction zones to ensure no excessive dust emissions. DG sets having acoustic enclosure along with sufficient stack height of 3 m to be used at construction site complying with	2	2	3	2	24 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								emissions norms notified by MoEF&CC / CPCB. Regular water sprinkling to be carried out for dust suppression.					
	Noise and vibration	Noise & vibration generation may be nuisance to local inhabitants of the area, damage structures, affect human health,	3	2	3	3	54 (Moderate)	Regular maintenance and servicing of machinery and equipment to minimize its operational noise. PPE (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines; Compressors with pre-installed Acoustical Canopy should be chosen so that the noise generated at the source itself is lesser than 85 dB. Valves should be covered with Removable Acoustical Blankets. Hydraulic pumps and compressors should be covered with Acoustical Enclosures with 20 dB Transmission Loss Rating in order to reduce the noise. The contractor should carefully choose the above equipment to meet with the CPCB Norms.	2	2	2	2	16 (Low)
	Construction Debris	Bridge foundation works may result into generation of debris materials due to excavation and drilling works which may cause temporary increase in turbidity and thereby contaminating the water.; Waste generated from the site and labour colony at (between Ch 4+150 and 4+ 250, Ch 28+600 and 28+700 and Ch 46+950 and 47+000) if not managed properly will cause health hazard as well as pollute the land.	3	2	2	3	36 (Moderate)	Admixtures barrels can be reused by cutting them into halves to collect waste. Construction waste to be stored at the designated site and to be disposed according to C&D waste rules 2016. Excavated soil, if contaminated to be disposed at secured landfills, whereas non-contaminated soil will be reused for	2	1	2	2	8 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
		Excavation waste such as muck (525652.02 cum) and sludge (92762.11 cum) from the piling in major and minor bridge's location and cutting soil from earthwork area may give adverse impacts on the dumping site, if contaminated. The waterbody is at the distance of approximately 1.8 km from Ch 4+250, 1.6 km from Ch. 28+700 and 2.3 km from Ch.47+000. The organic polluted water (water with excess of organic matter i.e., sewage or manure) generated from labour camp site may impact water quality if disposed-off directly without treatment. Unplanned dumping of debris generated from the construction and demolition activities may lead to dust generation, soil, and water contamination. Hazardous waste generated from the construction site and labour colonies may pose a potential hazard to the human health or the environment (soil, air, water) when improperly managed.						filing of borrow areas (locations as mentioned in Table 2 34 of Chapter 2). There should be a dedicated space to store hazardous waste. Its disposal to be done as per the Hazardous and Other Waste (Management & Trans boundary) Rules 2016 and MSIHC rules 2008, as amended. The waste material generated during the excavation of rock will be reused during the site development to some extent. The material will be used after testing its quality. No dumping allowed on private property. The disposal waste material should be properly compacted. The waste carrying trucks should be properly covered by tarpaulin					
Labour camp	Waste Generation	Soil contamination may take place due to waste disposal from the labour camp (between Ch 4+150 and 4+ 250, Ch 28+600 and 28+700 and Ch 46+950 and 47+000).	3	2	2	3	36 (Moderate)	Facilities like drainage system at construction site and labour camps to avoid stagnant water pools. Temporary camps will be constructed with adequate sanitation, drinking water supply. Domestic wastewater and domestic wastewater will be sent out to two settling pits and once settled the water will be used for watering surrounding plantations. The settled material will be either used as fertilizer (from kitchen	2	1	2	2	8 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								waste) or disposed to disposal sites approved by local authorities.					
	Biomedical waste generated due to COVID-19 prevention measures	Waste generation in from of PPE kits, gloves etc. may lead to health hazards	3	3	2	3	36 (Moderate)	Covid-19 precautionary guidelines to be followed.	2	2	2	2	16 (Low)
Tunneling by NATM (Chainage addressed in Table 2-13 of Chapter2))	Generation of Noise and Vibrations due to blasting	Generated noise can be nuisance to local inhabitants of the area.	3	2	2	3	36 (Moderate)	Regular maintenance and servicing of machinery and equipment to minimize its operational noise. PPE (ear plugs or earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines; Compressors with pre-installed Acoustical Canopy should be chosen so that the noise generated at the source itself is lesser than 85 dB. Valves should be covered with Removable Acoustical Blankets. The contractor should carefully choose the above equipment to meet with the CPCB Norms.	2	2	2	2	16 (Low)
	Waste generation	The generated muck (525652.02 cum) if disposed [2 location between Ch. 33+900 to 34+300 and between Ch.42+100 to 42+200)] without treatment will lead to contamination of the soil	3	2	2	3	36 (Moderate)	Excavated soil, if contaminated to be disposed at secured landfills, whereas non-contaminated soil will be reused for filing of borrow areas (locations as mentioned in Table 2-34 of Chapter 2); muck will be disposed at 2 location between Ch. 33+900 to 34+300 and between Ch.42+100 to 42+200).	2	2	2	2	16 (Low)
	Ventilation	Suffocation and death of people working inside the tunnel from improper ventilation	3	1	2	3	18 (Low)	Ventilation shaft to be provided at the tunnel location for safety of workers	2	1	2	2	8 (Low)

Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
			Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)		Severity (A)	Extent (B)	Duration (C)	Probability (D)	Impact Significance (AxBXCXD)
								(details of tunnel safety during construction and operation are provided in Chapter 7)					
	Water percolation	Seepage of water may induce rock fall	3	1	2	3	18 (Low)	Consolidation grouting over the crown for the seepage of water and rock fall will be carried out at tunnel location.	2	1	2	2	8 (Low)

Table-0-5: Impact Evaluation and Mitigation Measures

S. No.	Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-Mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
				Severity (A)	Extent (B)	Duration (C)	Probability (D)			Severity (A)	Extent (B)	Duration (C)	Probability (D)	
Operation Phase														
1	Proposed road development	Ancillary development	Change in landuse	3	3	3	3	81 (High)	Ancillary development will be their due to better connectivity & individual development will proposed their own mitigation while obtaining required clearance					
		Traffic movement	Vehicular emission will impact air quality	3	2	3	3	36 (Moderate)	Three Tier Plantations along both side of the road and plantation of shrubs along the median. Provision of Charging points for electrical vehicles to encourage use of EVs.	2	2	3	2	24 (Low)
			Noise generation due to traffic movement as the alignment is green field and people were not used to vehicular movements from a highway before, may be nuisance to local inhabitants of the area, effect on human health;	3	2	3	3	36 (Moderate)	Noise Barrier to be provided nearby sensitive receptors, Honking should be strictly prohibited in the forest area	2	2	3	2	24 (Low)
		Waste generation	Due to waste generated at wayside amenities Toll plazas water soil get polluted	3	1	3	3	27 (Low)	Green colour coded bin must be used to collect bio-degradable waste especially food waste at toll plaza way side amenities. The container should remain closed all the time to prevent flies, insects, and other animals from spilling the waste and to reduce the odour from decomposition of the food waste. To reduce waste generation good housekeeping is to be maintained and source segregation of the waste is to be encouraged before disposal. Proper sanitation facilities like septic tank with soak pit facility or mobile toilets should be provided	2	1	3	2	12 (Low)

S. No.	Project Activities	Aspect	Anticipated Impacts	Significance of Impact (Pre-Mitigation)					Mitigation Measure	Significance of Impact (Post-Mitigation)				
				Severity (A)	Extent (B)	Duration (C)	Probability (D)			Severity (A)	Extent (B)	Duration (C)	Probability (D)	
									No dumping allowed on private property. The disposal waste material should be properly compacted.					
			During maintain ace work, hazardous waste like, paint, thinners, etc., may pollute water or soil.	3	1	3	3	27 (Moderate)	No dumping allowed on private property. The disposal waste material should be properly compacted. There should be a dedicated space to store hazardous waste. Its disposal to be done as per the Hazardous and Other Waste (Management & Trans boundary) Rules 2016 and MSIHC rules 2008, as amended.	2	1	3	2	12 (Low)
		Movement of animals	Possibility of Road killing	3	1	3	3	27 (Moderate)	PUP has been considered in design for movement of animals & pedestrian in non-forest area. Animal underpass or fencing may be provided to prevent entry of animals on road near forest area if suggested by DCF & same will be incorporated in design.	2	2	1	3	12 (Low)