Environment Impact Assessment
&
Environment Management Plan

Proposed Sonawade-Ghodge, Nardev-Shivdav Road Passing through the Districts of Sindhudurg and Kolhapur

Prepared For

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1. About Project & Proponent

Project: Proposed Sonawade-Ghodge, Nardev-Shivdav Roadpassing through the Districts of Sindhudurg and Kolhapur

The proposed alignment starts from village Sonawade- Durgapur, Tahsil Kudal to Vinzole-Shivdav, Tahsil Budargadh in between chainage 1/897 to change 11/499.5 as missing links on existing SH-120 and SH 121 (Math-kudal Pandur Ghotage Sonwade Shivdav Kadgaon Gargot Road SH-179 Km 45/00 To 58/00 Tal-Kudal & Bhudargad ,Dist-Sindhudurga & Kolhapur). The elevation difference between starting point and end is roughly 365m. The grade proposed for this is within permissible limits i.e. 1:18 grades are proposed. The radius for curves is also within the permissible limits. The horizontal curves are designed for the apexes having deflection angle of 75.

Project Proponent: Executive Engineer, P.W. (South) Division, Kolhapur

2. Brief Description of Project

The Government of Maharashtra, Public Works Department, through the Executive Engineers of Kudal in Sindhudurg District and Kolhapur South Division in Kolhapur District has decided to construct the Math – Kudal – Pandur - Ghotage – Sonawade – Naikwadi – Gargoti Ghat Road, State Highway 120 and 121 (SH-179) in Sindhudurg and Kolhapur Districts of Maharashtra State. This is a two lane standard State Highway connecting Malwan, Kudal, Vengurla in Sindhudurg Districts with Gargoti in Kolhapur District. The construction of this ghat road is proposed in the supplementary budget of 1981-82, under Integrated Development of Western Ghat Scheme and as per Road Development Programme- 1981-2000, by the concerned implementing agencies. This project has been accorded administrative sanction by the Govt. of Maharashtra vide their letter nos. SHR 2996/case no.821/planning-3, dated-16th March 1996 and SHR 2196/case no. 699/planning-3, dated- 15th March 1996.

The Ministry of Environment & Forest has made prior Environmental Clearance (EC) Developmental Projects mandatory through its notification issued on 14th September 2006 and as amended on 1st December 2009. The Govt. of Maharashtra, Public Works Department(PWD), initiated a proposal for construction of Math Kudal- Pandur- Ghodge- Sonawade- Naikwadi- Gargoti Ghat Road, S.H. 120 and 121 (SH-179) in Sindhudurg and Kolhapur Districts of Maharashtra State.

Table No. 1 Salient features of the Proposed Road

Sr. No.	Particulars	Value
1	Total Length	9.595 km
a	Length though Forest	9.292 km
b	Length through Non-Forest	0.300 km
2	Land Width	
a	From Ch. 0/00 to 12/480	30 m
b	From Ch. 12/480 to 16/542	24 m
3	Carriage way	Two lane
4	Design Speed	40-60 km
5	H. P. Drains	
a	900 mm - 3Rows	9 Nos.
b	900 mm - 4 Rows	2 Nos.
c	900 mm - 5 Rows	1 Nos.
d	900 mm - 6 Rows	2 Nos.
e	Box Culvert	2 Nos.
6	Slab Drain	21 Nos.
7	Bridges/Flyover	1 Flyover Bridge -1100 m 2 Major Bridge-300m 3 Major Bridge-100m 4 Major Bridge-80m
8	Estimated Cost	Approximately Rs. 210 Crores
9	Category of Road	S. H. – 120 and 121 (SH-179)

3. Need for the project and its importance

In the present circumstances the transportation from Kolhapur District to Sawantwadi, Vengurla, Kudal, Malwan, Kankawali and Devgad tahsils of Sindhudurg Districts is operated through unsafe, inconvenient ghat roads of longer length, which is time taking, troublesome and highly polluted due to carriage of heavy load. The existing ghat roads are:

- Karul Ghat, which takes off from Talere on Panwel-Mahad-Panaji, N H 17, at 393/00 km.

- Amboli Ghat from Sawantwadi, which takes off on Panvel-Mahad- Panaji NH-17 at 460/00 km.

- Phonda Ghat, which takes off from Humrath and Kankawali, on Panvel–Mahad–Panaji NH-17 at 400/400 km.

The distance between Sindhudurg and Kolhapur through these three ghat roads is roughly 90 km from Panvel-Mahad-Panaji- NH 17. In order to overcome the hurdles in existing ghat roads as explained above, and to have a direct communication in between Kolhapur and Sindhudurg districts, it is proposed to construct above-mentioned road. This proposed road shall not only reduce the distance in between two districts but also connecting to important commercial, business and educational centers. In addition, this facility shall ensure convenient, speedy, safe and pollution free transport to public residing in and around the two districts.

4. Project Site

The proposed alignment starts from village Sonawade- Durgapur, Tahsil Kudal to Vinzole-Shivdav, Tahsil Budargadh in between chainage 1/897 to change 11/499.5 as missing links on existing SH-120 and SH 121.

Table No. 2 Salient features of the project site and study area

No.	Particulars	Details
1.	Name and Location of Project	Proposed Sonawade-Ghodge, Nardev-Shivdav Road passing Through the Districts of Sindhudurg and Kolhapur The proposed road area is lying entirely in the hilly section of the Western Ghats of Maharashtra. Its covers the area between 16°10'26.14"N 73°52'39.86"E and 16°10'1.13"N 73°56'15.44"E
2.	Plot/Survey/ Khasra No.	Survey No-Sonavade -7 ,9/5 ; Durganagar-1,2,3, 50B, 77B, 75; Vinjole- 43, 41, 40, 38, 30, 37, 36, 35, 34, 33 ShivdavKhurd -30/1
3.	Village	Vinjole , Shivdav ,Ghotage
4.	Tehsil	Kudal & Bhudargad

No.	Particulars	Details
5.	District	Sindhudurg& Kolhapur
6.	State	Maharashtra
7.	Wild Life Sanctuary	crow flying distances at 2.75 km (red colour), 5.75 km (blue colour) and 10 km (green colour) along the length of the proposed road at various places (Refer Chapter No. 2, Figure No. 2.2)
8.	Displacement of Population	No
9.	Availability of Raw Material	Local
10	Land Required	Reserve Forest Land 25.76 hect area &Private Forest of 1.150 ha; **Stage -1 approved;** F. No. FC-II/MH-23/2015-NGP/900 Dated: 29th September, 2016

5. Raw material required along with estimated quantity

Raw materials requirement

Stone	3055	Cum
Aggregates	77526	Cum
Sand	21023	Cum
Soil	1146184	Cum
Hard Murum	13231	Cum
Cement	18490	M.T.
Soft Murum	74	Cum
Steel	5691	M.T.
Aspahalt	318.30	M.T.

Table No. 3 Cost Estimate

Sr.No.	Sub-Estimate No & Name	Amount
1	Earthwork	Rs. 51,44,35,100.00
2	Base and Sub-base	Rs. 6,62,96,312.00
3	B.T.Surface	Rs. 1,20,49,735.00
4	C.D.Work 900 mm dia-Three Rows (As per Abstract Sheet No : 4 - Rs. 677779.00 * 6 times)	Rs. 40,66,674.00
5	C.D.Work 900 mm dia-four Rows (As per Abstract Sheet No : 5 - Rs. 813433.00 * 2 times)	Rs. 16,26,866.00
6	C.D.Work 900 mm dia-five Rows	Rs. 10,21,818.00
7	C.D.Work 1200 mm dia-Six Rows	Rs. 14,74,375.00

Sr.No.	Sub-Estimate No & Name	Amount
8	Slab Drain 6 X 5.50 (As per Abstract Sheet No : 8 - Rs. 7427515.00 * 2 times)	Rs. 1,48,55,030.00
9	Flyover Bridge	Rs. 65,67,33,216.00
10	Major Bridge-300m	Rs. 23,20,96,035.00
11	Major Bridge-100m	Rs. 5,82,39,777.00
12	Major Bridge-80m	Rs. 5,44,97,100.00
13	Slab Drain 6 X 4.50 (As per Abstract Sheet No : 13 - Rs. 4349861.00 * 5 times)	Rs. 2,17,49,305.00
14	For Slab Drain	Rs. 8,15,10,879.00
15	Laboratory Q.C. And Royalty Charges	Rs. 1,85,90,367.00
Total		**1,73,92,42,589.00**
16	Add work contingency @ 4.00%	Rs. 6,95,69,703.00
17	Add Computerization Charges @ 2.00%	Rs. 3,47,84,851.00
18	Add Probable Increase in DSR for one year @ 15.00%	Rs. 26,08,86,388.00
	Total	**2,10,44,83,531.00**
	Say Rs.	**210.00 Cr.**

6. Baseline Environment

Study Area and Period

The study area for monitoring of environmental quality includes 10 km region around the project site. Site area covers the 10 KM radial study area in Survey of India (SOI) Toposheet Nos. (47 L/4, 47 H/15 and 47 H/16).

The studies were conducted during summer season for the period of 10th December 2016 to 10th March 2017

Table No. 4 Environmental Setting (10 km radius)

Sr. No.	Particulars	Details
1.	Site Coordinates	Area between 16°10'26.14"N 73°52'39.86"E and 16°10'1.13"N 73°56'15.44"E
2.	Nearest Villages /Habitats	There are 4 villages along the road of which Sonawade, Sawantwadi, Vinjale, and Shivdev are major habitats
3.	Wild Life Sanctuary	proposed road boundary cuts the external boundary of the Radhanagari Wildlife Sanctuary at the areal crow flying distances at 2.75 km (red colour), 5.75 km (blue colour) and

Sr. No.	Particulars	Details
		10 km (green colour) along the length of the proposed road at various places
4.	Water Bodies	Patgaon Dam : 4.5 (S)
5.	Connectivity	Up to Sonawade village SH-120 state road is reached from shindhudurga tahasil and other side of project Shivdhav village having road accessibility from Kolhapur district.
6.	Nearest IMD Observatory	Vengurla
7.	Archaeological monuments, Historical Place	The Songad Fort in the village boundary of Sonawade, is archaeological and historical monument located along the project road and has an altitude of 635 m from MSL. The old remnants of fort still exists in dilapidated condition. Historical lake is in dilapidated state, still holds water which can be used for useful purposes
8.	Seismic Zone	III

Table No. 5 Monthly Metrological Data during Study Period

Sr. No.	Particulars		Details
1	Monitoring Period		December 2016 to February 2017
2	Temperature(^{0}C)	Min	December : 14.8
			January : 14.2
			February : 15.0
		Max	December : 34.3
			January : 34.5
			February : 35.2
3	Avg. Wind Speed (m/s)		December : 1.9
			January : 1.8
			February : 1.2
4	Wind Direction		December : E
			January : E
			February : E followed by W
5	Relative Humidity (%)		December : 73
			January : 75
			February : 77

Table No 6 Noise Level Results

Station Code	Station Name	Observation dB (A)	
		Day Time	Night Time
N-1	Shivdav	40	35
N-2	Sonvade	38	33
N-3	Patgaon	42	37
N-4	Anturli	37	32
N-5	Anaf Khurd	36	32
N-6	Nardave	38	33
N-7	Jambhulgaon	42	36
N-8	Ghotage	41	37
N-9	Tambyachiwadi	39	36

Water Environment

Discussion:

Total Suspended Solids: The total suspended solid (TSS) values of the samples recorded values are well within the limits.

Total Dissolved Solids: The dissolved solids consist mainly of bicarbonates, carbonates, sulphates, chlorides, nitrates and possibly phosphates of calcium, magnesium, sodium and potassium. The amount of dissolved solids present in water is a consideration for its suitability for domestic use. The TDS value of ground & surface water samples in the project area ranges between 110 to 194 mg/l and 155 to 234 mg/lit respectively.

pH: The pH is a measure of the activity of the (solvated) hydrogen ion. The values ranges from 6.9 to 7.55

Total Hardness as $CaCO_3$: The values of the ground water samples analyzed ranges from 36.02 to 62.04 mg/lit whereas surface water shows values between 60 to 100.08 mg/lit.

Chloride: The chloride valuea are within permissible limit. The values of graound water ranges between 10.76 to 37.18 mg/lit, whereas as surface water shows values between 27.88 to 37.17 mg/lit.

Sulphate: The concentration of sulphates in the water samples analyzed is within the prescribed limits. Values are recorded between 7.5 to 25.5 mg/lit and surface water shows values between 7.12 to 7.85 mg/lit.

Biochemical Oxygen Demand (BOD) at 270C for 3 days of surface water sample ranges between 3 to 6 mg/lit.

Chemical Oxygen Demand (COD) values of surface water samples recorded between 8 to 16 mg/lit

Dissolved Oxygen (DO) values of surcae water recorded between 6.3 to 6.8 mg/lit

Soil Environment

Study area soil samples are clay loam in nature

Bulk Density: Bulk density is a measure of the weight of the soil per unit volume (g/cm3). The bulk density of soil ranges from 1.089 to 1.17 g/cm3

Water holding capacity (WHC): Water holding capacity is the amount of water that can be retained by the soil when all the pores in the soil have been filled with water i.e. soil is saturated with water. The percentage of water holding capacity of soil when examined ranges from 39.4 % to 44.2 %.

pH : Result shows the pH of the soil samples in the study area ranging between 5.58 to 6.8.

Values of Total Kjeldhal Nitrogen (as N), Phosphorous (as P) & Potassium (as K) recorded between 0.24 to 0.46 %, 5.4 to 13.9 kg/ha and 128 to 212.8 kg/ha respectively.

Ecology & Biodiversity

The plant diversity on the study area is showing presence of 86 families, 223 genera shows 292 species, of which climbers are 34, herbs- 118, shrubs- 40 and tree species are 100. The analysis based on the plant families indicates that, total 86 families are recorded from the study area. Plant families, Fabaceae, Orchidaceae, Euphorbiaceae, Acanthaceae, Moraceae, and Rubiaceae are the large families among others.

Among the faunal Diversity Mammals are 25 species, and 22 species of Amphibians belonging to 8 families are scattered over 16 genera. A total of 34 species of Reptiles belonging to 12 families are distributed over 26 genera were presence. 63 species of avifauna and 11 species of grasshopper recorded in the study area.

The proposed road is approximately 3 - 5 km from the boundary of the Radhanagri Wildlife Sanctuary WLS). The proposed road passing through these villages and forests forming part of the corridor would hamper the connectivity of the landscape and affect movement of tigers in the landscape, ln addition, it would also affect the free movement of the gaur, the flagship species of the area, and other animals,

Dense forest cover in the hilly segment of the proposed alignment (Sawantwadi Forest Division) harbours rich assemblages of bird species and arboreal species such as the giant Squirrel and langur.

Recorded signs of gaur, langur, sambar, wild boar, and signs of other small mammals.

The habitat in the flat segment under the Kolhapur Forest Division is a mix of dense forests and open grasslands with waterholes - an excellent habitat for gaur, Signs of gaur and other species such as sambar and wild pig were observed in this section

Land Use Land Cover Study

Class	Area in Sq. Km.	Area in %
Crop Land	14.48	3
Open Land	7.66	2
Vegetation	237.34	55
Built up land	4.65	1
Barren Land	137.32	32
Fallow Land	28.35	7
Waterbody	1.66	0
Total	**431.46**	**100**

Socio economic Environment

The present study area covers 14 villages from Kolhapur District and 25 villages from Sindhudurg District

- The total population of study area is: 38917
- Total House hold are 9712

- Male to female ratio is: 48.70: 51.30. Female population is more than male.
- 72 % population is literate while 28% of the population was reported to be illiterate
- The study area having 8% ST population and 0.7% SC population
- Total working population is 49.50 % whereas Non-working population is 50.46 % in the study area.

7. Impact Assessment

Categorization of Impact

Broadly, the various impacts of roads categorized as:

- Roads as cause for wildlife mortality (road kill)
- Roads as cause for habitat loss and degradation
- Roads as barriers, and cause for habitat fragmentation
- Roads as conduits for invasive alien species
- Roads and genetic effects on animals
- Roads as cause for landslides and soil erosion
- Roads through closed-canopy forests: effects on arboreal animals and vegetation
- Road impacts on aquatic ecosystems
- Roads as ecological traps
- Roads and change in animal behavior
- Roads, people and pollution
- Road impacts on local and indigenous peoples

8. Site Alternative Study

Three alternatives considered by the PWD authorities to avoid and minimize impacts that would be inevitable if technically (based on design speed and geometrics) best-fit alignment is followed.

The DCF, Sawantwadi and the DCF, Kolhapur have also examined the above mentioned three alternative alignments and have come to the conclusion that the alternative- III which involves 25.76 ha. of reserve forest land and is the shortest in length, is the most suitable from forestry point of view and have certified at CERTIFICATE NO. 27 of the F. C. Act proposal, in this regard.

They have further certified that the alignment no. III, involves minimum of unavoidable forest land of lesser vegetative density

9. Key Risks Identification

- Traffic Risk
- Fire Hazards
- Constructional Risk
- Operational and Maintenance Risk
- Material & Manual Handling
- Impacts on Wildlife Movement and Mortality

10. Expected Benefits from the Project Road

The proposed ghat road would be the shortest road connecting the two districts from Kudal. The constant demand from the public and public representatives from Kolhapur and Sindhudurg districts for easy gradient and shortest route from Ghotge- Sonawade villages via Sindhudurg dist. And Vinzole- Shivadav- Pangaon villages of Kolhapur dist. Also this road project is being discussed in the State Assembly and the public representatives have expressed their concern on the assembly floor for delay and requested for early construction of this ghat road.

Direct Benefits

- Fast and Safe Connectivity,
- Decongestion of traffic on Kurul and Phonda Ghat roads.
- Savings in fuel, travel time and total transportatiof road users,
- Reduction in road accidents,
- Reduction in air and noise pollution due to easy gradient and constant flow,

Macro Level Benefits

Employment opportunity to people

- Development of tourism in the region
- Development of local industry and handicrafts
- Quick transportation of agricultural produce and perishable goods like Food grain, fruits, vegetables, etc.
- Improved quality of life for people

11. Employment Generation (Direct and Indirect) due to the project.

Direct Employment Generation:

Construction phase of the project is likely to be complet within 30 months; workers will be need to take the part in various project activities. About 100persons per day, which shall include skilled, semi-skilled and unskilled labours, shall engaged. In the post construction phase, the project will provide social benefits to no. of people in terms of direct employment by way of better commercial and industrial development of the area.

Indirect Employment:

Ancillary units will also set up due to project, which will provide employment. Local vendors / traders etc. will benefitted through employment generated during construction and operation phase.

12. Environment Management Plan

Pre construction Stage

The pre-construction stage involves

- Obtain all the necessary clearances /NOC's/ consents from agencies concerned
  - Forest Clearance/ Tree Cutting
  - Wild Life Clearance
  - Environmental Clearance
  - Consent to Establish/Operate
- Identification and selection of material sources (quarry and borrow material, water, sand etc)

- Fulfill conditions as per respective NOCs

Construction Stage

- Stone crushing and screening plants, hot-mix plants, concrete batching plants etc. shall be located sufficiently away from habitation, agricultural operations.
- Precaution shall be taken to reduce the levels of noise, vibration, dust and emissions from plants
- The Contractor shall not use or generate any materials in the works which are hazardous to the health of persons, animals or vegetation.
- Provision of protective clothing or appliances to workers
- Provision of drinking water for workers shall be made available
- The use of firewood shall not be permitted

13. Budgetary Provision for Environmental Management Plan (Rs. in Lakh)

No.	Particulars	Amount
One Time Installation Cost (Capital Cost)		
1	Air Quality Monitoring	15.00
2	Noise Level Monitoring	05.00
3	Green Belt Development/Ecology & Biodiversity	40.00
4	Water & Soil Quality Monitoring	10.00
5	Occupational Health & Safety	20.00
	Total	**90.00**
Recurring Cost		
1	Air Quality Monitoring	10.00
2	Noise Level Monitoring	05.00
3	Green Belt Development/ Ecology & Biodiversity	25.00
4	Water & Soil Quality Monitoring	10.00
5	Occupational Health & Safety	15.00
6	Corporate Social Responsibility	05.00
Total		**70.00**