

**Ecology Report for Up-Gradation of Haveri – Baindur Section
of NH- 766 C in the State of Karnataka (Package no-
NH/IAHE/24) Client : MoRTH**



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**Ecology Report for Up-Gradation of Haveri – Baindur Section of NH- 766 C in the State of
Karnataka (Package no- NH/IAHE/24) Client : MoRTH**

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1. INTRODUCTION

1.1 General

India has one of the largest road networks in the world. At present, out of 71,772 km of National Highways about 24% length is of 4-lane and above standard, 52% length is of 2-lane standard and 24% length of single and intermediate standard. For the purpose of management and administration, roads in India are divided into the following five categories:

- National Highways (NH)
- State Highways (SH)
- Major District Roads (MDR)
- Other District Roads (ODR).
- Village Roads (VR)

The National Highways are intended to facilitate medium and long distance inter-city passenger and freight traffic across the country. Freight transport by road has risen from 6 Billion Tonne Km (BTK) in 1951 to 1100 BTK in 2000 and passenger traffic has risen from 23 Billion Passenger Km (BPK) to 2875 BPK during the same period. The annual growth of road traffic is expected to be 10 to 11%. Current boom in the automobile sector may even increase the future growth rate of road traffic. Hence upgrading of roads by way of widening of carriage-ways, improved surface quality, strengthening/reconstruction of old/weak bridges and culverts, etc. has to be carried out to meet the expected rise in traffic.

At the same time, adverse impact on the surrounding environment may also be created by these development works. The affected aspects may include people and properties that may lie in the direct path of road works. Damage to sensitive ecosystems, soil erosion, and changes in drainage patterns and thereby groundwater, loss of productive agricultural lands, resettlement of people, and disruption of local economic activities, demographic changes and accelerated urbanization are some of the environmental impacts caused by highway projects. Therefore, careful consideration should be given to the environmental impacts while planning development and operation of highway projects. Environmental Impact Assessment (EIA) becomes an essential component in the project cycle and can be used as a tool to develop mitigation measures which when implemented serve to minimize these adverse effects that may be created by the highway development projects. The integral part of the project cycle consists of recognition, assessment and appraisal of potential environmental impact.

1.2 Purpose of the Report

Environment plays a vital role in overall development of the country. Recognizing the importance of environmental protection and sustainable development, the Ministry of Environment Forest and Climate Change (MoEF&CC), Government of India had formulated policies and procedures governing the developmental activities like Highways involving Expansion , up-gradation and strengthening of national highways of length greater than 100 km, involving additional right of way or land acquisition greater than 40 m on existing alignment and 60m on realignment or by passes would now come under the purview of Environment Clearance process, through submission of an EIA Report as per the EIA Notification of MoEF&CC to prevent indiscriminate exploitation of natural resources and promote integration of environmental concern in developmental projects.

The Ministry of Environment and Forests GOI has issued an Environment Impact Assessment (EIA) Notification on 14th September, 2006 after taking due cognizance of the seriousness of continuing environmental deterioration with increase in generation of green house gases. This was supplemented by subsequent amendments on 1st December 2009.

"The proposed project will come under the scope of EIA Notification, falling under Category A item 7(f) of the schedule, since it is an “Upgradation of Baindur to Ranebennur section of NH 766C in the state of Karnataka to Two/Four Lane with Paved Shoulder configuration”.

It is envisaged that the present study would help the Project Proponent to obtain Environmental Clearance (EC) from MoEF&CC as per the above-mentioned EIA notification with case specific anticipated impacts and mitigation measures proposed.

1.3 Project Proponent

It was decided by the Ministry of Road Transport & Highways (MORTH), Government of India to take up the development of various NH corridors in the country so Indian Academy of Highway Engineers (IAHE), under the aegis of Ministry of Road Transport & Highways (MORTH) has undertaken formulation of Detailed Project Reports (DPR) under Phase I in the states of Maharashtra, Karnataka, Gujarat, Chhattisgarh and Rajasthan where Package 24 is in Karnataka.

The project alignment starts from Baindur and ends at Ranebennur with a total project length of 199.087 kms. This Up-gradation is particularly important for safe and efficient movement of traffic as this road will serve as a critical Link between Mangalore and mining areas of Bellary and Hospet thus contributing substantially towards development of the local economy with the intensity of traffic increase.

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Presently, NHs are being developed, maintained and managed under an agency system. The execution of works and day-to-day management of most NHs are looked after by the Public Works Department PWD and those in the border areas are developed and maintained by the Border Roads Organisation (BRO).

The Ministry of Shipping, Road Transport and Highways, Government of India, has the overall responsibility including planning, budgeting and standardisation for National Highways. To give a boost to the development of National Highways, a National Highways Authority of India (NHAI), under Ministry of Road Transport and Highways has been formed to implement important projects on NHs. The National Highways Authority of India was constituted by an act of Parliament, "the National Highways Authority of India Act, 1988". The Authority was operationalised in February 1995 with the appointment of full time Chairman and other Members.

1.4 Project

Existing Project Features:

The project alignment starts from Baindur and ends at Ranebennur with a length of 199.087 kms passing through three districts Udupi, Shimoga & Haveri. The chainage wise details of stretch start and end point at districts is given in **Table 1**.

Table 1.1: Stretch start and end point at districts

Sl No	Design Chainage		Length in Kms	Existing Chainage		District	Name of Place	
	From	To		From	To		From	To
1	0+000	37+100	37.10	252+260 (NH-17) & 395+500 (SH-27)	176+300 (SH-26)	Udupi	Baindur (NH-66)	Near Nagodi
2	37+100	161+200	124.10	176+300 (SH-26)	258+100 (SH-57)	Shimoga	Near Nagodi	Near Kavasapura
3	161+200	199+087	37.89	258+100 (SH-57)	219+800 (SH-57) & 298+400 (NH-48)	Haveri	Near Kavasapura	Ranebennur (NH-48)

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Bridges, Junctions and cross drainage structures

Major Bridges – 3

Minor Bridges – 58

Major Junctions – 17

Minor Junctions –150

RUB – 1 (Thaggarse)

Level Crossing – 1 (Anandpur)

Settlements:

Major Towns/Settlements – 2 (Hosanagara & Shikaripura)

Minor Towns/Settlements – 4 (Kollur, Nagara, Anandpur & Masur)

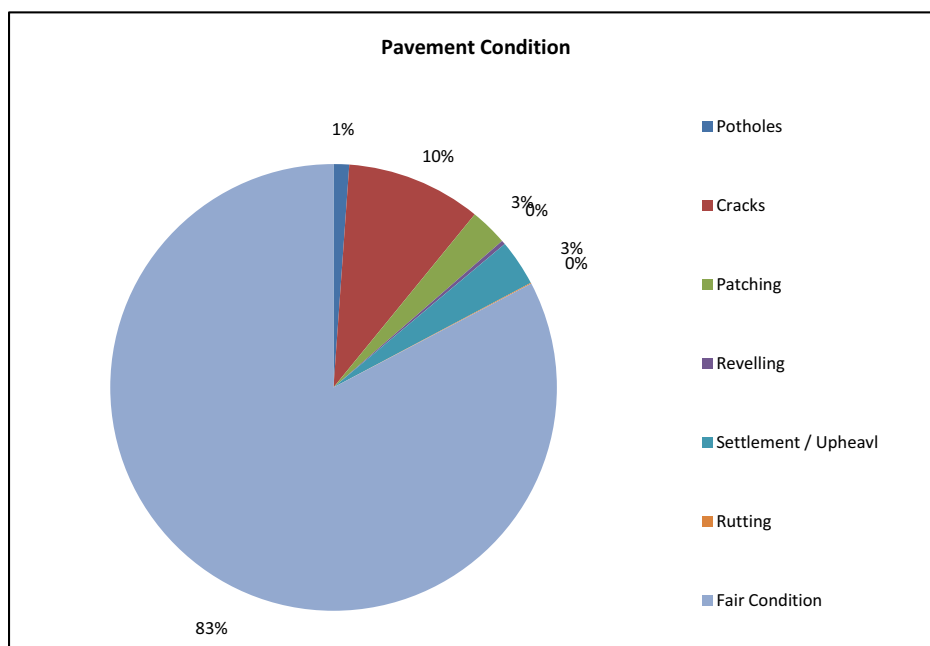
Villages – 69

Wild Life Sanctuaries:

Mookambika Wild life Sanctuary runs 26.0 Km along the project corridor starting from Chainage 13+500 near Arashirooru (382+650, SH-27) and ends at Chainage 40+200 near Nagodi (173+400, SH-26) Sharavati WLS: The total length of Sharavati wild life Sanctuary is about 15.5 km along the project corridor starting from approx Chainage 39+500 and ends at Chainage 55+200.

Existing Pavement Condition:

The onsite Visual inspection of the road showed a generally good surface condition. Approximately 15-20 % of the highway has damaged riding surface.



Existing lane configuration

Single Lane	31.4 Km
Intermediate Lane	151.5 Km
2-Lane	17.3 Km

Proposed Improvements

The improvement proposals include the following keeping in view the requirement for next 30 years. Realignment at number of locations are carried out to improve geometry, avoid sharp horizontal curves, to avoid religious places, to minimize acquisition of buildings, Forest and WLS along the project stretch.

- ✓ Widening of existing carriageway to 2 to 4 lane
- ✓ Vehicle Underpasses (VUP/LVUP) are proposed at few locations to avoid the conflict of cross traffic and to minimize number of accidents.
- ✓ Improvement to existing major/minor bridges, culverts and construction of new bridges.
- ✓ Proposal for busbays, toll plazas, truck laybys, RoB/RUB.

Existing alignment has number of geometric deficiencies viz., insufficient curve radius for 100 kmph and 60 kmph design speeds, spirals, kinks, improper super elevation, gradient etc, Separate geometry is adopted for 100 km and 60 km design speed in plain/rolling and mountainous Terrain.

- ✓ Realignment of total(2.82 km) at two locations Masur from km 166+360 to km 167+060, Halageri from km 192+325 to km 194+445 is proposed to improve geometry, avoid sharp horizontal curves, to minimize acquisition of buildings, to avoid heavily builtup areas.
- ✓ Bypasses of total(10.71 km) is proposed at two locations near Anandapur and Shikaripura to save journey time of vehicles travelling in this road as the proposed bypass will be Four lane access control.
- ✓ Junction improvements particularly at crossing with major road and highways.
- ✓ Providing of signage and road marking for additional safety and convenience to the road users.

1.5 Environmental Assessment of the Project

The detailed design of the project has been closely co-ordinated with the preparation of this Environmental Impact Assessment Report and Environment Management Plans. The EA preparation

led to identification of potential negative environmental impacts and their feasible remedial measures (including avoidance, mitigation and enhancements). Based on these findings, Environmental Management Plans (EMPs) have been prepared for implementation of the project.

1.6 Objective of the Study

The major objective of this study is:

- a) To present a picture of the existing environmental conditions along the project road based on existing secondary information amply supported by field studies/ survey carried out by environmental specialists,
- b) To study and formulate preliminary assessment of the likely environmental impacts on the environment due to the physical intervention of this project,
- c) To suggest and recommend the environmental management measures to reduce adverse impacts, if any, and
- d) To establish and determine the scope of further detail environmental assessment, where required.

1.7 Scope of the Study

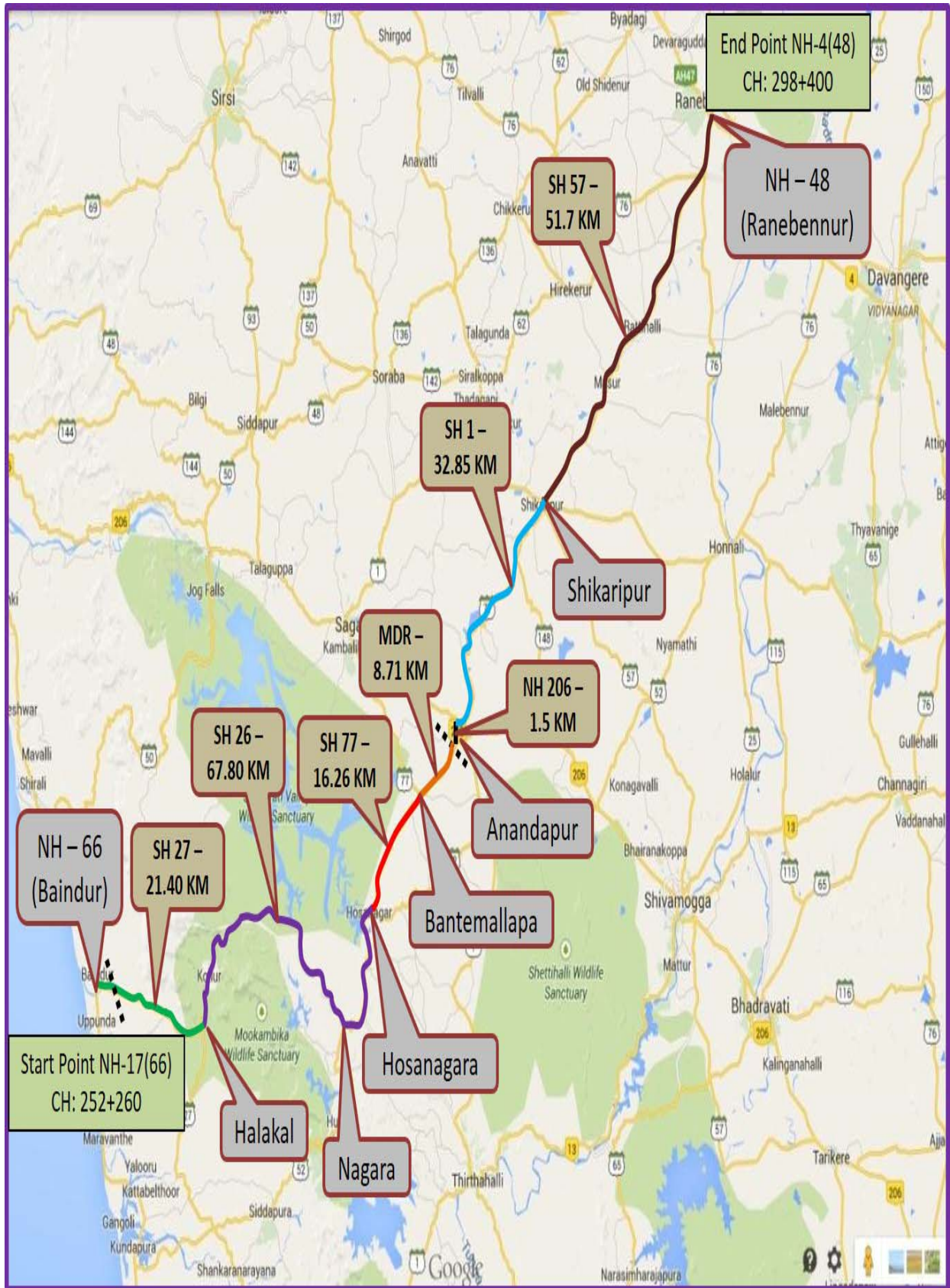
The summary of the scope of work related to EIA is as mentioned:

- Collection and collation of information on existing environmental scenario from secondary sources and detection and identification of data gaps to be filled from primary surveys. Primary surveys: baseline (air, water, and noise) Pollution monitoring at representative and sensitive location.
- Recognition and Identification of all micro-level environmental issues and all regionally or nationally recognized environmental resources & features (like stretches of road side trees, environmental and common property resources such as forest, large water bodies, heritage complexes and major cultural properties) within the project's influence area
- Stakeholder assessment and consultation with all communities likely to be affected,
- Identification of the Valued Ecosystem Components (VECs) in the project influence area.
- Preliminary analysis of impacts and management measures, especially on the identified VECs.
- Scoping for project EIA
- Environmental inputs related to alignment, road cross-sections, construction material use and mitigation & enhancement measures
- Environmental surveys, concerning wildlife, land use, air quality, water quality, noise levels and effluent (if any) at selected locations within the ROW,
- Selection of sites for the generation of the primary data with respect to Air, Water, and Noise quality,
- Tabulation of environmental attributes and identification of impacts likely to occur due to the project,

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- Collection of baseline data from secondary sources such as Central and State Government Departments
- Retrieval of all available baseline data and categorization (as per relevant guidelines) of the project road.

Figure 1.1: Amalgamation of various SH and NH along the project corridor



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1.8 Details of the Project and Location

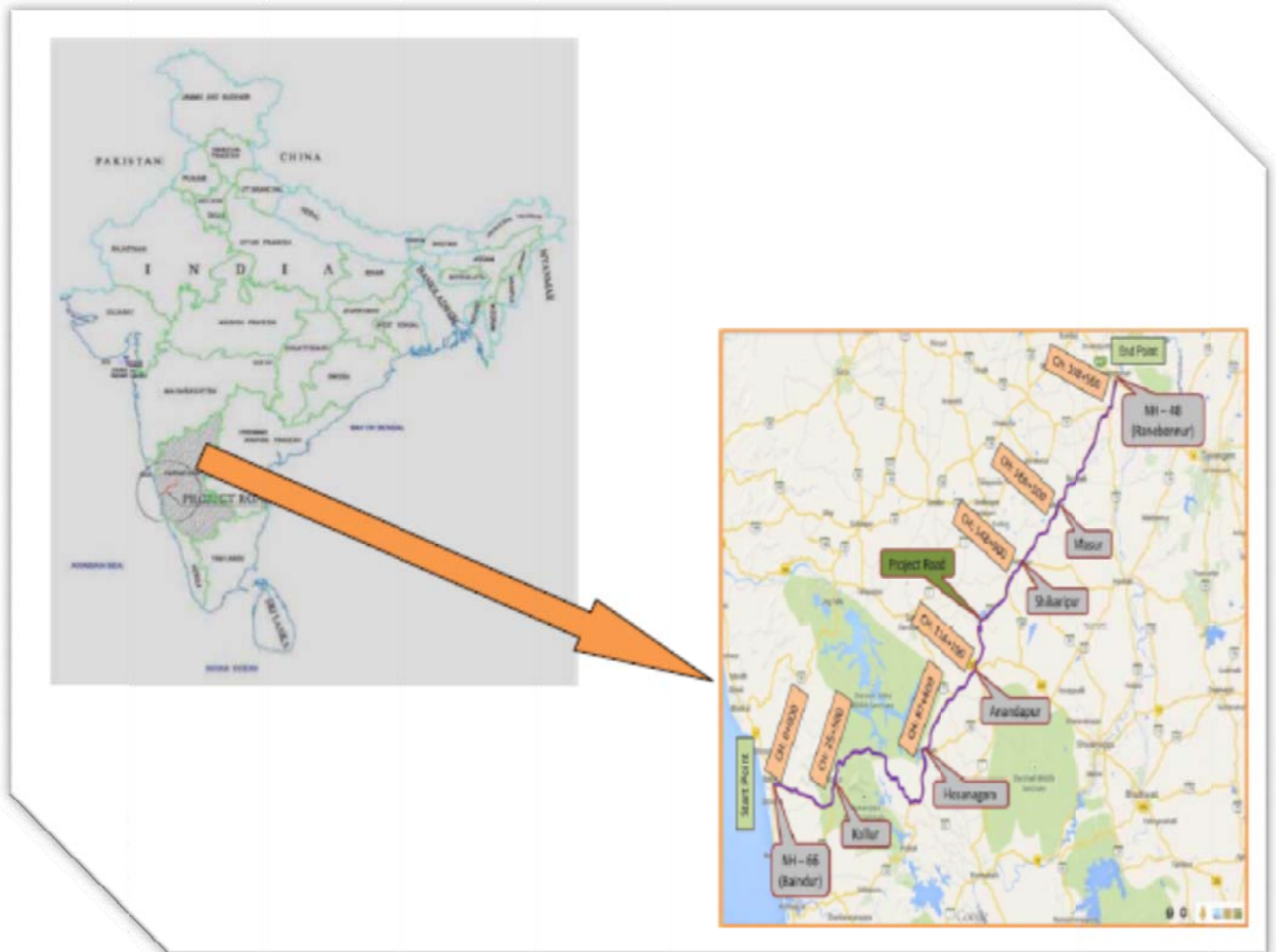
The project alignment starts from Baindur and ends at Ranebennur over a length of 199.087 km (given in Table 2.2). The location map is shown in Figure 2:

Table 1.2: Chainage wise details Baindur to Ranebennur

Sl.No	Design Chainage		Length in Kms	Existing Chainage		District	Name of Place	
	From	To		From	To		From	To
1	0+000	37+100	37.10	252+260 (NH-17) 395+500 (SH-27)	& 176+300 (SH-26)	Udupi	Baindur (NH-66)	Near Nagodi
2	37+100	161+200	124.10	176+300 (SH-26)	258+100 (SH-57)	Shimoga	Near Nagodi	Near Kavasapura
3	161+200	199+087	37.89	258+100 (SH-57)	219+800 (SH-57) & 298+400 (NH-48)	Haveri	Near Kavasapura	Ranebennur (NH-48)

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Figure 1.2 : Location map



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The alignment passes through reserve, protected forests and wildlife sanctuaries.

Existing pavement condition Pics



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1.9 Forests:

The state of Karnataka has a rich diversity of flora and fauna. It has a recorded forest area of 38.724 sq. km which constitutes 20.19% of the total geographical area of the state. Many regions of Karnataka are still unexplored and new species of flora and fauna are still found. The Western Ghats mountains in the western region of Karnataka is a biodiversity hotspot. Karnataka has a protected area network of 5 national parks (2431.300sq.km.), and 21 wildlife sanctuaries (3887.827 Sq. Km), covering nearly 16% of its forest area.

As per 2012-13 Statistics, Karnataka has 29,550 sq.km of reserved forest, 3,585 sq.km of protected forest and 9,949 sq.km of unclassified forest. In total 43,084 sq.km of forest area.

Table 2.12 gives the Forests area in the project area. Also, details of trees within the existing ROW within the project corridor are incorporated in report.

Table 1.3 Forests Details chainage wise

Sl. No	Existing Chainage		Road Name	Design Chainage		Length in Km	Reserved Forest or Protected Forest
	From	To		From	To		
1	391+880	391+390	SH -27	3+620	4+110	0+490	Reserved Forest
2	387+300	387+160	SH -27	8+050	8+190	0+140	
3	386+260	385+760	SH -27	8+940	9+440	0+500	
4	385+700	385+160	SH -27	9+540	10+080	0+540	
5	385+055	384+565	SH -27	10+180	10+670	0+490	
6	384+570	384+270	SH -27	10+770	11+070	0+300	
7	382+160	381+610	SH -27	13+000	13+550	0+550	
8	380+770	378+330	SH -27	14+410	16+850	2+440	Mookambika Wildlife Sanctuary
9	378+170	187+050	SH -27 & 26	17+150	25+590	8+440	
10	184+920	183+920	SH -26	27+690	28+690	1+000	
11	183+710	172+380	SH -26	28+890	40+220	11+330	Reserved Forest
12	173+800	172+280	SH -26	40+270	41+790	1+520	
13	172+100	171+560	SH -26	41+990	42+530	0+540	
14	171+350	166+650	SH -26	42+740	47+440	4+700	
15	165+155	164+905	SH -26	48+840	49+090	0+250	
16	164+410	162+750	SH -26	49+540	51+200	1+660	
17	162+250	159+730	SH -26	51+570	54+090	2+520	
18	159+550	159+300	SH -26	54+240	54+490	0+250	
19	158+780	156+530	SH -26	54+990	57+240	2+250	
20	155+785	151+445	SH -26	57+890	62+230	4+340	
21	150+330	143+400	SH -26	63+170	70+100	6+930	
22	140+570	136+840	SH -26	72+840	76+570	3+730	
23	136+350	133+640	SH -26	76+820	79+530	2+710	
24	133+330	132+840	SH -26	79+700	80+190	0+490	

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Sl. No	Existing Chainage		Road Name	Design Chainage		Length in Km	Reserved Forest or Protected Forest
	From	To		From	To		
25	132+750	131+830	SH -26	80+240	81+160	0+920	
26	131+520	131+320	SH -26	81+280	81+480	0+200	
27	131+260	131+030	SH -26	81+540	81+770	0+230	
28	130+630	130+280	SH -26	82+150	82+500	0+350	
29	130+080	129+110	SH -26	82+700	83+670	0+970	
30	127+100	126+500	SH -26	85+660	86+260	0+600	
31	126+260	125+540	SH -26	86+490	87+210	0+720	
32	114+750	113+470	SH -77	89+860	91+140	1+280	
33	113+200	113+020	SH -77	91+410	91+590	0+180	
34	112+800	112+220	SH -77	91+810	92+390	0+580	
35	111+765	111+415	SH -77	92+840	93+190	0+350	
36	111+010	110+660	SH -77	93+590	93+940	0+350	
37	110+050	109+950	SH -77	94+550	94+650	0+100	
38	109+650	105+880	SH -77	94+910	98+680	3+770	
39	105+320	104+350	SH -77	99+150	100+120	0+970	
40	103+265	102+345	SH -77	101+200	102+120	0+920	
41	7+620	4+010	MDR	106+310	109+920	3+610	
42	3+430	1+910	MDR	110+520	112+040	1+520	
43	1+920	1+770	MDR	118+980	119+130	0+150	
44	180+915	181+695	SH -01	126+440	127+220	0+780	
45	183+510	184+360	SH -01	129+040	129+890	0+850	
46	184+860	187+310	SH -01	130+390	132+840	2+450	
47	188+215	188+735	SH -01	133+740	134+20	0+520	
48	192+600	192+830	SH -01	137+630	137+860	0+230	
49	196+320	197+970	SH -01	141+350	143+000	1+650	
Total Length						82+360	Reserve d Forest

**Sharavati and Shettihalli Wild life sanctuary chainage wise details are being worked out and will be presented in the Final EIA Report*

1.10 Junctions:

All intersections are major intersection with state highways or MDR crossing the project alignment and minor intersections with village road intersecting the project alignment. There are 19 major and 119 minor intersections in the project alignment. The details of the major junctions are given in Table 2.11.

Table 1.4 : Details of Major junctions / intersections

Sl.No.	Design Chainage @ I. Km II	Location	Intersection Type	Proposals
1	0+000	Baindur Junction	+	At Grade Junction
2	21+300	Halakal	Y	At Grade Junction
3	71+300	Nagara	T	At Grade Junction
4	89+330	Hosanagara	Y	At Grade Junction
5	105+180	Bantemallapa	Y	At Grade Junction
6	105+280	Bantemallapa	Y	At Grade Junction

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Sl.No.	Design Chainage @	Location	Intersection Type	Proposals
	I. Km II			
7	112+640	Anandapura Bypass	Y	At Grade Junction
8	114+985	Anandapura Bypass	+	Grade Separated with Cloverleaf Interchange
9	116+840	Anandapura Bypass	Y	At Grade Junction
10	145+375	Shikaripura Bypass	Y	At Grade Junction
11	148+005	Siralkoppa	+	At Grade Junction
12	151+270	Puradhalu	+	At Grade Junction
13	151+885	Shikaripura Bypass	Y	At Grade Junction
14	166+360	Masur	+	At Grade Junction
15	167+060	Masur	Y	At Grade Junction
16	192+325	Halageri Bypass	Y	At Grade Junction
17	192+790	Kod	+	At Grade Junction
18	194+445	Halageri Bypass	Y	At Grade Junction
19	199+087	Ranebennur	+	At Grade Junction

1.11 Socio Religious Structure And Buildings: (Sensitive receptors)

The roadway is flanked on the sides by important social activity centers such as schools, colleges, and places of worship etc. sensitive receptors are stated below noted during the site survey.

Table 1.5 (Sensitive receptors)

Sl. No.	Highway Name	Design chainage		Noise Barrier		Amenities	
		From	To	LHS	RHS	LHS	RHS
III.	IV.						
1	SH -27	1+260	1+330	70	V.	VI.	Govt School
2	SH -27	2+890	2+930	40	-	Anganwadi	-
3	SH -27	3+250	3+280	30	VII.	Govt Hospital	VIII.
4	SH -27	4+820	4+920	100	-	School	-
5	SH -26	25+840	25+870	30	IX.	Govt Hospital	-
6	SH -26	26+020	26+080	60	X.	Govt School	XI.
7	SH -26	27+100	27+120	-	20	-	Anganwadi
8	SH -26	41+890	41+960	70	-	School	-
9	SH -26	42+690	42+720	-	30	-	Anganwadi
10	SH -26	47+920	47+960	-	40	-	School

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Sl. No.	Highway Name	Design chainage		Noise Length	Barrier	Amenities	
		From	To			LHS	RHS
III.	IV.						
11	SH -26	48+000	48+030	XII.	XIII.	Hospital	XIV.
12	SH -26	51+500	51+560	-	60	-	Govt School
13	SH -26	62+340	62+370	30	-	Library	-
14	SH -26	63+080	63+130	-	50	-	School
15	SH -26	70+440	70+550	-	110	-	School
16	SH -26	71+850	71+870	XV.	20	School	Hospital
17	SH -26	72+170	72+250	80	XVI.	School	XVII.
18	SH -26	76+670	76+690	20	-	Anganwadi	-
19	SH -26	76+740	76+790	50	-	School	-
20	SH -26	79+640	79+670	30	-	School	-
21	SH -26	81+140	81+180	40	-	School	-
22	SH -26	82+080	82+100	20	XVIII.	Hospital	XIX.
23	SH -26	87+020	87+180	160	-	School	-
24	SH -26	88+000	88+040	-	40	-	School
25	SH -26	88+150	88+170	-	20	-	Hospital
26	SH -77	91+260	91+310	-	50	-	School
27	SH -77	93+080	93+100	20	-	Anganwadi	-
28	SH -77	94+060	94+100	-	40	-	School
29	SH -77	95+910	95+930	20	-	Anganwadi	-
30	SH -77	98+730	98+770	-	40	-	School
31	SH -77	98+780	98+800	-	20	-	Anganwadi
32	SH -77	100+410	100+460	50	-	School	-
33	SH -77	100+570	100+640	70	XX.	School & hospital	XXI.
34	SH -77	104+880	104+910	XXII.	30	XXIII.	School
35	MDR	108+440	108+470	-	30	-	School
36	MDR	110+240	110+290	50	-	School	-
37	SH -57	152+800	152+830	30	-	Anganwadi	-
38	SH -57	158+670	158+710	-	40	-	Hospital
39	SH -57	160+570	160+600	30	-	School	-
40	SH -57	160+740	160+770	30	-	School	-
41	SH -57	163+940	164+000	-	60	-	School

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Sl. No.	Highway Name	Design chainage		Noise Length	Barrier	Amenities	
		From	To			LHS	RHS
III.	IV.						
42	SH -57	169+490	169+510	-	20	-	School
43	SH -57	174+110	174+140	-	30	-	School
44	SH -57	175+660	175+760	-	100	-	College
45	SH -57	178+200	178+240	40	-	Hospital & School	-
46	SH -57	187+270	187+320	50	-	School	-
Total				1220	850	XXIV.	XXV.

1.12 Project Cost:

The total project cost is **Rs 2140.67Cr** for flexible and **Rs 2541.81Cr** for rigid pavement with **Rs 23.99Cr** and **Rs 30.35Cr** EMP cost included respectively.

The summary of the cost is given in detail in Table 2.20

Table 1.6 Project Cost

Sl. No	Bill. No.	Description	Flexible pavement	Rigid pavement
1	Bill no.1	Site clearance and dismantling	33035610.34	27650481.67
2	Bill no.2	Earth work	1362183897.26	1539371992.83
3	Bill no.3	Granular sub-base and base courses	2297465683.20	1272103066.91
4	Bill no.4	Bituminous courses	1939320632.37	--
5	Bill no.4a	Concrete pavement	104190422.38	5994019043.51
6	Bill no.5	Slab, box and pipe culverts retaining walls	1993887306.88	1993887306.88
7	Bill no.6	Major and minor bridges/ interchange	1481905008.74	1481905008.74

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Sl. No	Bill. No.	Description	Flexible pavement	Rigid pavement
8	Bill no.6a	Rob	368158680.84	368158680.84
9	Bill no.7	Drainage and protection works	1099016735.91	1099016735.91
10	Bill no.8	Traffic signs, marking and other appurtenances	575286196.68	575286196.68
11	Bill no.9	Bus bay_truck lay bay_rest area	158378546.64	158378546.64
12	Bill no.10	Miscellaneous (highway patrol, operation and maintenance centre excluding the cost of maintenance)	108662400.00	108662400.00
13	Bill no.11	Highway traffic management systems (htms)	71542600.00	71542600.00
14	Bill no.12	Toll plaza	74080871.08	74080871.08
Grand total, Rs.			11667114592.32	14764062931.71
Sub total (a)			1166.71	1476.41
Add for contingencies at 2.8%			32.67	41.34
A	Total		1199.38	1517.75
B	Agency charges at 3%		35.98	45.53
C	Supervision charges at 3%		35.98	45.53
D	Qc charges at 0.25%		3.00	3.79
E	Road safety charges at 0.25%		3.00	3.79
F	Maintenance charges at 5%		59.97	75.89
G	Price escalation for 2 years at 10%		119.94	151.77
Total a+b+c+d+e+f+g			1457.25	1844.06
H	Non civil works		XXVI.	XXVII.
1	Utility relocation		34.11	34.11
2	Land acquisition		595.34	595.34

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Sl. No	Bill. No.	Description	Flexible pavement	Rigid pavement
3		Rehabilitation and resettlement 1.5%	17.99	22.77
4		Environmental mitigation measures at 2%	23.99	30.35
5		Highway plantation & maintenance (green highway) 1%	11.99	15.18
XXV		Sub total (h)	683.43	697.75
Grand total amount			2140.67	2541.81

2. DESCRIPTION OF THE ENVIRONMENT

2.1. General

Baseline conditions describe the state of the environment before the onset of the proposed development. Baseline conditions help to consider what the future state of the environment will be when the project comes to fruition. Human influences will also affect the environmental baseline over a period of time. They provide the basis from which project impact comparisons are made. The baseline environmental data of the project influence area helps to predict the magnitude of impacts that are likely to be caused due to the proposed project. It also helps to identify critical environmental attributes required to be monitored during and after the proposed improvements.

Development of highway projects is generally intended to improve the economic and social welfare of the people. At the same time it may also create adverse impact on the surrounding environment. Environmental components to be considered in relation to highway projects are: land, air, water, meteorology, flora, fauna, solid waste management, socio-economic and health. Hence it is necessary to ascertain the baseline data of these environmental components. Highway development and operation should, therefore, be planned with careful consideration of the environmental impacts to minimize the adverse effects that may be created by the highway development projects.

2.2 Study Area

As a prerequisite for the study for the project, field inspection at all the sensitive locations, collection of baseline data - primary and secondary information for all environmental components in the project area has been carried out.

2.3 Climate

Karnataka has typical monsoon climate, with hot, rainy and cold weather seasons. However, dew, frost and hail also occur, depending upon the seasonal weather. The winter season from January to February is followed by summer season between March and May, the monsoon season between May to September and postmonsoon season from October to December. The post-monsoon (period of retreating) and winter seasons are generally pleasant over the entire state. The months April and May are hot, very dry and generally uncomfortable. Weather tends to be oppressive during June due to high humidity and temperature. Temperature varies between 22°C and 46°C during this season. Rainfall starts normally in the first week of June. July is the wettest month in Karnataka, while August also gets substantial rain. Monsoon starts its retreat with the coming of September to the state. Winter season is a cool, dry spell, with clear skies gentle breeze; pleasant weather prevails from

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November to February. The Temperature varies between 2.8°C (at Bidar) and 45.6°C (at Raichur) during this season.

2.4 Rainfall

The southwest monsoon accounts for almost 80% of the rainfall that the state receives. The annual rainfall across the state ranges from low 50 cm to copious 350 cm. The districts of Bijapur, Raichur, Bellary and Southern half of Gulbarga experience the lowest rainfall ranging from 50 to 60 cm while the west coastal region and Malenadu enjoy the highest rainfall. Agumbe in the Western Ghats experiences the heaviest rainfall in the country next only to Cherrapunji. July and August receive the maximum rainfall in the year.

RANGE OF WILDLIFE, STATUS, DISTRIBUTION AND HABITAT:

VEGETATION:

THE BIO-GEOGRAPHIC CLASSIFICATION:

Western ghat forests are celebrated for their diversity. Millions of years of evolutionary pressures, shaped these ecosystems into the most complex in the world. There is an intricate web of life, which is the essence of forests themselves. Very few habitations on earth contain such profusion or weight of plant life per hectare; hidden by vegetation from all but a trained eye multitude of plants and animals, rare, strange and beautiful.

The biotic factors and edifice variations have played a dominant role in determining the nature of the forests growing in the sanctuary. The eastern portion of the sanctuary comprises dry deciduous forests and it gradually changes to moist deciduous type as we go towards the west. The following types of forests are mainly found in the sanctuary.

FOREST TYPES:

There are two types of forest in Sharavathi Wildlife Sanctuary

- A. The Southern Tropical Evergreen type
- B. The Southern Tropical Semi-Evergreen type

A. The Southern Tropical Evergreen type: This type is seen in Nagavalli, Kannor Kote, part of Biligar and Kattinkar areas. The top canopy consists of

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<u>Deptero</u>	<u>carpus indicus, Calophyllum tomentosum,</u>	<u>Machilus mecarantha,</u>
<u>Acrocarpus, fraxinopolius,</u>	<u>Bischfia Javanica,</u>	<u>Syzigium Species,</u>
<u>Alstonia</u>	<u>scholaris Eugeria</u>	<u>Mangifera indica.</u>

CLIMBER : The following climbers are found in the sanctuary.

1. Calycoptris floribunda - Neerballi
2. Gnetum scandens - Hulubilu
3. Entanda scandens - Aneballi
4. Acacia Concinna - Seegekai
5. Acacia indica - Kaduseege

B. Southern tropical Semi-evergreen Forest Type :

This type of forest is seen in parts of Muppane, Attigodu Satate Forests. The important species found are, Lagerstroemia lanceolata Careya arborea, officinalis, Randia species, Syzygium species, Artocarpus species and Bamboo patches.

FLORA :

This sanctuary consists of multitiered vegetation that belongs to tropical evergreen type to moist deciduous type. We can clearly observe lower, middle, top canopies, under growth and climbers. There are few areas where human interference is very low. On the fringes of villages the forest area has been degraded due to human interference as well as cattle pressure. The following are the species commonly seen in the area.

TOP CANOPY:		
	Botanucal Name	Common Name
1.	Diptoerocarpus Indicus	Dhupa
2.	Peciloneuron Indicum	Balgi
3.	Calophyllum temontosum	Surahonne
4.	Hopea Parviflora	Kiralbogi
5.	Machilus macrantha	Gulmavu
6.	Palaquim ellipticum	Pali
7.	Actrocarpus fraxinifolious	Balangi
8.	Bischofia iavanica	Nerulli
9.	Terminalia paniculata	Hunalu
10.	Terminalia temontosa	Mathi

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11.	Lagarstroemia lanceolata	Nandi
12.	Lophopetalum wightianum	Bolpole
13.	Mangifera indica	Mavu
14.	Vitex altissima	Naviladi
15.	Acrocarepous hirsta	Hebbalasu
16.	Bombax ceiba	Boorga
17.	Schlechera oleosa	Sagada
18.	Alstonia scholaris	Hale
19.	Syzygium cumini	Nerale
20.	Petrocarpus marsupium	Honne
21.	Dalbergia Latifolia	Beete
<u>LOWER CANOPY:</u>		
1.	Myristica malabarica	Rampatre
2.	Caryota urens	Bhagane
3.	Elaeocarpus serratus	Maite
4.	Aporasa lindleyana	Sarali
5.	Holigarna caustica	Holegaru
6.	Fagara budrunga	Jumma
8.	Olea dioica	Akkasale
9.	Careya arborea	Kavalu
10.	Emplica officinalis	Nalli
11.	strychnus nux-vomica	Kasaraka
12.	Cinnamum zeylanicum	Dalchinni
13.	Randia dumatorum	Kare
14.	Xylia xylocorpa	Jamba
<u>UNDER GROWTH</u>		
1.	Strobilanthus Species	Gurgi
2.	Calamus species	Betta
3.	Clerodardron Infortunatum	Taggi
4.	Helectres Isora	Kavali
5.	Acacia Intia	Kaduseege

ANIMALS:

Vertebrates, their status distribution and habitat:

A casual visitor to the sanctuary will be disappointed by the apparent absence of animals except for the raising and falling resonant trill of cicadas and in some parts of blood sucking leeches in monsoon and the rapacious ticks in summer. Given that, travel in the forest is never silent, most creatures are either hiding or have vacated long before our arrival. In reality, the sanctuary is

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fabulously rich in animal life. They show their presence with unusually with their colours, smells, movements and noises, which will penetrate the wall of the green and distinguish each animal from thousand of other species with which it shares the forest. They use distinctive signals to communicate. Many are adopted nocturnal habit.

Almost all the kinds of wild animals found in southern India are found in the sanctuary.

PREY ANIMALS:

There are several kinds of animals in the sanctuary including carnivores, herbivores, omnivores and aquatic animals. The following are the important wild animals found in the sanctuary.

- a. Spotted Deer:(*Axis axis*) The Sanctuary contains fairly good number of spotted deer in the Eastern portion i.e., in Muppuni S.F. and Madenur area. They are usually in herds of 5 to 10.
- b. Sambars: (*Cervus unicolor*) These animals are fairly distributed throughout the sanctuary. Their concentration is more on the western portion of the sanctuary.
- c. Indian guars: (*Basion*) (*Bos gaurus*) This sanctuary has an appreciable population of Basons. Their concentration is more on the fringes of Linganamakki, Thalekalale reservoirs Attigodu R.F., Muppuni R.F. and Madainur area. They are usually seen in herds of 10-15. They feed on grasses and strobilanthus.
- d. Indian Wild Boar (*Sus scrofa*): They are distributed fairly well throughout the sanctuary.
- e. Indian porcupine (*Hystrix indica*): Fairly good population is seen in the sanctuary.

PREDATORS:

- a. Tiger: (*Panthera tigris*) As per Census, there are 4 Tigers in the sanctuary, but this number is on the lower side.
- b. Panther: (*Panthera Pardus*): Their strength is quite satisfactory. This sanctuary is known for black panthers which are often seen in Govardhanagiri SF crossing the Kogar Bhatkal road during night time.
- c. Indian Wild Dog: (*Cuon alpinus*) There are good number of Wild dogs in Govardhanagiri and Karani R.F. areas. They feed on Langurs, Deer, Barking Deer, Sambars etc.,

SCAVENGERS:

Jackals and vultures are scavengers of the sanctuary.

AQUATIC HABITAT:

The Sharavathi Reservoir bordering the sanctuary has a good population of otter, fishes and

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crocodiles. Water birds like cormorants and snake birds visit the reservoir.

AVIFAUNA:

The sanctuary has a good population of birds like grey jungle fowl, peacocks, wood peckers, fly catchers, king fisher, whistling teal, bulbuls, Maina, Bee eaters, Drongo etc.

OTHER ASSOCIATES:

- a. Indian Elephants: (Elephas maximums) There is no elephant in the sanctuary. It is said that a lone elephant which is in Mookambika wildlife sanctuary. (The Karani S.F. of this sanctuary is having the common border with the Mookambika Wildlife sanctuary).
- b. Sloth Bear: (Melursus ursinus) Sloth bears are quite common in the sanctuary. They feed on fruits and honey. They eat insects by dissecting decaying fallen fire wood and timber.

The other animals found in the area are Malabar Squirrel, Crocodiles, Pangolin etc.,

2.1 LIST OF ANIMALS FOUND IN SHARAVATHI WILDLIFE

<u>SANCTUARY</u>		
	<u>COMMON NAME</u>	<u>ZOOLOGICAL NAME</u>
1.	Tiger	Panthera tigris
2.	Panther (Normal and Black)	Panthera pardus
3.	Wild Dogs	Cuon alpinus
4.	Wild cats	Felis chaus
5.	Malabar civets	Viverricula indica
6.	Hyena	Hyena hyena
<u>HERBIVORES</u>		
1.	Sambar	Cervus unicolor
2.	Barking Deer	Muntiacus muntjac
3.	Spotted Deer	Axis axis
4.	Musk Deer	Moschus moschiferus
5.	Black naped hare	Lepus nigricolis
6.	The gaur (Bison)	Bos gaurus
7.	Mouse Deer	Tragulus meninna
<u>SCAVENGERS:</u>		
1.	Jackal	Canis aureus
<u>RAPTILES:</u>		
1.	Land monitor lizard	Varanus griseus
2.	Python	Python molurus
3.	King Cobra	Naja naja

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<u>SANCTUARY</u>		
<u>COMMON NAME</u>		<u>ZOOLOGICAL NAME</u>
4.	Tortoises	Geochelone elegans
<u>OTHER ANIMALS:</u>		
1.	Flying Squirrel	Refuta indica
2.	Giant malabar squirrel	Benus hylopetus
3.	Indian Porcupine	Hystrix indica
4.	Common langur	presbytis enstellus
5.	Bonnet monkey	Macaca radiata
6.	Lion tailed maeaque	Macaca slenus
7.	Sloth bear	Melursus ursinus
8.	Wild bear	Sus scrofa
<u>Birds found in Sharavathi Valley Wildlife Sanctuary:</u>		
	<u>Common Name</u>	<u>Zoological Name</u>
1.	Jungle Myna	Acridotheres fuscus
2.	Common Myna	Acridotheres tristis
3.	Hoope	Upupa eops
4.	Red Whiskered Bulbul	Pyenonotus jocosus
5.	Red Vaned Bulbul	Pyenonotus cafer
6.	Little cormorant	Phalacrocorax nigir
7.	Darter	Anbing rufa
8.	Little Egret	Egretta grazetta
9.	Cattle Egret	Bulbulcus ibis
10.	Large Egret	Egretta alba
11.	Adjutant stork	Leptopilos dubius
12.	White necked stork	Ciconia episcopus
13.	White Ibis	Threskiornis melanocephalus
14.	Brahmini kite	Haliastur indus
15.	Grey Jungle fowl	Gallus sconerata
16.	Pea fowl	Pava cristaus
17.	Purple moorahen	Porphyrio porphyrio
18.	Pheasant tailed jacana	Hydrophasianus chrurgus
19.	Red whattled lapwing	Vanellis indicus
20.	Spotted dove	Streptopelia chinensis
21.	Blue rock pegin	Columba livia
22.	Indian lorikeet	Lsricula vernlis
23.	Rose ringed parakeet	Psittacula krameri
24.	Indian cuckoo	Cuculus micropterus
25.	Common grey Hornbill	Tockus birostris
	<u>COMMON NAME</u>	<u>ZOOLOGICAL NAME</u>
26.	Malabar pied Hornbill	Anthracoocorus coronatus

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SANCTUARY		
	COMMON NAME	ZOOLOGICAL NAME
27.	Green Indian Hornbill	Busceres bicormis
28.	Green Barbet	Meglaima zeylanica
29.	Blue Throated barbet	Melaima
30.	White wagtail	Motacilla able
31.	Scarlet minivet	Pericroctus flammeus
32.	Grey Indian Shrike	Lanius
33.	Paradise fly catcher	Terpsiphone paradisi
34.	Magopi robin	Copsychus saularis
35.	Tailor Bird	Orthotomus sutorius
36.	Purple Sunbird	Nectarinia asiatica
37.	White backed munia	Lanchura striata
38.	Golden oriole	Oriolus oriolus
39.	Black Drango	Dicrurus adsimilius
40.	Large Racket tailed Drango	dicrurus paradiseus
41.	Jungle Crow	Corous macrorphynchos

2.5 The limiting factors

The sanctuary has 24 villages inside the sanctuary. - people and - cattle stay inside the sanctuary. The size of the revenue enclosure, vary from few house hold to a maximum of 30 house hold. The majority of the houses are Mangalore tiled and few are thatched. There are very few RCC buildings. 95% of the people are dependent on agriculture. People also encroached forest land mainly for cultivation purpose. Illicit felling of trees inside and outside the sanctuary has come down drastically over the years and it is almost nothing now.

2.6 Important invertebrates, their status, distribution and habitat:

The invertebrates fauna found in Sharavathi valley wildlife sanctuary are butterfly, beetles, snakes, crabs, cockroaches, earth worms, ants, termites, honeybees, scorpions, leeches etc., their endemic status and distribution is yet to be studied.

2.2 LIST OF MAMMALS FOUND IN THE DIVISION:

Sl. No.	Latin names	Kannada name	Common names
1	Macaca sinica (Linn)	Kapi	The Bonnet Monkey
2	Pithecus entellus (Blyth)	Musia	Hanuman Monkey
3	Loris lydekkerianus (Car)	Kadupapa	Mysore Slender Loris
4	Felis affinis (Linn)	Huli, Dodhull,	The Tiger

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Sl. No.	Latin names	Kannada name	Common names
		Pattehuli	
5	Felis affinis (Grey)	Kadubekku	The Jungle Cat
6	Acinonyx venaticus	Kiruba	The hunting Leopard or Cheetah
7	Mangos Mango mungo (Geml)	Mungasi	The indian mongoose
8	Canis indicus (Hodgs)	Nari	The Indian Jackal
9	Lutra lutra (Linn)	Nirunayi	The common Otter
10	Melurus ursinus (Shaw)	Karadi	The Sloth Bear
11	Tragullus meminna (Erxl)	-	The Indian chevrothin, Mouse Deer
12	Pteropus giganteus	-	The Indian flying Fox
13	Lyroderma lyra lyra (Geoff)	-	The vampire Bat
14	Petaurista philippensis (Elli)	Harubekku	The South Indian flying Squirrel
15	Seiurus Malabaricus (Linn)	Kendalilu	The red squirrel, the Malabar squirrel
16	Seiurus (H.Sm.)	Kati, Kadukona	The Gaur, The Bison
17	Muntiacus vaginalis (boded)	Caducei	The Barking deer
18	Rosa Uni-colour (Bees)	Kara, Cadaver	The sandbur
19	Axis	Sarong	The spotted Deer
20	Sues cryostats (Wang)	Kaduhandi	The Indian Wild Boar
21	Hystrix leucra (Sykes)	Mullandi	The Indian Porcupine
22	Manis crassicaudata (Geoff)	Chipuhandi	The Indian Pangolin

2.3 LIST OF BIRDS FOUND IN THE DIVISION:

Sl.No	Latin names	Kannada name	Common names
1	Corvus macrithyncus (Eagl)	Kage	The Jungle Crow
2	Palaeornis torquatus (Bodd)	Gill, Gini	The Common Indian Parrot
3	Neopharon ginginianus (Lath)	Haddu	The vulture
4	Harasser indus (Bodd)	Garuda	The Bromine kite
5	Crocopus chlorogaster (Bluth)	Biliva	The Green Pigeon
6	Columba intemedia (Strikill)	Kaduparjala	The Blue rock pigeon
7	Pavo cristatus (Linn)	Navilu	The Pen fowl
8	Gallus sonnerati (Temmm)	Kadukoli	The gray jungle fowl
9	Gallooerdix spadicea (Gu)	Chittagoli	The red Sour fowl
10	Francolinus pondicerians (Gm)	Gawjalakki	The Gray patridge
11	Sarcidiomis melanonotus (Penn)	Nirukoli	The Comb Duck

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Sl.No	Latin names	Kannada name	Common names
12	Dendrocyena javanica (Horsf)		The Whistling teal
13	Nettion crecca (Linn)		The Common Teal
14	Gallus banakiva murgi	Kempu kadukoli	The Red Jungle Fowl
15	Dendrocittarufa	Matapakshi	The Tree pie
16	Dumetia hyperithra	Chirapakshi	The Rufous-Hellied Babbler
17	Otocompusa jocose fascucaudata	Kembumise bulbul	The Southern Red Whiskered Bul Bul.
18	Saxicolodes cambaiensis	Buda balatuti	The Indian Robin
19	Pienonotus luteolus	Bul bul	The white browed Bul bul
20	Tehitrea paradise	Rajahakki	The paradise flycatcher
21	Cyornis tickellioe	Nili-Rajahakki	Tickelle Blue flycatcher.
22	Tephrornis pondiceriana	Bharadwaja	The common woodshrike
23	Pericocotus speciosus	Chtrapakshi	The Scarlet minivet
24	Dicurus macrocerus	Kare bharadwaja	The king Crow
25	Dissemurus sctorius	Bharadwaja	The Rocket tailed drongo
26	Orthotomus sctoricus	Chipaganahakki	The Tailor Bird
27	Acredotheres trestis	Goravantehakki	The Common myna
28	Gymnoris xanthocolis	Kodagubachi	The Yellow throated Sparrow
36	Astur dussumier	Shikara	The Indian shikhara
37	Oenopopelia transquebarica	Galava	The red turtule dove
38	Amauromis phoenicurus	Nirakoli	The white breasted water hen
39	Bulbulcus coromandus		The cattle egret
40	Nettion crecca		The common teal
41	Demdrocygna javanica	Nirubathu	The common whistling teal
42	Niroca rufa	Batu	The white Bye

2.4 LIST OF REPTILES.

Sl. No.	Latin names	Kannada name	Common names
1	Crocodilus palustris (Less)	Mosale	The Mugger
2	Testudo elegans (Schoep)	Ame	The land Tortoise
3	Gonotodes mysorensi (Gord)	Uda	The Monitor lizard
4	Calotes versicolor (Dand)	Hentegooda	
5	Chameleon calcaratus (Merrem)	Hentegooda	The Chameleon

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Sl. No.	Latin names	Kannada name	Common names
6	Python molures (Linn)	Hebbau	The Python
7	Tropidnotus stolatus (Linn)	Hasaru Havu	The Common Green Snake
8	Bugarus coeruleus (Schn)	Kattihavu	The Krait
9	Naja tripudians (Merr)	Nagarahavu	The Cobra
10	Vipera resseli (Shaw)	Kalinga Sarpa, Karinagara	Viper King cobra

2.5 LIST OF AMPHIBIANS:

Sl. No.	Latin names	Kannada name	Common names
1	Rana hexadactyla (Less)	Hasarukappe	The Green tank frog
2	Rantigrina (Dand)	Mamadakappe	The Bull frog
3	Rana cyanophlyctis (Schneid)		The Concer frog
4	Rana malabarica (Dum)	Malekappa	The Tree frog
5	Rhacophorus pleuroxtictus (Guth)	Maradakappa	The Tree frog
6	Rana verrucosa kalloula spp	Balemaradakappe	The Plantain frog

2.6 LIST OF FISHES:

Sl. No.	Latin names	Kannada name	Common names
1	Clarias batrachus (Linn)	Anaminu	The Black cat fish
2	Saccobranhus fossillis (Block)	Chelumiu	Scorpin fish
3	Wallago attu (Bioche)	Baiwminu	
4	Callichrous bimaculatus (Bloche)		Butter fish
5	Pseudotropius atheronoides (Bloche)		Lady fish
6	Macrones vittatus (Block)		Pidler
7	Macrenes aor (H.B.)		
8	Macrenes kelitius (H.B.)		
9	Barbus tor (H.B)	Biliminu, Masheer	
10	Barbus neilli (Day)	Biliminu, Masheer	
11	Barbus sarana (H.B)	Gid pakke	
12	Labeo kontius (Jerd)	Handikurulu	
13	Labeo boga (H.B)	Mada kurlu	
14	Mastocembalus armatus	Havuminu	

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Sl. No.	Latin names	Kannada name	Common names
	(Lacep)		
15	Ophioce halus puntatus (H.B)	Kacuminu	
16	Oleucopunctatus gachua (H.B)	Korave	

2.7 LIST OF SPECIES:

Sl. No.	Batanical name	Vernacular name	Family
1	Acacia Arabica	Karjali	Mimoseae
2	Acacia catechu	Kaggali, Khair	Mimoseae
3	Acacia concianna	Seege	Mimoseae
4	Acacia ferruginea	Banni	Mimoseae
5	Acacia intia	Kaduseege	Mimoseae
6	Acacia leucophloea	Bilijali	Mimoseae
7	Acacia suma	Mugalimara	Mimoseae
8	Adhatoda vasica	Adusoge	Acanthaceae
9	Adina cardifolia	Yethyaga	Rubiaceae
10	Aegle marmelos	Bilwapatre	Rutaceae
11	Aglaia roxburghiana	Kempunola	Meliaceae
12	Ailanthus malabarica	Halmaddi	Simaroubaceae
13	Albizzia amara	Sujjalu	Mimoseae
14	Albizzia lebbek	Kallubage	Mimoseae
15	Albizzia odoratissima	Bilwara	Mimoseae
16	Albizzia procera	Bellatte	Mimoseae
17	Alseodaphne semecarpifolia	Mase, Nelthere	Lauraceae
18	Alstonia scholaris	Maddale	Apocynaceae
19	Amoora canarana	Hottenola	Meliaceae
20	Anacardium occidentale	Geruhannu, godambi	Anacardiaceae
21	Anogeissus latifolia	Dindiga	Combretaceae
22	Anthocephalus cadamba	Neerubale	Rubiaceae
23	Antiaris toxicaria	Ajjanapatte	Moraceae
24	Antidesma diandrum	Hulimajjige	Euphorbiaceae
25	Aporosa lindleyana	Sarali, Sali	Euphorbiaceae
26	Arenga wightii	Dadasal	Palmae
27	Artocarpus hirsute	Hebbalasu	Moraceae
28	Aetocarpus integrifolia	Halasu	Moraceae
29	Artocarpus lakoocha	Vatehuli	Moraceae

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Sl. No.	Batanical name	Vernacular name	Family
30	Azadirachta indica	Bevu	Meliaceae
31	Bambusa bambos	Hebbiduru	Graminae
32	Bassia latifolia	Ippe	Sapotaceae
33	Bauhinia malabarica	Mandara	Papillionaceae
34	Bauhinia racemosa	Basavanapada	Caesalpinae
35	Bauhinia vahlii	Basavanapada-balli	Papilionaceae
36	Boswellia cerrata	Bilidhupa, Sambrani	Burseraceae
37	Brindelia retusa	Goje	Euphorbiaceae
38	Buchanania latifolia	Nurukalu	Anacardiaceae
39	Butea monosperma	Muttuga	Papilionaceae
40	Butea superba	Kadavarballi	Papilionaceae
41	Caesalpinia bonducella	Gajjuga	Caesalpiniaceae
42	Caesalpinia minosoides	Kenjiga	Caesalpineae
43	Calamus pseudotenuis	Haludetta	Palmae
44	Calamus rotang	Nagabetta	Palmae
45	Calamus thwaitesii	Handibetta	Palmae
46	Calophyllum inophyllum	Yennehonne	Guttiferae
47	Calophyllum wightianum	Holehonne	Guttigerae
48	Canarium strictum	Kaidhupa	Burseraceae
49	Canthium didymium	Kakkorle, Pyre	Rubiaceae
50	Carallia integerrima	Andipunar	Rhizophoraceae
51	Careya arborea	Kowlu	Myrtaceae
52	Carissa carandus	Kauli	Apocynaceae
53	Caryota urens	Bagani	Palmae
54	Cassia auriculata	Avarike tangadi	Papilionaceae
55	Cassia fistula	Kakke	Caesalpineae
56	Cassia tomentosa	Sillange	Caesalpineae
57	Cedrela toona	Gandhagarige	Meliaceae
58	Celastrus paniculata	Gowri	Celastraceae
59	Celtis australis	Karki	Ulmaceae
60	Chloroxylon swietenia	Massivala, Massibalally	Meliaceae
61	Chukrasia tabularis	Kalagarige	Meliaceae
62	Cinnamomum zeylanicum	Dalchinni	Lauraceae
63	Cipadessa baccifera	Chittumbe	Meliaceae
64	Clematis gourina	Arike Hambu	Ranunculaceae
65	Cochlospermum gossypium	Betta tavare	Bixaceae
66	Colebrookea oppositifolia	Biligurigi	Labiapae
67	Cordia macleodii	Hadaga	Boraginaceae
68	Cardia myxa	Challe	Boraginaceae

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Sl. No.	Batanical name	Vernacular name	Family
69	Cryptolepis buchanani	Karebantaballi	Asclepiadaceae
70	Dalbergia latifolia	Beete	Papilionacea
71	Delbergia paniculata	Pachali	Papilionacea
72	Dendrocalamus strictus	Kirubidaru	Graminae
73	Dichrostachys cinerea	Vadivara	Mimoceae
74	Dillinia pentagyna	Kalthega, Kanigalu	Dilleniacea
75	Dipsyros crumanata	Kantumri	Ebenaceae
76	Dipsyros melanoxyton	Tupra	Ebenaceae
77	Dipsyros montane	Jagalaganti	Ebenaceae
78	Dipsyros paniculate	Karkoomar, Karmaralu	Ebenaceae
79	Dipterocarpus indicus	Dhuma	Dipterocarpaceae
80	Diospyros embryopteris	Kustaraka	Ebenaceae
81	Dodonaea viscosa	Bandanike	Sapindaceae
82	Dysoxylum malabaricum	Devagarige, Devadari	Maliaceae
83	Elaeocarpus serratus	Kyasatta	Tiliaceae
84	Elaeocarpus tuberculatus	Sttaga, Bhutali	Tiliaceae
85	Eleaeodendron glaucum	Makarathi	Celastraceae
86	Embllica officinalis	Nelli	Euphorbiaceae
87	Erinocarpus nimmonii	Adavi-bende	Tiliaceae
88	Erythrina stricta	Keechakanamara	Papilionaceae
89	Erythrina suberosa	Mullumuttuga, Parivala	Papilionaceae
90	Eugenia zeylanica	Meenangi	Myrtaceae
91	Euonymus dichotomus	Kankutle	Celastraceae
92	Ficus asperima	Garagatti	Moraceae
93	Ficus benghalensis	Ala	Moraceae
94	Ficus callosa	Nlrvalla	Moraceae
95	Ficus glomerata	Atthi	Moraceae
96	Ficus hispida	Nirgaragatti	Moraceae
97	Ficus infectoria	Basari	Moraceae
98	Ficus religiosa	Arali	Moraceae
99	Flacourtia montana	Hannusampige	Bixaceae
100	Flacourtia sepiaria	Miridi	Bixaceae
101	Garcinia cambogia	Kadagolmuraka	Guttigeriae
102	Garcinia morelaa	Arasingurgi	Guttigeriae
103	Garcinia xanthochimus	Jeerakanahuli	Guttigeriae
104	Gardenia gummifera	Bikke	Rubiaceae
105	Gardenia latifolia	Kallagare	Rubiaceae
106	Garuga pinnata	Godda	Burseraceae
107	Givotia rottieriformis	Puliki	Euophorbiaceae

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Sl. No.	Batanical name	Vernacular name	Family
108	Glycosmis pentaphylla	Kadumaralugida	Rutaceae
109	Gmelina arborea	Shivini	Verbenaceae
110	Goochidion zeylanicum	Nirsolle	Euphorbiaceae
111	Grewia tiliaefolia	Tadasalu	Tiliaceae
112	Gymnosparia montana	Thandrasi	Celastraceae
113	Helecteres isore	Cowri	Tiliaceae
114	Hemidesmus Indicus	Sogade beru, Sarasaparilla	Asclepiadaceae
115	Hernada reparia	Holebasari	Ephorbiaceae
116	Holarrhena antidesentrica	Kodachiga, Kodasa	Apocynaceae
117	Holigarna arnottiana	Sanneleholegeru	Arnacardiaceae
118	Holigarna beddomei	Doddeleholegeru	Arnacardiaceae
119	Hopea parviflora	Kiralbogi	Dipterocarpaceae
120	Hopea wightiana	Hyga, Haiga	Dipterocarpaceae
121	Hydnocarpus wightiana	Garudaphala	Bixaceae
122	Hymenodictyon excelsum	Doddathoppe	Rubiaceae
123	Ichnocarpus frutescens	Karigambu	Apocyanaceae
124	Kydia calycina	Bende	Malvaveae
125	Lagrstroemia flosreginae	Holedasavala	Lythraceae
126	Lagrstroemia lanceolata	Nandi	Lythraceae
127	Lagrstroemia pareiflora	Channangi	Lythraceae
128	Lannea grandis (Odinia wodier)	Godda	Anacardiaceae
129	Lansium anamallayanum	Chigatamari	Meliaceae
130	Lantana camara	Chandranga	Verbinaceae
131	Lasiosiphon eriocephalus	Mukkandaka	Thymelaeaceae
132	Lettsonia thomsoni	Uganihamby	Convolvulaveae
133	Limonia acidissima	Naibyala	Rutaceae
134	Linociera malabarica	Tagadatti, Akkarakal	Oleaceae
135	Litsea zeylanipa	Sudagenasu	Lauraceae
136	Loranthus longiflorus	Bandanike	Loranthaceae
137	Macaranga roxburghii	Chandrakala	Euphorbiaceae
138	Machilus macrantha	Gulamavu	Lauraceae
139	Mallotus philippensis	Bannadamara	Euphorbiaceae
140	Mamena sirige	Suragi	Guttiferae
141	Mangifera Indica	Mavu	Anacardiaceae
142	Melia camposita (M dubia)	Hebbevu	Meliaceae
143	Mellia spp	Vishapuri	Meliaceae
144	Memecylon adule	Arichapla, Adcheri	Melastomaceae
145	Mesuaferrea	Nagasampige	Guttiferae

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Sl. No.	Batanical name	Vernacular name	Family
146	Michelia champaca	Sampige	Mangoliaceae
147	Mimosa pudica	Muttideremuni	Mymoseae
148	Mithragyna parvifolia	Kadavala, Kalam	Rubiceae
149	Mucuna prurita	Nasaguni	Papilionaceae
150	Murraya koenigii	Karibevu	Rutaceae
151	Myristica malabarica	Ramapatre	Myristicaceae
152	Nephilium longana	Sannelekendal	Sapindaceae
153	Ochlandra travancorica	Vate	Graminae
154	Ochna squarrosa	Madli	Ochnaceae
155	Olea dioica	Sadle	Oleaceae
156	Ougeinia delbergioides	Bettadahonne, Krimutthal	Papilionaceae
157	Oxytenanthera stocksii	Pannangi	Graminae
158	Palaquium ellipticum	Hadasale	Sapotaceae
159	Pandanus odoratissimus	Kyadige, Kedige	Pandanaceae
160	Pavetta indica	Pavate	Rubiceae
161	Phoenix spp.	Karichalu	Plamae
162	Phoenix sylvestris	Ichalu	Plamae
163	Plumeria acutifolia	Devakanigal	Apocyanaceae
164	Poeciloneuron indicum	Balagi	Trernstroemiaceae
165	Polyalthia fragrans	Maragowri	Anonaceae
166	Pongamia pinnata	Honge	Papilionaceae
167	Premna tomentosa	Eji, Narave	Verbenaceae
168	Psychotria flavida	Vatemadikay, Kankalli	Rubiaceae
169	Pterocarpus marsupium	Honne	Papilionaceae
170	Pterospemum suberifolium	Sownamara	Sterculiaceae
171	Putrangiva roxburghii	Putranjeeva	Euophbiaceae
172	Randia dumentorum	Kare	Rubiaceae
173	Saccopetalum tomentosum	Ubalu	Anonaceae
174	Salix tetrasperma	Niranji	Salicaceae
175	Santalum album	Sri Gandha	Santalaceae
176	Sapindus emarginatus	Antavala	Sapindaeae
177	Saraca indicaa	Asoka	Caesalpinae
178	Schleichera oleosa	Kendala, Kusum, Sagade	Sapindaeae
179	Schredera swietenioides	Gante	Oleaceae
180	Semecarpus anacardium	Kadugeru	Anacadrdrdiaceae
181	Shorea talura	Jalari, Jala, Jalgiri	Dipterocarpaceae
182	Smilax proliferata	Karinarigedde	Liliaceae
183	Soymida febrifuga	Some	Meliaceae
184	Spatholobus roxburghii	Kadavarehamabu	Papilionaceae

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Sl. No.	Batanical name	Vernacular name	Family
185	Spondias mangifera	Amate	Anacardiaceae
186	Sterculia foetida	Peenari	Sterculiaceae
187	Sterculia guttata	Hulithoradu, Hulimara	Sterculiaceae
188	Streculia urens	Savige	Sterculiaceae
189	Streculia villosa	Bildale	Sterculiaceae
190	Stereospermum personatum	Kaladri	Bignoniaceae
191	Stereospermum xylocarpum	Genasu	Bignoniaceae
192	Stereospermum spp.	Kadunugge	Bignoniaceae
193	Stereospermum suaveolens	Padri	Bignoniaceae
194	Strobilanthus spp.	Gurgi	Acanthaceae
195	Strychnos nuxvomica	Nanjanakoradu, Kasaraka	Loganiaceae
196	Strychnos potatorum	Chilla	Loganiaceae
197	Synplocos spicata	Chunga, Buthagani	Symplocaceae
198	Syzygium cumini	Neralu	Myrtaceae
199	Tabermaemontana heyneana	Madlemara, madarasa	Apocynaceae
200	Tectona grandis	Saguvani	Verbenaceae
201	Terminalia arjuna	Bilimathi, Holemathi	Combrataceae
202	Terminalia bellerica	Tare	Combrataceae
203	Terminalia chebula	Alale	Combrataceae
204	Terminalia tomentosa	Mathi	Combrataceae
205	Toddalia aculeaca	Kadumenasu	Rutaceae
206	Trema orientalis	Gorakalu, Indian charcoal tree	Ulmaceae
207	Trema nudiflora	Kadukumbala	Euphorbiaceae
208	Urena lobata	Kogamani	Malvaceae
209	Vitex alata	Nirnaviladi	Verbenaceae
210	Vitex altissima	Naviladi	Verbenaceae
211	Vitex negundo	Lakkigida	Verbenaceae
212	Vitis quadrangularis	Perande	Vitaceae
213	Wendlandia exerta	Kansurgi	Rubiaceae
214	Zanthoxylum rhetsa	Jummanamara	Rutaceae
215	Zizyphus jujube	Elachi	Rhamanaceae
216	Zizyphus oenoplia	Sodli (paragi)	Rhamanaceae
217	Zizyphus regosa	Bili-mulluhannu	Rhamanaceae
218	Zizyphus xylopyrus	Chatte, ghotte	Rhamanaceae

3. MOOKAMBIKA WILDLIFE SANCTUARY

3.1 Name, location and area :

Mookambika Wildlife Sanctuary has been named after goddess “Mookambika” the presiding deity of the famous Mookambika temple at Kollur located at the heart of the Sanctuary. It is located in Kundapur Taluk of Udupi district in Karnataka state. It lies between 13° 42’ and 13° 59’ north latitude and 74° 39’ and 74° 50’ east longitude. The Government of Karnataka in its Notification no. AFD.48.FWL.74, dated : 17-06-1974 declared its intention to constitute Mookambika Wildlife sanctuary and confirmed the formation of Sanctuary vide Notification no. AFD.48.FWL.74, dated: 22-05-1978. the sanctuary is spread over 247 sq. kms.

To begin with the sanctuary was under the control of Kundapur Forest Division. As per the government of Karnataka order no. AHFF.83. FNG.92, dated : 08-05-1992, administration of the sanctuary was brought under the newly constituted Kudremukh Wildlife Division, Karkala.

3.2 Approach and access:

The sanctuary is approachable by all weather roads from Kundapur (35 kms), Byndoor (25 kms), and Shimoga (130 Kms). Nearest Railway station is Mookambika Railway Station, Byndoor, which is 28 kms. Nearest airport is Mangalore (Bajpe) – about 140 kms from Kollur.

3.3 Boundaries:

The boundaries of the Sanctuary are fully described in the gazette notification furnished at Annexure-1. It starts from Uttar Kannada district border on its north near Shiroor and runs along inter-district boundary till the head of Chakra dam. Then turning west, it goes up to Halejaddu near Aloor and then turns north and goes back to the starting point Via Chittur, Areshirur and Ganganadu village limits. The sanctuary is honeycombed by extensive habitations in the southern half and only ribbons of forest traverse the terrain. They are like islands in a sea of habitations. Boundaries of each forest are defined.

3.4 Geology, rock and soil :

The sanctuary covers western slopes of Western Ghats. The terrain is hilly and very undulating. The underlying geological formation is of archaic origin. The ghat forests are principally of genesis composition, interspersed occasionally by quartzite, mica-schist and granite, out crops which, occur in long stretches along the sharp edges of the Ghats. The upper reaches of the

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Ghats, which form the eastern boundary of the sanctuary consists predominantly of rock precipices and are completely inaccessible. These rock cliffs are very steep and exposed over long stretches. Wild plantain and grass slips grow in the depressions of these cliffs.

Peculiar feature of the genesis found here is its readiness to decompose into reddish felspathic clay, which after exposures forms into hard brittle substance known as laterite. Laterite is formed extensively all over the plains and foothills of this tract. Presence of large quantities of ferruginous matter is another characteristic feature of this gneiss. Quartz is frequently identifiable in the original rocks in the foothills and to a lesser extent in the plains. It is found as separate nodules or small crystals. The foothill portions are characterized by soft laterite formed by the decomposition of original gneissic rock. The brownish friable loam, often reaches to considerable depth and is an indication of the capacity of the soil to support good deciduous or semi-evergreen forests. The underlying rock is invariably gneiss, sometimes outcropping in the form of boulders. In the plain portions, the rock is decisively laterite. Soil conditions vary in quality, depth and consistency. On the Ghats, soil is dark or brownish loam of moderate depth, admixed with gneissic or quartzite boulders. Humus and unrecompensed vegetable matter are in plenty. The foothill portions contain fairly deep brownish friable clayey loam covered by a moderately thick layer of decomposed and un decomposed vegetable matter, which are rich in organic constituents. The surface soil in the plains and littoral portions consist of gravel or disintegrated laterite, covering a hard lateritic pan. In the neighborhood of villages, the forest soils are much impoverished by the heavy demands by ryots for mulch; both dry and green , for manure. The deep reddish loamy soil rich with humus occurring at foothills supports a fairly good deciduous and semi evergreen type of forests.

3.5 Forest types:

Forest types in the protected area are varied and rich. Moist deciduous forests occur at lower altitude, especially the foothills. West coast semi-evergreen and west-coast tropical evergreen forests occur at mid altitudes and white typical shola-grass land vegetation is found at higher altitudes. Composition of these forests is as under as per Champion & Seth classification.

3.6 West coast tropical evergreen forests :

Evergreen species are chiefly confined to higher elevations of ghats. Some of the important species occurring in the top canopy are *Dipterocarpus indicus* (Dhuma), *Poeciloneuron indicum* (Baligi) *Calophyllum tomentosum* (Surahonne), *Hopea parviflora*

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(Kiralbhogi), *Machilus mecarantha* (Gulmavu), *Palaquium ellipticum* (pali), *Acrocarpus fraxinifolius* (Belangi), *Bischofia javanica* (Nerulli), *Eugenia gardineria* etc.

3.7 West coast semi-evergreen forests:

This type occurs in the ghat slopes especially logged areas. There is a more liberal admixture of evergreen and deciduous species in the top canopy.

The principal species occurring in the top canopy are *Terminalia paniculata* (Hunalu), *Terminalia tomentosa* (Matti), *Lagerstromia lanceolata* (Nandi), *Machilus mecharantha* (Gulmavu), *Lophopetalum wightianum* (Bolpale), *Mangifera indica* (Mavu), *Vitex altissima* (Naviladi), *Hopea parviflora* (kiralbhogi), *Eugenia species*, *Artocarpus hirsute* (Hebbalsu), *Cinnamomum species* (*Dalchini*) etc.

Middle canopy consist of *Holigarna arnottiana* (chara), *Fagara budrunga* (Jumma), *Dillenia pentagyna* (Kanagalu), *Hopea wightiana* (Haiga), *Syzygium species* (Neralu), *Olea dioica* (Akkasalle), *Aporosa lindleyana* (Salle) etc.

Strobilanthes (Gurgi), *Clerodendron infrotuntum* (Taggi), *Leea indica*, *Calamus species* (Betta) etc., form the ground cover.

3.8 Southern secondary moist mixed deciduous forests (3B/C2/2SI) :

This type occurs in the foothill portions of ghat and plains. The top canopy consists of *Terminalia paniculata* (Hunalu), *Bombax ceiba* (Booruga), *Mangifera indica* (Mavu), *Dalbergia latifolia* (Beete), *Schleichera oleosa* (Sagadi), *Dillenia pentagyna* (Kanagalu), *Adina cardifolia* (Yettega), *Alstonia scholaris* (Maddale) etc.

Middle canopy consists of *Olea dioica* (Aksalle), *Careya arborea* (Kavalu), *Embllica officinalis* (Nelli), *Strychnos nux-vomica* (Kasan) etc.

The under growth consists of *Clerodendron infrotuntum* (Taggi), *Helecteres isora*

(Kowry), *Acacia intsia* (Kadu seege), *Holarrhena pubescens* (Haale) etc.

3.9 Dry grass lands :

The area consists of species like *Bauhinia vahlii* (Basavanpadadballi), *Embllica officinalis* (Nelli), *Careya arborea* (Kavalu) in addition to grass and is generally found on the hilltops. These

are believed to be abandoned cultivation of past.

3.10 Fauna:

Fauna found in the sanctuary are as follows.

Prey animals:

- a) **Spotted deer (*Axis axis*)**: These animals prefer somewhat open forest areas. They are found in southern and western parts of the sanctuary . They are normally seen in Mudagalpare, Chottor, Jannalane, Gundubereu, Harmannupare reserves and also in older cashew plantation areas near Alur. Normally they are noticed in groups of 5 to 8.
- b) **Sambar (*Cervus unicolor*)**: Sambar is found unevenly distributed over the sanctuary.It inhabits slopes containing thick jungle mixed with open grasslands. They are found in herds of 3 to 5.
- c) **Gaur or Indian bison (*Bos gaurus*)** : This animal is found all over the sanctuary. Its presence is common along the eastern boundary of the sanctuary. It is normally noticed in groups 5 to 10. During summer, they are seen in early morning or twilight hours grazing in the grasslands. Crop raids are common along the southwest.



Indian Gaur (Bison)

- d) **Indian wild boar (*Sus serofo*)** : Wild boar is commonly seen all over the sanctuary.They are the common pests to agricultural crops.
- e) **Indian porcupine (*Hystrix indica*)** : These rodents prefer rocky hill sides and are normally sighted along hill ridges and foothills.
- f) **Indian hare (*Lepus nigricelis*)** : Found commonly all over the sanctuary.
- g) **Barking deer or Muntjac (*Muntiacus muntjac*)** : This sanctuary is an ideal habitat for these animals. Normally found in dense forests, it comes out to open for grazing and browsing in the nights. It is timid and shy animal.
- h) **Mouse deer (*Tragulus meminna*)** : It is seldom found in forests.
- i) **Common Langur (*Presbytis entellus*)** : This arboreal mammal is normally seen in dense forest. Population density is very thin.
- j) **Bonnet macaque (*Macaca radiata*)** : This arboreal mammal is found in the edges along

roads and enclosures. They do not enter interior forests, as do the common langurs.

- k) **Lion tailed macaque (*Macaca silenus*)** : This is an endangered primate found only in dense evergreen forests of mid western ghats at an altitude of 400 to 700 meters above mean sea level. It is found in groups of 5 to 25. They are reported from Megini valley, around Arasingundi falls and Nagankalbare RF. As per the 2006 study report taken up by this division it is found that there are 6 groups of LTM and numbering 73 compared to their number 94 in the year 1985 (karanth)

Predators:

Tiger (*Panthera tigris*) : It is found in the higher altitudes especially along the hill ridges where the gaur and sambar population is high. Movements of tigers were observed in Haddinbare and Nagankalbare reserves.

Leopard or Panther (*Panthera pardus*) : This wild animal is found in fairly good number in mild and lower altitudes, especially towards the forest edges. Black panther are also reported from Megini valley reserve forest.

Indian wild dog (*Cuon alpinus*) : Presence of wild dogs is confirmed by scats.

Their spread overlaps with tiger as well as panthers.

Python and King cobra : The sanctuary has a good population of these reptiles.

Scavengers:

Jackal (*Canis aureus*) is the chief scavenger of the sanctuary. Vultures have not been recorded in the sanctuary.

Other associates:

Indian elephant (*Elephas maximus*) ; There was only one feral elephant inhabiting Megini valley Reserve Forest. It has a fixed seasonal migratory route from Bavadi to Karni. It feeds mainly on reeds and caryota plants. This was found dead naturally on 29-12-2007 inside the Megini valley RF.

Sloth bear (*Melursus ursinus*) : Sloth bears are normally found in higher elevations. There are reports of bears attacking human beings in the recent years especially in summers when they come to feed on the fruits of phoenix humilis.

Other animals found :

Giant squirrel (*Ratufa indica*) : It is an arboreal mammal normally restricted to the relatively undisturbed areas of the forests. Most of the time the animal is found on the tree crowns in the dense forests.

Flying squirrel (*Benus hylopeteres*), Land monitor lizard (*Varanus grisens*), Tortoises also occur in the sanctuary. Cane turtle – a rare species, which is on the verge of extinct, is seen rarely around Dali.



HORNBILL BIRD

Avifauna :

The sanctuary has a good population of a variety of birds typical to the Western Ghats of Karnataka. Avifauna found in the Sanctuary include Jungle myna, Peafowl, Common fowl, Common myna, Red vented bulbul, Little cormorant, Cattle egret, Little egret, Black drongo, Jungle crow, Crow pheasant, White cheeked bulbul, Brahminy kite, Grey jungle fowl, Pea fowl, White breasted water hen, Red wattled lapwinger, Spotted dove, Blue rock pigeon, White breasted king fisher, Malabar grey hornbill, Golden backed throated wood pecker, Scarlet minicret, Ashy swallow shrike,

Paradise fly catcher, Magpie robin, Taylor bird, Purple sunbird, White backed munia, Golden oriole. Great Indian Hornbill is sighted in Megini and Nagankalbare forests.



Giant squirrel

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Introduction

Any infrastructure development work such as major highway project is expected to impact both beneficially and adversely on environmental as well as on social profile in the project influence zone. The human environment is enhanced by access between existing communities; in addition, transportation networks encourage future development. Businesses also benefit, enhancing the economic growth.

The adverse impacts associated with the project may be long term or temporary and may also vary both spatially and temporally, depending on the baseline environmental quality along its entire length as well as the scale and nature of project intervention during various stages of the project. Adverse impacts may be on physical, biological and social that effect environment in a variety of ways. Longer term impacts include noise, air pollution and potential loss of living quality. Wildlife and plants, in concert with humans suffer from habitat displacement and various forms of pollution. The most immediate negative impact on human environment is the displacement and relocation of existing homes and businesses.

With ever increasing socio-economic activities, the demand for an efficient transportation network also increases. Therefore, it requires conscious thought and ground reality to devise mitigation measures to alleviate adverse impacts for those which cannot be avoided therein. This may aid in reducing the magnitude of environmental impacts and permit it to be within the stipulated levels at least. With all these measures and keeping in view the long term sustainable development of a region on sound environmental considerations it is quite obvious to establish an efficient, optimized and durable environmentally sound road infrastructure throughout the country.

The environmental impact assessment process involves following basic steps:

- Identification of Impacts
- Evaluation of impacts
- Prioritization of impacts
- Identification of mitigation measures for impacts

Matrix method was followed for the identification and evaluation of impacts. The Activity -impact identification matrix is presented as **Annexure 4.1**.

4.2 Potential Impacts and Mitigation Measures

The potential impacts due to the project implementation can be classified in to three groups. These are impacts on physical environment, ecological environment and socio-economic environment. The above mentioned impacts on three groups of environment can be taken care of during design stage, construction stage and during operation stage. In the present EIA study, the following impacts were taken into consideration for the said project.

4.2.1 Impacts during Design Stage

During design stage as described earlier it is necessary to foresee the impacts after careful ground surveys and analysis. All information collected must be accurately transferred to design drawings and plans, so that this will also lead to a design that is most acceptable to the people for whom the highway is being planned. The major issue is land availability for the new alignment. The proposal involves realignment and bypasses along the corridor which will have severe geological impacts and excavated material disposal problem.

The other major impacts will be on forest, agricultural land and on wild life sanctuaries as this area is a habitat for rare and endangered species of flora and fauna.

The existing road geometry is a big issue related to safety hence concentric and eccentric widening is proposed where necessary for improving the road geometry and safety to passenger traffic. The Proposed alignment passes through ever green, semi ever green and mixed deciduous forests so in order to develop the road significant numbers of trees will have be removed and relocated.

All along the proposed alignment there are few business establishments and residential structures which will be affected due to the upcoming alignment.

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4.2.2 Impacts during Construction Stage

The alignment has been finalized keeping in view the above said environmental impacts. Though all the above said impacts could not be avoided in any design, but may be selected in such a manner that the impacts are reduced to an acceptable level by adopting appropriate mitigation measures and compensate other impacts in order to follow the philosophy of sustainable development.

4.2.3 Impacts on Physical Environment

4.2.4 Topography

The construction stage impacts are the most critical in highway construction projects. The area in which the works are located is in plain/rolling terrain, except for small length which is hilly in nature.

Table 4.1 gives the extent of nature of the terrain in the project corridor.

Packages	Length of Stretch (Km)	Terrain	Remarks (Design Chainage From - To)
Package-1A	13.500	Mountainous	Baindur (0.00 Km) to Mookambika Wildlife Sanctuary Start (13.50 Km)
Package-1B	26.700	Mountainous & Steep	Mookambika Wild Life Sanctuary Start (13.50 Km) to End (40.20 Km)
Package-1C	31.100	Mountainous	Mookambika Wild Life Sanctuary End (40.20 Km) to Nagara-Kundapura Junction (71.30 Km)
Package-1 (Total)	71.300		
Package-2A	41.340	Mountainous/ Plain & Rolling	Nagara-Kundapura Junction (71.30 Km) to Anandapura Bypass Start (112.64 Km)
Package-2B	4.200	Plain & Rolling	Anandapura Bypass (112.64 Km to 116.84 Km)
Package-2C	28.540	Plain & Rolling	Anandapura Bypass End (116.840 Km) to Start of Shikaripura Bypass (145.375 Km)
Package-2 (Total)	74.075		

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Package-3A	6.510	Plain & Rolling	Shikaripura Bypass (145.375 Km to 151.885 Km)
Package-3B	47.202	Plain & Rolling	Shikaripura Bypass End (151.885 Km) to Ranebennur (199.087 Km)
Package-3 (Total)	53.712		
Total Length	199.087		

The dumping of construction waste including construction/ excavation will generate large volume of solid waste which may alter the topography of the area. Part of this could be utilized for construction, while most of this will have to be properly disposed off in an environment friendly manner which is not an easy task as it is difficult to find disposal for all the excavated material since majority of the alignment passes through ecologically sensitive areas and dense forests of the Western Ghats region which are prone to landslides during raining season as per the local population and the tabulated history of the region.

Thus the overall impact of the project activities on topography of the area will not have negative impact only if the development is done in an environmentally friendly manner and cognizance of the above stated facts/ reasons.

The establishment of labor-camps including hot mix plants, WMM plants etc. will lead to temporary impacts on air, water, noise and soil quality.

Therefore disposal of construction material and oil spillage from the construction zones are the expected impacts.

4.2.2.5 Geology:

The area is fairly fragile geologically. The proposed improvements may lead to severe disturbances in the Western Ghat region that could trigger landslides, landslips, mud flow either instantaneously or at later stages. Therefore, careful planning coupled with modern engineering practices for slope stabilization need to be implemented to avoid earth movements, which could lead to loss of life and property also.

4.2.2.6 Seismology:

Seismically the area is vulnerable therefore, the development of highway especially the bridges and other structures must be of high standards to withstand the seismic vibrations of higher magnitude. Present upgradation will incorporate both existing structures that will be checked & complied and new structures will be designed earth quake resistant.

4.2.2.7 Climate:

Climatic parameters like temperature, rainfall and humidity will not be impacted by the project execution. During construction phase there will be very minor rise in temperature in areas of the Hotmix plants, WMM plants etc which is temporary in nature.

4.3 AIR ENVIRONMENT

Air quality

Due to the proposed road improvements aimed at enhancing the efficiency of road transport system the number of vehicles on these roads will be increased over time, so impacts on ambient air environment may be significant, which needs detailed analysis.

4.3.1 Preconstruction Stage:

The preconstruction stage activities include site clearance, shifting of utilities, removal of trees present in the corridor of impact, transportation of man and material, construction of accommodations, construction of stock yards, installation of construction plants and construction of office buildings. Dust generation during such activities would be the predominant polluting activity during pre-construction stage and particularly so if pre-construction tasks are performed during dry weather.

The impacts due to the pre construction activities are temporary and location specific and the width of the impacts is limited. Quantification of impacts at the pre construction stage is very difficult as these are very temporary and localized.

4.3.2 Construction Stage :

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During construction stage air quality will be impacted by dust generation and construction site vehicle emissions like oxides of nitrogen, carbon monoxide, sulphur dioxide and carbon based emissions from the hot mix plants

The air pollution during the construction phase may be considerable locally, particularly near the working zones, construction plant sites, quarries and from construction machinery and construction vehicles. The list of activities which generate air pollutants are:

- **Dust generation from the construction zone during different stages of the construction such as clearing and grubbing, materials dumping, drying of materials, brushing of the surface etc.,**
- **Dust generation from the access roads to the soil borrow-areas, aggregate quarries construction plants and construction camp sites.**
- **Operation of the construction plants such as hot mix plants, Crushers, WMM plants and Concrete Batching Plants**
- **Material storage, transportation and handling (loading/unloading) of different construction materials such as sand, earth from borrow pits and aggregates.**
- **Asphalt odor during paving of asphalt layers**
- **Odor and smoke from construction labor camp.**
- **Fugitive emissions from construction machinery/ vehicles involved in construction -**
- ✓ **Vehicles working at the surface construction site, including earth/ debris moving equipment, concrete trucks, material delivery trucks, truck-mounted cranes, etc.**
- ✓ **Stationary plant emissions like mobile generators, dewatering pumps, concrete pumps etc.**
- ✓ **Vehicles and equipment within the underground excavation area or within the enclosed work shed including the front-end loaders, trucks, mobile generators and the like.**

4.3.3 Operational Stage:

During the operational stage air pollutant will be from vehicular movements on roads. The severity of impact of gaseous pollutants due to vehicles plying on the highway at any given time will depend upon the traffic volume, emission rates of auto exhausted pollutants and prevailing metrological condition within the project corridor. Emissions are part and parcel of overall infrastructural development process and efficiency augmentation of transport system. However, compliance with future statutory regulatory requirements with respect to emission limits, auto-technology, vehicular fuel quality should be adequate to prevent any negative public health impacts of this project.

4.4 WATER ENVIRONMENT

Due to the proposed project there will be some direct and indirect long-term impacts on the water resources. Table below presents the major adverse impacts on the water resources and the indicators chosen to assess the impacts for the study.

Table 4.2: Impacts on Water Resources Due To Construction Activities

Impacts Due To Construction	Indicators
Loss of water bodies	Area of water bodies affected
Loss of other water supply sources	Number of wells affected
Alteration of drainage, run off, flooding	No. of cross drainage channels
Depletion of Ground Water recharge	Area rendered impervious
Use of Water Supply for Construction	Quantum of water used
Contamination from fuel and lubricants	Nature and quantum of contaminants
Contamination from improper sanitation and Waste Disposal in Construction	Area of camp / disposal site and, proximity to water bodies / channels

4.4.1 Run-off and Drainage:

Sediment accumulation in water bodies decreases the storage capacity for road run-off. To worsen the situation road construction activities can lead to increased run-off both, during the construction and operational stage. This can be considered a high adverse impact.

Sr. No.	Phase of Constructio	Reason
1	Construction phase	The removal of vegetation and compaction of soil can lead to increased run-off during the monsoon
2	Operational phase	The area of open ground lost and added impervious black top surface increases the amount and rate of run-off.

During the operation phase increased run-off can be calculated using the formula:

Increase in runoff per year (m^3) = increase in runoff coefficient due to construction * annual rainfall in the area (m) * area of the constructed surface (m^2)

The appropriate run-off coefficients are: 0.95 for asphalt, 0.2 for silty and sandy soil, 0.3 for loamy soil, and 0.55 for Black cotton soil.

4.4.2 Water Requirement For Project:

The water requirement for construction depends on the climatic conditions, type of equipment, type of material available, mix design, type of construction plant and number of people working on the project. With the following assumptions the approximate water quantity required for the Project has been calculated.

- 8-10% of weight of soil for the embankment construction
- 7-8% of weight of soil for sub grade construction
- 5-6% of weight of GSB materials for GSB and WMM
- 150 liters/ cum for concrete

The water requirement has been assumed based on past project experiences and on the strict quality control basis. Domestic requirement of 150 liters per worker has been assumed. For this project about 50 nos., 60 nos. and 45 nos. resident workers have been considered as the project is divided into three packages.

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Table 4.3: Requirement of Water for Proposed Construction Works

S. No.	XXIX. Purpose	Baindur (NH-66) to Nagara Fort (70.50 Km) (Cum/day)	Nagara Fort to SH-148 Shikaripura (72.60 Km) (Cum/day)	SH-148 (near Shikaripura) to Ranebennur (53.75 km) (Cum/day)
1	Permanent works (Total quantity in cum)	90 kl/day	100 kl/day	185 kl/day
2	Dust Suppression at work zone in (cum/day)	15	18	30
3	Curing (cum/day)	8	10	10
4	Laboratory (cum/day)	5	5	7
5	Haul Roads (cum/day)	15	15	18
6	Crusher (cum/day)	10	10	12
7	Plant Cleaning and workshop washing (cum/day)	8	8	10
8	Domestic Purpose in (cum/day)	8	9	18
XXX.	Total Requirement(cum/day)	XXXI.	XXXII.	XXXIII.

Water quality:

Degradation of water quality due to sediment transport may occur from activities like removal of trees, removal of grass cover, excavation, stock piling of materials as part of the pre construction and construction activities. The soil type present along the project corridor are claysoil(72.22km), Gravel Soil(52.45km), Gravel/Laterite Soil (44.35 km), Silty soil (28.65km).

The impacts due to increased sediment laden run-off will make the water more turbid. This is a significant negative impact on the water bodies supporting aquatic life. Heavier sediment may smother the algae growing in the lower strata and could completely alter the nature of the watercourse.

Contamination of Water

4.4.3 Construction Stage:

The degradation of the surface and to a much less extent ground water quality can occur from pavement construction works, bridge construction works, construction plants, machinery and accommodations of workers.

Surface water:

Sharavathi River and Souparnika River drain the project corridor. In addition to these large number of streams and nallas also feature some of which are also perennial.

Factors which will have potential impacts on surface water quality are:

- Water flow from scarified bitumen materials
- From the foundation works of the bridges and culverts such as piling and excavation for open/ well foundations
- Oil spills from the Maintenance of the machinery and operation of the diesel generator sets on site.
- Oil Spill from the operation of the diesel pumps and diesel storage, transportation and transfer, parking places, and diesel generators.
- Operation of the emulsion sprayer and laying of hot mix.
- Operation of the residential facilities for the labour and officers and offices
- Storage and stock yards of bitumen and emulsion
- Heavy metals, oils, and other toxic substances and debris from construction traffic and spillage can be absorbed by soil at construction site and carried with run-of water to the water courses, which can thus lead to increase in turbidity and alkalinity & impact aquatic flora and fauna adversely.

Ground water:

- Within the ROW of 60m, number of wells and Hand pumps were seen that are used for drinking and other domestic purposes that are impacted. Apart from this no major impact is envisaged.

4.4.4 Operation Stage:

During the operation stage, water may get contaminated with similar reasons, as mentioned above, during routine and periodical maintenance of the project road. The implications of accidental discharge are potentially disastrous. But, it must be emphasized that the probability of such an accident is quite low, as one of the objectives of the design is the enhancement of road safety.

4.5 NOISE ENVIRONMENT:

Environmental noise particularly highway traffic noise, is a complex phenomenon because its intensity and characteristics vary with time depending upon the frequency as well as type of vehicles on the road.

The impacts of noise due to the project will be of temporary significance locally in the construction phase. Table below present the source of noise pollution and the impact categorization.

Table 4.4 Source of noise pollution

Sl. No.	Phase	Source of Noise pollution	Impact categorization
1	Pre construction	<ul style="list-style-type: none"> ✓ Man, material & machinery movements ✓ establishment of labor camps, onsite offices, stock yards and construction plants 	<ul style="list-style-type: none"> ✓ all activities will last for a short duration and also shall be localized in nature
2	Construction Phase	<ul style="list-style-type: none"> ✓ Plant Site: stone crushing, asphalt production plant and batching plants, diesel generators etc ✓ Work zones 	<ul style="list-style-type: none"> ✓ Plant Site: Impact will be significant within 500m. ✓ Work zones: Such impacts again will be of temporary nature as the construction site will go on changing with the progress of the works.
3	Operation Phase	<ul style="list-style-type: none"> ✓ due to increase in traffic (due to improved facility) 	<ul style="list-style-type: none"> ✓ will be compensated with the uninterrupted movement of heavy and light vehicles till the facility reaches the level of service C.

The project involves construction of bypasses, realignment to avoid densely built-up areas and from safety point of view. Numerous sensitive receivers are present along this corridor of impact.

Machinery such as excavators, bulldozers, stabilizers, drills, stone crushers, graders, vibratory rollers, concrete-mixing plants and screening plants will generate noise during proposed activity in the project corridor. The construction operations using heavy machinery and vehicles could lead to temporary high noise levels. All these will disturb the ecosystem of the region temporarily. The traffic congestion due to construction may lead to high noise as a result of honking of horns.

Impacts on different receptors will also vary considerably during the construction stage and these impacts will be localized and limited to stretches where construction work will be under progress, near equipment / vehicle yard, plant sites.

- During construction operation of machineries and equipment including stone crushing, asphalt production and batching plants and diesel generators used in construction will add some significant changes into the noise level
- Anticipated vibration levels generated are likely to be low enough to cause any disturbance to settlements along the project corridor.

4.6 LAND ENVIRONMENT

Soil Quality

4.6.1 Construction Stage:

In this project contamination of the soil may take place, from the following activities at the construction zones, construction labour camps, construction plant sites and other auxiliary facilities required for the construction. Details of the activities from which the contamination can occur are presented below;

- Scarified bitumen wastes, over production of bituminous product,
- Debris generation due to dismantling of structures,
- Maintenance of the machinery and operation of the diesel generator sets on site,

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- Oil Spill from the operation of the diesel pumps and diesel storage, during transportation and transfer, parking places, and diesel generator sets,
- Operation of the emulsion sprayer and laying of hot mix,
- Operation of the residential facilities for the labour and officers,
- Storage and stock yards of bitumen and emulsion,
- Excess production of hot mix and rejected materials,

4.6.2 Operation Stage:

During the operation stage, soil may get contaminated with similar reasons, as mentioned above, during routine and periodical maintenance of the project road. The implications of accidental discharge are potentially disastrous. But, it must be emphasized that the probability of such an accident is quite low, as one of the objectives of the design is the enhancement of road safety.

All impacts relating to air, water, noise and soil quality are largely confined to construction activities that can be controlled and minimized to a lowest level by adopting adequate remedial measures.

4.7 IMPACTS ON ECOLOGICAL ENVIRONMENT:

4.7.1 Flora And Fauna - Impact

The major impact in this project on flora involves the removal of trees to permit construction and to provide clear zone for safety of the road users. Table 4.2 presents the major adverse impacts on the flora & fauna and the indicators chosen to assess the impacts for this study.

Table 4.5 Impacts on flora & fauna due To Construction Activities

Impacts Due To Construction	Indicators
Alteration of Wild life passage	Locations of wild life crossing of project road
Tree felling	No. of trees to be fell
vegetation	Area of vegetation loss
Cattle Grazing Ground	Area and location of grazing ground.

4.7.2 Tree Cutting

Trees located within the toe line (bottom of formation) need to be removed for efficient construction workmanship and more importantly to prevent collision with the trees, in case of accident. Roadside trees with strong and rigid stems can pose safety hazards. Some trees obstruct clear sight distances. Others have a propensity to overturn when old and are potential safety hazards depending upon age and decay condition. All such trees that are safety hazards need to be cleared.

There will be a significant, direct impact on cutting of the roadside trees, it includes

- The loss of shade
- Loss of tree products.
- Loss of birds nesting place
- Removal of roadside trees will also reduce comfort levels for slow moving traffic and pedestrians.
- The removal of trees will facilitate erosion and contribute to the loss of the micro- ecosystems developed on the roadside.
- As the alignment passes through hilly terrain at few locations and fragile areas (Ghat sections with loose soil) the tree cutting and vegetation removal from the project area will induce landslides and land slips activities in the area. Also there are other impacts associated with tree cutting and vegetation removal like change in land use, change in drainage pattern, reduction in ground water recharge capacity

As discussed in baseline environment chapter there are approximately 10492 trees of various girth sizes which may be felled during development of the project alignment.

5. ANALYSIS OF ALTERNATIVE OPTIONS

The proposed alignment passes through a number villages/towns (settlements) all along and also essential utilities present/run parallel to the existing highway. The necessity of bypasses is felt at a few places. The feasibility of these has been assessed after collecting and analyzing the field data. The built up areas with crowded commercial activities with immediate demand for bypasses / realignments were identified at six locations. These locations have been finalized based on the impacts of project improvements on the built up areas, land acquisition requirements, impacts on sensitivity of environmental features and overall highway design standards stipulated for National Highway.

Table 5.1: List of Proposed Bypasses & Realignments

Sl. No.	XXXIV. Name of Town	Start Chainage, in Km	End Chainage, in Km	Length of town to be bypassed in Km	Proposed bypass Length in Km	Bypass Realignment
1	Anandapura	112+640	116+840	2.40	4.20	Bypass
2	Shikaripura	145+375	151+885	2.00	6.51	Bypass
3	Masur	166+360	167+060	1.30	0.70	Realignment
4	Halageri	192+325	194+445	1.20	2.12	Realignment

Proposed Options for Bypasses and Realignments

5.1 PROPOSED BYPASS AT ANANDAPURA :

The existing alignment of Baindur to Haveri section passes through Anandapura by intersecting MDR with State Highway-01 and National Highway-206. In order to avoid the delay, accidents at the junction and to avoid congestion in town, it is recommended to provide bypass.

Reason for Realignment

- This Realignment section will save journey time of vehicles travelling in this road.
- The proposed Realignment should be Four lane access control.

Realignment options

There are Three Options as stated below Table 5.2 gives the merit and demerits of the chosen proposal.

Option: 1-Follows the exiting Road with a length of 2.40 Km

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Option: 2-Bypass is proposed on Right side of option-1 with a length of 4.20 Km

Option: 3-Bypass proposed on Left side of option-1 for a length of 4.90 **Table 5.2** : Km

Table 5.2 : Merits and emerits of the bypass at Anandapura.

Sl No.	Bypass	Option	Merits	Demerits
2	Anandapura	Option-1	Additional land not required	<ul style="list-style-type: none"> • Road Length is less compare to other options but travel time more because of settlements and Junctions. • Reduction in design standards • Traffic Congestions in Anandapura town limits • Causing delay at Junctions • Major concerns of safety issues • Need to cross railway level crossing before NH Junction.
		Option-2	<ul style="list-style-type: none"> • Avoid traffic congestion in town limits and Junctions • Improve safety on project road • Improve in design standards • Avoids Two junctions namely NH & SH 	<ul style="list-style-type: none"> • Land Acquisition is required. • Additional Cost for Construction of Bypass. • One ROB is to be constructed at railway crossing, 4 No's of VUP & LVUP is to be proposed. • Two Junctions is to be improved in start and end point of bypasses.
		Option-3	<ul style="list-style-type: none"> • Avoid traffic congestion in town limits and Junctions • Improve safety on project road • Improve in design standards • Avoids Two junctions namely NH & SH 	<ul style="list-style-type: none"> • Land Acquisition is required • Additional Cost for Construction of Bypass. • One extra SH-01 crosses in this option. • One ROB is to be constructed at railway crossing, 4 No's of VUP & LVUP is required. • Two Junctions required at start and end point of bypasses.

From the above table it can be clearly understood that Option-2 is the feasible Realignment option for Anandapura and is considered for present alignment.

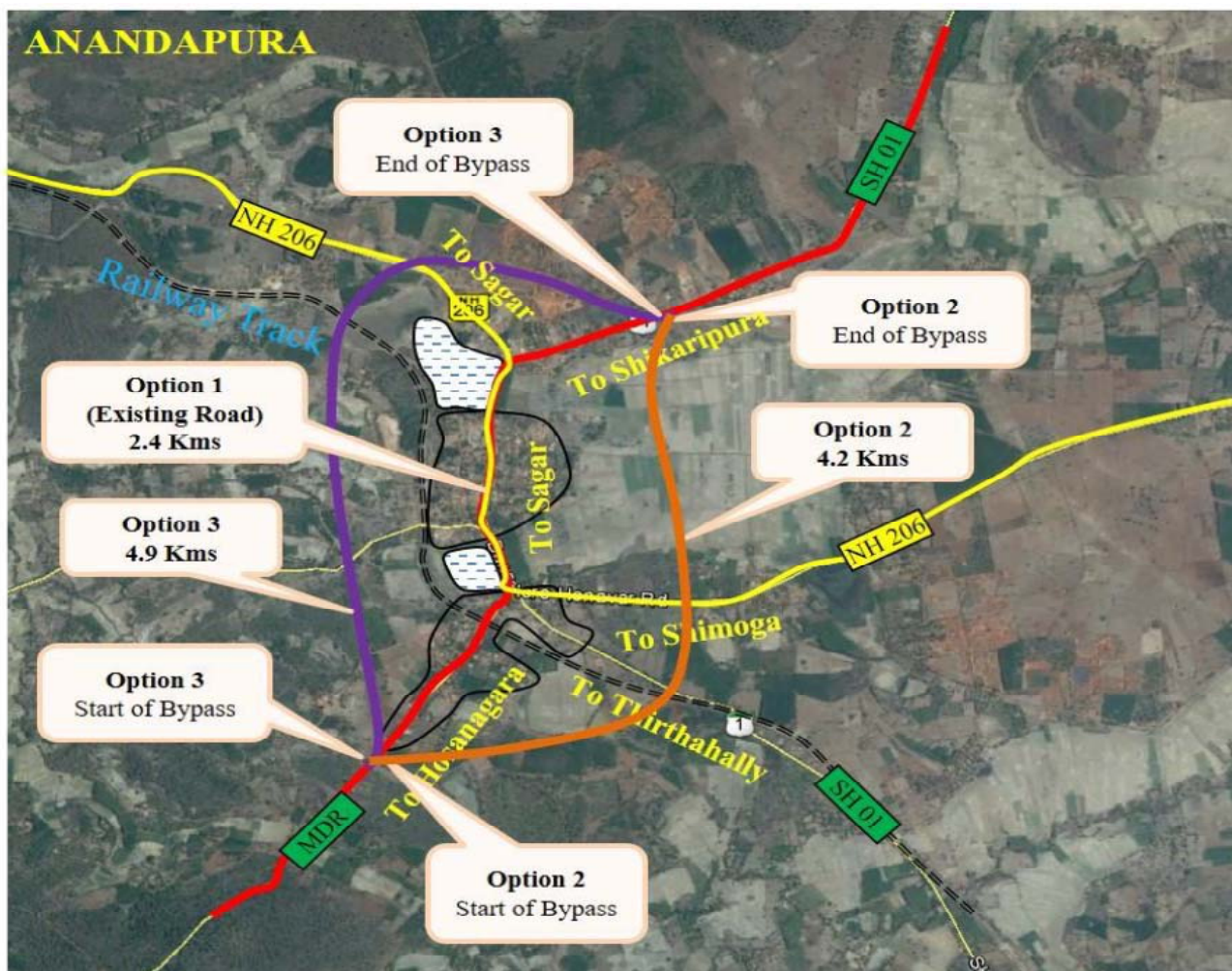


Figure 5.1: PROPOSED BYPASS IN ANANDAPUR

5.2 Proposed Bypass at Shikaripura

The existing alignment of Baindur to Haveri section passes through Shikaripura by SH- 01 intersecting with SH-57, SH-48. In order to avoid the delay, accidents at the junction and to avoid congestion in town, it is recommended to provide bypass at Shikaripura as shown in below **Figure 5.3**. This bypass route will save journey time of vehicles travelling on this road.

Three options are studied as below

Option-1: Follows the exiting Road with a length of 2.00 km

Option: 2- Bypass proposed on LHS of option-1 with a length of 6.51 Km

Option: 3- Bypass proposed on RHS of option-1 with a length of 7.90 Km

Ecology Report for Up-Grading of Haveri – Baindur Section of NH- 766 C in the State of Karnataka (Package no- NH/IAHE/24) Client : MoRTH

Table 5.3 :Merits and Demerits of the bypass proposals

Sl No.	Bypass	Option	Merits	Demerits
4	Shikaripura	Option-1	<ul style="list-style-type: none"> • Additional land not required 	<ul style="list-style-type: none"> • Road Length is less compare to other options but travel time more because of settlements and Junctions. • Reduction in design standards • Traffic Congestions in Shikaripura town limits. • Need to cross SH01, SH57, and S48 junctions. • Causing delay at Junctions and in town. • Major concerns of safety issues
		Option-2	<ul style="list-style-type: none"> • Avoid traffic congestion in town limits and junctions. • Improve safety on project road. • Improve in design standards. • Avoids three SH junctions. 	<ul style="list-style-type: none"> • Land Acquisition is required. • Additional Cost for Construction of Bypass. • Road Length is less comparing to option 3. • Two VUP and 4 No's of LVUP is to be proposed. • Two Junctions is to be improved in start and end point of bypasses.
		Option-3	<ul style="list-style-type: none"> • Avoid traffic congestion in town limits and junctions. • Improve safety on project road. • Improve in design standards. • Avoids three SH junction. 	<ul style="list-style-type: none"> • Land Acquisition is required • Large number of Irrigation land area is affected • Additional Cost for Construction of Bypass. • Road Length is more comparing to option 2. • Three VUP and 5 No's of LVUP is required. • Two Junctions is required in start and end point of bypasses.

Option 2 is the preferred bypass option for Shikaripura.



Figure 5.2: PROPOSED BYPASS IN SHIKARIPURA

5.3 PROPOSED REALIGNMENT IN MASUR :

Masur is a Village in Hirekerur Taluk in Haveri District of Karnataka State with a Built up area around 1.3 kms, starting from chainage 165+800 and ends at 167+100.

- The existing highway is Intermediate lane with 15 – 20 mts right of way including one sharp bend curve and one minor junction.
- In order to avoid the delay and accidents at the Corridor, it is advised to realign the corridor.

Three options are studied as below with Figure 5.4 depicting the options

Option: 1-Follows the exiting Road with a length of 1.30 km

Option: 2-Proposed Realignment on LHS of option-1 with a length of 0.70 Km

Option: 3- Proposed Realignment on RHS of option-1 with a length of 2.20 Km

Ecology Report for Up-Gradation of Haveri – Baindur Section of NH- 766 C in the State of Karnataka (Package no- NH/IAHE/24) Client : MoRTH

Table 5.4 :Merits and demerits of the proposed Realignment:

Sl No.	Bypass	Option	Merits	Demerits
5	Masur	Option-1	<ul style="list-style-type: none"> • Additional land not required 	<ul style="list-style-type: none"> • Road Length is more and travel time more because of settlements and SH Junction. • Reduction in design standards • Traffic Congestions in Masur town limits. • Need to cross SH77 junction and one sharp bend in town limits. • Causing delay at Junctions and in town. • Major concerns of safety issues
		Option-2	<ul style="list-style-type: none"> • Road Length less compare to Option 1 and Option3. • Avoid traffic congestion in town limits and junction. • Improve safety on project road. • Improve in design standards. • Avoids sharp bend and junction in town limits. 	<ul style="list-style-type: none"> • Land Acquisition is required. • Additional Cost for Construction of Bypass. • One VUP is to be proposed. • Two Junctions is to be improved in start and end point of bypasses.
		Option-3	<ul style="list-style-type: none"> • Avoid traffic congestion in town limits and junction. • Improve safety on project road. • Improve in design standards. • Avoids sharp bend and junction in town limits. 	<ul style="list-style-type: none"> • Land Acquisition is required • Passes through settlement at few places. • Additional Cost for Construction of Bypass. • Road Length is more comparing to option 1 & 2. • One VUP , 2 LVUP and 2 minor bridges is required. • Two Junctions is to be improved in start and end point of bypasses.

Option 2 is the preferred Realignment option for Masur.

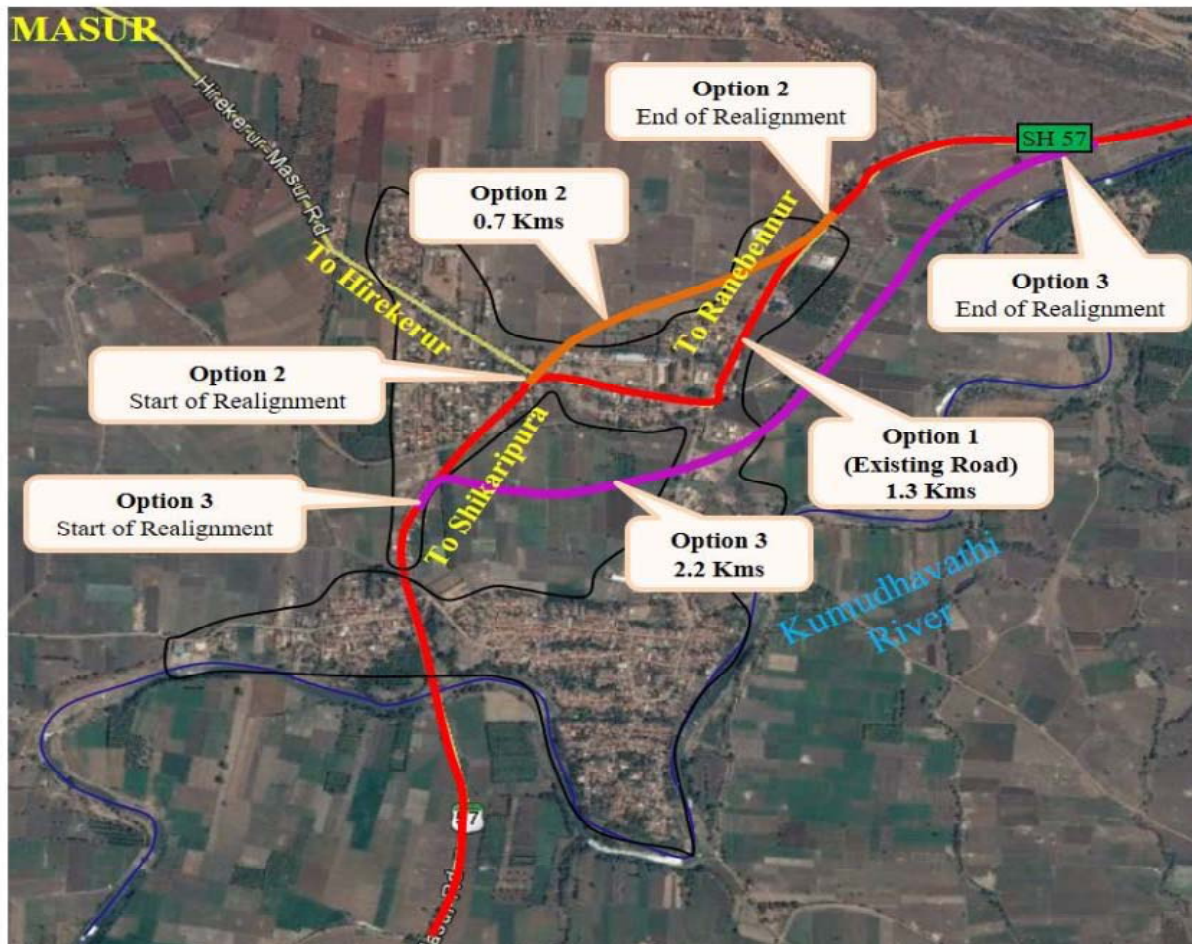


Figure 5.3: PROPOSED BYPASS IN MASUR

5.4 Proposed Realignment at Halageri :

Halageri is a Village in Ranibennur Taluk in Haveri District of Karnataka State with a Built up area around 1.2 kms, starting from chainage 192+800 and ends at 194+000. The existing highway is Intermediate lane with 15 – 20 mts right of way including Three minor junctions. In order to avoid the delay and Traffic jamming at the Corridor, it is advised to realign the corridor shown in **Figure 5.5.**

Three options are studied as below

Option: 1-Follows the exiting Road with a length of 1.20 km

Option: 2- Realignment proposed on LHS of option-1 with a length of 2.12 Km

Option: 3- Realignment proposed on RHS of option-1 with a length of 3.40 Km

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Table 5.5 :Merits and Demerits of the Proposed realignment options:

Sl No.	Bypass	Option	• Merits	• Demerits
6	Halageri	Option-1	<ul style="list-style-type: none"> • Additional land not required 	<ul style="list-style-type: none"> • The travel time is more because of settlements and SH Junctions. • Reduction in design standards • Traffic Congestions in Halageri town limits. • Need to cross SH76, SH52 junctions and one sharp bend in town limits. • Causing delay at Junctions and in town. • Major concerns of safety issues
		Option-2	<ul style="list-style-type: none"> • Road Length less compare to Option 1 & Option3. • Avoid traffic congestion in town limits and junction. • Improve safety on project road. • Improve in design standards. • Avoids sharp bend and junction in town limits. 	<ul style="list-style-type: none"> • Land Acquisition is required. • Additional Cost for Construction of Bypass. • Crosses water body (Canal) • One VUP , 2 No's of LVUP is to be proposed. • Two Junctions is to be improved in start and end point of bypasses.
		Option-3	<ul style="list-style-type: none"> • Avoid traffic congestion in town limits and junction. • Improve safety on project road. • Improve in design standards. • Avoids sharp bend and junction in town limits. 	<ul style="list-style-type: none"> • Road Length is more comparing to option 1 and option2. • Land Acquisition is required • Crosses water body (Canal) • Passes through settlement at few places. • Additional Cost for Construction of Bypass. • Two VUP and 2 LVUP is required

Option 2 is the preferred Realignment option for Halageri.

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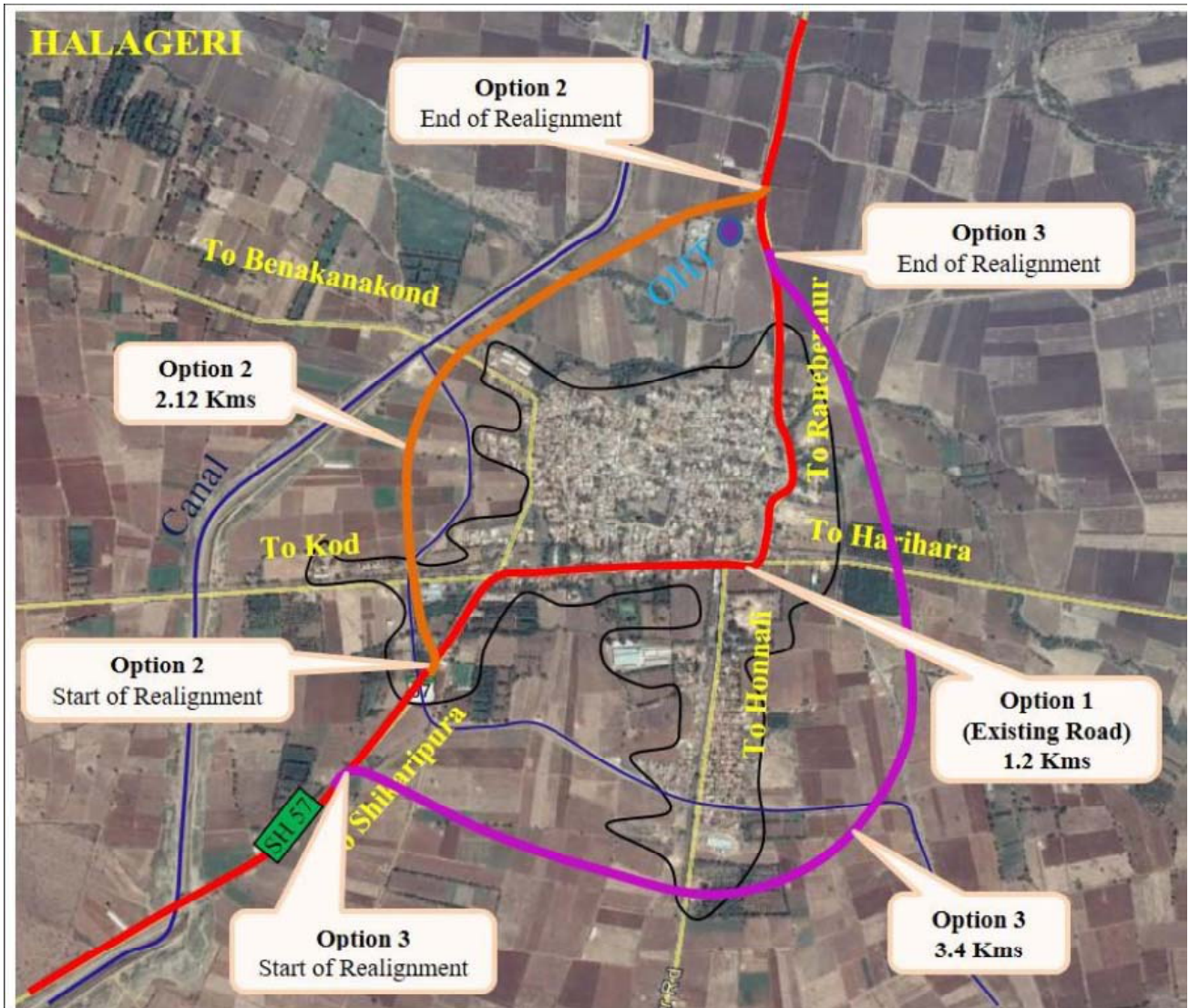


Figure 5.4: Realignment option at Halageri.

MINISTRY OF ROAD TRANSPORT AND HIGHWAYS

NOTIFICATION

New Delhi, the 8th October, 2014

S.O. 2595 (E).—In exercise of the powers conferred by sub-section (2) of Section 2 of the National Highways Act, 1956 (48 of 1956) (hereinafter referred to as the said Act), the Central Government hereby declares each of the highways specified in the column (3) of the Table below to be a national highway, as specified in the corresponding column (2) thereof.

The highways, now declared to be national highways by this notification, shall be deemed to be inserted in the Schedule to the said Act with the new serial numbers, the new national highways numbers and the description of the national highways thereof, as indicated in columns (1), (2) and (3) respectively, of the Table.

TABLE

Serial No.	New National Highway No.	Description of National Highways
(1)	(2)	(3)
306	766C	The highway starting from its junction with NH 66 near Byndur (Baindur) connecting Kollur, Hosanagara, Anandapur, Ananthapura, Shikarpur, Masur and terminating at its junction with NH 48 near Ranibennur in the State of Karnataka.

[F. No. NH-14014/36/2014-P&M]

MAYA PRAKASH, Director (P&B)

Footnote:-The National Highways Act, 1956 (48 of 1956) and the Schedule thereto was published in the Gazette of India vide notification number S.R.O. 1180, dated 4th April, 1957 and was substituted vide notification number S.O. 689 (E), dated 4th April, 2011 and last amended vide notification number S.O. 1522 (E), dated 13th June, 2014.