



भारतीय राष्ट्रीय राजमार्ग प्राधिकरण

(सड़क परिवहन और राजमार्ग मंत्रालय, भारत सरकार)

National Highways Authority of India

(Ministry of Road Transport and Highways, Govt. of India)

परियोजना कार्यान्वयन इकाई - औरंगाबाद (बिहार)

Project Implementation Unit - Aurangabad (Bihar)

प्लॉट नं० : 211, वार्ड नं०-4 क्षत्रीय नगर, आर्यन पब्लिक स्कूल के पास, (शिव मंदिर), NH-19, औरंगाबाद (बिहार) - 824101

Plot No. - 211, Ward No.- 4, Kshatriya Nagar, Near Aryan Public School (Shiv Temple), NH-19, Aurangabad, (Bihar)-824101



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Ref: NHAI/PIU-Aurangabad/VRK/P-4/FC/2025/741

06. Nov., 2025

To,

The Director, IA-III (Infra-1)

Ministry of Environment, Forests and Climate Change,

Indira Paryavaran Bhawan, Aliganj,

Jorbagh Marg, New Delhi-110003

Sub.: Development of 4/6 lane (Greenfield) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 114.000 (near Tetarahar village) (the amended end chainage km. is Km. 131.955) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3), the amended length of the project is 58.155 (earlier length 40.2 km); **Request for Amendment (Proposal no. IA/BR/INFRA1/420526/2023, File No. 10/11/2022-IA.III) - reg.**

- Ref.: (i) Minutes of 322nd meeting of EAC (Infra-I) held on 21st -22nd March, 2023
(ii) Minutes of 12th Meeting of SBWL issued vide letter No. 139, dated 07.03.2025
(iii) Minutes of 82nd meeting of SCNBWL held on 12.03.2025 and MoEF&CC (Wildlife Division), New Delhi vide Letter No. WL/BR/Road/401942/2022, dated 7th May 2025
(iv) Online proposal No. FP/BR/ROAD/401205/2022 for diversion of 36 ha forest land

Sir,

Hon'ble EAC (Infra-I) considered the proposal "Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 114.000 (near Tetarahar village) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3)" during 322nd meeting of EAC (Infra-I) held on 21st -22nd March, 2023 for recommendation and grant of Environmental clearance. The EAC (Infra-I) recommended the proposal for grant of environmental clearance with certain conditions.

Forest Diversion proposal:

Govt. of Bihar recommended for grant of diversion of 36 ha forest land (33.18 ha from Kaimur Wildlife sanctuary + 2.82 ha PF) vide proposal No. FP/BR/ROAD/401205/2022 dated 15.01.2025. IRO, MoEF&CC, Ranchi in-principally agreed after examination of the proposal subject to condition that the proposal may be processed for grant of in-principal approval under section-2 of Van (Sanraskhan Evam Samvardhan) Adhiniyam, 1980 after submission of clearances of SBWL & NBWL because majority of the forest land proposed for diversion falls in core area of the Kaimur Wildlife Sanctuary. Copy of the recommendation of Govt. of Bihar and EDS of IRO Ranchi is **enclosed**.

Wildlife Clearance

i) Clearance of SBWL

The Proposal was considered in 12th Meeting of State Board of Wildlife (SBWL), Bihar and it was recommended for grant of Wildlife Clearance. MoM dated 07.03.2025 of SBWL issued by Govt. of Bihar is **enclosed**. Govt. of Bihar forwarded the proposal on 8th March 2025 to MoEF&CC (Wildlife Division), New Delhi for its consideration in the next meeting of SCNBWL for grant of Wildlife Clearance.

ii) Clearance of SCNBWL

The Proposal was considered in 82nd Meeting of the Standing Committee of National Board for Wild Life held on 12th March, 2025 under the Chairmanship of Hon'ble Minister of Environment, Forest and Climate Change, Government of India. The SCNBWL has recommended the proposal for grant of Wildlife Clearance with certain conditions, one of which states that "**The use of explosives for road construction and tunnel construction works in the sanctuary area and its ESZ shall be prohibited**". Accordingly, MoEF&CC (Wildlife Division), New Delhi vide proposal No. WL/BR/Road/401942/2022, dated 7th May 2025 has conveyed the wildlife Clearance. Copy of the Wildlife Clearance is **enclosed**.

This proposal was considered by the Alignment Approval Committee under Chairmanship of Secretary, MoRTH with the representatives of WII, NHAI held on 04.04.2025. Copy of MoM is **enclosed**

[Signature]

Contd -/2

Head Office : G-5 & 6, Sector-10, Dwarka, New Delhi - 110075, जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110075

दूरभाष/Phone : 91-11-25074100/25074200 | फैक्स/Fax : 91-11-25093507 / 25093514, Website : www.nhai.gov.in

MoRTH has directed to realign the alignment to bypass the core area of Kaimur Wildlife Sanctuary. Accordingly, NHAI realigned the alignment from chainage 90+500 (near Darigaon village) to chainage 106.600 (Korar Village) to avoid the core area of the Wildlife Sanctuary.

Dr. Bilal Habib, Scientist, Wildlife Institute of India (WII), Dehradun has visited the amended alignment on 24th August 2025 with all concerned forest officials, NHAI and DPR Consultant. DFO, Rohtas and Dr Bilal Habib, WII suggested for realignment so that no disturbance in core area of Kaimur Wildlife Sanctuary.

Amendment of alignment from chainage km 90.500 (near Darigaon village) to chainage km 106.600 (near Korar village) of Varanasi-Kolkata Expressway (Package-II) due to conditions imposed by the SBWL and NBWL during the grant of Wildlife Clearance. KML file and Map of both the alignments are **enclosed**.

The detail of approved alignment and amended alignment is as under:

Sr.N.	Parameters	Approved alignment	Amended alignment
1.	Start point and end point with chainage and location	Start point Km. 73.800 (near Rampur village) and end point Km. 114.00 ((near Tetaraha village) in the State of Bihar.	Start point Km. 73.800 (near Rampur village) and end point Km. 114.00 ((near Tetaraha village) in the State of Bihar with the realigned from km. 90+500 (near Darigaon village) to km. 106.600 (Korar Village).
2.	Districts and Circle Office	Rohtas (Chenari, Sheosagar, Sasaram, Tilauthu, and Aurangabad (Nabinagar)	Rohtas (Chenari, Dehri, Sasaram & Tilauthu) and Aurangabad (Nabinagar)
3.	Length (Km.)	40.2	58.155
4.	ROW (m)	60-100	70-90 (90m at chainage km 13+050 to 14+030 for slope protection of hill)
5.	Non forest Area (Ha)	345.3	361.135
6.	Forest Area (ha)	36 (33.18 ha from Kaimur WLS and 2.82 ha PF)	9.749 PF
7.	Total No. of structures	110 (includes 1 tunnel, 1 MJB, 17 MNR, 68 culverts & 23 elevated/ Viaduct/ LVUP/SVUP/ underpass etc.)	178 (Includes 02 MJB, 26 MNR, 109 Culverts & 41 elevated/ Flyover/ LVUP/SVUP/ etc.)
8.	Chainage-wise details of structures	Annexure-I	Annexure-I
9.	No. of trees in non-forest area	1417	1620
10.	No. of trees in forest area	5347	737
11.	No. of waterbodies	14	13
12.	Generation of Muck and waste material (cum)	1365144	726817 (100% proposed to be reused)
13.	Project cost (INR)	3374 Cr.	3093 Cr.

The amended EIA/ EMP is **attached**.

It is, therefore, requested to kindly consider the proposed amendment of alignment chainage from km. 90+500 (near Darigaon village) to km. 106.600 (Korar Village) to bypass Kaimur Wildlife Sanctuary, reduction of diversion of forest land from 36 ha (33.18 ha core area of Wildlife Sanctuary and 2.82 ha PF) to 9.749 ha, reduction of tree felling in forest area from 5347 to 737, non-requirement of any forest area for dumping of muck material for its appraisal, recommendation and grant of Environmental Clearance under EIA Notification-2006 and amendments thereafter.

Yours faithfully,

Encl: As above.

(Amit Kumar Ojha)

Project Director

Copy to: 1) CGM (Tech)-BH, NHAI-HQ – for information please.
2) CGM (Tech)-cum-Regional Officer, NHAI, RO-Patna – for information please.

Annexure-I**Chainage-wise details of structures in Approved Alignment**

Sl no.	Chainage	Type of structure
1	90+250	Minor bridges cum underpass over irrigation canals
2	90+415	Minor Bridge on stream
3	90+710	Small Vehicular Underpass (SVUP)
4	90+800	Minor Bridge on stream
5	91+365	Minor bridge cum Underpasses (over rivers, streams, nallas)
6	91+420	Small Vehicular Underpass (SVUP)
7	91+800	Minor bridges cum underpass over irrigation canals
8	91+975	Minor Bridge on stream
9	92+300	Light Vehicular Underpass (LVUP)
10	92+900	Minor bridge cum Underpasses (over rivers, streams, nallas)
11	93+410	Minor bridges cum underpass over irrigation canals
12	93+700	Animal Underpass
13	93+840 to 93+940	Elevated Structure (Viaduct)
14	93+971 to 98+394	Tunnel
15	98+430 to 98+730	Elevated Structure (Viaduct)
16	98+870	Minor Bridge on stream
17	99+000	Animal Underpass
18	99+320	Minor Bridge on stream
19	100+960	Small Vehicular Underpass (SVUP)
20	101+116	Minor Bridge on stream
21	102+170	Minor bridge cum Underpasses (over rivers, streams, nallas)
22	102+755	Small Vehicular Underpass (SVUP)
23	102+895	Light Vehicular Underpass (LVUP)
24	103+293	Minor Bridge on stream
25	103+375	Small Vehicular Underpass (SVUP)
26	103+780	Minor bridge cum Underpasses (over rivers, streams, nallas)
27	104+408	Small Vehicular Underpass (SVUP)
28	104+568	Light Vehicular Underpass (LVUP)
29	104+815	Minor Bridge on stream
30	104+915	Light Vehicular Underpass (LVUP)
31	105+184	Minor Bridge on stream
32	106+288	INTERCHANGE-VUP
33	106+780	INTERCHANGE-FLYOVER

Sl no.	Chainage	Type of structure
34	Bypass- 2+820	VUP
35	Bypass- 3+460	LVUP
36	Bypass- 4+245	FLYOVER
37	Bypass- 4+630	LVUP
38	Bypass- 0+604	VUP
39	107+440 to 112+840	MAJOR BRIDGE
40	113+955	FLYOVER
41	114+780	MINOR BRIDGE CUM UNDRPASS
42	115+150	MINOR BRIDGE

Chainage-wise details of structures in Amended Alignment

Sr. no.	Chainage	Type of Structure New proposal
1	0.+250	MNB cum Underpass
2	0.+425	MNB
3	00.+800	SVUP
4	1+120	MNB
5	01.+250	LVUP
6	01.+860	MNB cum Underpass
7	02.+100	VUP
8	02.+840	MNB
9	03.+500	MNB Cum UP
10	03+84	MNB Cum SVUP
11	04.+200	MNB cum LVUP
12	04.+880	MNB cum LVUP
13	05.+320	MNB cum Underpass
14	05.+590	LVUP
15	05.+950	MNB cum Underpass
16	06.+450	MNB Cum SVUP
17	06.+780	MNB cum Underpass
18	07.+080	MNB Cum SVUP
19	07.+340	VUP
20	07.+650	MNB Cum SVUP
21	08.+350	MNB Cum SVUP
22	08.+500	SVUP
23	09.+000	MNB
24	09.+180	LVUP

Sr. no.	Chainage	Type of Structure New proposal
25	09.+420	SVUP
26	10.+200	MNB cum Underpass
27	11+610 TO 12+210	Elevated
28	12.+340	VUP
29	12.+960	SVUP
30	13+490 to 13+780	Elevated
31	14.+000	LVUP
32	14.+650	LVUP
33	14.+900	SVUP
34	15.+200	MJB
35	15.+800	SVUP
36	16.+560	LVUP
37	17+280 to 17+610	Elevated
38	17.+895	LVUP
39	18.+970	MNB cum LVUP
40	19.+500	LVUP
41	20.+050	LVUP
42	21.+020	MNB
43	21.+340	SVUP
44	21.+690	LVUP
45	22.+700	LVUP
46	23.+180	LVUP
47	23.+900	MNB cum SVUP
48	24.+100	VUP
49	24.+350	LVUP
50	24.+700	SVUP
51	25.+000	MNB
52	26.+050	LVUP
53	27.+273	SVUP
54	27.+980	LVUP
55	28.+600	MNB cum LVUP
56	29.+690	LVUP
57	30.+100	SVUP
58	30.+400	SVUP
59	31.+190	SVUP
60	31.+320	LVUP
61	31.+540	SVUP
62	31.+570	MNB
63	32.+226	LVUP

Sr. no.	Chainage	Type of Structure New proposal
64	32.+718	Flyover
65	33+460 to 38+775	MJB
66	39+915	Flyover
67	40+740	MNB
68	41+110	MNB

बिहार सरकार

पर्यावरण, वन एवं जलवायु परिवर्तन विभाग

प्रेषक,

अभय कुमार,
वन संरक्षक-सह-विशेष सचिव।

सेवा में,

अपर प्रधान मुख्य वन संरक्षक (केन्द्रीय),
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय,
एकीकृत क्षेत्रीय कार्यालय, द्वितीय तल,
झारखण्ड राज्य आवास बोर्ड मुख्यालय,
हरमू चौक राँची, झारखंड,
राँची-834002

पटना-15, दिनांक.....

विषय:- भारतमाला परियोजना के तहत रोहतास जिलान्तर्गत वाराणसी-कोलकाता ग्रीनफील्ड एक्सप्रेस-वे 4/6 लेन (भाया राँची खड़गपुर) (74.100-109.80 कि०मी०) कुल 35.70 कि.मी. में पथ/सुरंग के निर्माण हेतु वन (संरक्षण) अधिनियम, 1980 के तहत 36.00 हे० वन भूमि अपयोजन प्रस्ताव पर सैद्धांतिक स्वीकृति के संबंध में।

महाशय,

निदेशानुसार उपर्युक्त विषय के संदर्भ में सूचित करना है कि रोहतास जिलान्तर्गत वाराणसी-कोलकाता ग्रीनफील्ड एक्सप्रेसवे 4/6 लेन (भाया राँची खड़गपुर) (74.100-109.80 कि०मी०) कुल 35.70 कि.मी. में पथ/सुरंग के निर्माण हेतु वन (संरक्षण) अधिनियम, 1980 के तहत 36.00 हे० वनभूमि अपयोजन प्रस्ताव, "परियोजना निदेशक, भारतीय राष्ट्रीय राजमार्ग प्राधिकरण, परियोजना कार्यान्वयन इकाई सासाराम" द्वारा समर्पित किया गया है, जिसे प्रधान मुख्य वन संरक्षक, बिहार, पटना के अनुमोदनोंपरांत नोडल पदाधिकारी (वन संरक्षण) द्वारा उपलब्ध कराया गया है।

विषयांकित परियोजना में 36.00 हे० वन भूमि का अपयोजन प्रस्तावित है। परियोजना निर्माण के क्रम में 4876 वृक्षों का पुर्नस्थापन किया जायेगा एवं 471 वृक्षों का पातन किया जायेगा, जिसका अनुमोदन निदेशक, पारिस्थितिकी एवं पर्यावरण, पटना की अध्यक्षता में गठित वृक्ष सुरक्षा समिति द्वारा किया गया है। विषयांकित अपयोजन प्रस्ताव में वानस्पतिक घनत्व 0.7 से कम अंकित किया गया है।

परियोजना निर्माण में अपयोजित होने वाली वन भूमि के लिये जिला पदाधिकारी, पटना एवं भोजपुर द्वारा FRA, 2006 प्रमाण पत्र निर्गत नहीं किया गया है परन्तु पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार, नई दिल्ली के पत्रांक-11-43/2013-FC दिनांक-26.02.2019 के आलोक में प्रयोक्ता एजेंसी द्वारा FRA, 2006 प्रमाण पत्र, सैद्धांतिक स्वीकृति पत्र के अनुपालन के साथ उपलब्ध कराने संबंधित दिशा-निर्देश निर्गत की गयी है। तदआलोक में बिना FRA, 2006 प्रमाण पत्र के ही प्रस्ताव पर Stage-I की स्वीकृति प्राप्त करने हेतु प्रस्ताव अग्रसारित किया जा रहा है।

परियोजना निर्माण के क्रम में कुल 36.00 हे० अपयोजित होने वाली वन भूमि के बदले क्षतिपूरक वनीकरण हेतु दुगने से अधिक 96.14 हे० अवकृष्ट वन भूमि रोहतास वन चेनारी प्रक्षेत्र के अंतर्गत कुसमहा के (PF) को चिन्हित कर दस वर्षीय वृक्षारोपण प्राक्कलन तैयार किया गया है, जो प्रस्ताव के साथ संलग्न है। क्षतिपूरक वनीकरण के लिये चिन्हित वन भूमि Geo-referenced नक्शा एवं वन भूमि क्षतिपूरक वनीकरण के लिये उपर्युक्त है, का प्रमाण पत्र भी प्रस्ताव के साथ संलग्न है।

विषयांकित प्रस्ताव में संबंधित वन प्रमंडल पदाधिकारी का अनुशंसा प्रपत्र-II के रूप में वन प्रमंडल पदाधिकारी का स्थल निरीक्षण प्रतिवेदन संलग्न है। वन संरक्षक द्वारा प्रस्ताव की अनुशंसा की गयी है, जिसका अनुमोदन प्रपत्र-III के रूप में एवं नोडल पदाधिकारी (वन संरक्षण), बिहार द्वारा की गयी अनुशंसा प्रपत्र-IV के रूप में संलग्न है।

गैर वन भूमि की अनुपलब्धता की स्थिति में प्रमाण पत्र एवं गैर वन भूमि के बदले में अवकृष्ट वन क्षेत्र में क्षतिपूरक वनरोपण किये जाने संबंधी अनुरोध किस प्राधिकार के द्वारा दिया जाना है, यह वन (संरक्षण एवं संवर्द्धन) नियम, 2023 (पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय के अधिसूचना स0-582 (अ), दिनांक-20.09.2024 से संशोधन उपरांत) के नियम 13 (1) में स्पष्ट नहीं है। यहाँ प्रयोक्ता एजेंसी के द्वारा अपवादात्मक परिस्थिति के अनुरूप अनुरोध किया गया है। प्रयोक्ता एजेंसी द्वारा किया गया अनुरोध स्वीकार्य है अथवा नहीं संबंधित निर्णय, नियम निर्धारण करने वाले प्राधिकार अर्थात् पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार के द्वारा ही लिया जा सकता है। यह स्वीकार्य होने की स्थिति में वन (संरक्षण), अधिनियम, 1980 के तहत निम्नांकित शर्तों के साथ प्रस्ताव की अनुशंसा की जाती है :-

1. भूमि का वैधानिक स्वरूप यथावत रहेगा।
2. 36.00 हे० वन भूमि के लिये नेट प्रजेन्ट भेल्यू (NPV) के मद में रू० 12.28590 लाख प्रति हे० के दर से रू० 20,72,87,705/- (बीस करोड़ बहत्तर लाख सतासी हजार सात सौ पाँच रुपये) मात्र प्रयोक्ता एजेंसी द्वारा पर्यावरण, वन एवं जलवायु परिवर्तन विभाग के पक्ष में जमा कराया जायेगा।
3. अपयोजित होने वाली 36.00 हे० वन भूमि के बदले में क्षतिपूरक वृक्षारोपण के लिए 96.14 हे० अवकृष्ट वन भूमि रोहतास वन चेनारी प्रक्षेत्र के अंतर्गत कुसम्हा के (PF) में चिन्हित करते हुए रू० 5,18,09,391/- (पाँच करोड़ अठारह लाख नौ हजार तीन सौ एकानवे रुपये) मात्र का प्राक्कलन प्रस्ताव के साथ संलग्न है। संलग्न प्राक्कलन के आलोक में क्षतिपूरक वृक्षारोपण की राशि प्रयोक्ता एजेंसी द्वारा तात्कालिक मजदूरी दर पर उपलब्ध करायी जायेगी।
4. वृक्षों का पातन विभागीय देखरेख में प्रयोक्ता एजेंसी द्वारा अपने खर्च पर किया जाएगा एवं पातित काष्ठ को विभागीय वनागार तक पहुँचाया जाएगा। प्राप्त काष्ठ की नीलामी इत्यादि के लिए विभाग को 1648/- रुपये प्रति घनमीटर की दर से राशि प्रयोक्ता एजेंसी द्वारा उपलब्ध कराएगी।
5. प्रयोक्ता एजेंसी द्वारा सुरंग के प्रवेश, निकास एवं इसके निकट के स्थलों में Flyover का निर्माण कराया जायेगा।
6. सुरंग निर्माण के क्रम में निकले वाले पत्थर पर वन विभाग का अधिकार होगा एवं इसका निस्तारण एवं निस्तारण संबंधी व्यय का वहन प्रयोक्ता एजेंसी द्वारा किया जायेगा तथा इन कार्यों का संपादन वन प्रमंडल पदाधिकारी, रोहतास के दिशा-निर्देशन में किया जायेगा।
7. NHAI द्वारा Geotechnical & Geophysical investigation प्रतिवेदन समर्पित किया गया है। प्रयोक्ता एजेंसी द्वारा समर्पित प्रतिवेदन पर देश के प्रतिष्ठित NIT संस्थान से मंतव्य प्राप्त करने के उपरान्त परियोजना निर्माण कार्य क्रियान्वित किया जायेगा।



8. वन एवं वन्यप्राणियों के अधिवास क्षरण को न्यूनतम रखने तथा उसके अनुरूप वन्यप्राणियों के लिये संरक्षण एवं संवर्द्धन की योजना मान्यता प्राप्त बाह्य एजेंसी के माध्यम से तैयार कराया जायेगा। इन योजनाओं को तैयार करने में होने वाले व्यय का वहन प्रयोक्ता एजेंसी द्वारा किया जायेगा। बाह्य एजेंसी द्वारा किये गये अनुशंसाओं के आलोक में वन एवं वन्यप्राणियों के अधिवास क्षरण को न्यूनतम रखने संबंधित योजना को संशोधन/परिवर्तन कर लागू किया जायेगा। इस हेतु आवश्यक राशि प्रयोक्ता एजेंसी द्वारा पर्यावरण, वन एवं जलवायु परिवर्तन विभाग, बिहार को उपलब्ध कराएगी।
9. परियोजना निर्माण के क्रम में पौधों का पुनर्स्थापना प्रयोक्ता एजेंसी द्वारा वन प्रमंडल पदाधिकारी के दिशा-निर्देशन में कराया जायेगा। पुनर्स्थापित होने वाले पौधों के लिए स्थल एवं प्रक्रिया का निर्धारण वन प्रमंडल पदाधिकारी, रोहतास द्वारा किया जायेगा।

प्रस्ताव को संलग्न अभिलेख सहित भेजते हुए अनुरोध है कि उपर्युक्त प्रस्ताव के संदर्भ में लिये गये निर्णय से राज्य सरकार को संसूचित करने की कृपा की जाय।

विश्वासभाजन

ह०/-

(अभय कुमार)

वन संरक्षक-सह-विशेष सचिव

ज्ञापांक :- 04/वन भूमि-115/2024...../प०व०ज०प०, पटना-15, दिनांक.....

प्रतिलिपि :- प्रधान मुख्य वन संरक्षक, बिहार, पटना/परियोजना निदेशक, भारतीय राष्ट्रीय राजमार्ग प्राधिकरण परियोजना कार्यान्वयन इकाई, सासाराम को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

ह०/-

(अभय कुमार)

वन संरक्षक-सह-विशेष सचिव

ज्ञापांक :- 04/वन भूमि-115/2024.....214...../प०व०ज०प०, पटना-15, दिनांक.....15/01/25.....

प्रतिलिपि :- आई०टी० मैनेजर, पर्यावरण, वन एवं जलवायु परिवर्तन विभाग को निदेश दिया जाता है कि प्रस्ताव को मंत्रालय के वेब-साईट पर अपलोड करते हुए पार्ट-2 उपलब्ध कराया जाय।

(अभय कुमार)

वन संरक्षक-सह-विशेष सचिव

PART-V

(To be filled in by the Secretary Charge of forest Department or by any other authorizes officer of the State Government not below the rank of an Under Secretary)

Adverse comments made by any officer or authority in Part-B or Part-C or Part-D above should be specifically commented upon.

The proposed diversion of 36.00 ha. forest land for construction of Varanasi-Kolkata Greenfield Expressway 4/6(Via Ranchi-Khragpur) (74.100-109.80 KM.) Total 37.00 KM. Road/Tunnel in Rohtas District may be sanctioned subject to the condition/stipulation mentioned in the forwarding letter.

Date:- 15/1/25

Place:- Patna

Signature:-



Name of Designation:-

Official Seal:- वन संरक्षक-सह-विशेष सचिव
पर्यावरण, वन एवं जलवायु परिवर्तन विभाग
बिहार, पटना

S. No.	Query	Description	Document
1	Wild Life Clearance	Please submit/ upload the complete wildlife clearance.	

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Government of India
Ministry of Environment, Forest and Climate Change
(Wild Life Division)



2nd Floor, Vayu Wing,
Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi 110003

Date : 07 May, 2025

To,

The Principal Secretary,
Government of BIHAR,
Environment and Forest Department,
Secretariat, Patna-800015.



Sub: Proposal for use of 33.18 ha of forest land from Kaimur Wildlife Sanctuary for construction of 4/6-lane access controlled Greenfield Expressway from Varanasi to Kolkata (Package-II) via Ranchi with spur to Kharagpur under Bharatmala Pariyojana Phase-II (Lot-9/Pkg-3), length of the Tunnel is 4.38 KM in favour of NHAI regarding-WL/BR/ROAD/401942/2022

Sir,

Reference is invited to the following proposal:

i) Proposal No.	WL/BR/ROAD/401942/2022
ii) Name of the Project	Construction of 4/6-lane access controlled Greenfield Expressway from Varanasi to Kolkata (Package-II) via Ranchi with spur to Kharagpur under Bharatmala Pariyojana Phase-II (Lot-9/Pkg-3)
iii) Category of the project	Construction / Widening of Road including approach road to roadside establishments including bridges
iv) Name of User Agency	NHAI
v) Location of Project (District,State)	SHEOSAGAR, Sheosagar, Rohtas, BIHAR

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1. The above proposal was considered in the 82nd meeting of the Standing Committee of the National Board for Wild Life held on 12 March, 2025. under the Chairmanship of Hon'ble Minister for Environment, Forest & Climate Change.

2. After discussions, the Standing Committee of the National Board for Wild Life decided to recommend the proposal for use of 33.18 ha of forest land from Kaimur Wildlife Sanctuary for construction of 4/6-lane access controlled Greenfield Expressway from Varanasi to Kolkata (Package-II) via Ranchi with spur to Kharagpur under Bharatmala Pariyojana Phase-II (Lot-9/Pkg-3), length of the Tunnel is 4.38 KM in favour of NHAI subject to the following conditions:

1. During construction in the sanctuary area and its Eco-sensitive Zone, the User Agency shall not destroy or change or regulate the wildlife habitat.
2. The User Agency shall not harm, exploit or destroy any wildlife in the sanctuary area and shall strive to ensure the same.
3. The legal status of the proposed area shall remain as part of the sanctuary and shall remain under control of the Environment, Forests and Climate Change Department, Bihar.
4. No plastic, solid or liquid waste or sewage shall be thrown inside the sanctuary area and its Eco-sensitive Zone. The labour camps would be established outside sanctuary limits.
5. An amount equivalent to the cost of implementing the measures to mitigate impact of the activities proposed in the project in the Protected Area shall be deposited by the User Agency in consonance with the guidelines issued by the Ministry vide F.No. 6-30/2019-WL dated 13.12.2023 in CAMPA, under the head 'Additional Charges for Protected Areas'.
6. The road construction work shall be implemented after getting the opinion from the prestigious NIT Institute of the Country on the Geotechnical and Geophysical investigations report submitted by NHAI.
7. The highway road must be flyover road at the entry-exit area and nearby forest area, because the entry-exit area and nearby forest area has a good and dense forest. It's a natural habitat for many wildlife species (mentioned in the proposal) and is used for movement. The proposed highway road must not bifurcate the entry-exit habitat.
8. No facility like Toll Plaza, Fuel Stations / Retail Outlets, Restaurant / Hotel / Motel and other traveller amenity shall be permitted in the Right of Way in the stretch of expressway within the Sanctuary. No such facility shall be permitted in its notified Eco-sensitive Zone also in the Right of Way of the 4/6 lane expressway. However, such utilities that are essential for road transport safety and emergency requirements as per prevalent norms of National Highway may be provided.
9. The construction and installation work and related operations shall normally be carried out between sunrise and sunset, and in case of any unavoidable construction processes to be undertaken during night time, the Divisional Forest Officer-cum-Wild Life Warden, Rohtas shall be informed in advance about the same.
10. The use of explosives for road construction and tunnel construction works in the sanctuary area and its ESZ shall be prohibited.
11. Safe transportation of broken small and big stones, minerals etc. generated during road construction and tunnel construction work/mining in the sanctuary area and its ESZ along with their safe storage outside the sanctuary area shall be ensured by the User Agency in coordination and consent of the forest officials. All these materials shall be the property of the Forest Department and their proper disposal shall be done as per convenience by the Environment, Forest and Climate Change Department, Bihar.

Green Clearance No.:GCN13277511-20112024

12. Apart from the above-mentioned mining material, the muck shall be disposed of appropriately by the User Agency in the outer area of the sanctuary.
 13. During tunnel construction, it shall be ensured that the electrical machinery/equipment is properly covered with insulated wire.
 14. The User Agency / User Agency shall comply with any additional conditions imposed by Chief Wildlife Warden, Bihar as deemed necessary in the interest of wildlife protection and management in the sanctuary area.
 15. Orders of the Hon'ble Supreme Court passed in IA No. 1000 of 2003 in W.P. (C) No. 202 of 1995 T.N. Godavarman Vs Union of India & Ors and any such other order/orders passed in this context shall be complied with.
 16. An annual compliance certificate on the stipulated conditions shall be submitted by the User Agency to the State Chief Wild Life Warden and an annual compliance certificate shall be submitted by the State Chief Wild Life Warden to Government.
3. The minutes of the meeting have been posted online in the "PARIVESH" portal of this Ministry.
 4. The State/Union Territory Government may take further necessary action in this regard.

Yours faithfully,

(Dr Sudheer Chintalapati)

Scientist 'E'

Email: sudheer.ch@gov.in

Copy to:

1. Chief Wild Life Warden, Technology Bhawan, 4th Floor, Vishweshariya Bhawan Campus, Beli Road, Patna - 800015.
2. Deputy Director General of Forests Integrated Regional Offices, Ranchi Ministry of Environment, Forest and Climate Change, Bungalow No.A-2, Shyamali Colony, Ranchi-834002.
3. Inspector General of Forests, Forest Conservation Division, Ministry of Environment, Forest and Climate Change, New Delhi.
4. Joint Secretary, IA Division, Ministry of Environment, Forest and Climate Change, New Delhi.

(Dr. Sudheer Chintalapati)

Scientist 'E'

Email: sudheer.ch@gov.in

F.No.WL-6/10/2025- WL

Government of India
Ministry of Environment, Forest and Climate Change
(Wildlife Division)

2nd Floor, Vayu Wing,
Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi 110003.

Date: 15th April, 2025.

To,


**All Members
Standing Committee of NBWL**

Sub: Minutes of 82nd Meeting of the Standing Committee of National Board for Wild Life-reg.

Sir/Madam,

Kindly find enclosed a copy of the Minutes of 82nd Meeting of the Standing Committee of National Board for Wild Life held on **12th March, 2025** under the Chairmanship of Hon'ble Minister of Environment, Forest and Climate Change, Government of India.

Yours faithfully,



(Dr. Sudheer Chintalapati)

Scientist 'E'

Email: sudheer.ch@gov.in

Distribution:

1. Secretary, MoEF & CC
2. DGF&SS, MoEF&CC
3. ADGF (WL), MOEF&CC
4. ADGF (FC), MoEF&CC
5. Member Secretary, NTCA
6. Director/IGF, PE Division, MoEF&CC
7. Director, WII, Dehradun
8. Director, GEER Foundation, Gandhinagar
9. Dr. R. Sukumar, Member, NBWL
10. Dr. H.S. Singh, Member, NBWL
11. Secretary, Environment, Forest, Science and Technology Department, Govt. of Andhra Pradesh.

Copy to:

1. PS to Hon'ble MoEF&CC.
2. PS to Hon'ble MoS, EF&CC.
3. PPS to Secretary, MoEF& CC
4. PPS to DGF&SS, MoEF&CC.
5. PSO to Addl. DGF (WL)/PPS to IGF (WL)/Sr.PPS to DIGF (WL).
6. **The Additional Chief Secretary/Principal Secretary/Secretary Forest Department, The PCCF and HoFF**, Andhra Pradesh/ Arunachal Pradesh/ Assam/ Gujarat/ Himachal Pradesh/ Ladakh/ Karnataka/ Kerala / Madhya Pradesh/ Maharashtra/ Manipur/ Mizoram/ Odisha/ Rajasthan/ Tamil Nadu/ Telangana / Uttarakhand/ Uttar Pradesh/ West Bengal.
7. **The PCCF and HoFF**, Andhra Pradesh/ Arunachal Pradesh/ Assam/ Gujarat/ Himachal Pradesh/ Ladakh/ Karnataka/ Kerala / Madhya Pradesh/ Maharashtra/ Manipur/ Mizoram/ Odisha/ Rajasthan/ Tamil Nadu/ Telangana / Uttarakhand/ Uttar Pradesh/ West Bengal.
8. **The Chief Wild Life Warden**, Andhra Pradesh/ Arunachal Pradesh/ Assam/ Gujarat/ Himachal Pradesh/ Ladakh/ Karnataka/ Kerala / Madhya Pradesh/ Maharashtra/ Manipur/ Mizoram/ Odisha/ Rajasthan/ Tamil Nadu/ Telangana / Uttarakhand/ Uttar Pradesh/ West Bengal.

Copy also to: Sr. Technical Director, NIC with a request to upload the minutes of the meeting on PARIVESH Portal.

- by the User Agency Executive Engineer, Irrigation Division, Laxmipur (Jamui) for the Sindhwarni Reservoir Project.
2. During construction in the sanctuary area and its Eco-sensitive Zone, the User Agency shall not destroy or change or regulate the wildlife habitat.
 3. The User Agency shall not harm, exploit or destroy any wildlife in the sanctuary area and shall strive to ensure the same.
 4. The legal status of the proposed area shall remain as part of the sanctuary and shall remain under control of the Environment, Forests and Climate Change Department, Bihar.
 5. Weir height to be lower than past water levels (highest) of Kharagpur lake.
 6. Use of Silent power source during construction phase.
 7. No plastic, solid or liquid waste or sewage shall be thrown inside the sanctuary area and its Eco-sensitive Zone. The labour camps would be established outside sanctuary limits.
 8. No felling of trees would be allowed for this project.
 9. The work shall be not be executed between sunset and sunrise.
 10. An amount equivalent to the cost of implementing the measures to mitigate impact of the activities proposed in the project in the Protected Area shall be deposited by the User Agency in consonance with the guidelines issued by the Ministry vide F.No. 6-30/2019-WL dated 13.12.2023 in CAMPA, under the head 'Additional Charges for Protected Areas'.
 11. Necessary conditions may be imposed to promote eco-tourism in the proposed project area.
 12. Every possible effort shall be done to minimize the effect of construction on wildlife in that area and noise shall be kept under limits.
 13. No debris shall be dumped in the sanctuary. The construction debris shall be disposed of outside the sanctuary and at a safe distance.
 14. The User Agency / User Agency shall comply with any additional conditions imposed by Chief Wildlife Warden, Bihar as deemed necessary in the interest of wildlife protection and management in the sanctuary area.
 15. Orders of the Hon'ble Supreme Court passed in IA No. 1000 of 2003 in W.P. (C) No. 202 of 1995 T.N. Godavarman Vs Union of India & Ors and any such other order/orders passed in this context shall be complied with.
 16. An annual compliance certificate on the stipulated conditions shall be submitted by the User Agency to the State Chief Wild Life Warden and an annual compliance certificate shall be submitted by the State Chief Wild Life Warden to Government.

82.6.2.2 Proposal for use of 33.18 ha of forest land from Kaimur Wildlife Sanctuary for construction of 4/6-lane access controlled Greenfield Expressway from Varanasi to Kolkata (Package-II) via Ranchi with spur to Kharagpur under Bharatmala Pariyojana Phase-II (Lot-9/Pkg-3), length of the Tunnel is 4.38 KM in favour of NHAI

WL/BR/ROAD/401942/2022

The Standing Committee was informed that the proposal is for use of 33.18 ha of forest land from Kaimur Wildlife Sanctuary for construction of 4/6-lane access controlled Greenfield Expressway from Varanasi to Kolkata (Package-II) via Ranchi with spur to Kharagpur under Bharatmala Pariyojana Phase-II (Lot-9/Pkg-3), length of the Tunnel is 4.38 KM in favour of NHAI.

The proposal has been recommended by Chief Wild Life Warden, the State Board for Wild Life and the State Government.

Decision Taken: After discussions, the Standing Committee decided to recommend the proposal with the following conditions:

1. During construction in the sanctuary area and its Eco-sensitive Zone, the User Agency shall not destroy or change or regulate the wildlife habitat.
2. The User Agency shall not harm, exploit or destroy any wildlife in the sanctuary area and shall strive to ensure the same.
3. The legal status of the proposed area shall remain as part of the sanctuary and shall remain under control of the Environment, Forests and Climate Change Department, Bihar.
4. No plastic, solid or liquid waste or sewage shall be thrown inside the sanctuary area and its Eco-sensitive Zone. The labour camps would be established outside sanctuary limits.
5. An amount equivalent to the cost of implementing the measures to mitigate impact of the activities proposed in the project in the Protected Area shall be deposited by the User Agency in consonance with the guidelines issued by the Ministry vide F.No. 6-30/2019-WL dated 13.12.2023 in CAMPA, under the head 'Additional Charges for Protected Areas'.
6. The road construction work shall be implemented after getting the opinion from the prestigious NIT Institute of the Country on the Geotechnical and Geophysical investigations report submitted by NHAI.
7. The highway road must be flyover road at the entry-exit area and nearby forest area, because the entry-exit area and nearby forest area has a good and dense forest. It's a natural habitat for many wildlife species (mentioned in the proposal) and is used for movement. The proposed highway road must not bifurcate the entry-exit habitat.
8. No facility like Toll Plaza, Fuel Stations / Retail Outlets, Restaurant / Hotel / Motel and other traveller amenity shall be permitted in the Right of Way in the stretch of expressway within the Sanctuary. No such facility shall be permitted in its notified Eco-sensitive Zone also in the Right of Way of the 4/6 lane expressway. However, such utilities that are essential for road transport safety and emergency requirements as per prevalent norms of National Highway may be provided.
9. The construction and installation work and related operations shall normally be carried out between sunrise and sunset, and in case of any unavoidable construction processes to be undertaken during night time, the Divisional Forest Officer-cum-Wild Life Warden, Rohtas shall be informed in advance about the same.
10. The use of explosives for road construction and tunnel construction works in the sanctuary area and its ESZ shall be prohibited.
11. Safe transportation of broken small and big stones, minerals etc. generated during road construction and tunnel construction work/mining in the sanctuary area and its ESZ along with their safe storage outside the sanctuary area shall be ensured by the User Agency in coordination and consent of the forest officials. All these materials shall be the property of the Forest Department and their proper disposal shall be done as per convenience by the Environment, Forest and Climate Change Department, Bihar.
12. Apart from the above-mentioned mining material, the muck shall be disposed of appropriately by the User Agency in the outer area of the sanctuary.
13. During tunnel construction, it shall be ensured that the electrical machinery/equipment is properly covered with insulated wire.

14. The User Agency / User Agency shall comply with any additional conditions imposed by Chief Wildlife Warden, Bihar as deemed necessary in the interest of wildlife protection and management in the sanctuary area.
15. Orders of the Hon'ble Supreme Court passed in IA No. 1000 of 2003 in W.P. (C) No. 202 of 1995 T.N. Godavarman Vs Union of India & Ors and any such other order/orders passed in this context shall be complied with.
16. An annual compliance certificate on the stipulated conditions shall be submitted by the User Agency to the State Chief Wild Life Warden and an annual compliance certificate shall be submitted by the State Chief Wild Life Warden to Government.

82.6.2.3 Proposal for use of 2.0818 ha of forest land from Bhimband Wildlife Sanctuary for widening and Strengthening in Km 28.340 to 38.840 km of NH-333 (Gagta More to Kobharwa More in Hanta Jungle) Under NH Division , Lakhisarai at Munger Project length is 10+623 km in favour of Public Works Department-

WL/BR/ROAD/ 420974/2023

The Standing Committee was informed that the proposal is for use of 2.0818 ha of forest land from Bhimband Wildlife Sanctuary for widening and Strengthening in Km 28.340 to 38.840 km of NH-333 (Gagta More to Kobharwa More in Hanta Jungle) Under NH Division, Lakhisarai at Munger Project length is 10+623 km in favour of Public Works Department.

The proposal has been recommended by Chief Wild Life Warden, the State Board for Wild Life and the State Government. The NTCA has suggested for constitution of a committee for site appraisal.

Decision Taken: After discussions, the Standing Committee decided to recommend the proposal with the following conditions:

1. The User Agency shall prepare and implement the animal passage plan in the road length inside the sanctuary based on Wildlife Institute of India's guidance document titled-"Eco-Friendly Measures to Mitigate Impacts of Linear Infrastructure on Wildlife". Animal Passage Plan shall be an essential part of the scheme for the movement of wild animals.
2. During construction in the sanctuary area and its Eco-sensitive Zone, the User Agency shall not destroy or change or regulate the wildlife habitat.
3. The User Agency shall not harm, exploit or destroy any wildlife in the sanctuary area and shall strive to ensure the same.
4. The legal status of the proposed area shall remain as part of the sanctuary and shall remain under control of the Environment, Forests and Climate Change Department, Bihar.
5. No plastic, solid or liquid waste or sewage shall be thrown inside the sanctuary area and its Eco-sensitive Zone. The labour camps would be established outside sanctuary limits.
6. No felling or trimming of trees would be allowed for widening and strengthening of road.
7. The work shall be not be executed between sunset and sunrise.
8. The User Agency shall bear the cost of mitigation measures to ensure wildlife conservation during pre-construction, construction and post-construction phases. For this purpose, 2% of the project cost under the sanctuary area, shall be deposited by the User Agency in CAMPA, under the head 'Additional Charges for Protected Areas'.

राज्य वन्यप्राणी पर्षद की 12वीं बैठक की कार्यवाही
(परिचालन द्वारा निष्पादित)

बिहार राज्य वन्यप्राणी पर्षद की 12वीं बैठक का निष्पादन परिचालन के माध्यम से किया गया। इस बैठक में वन्यप्राणी आश्रयणियां एवं ईको-सेंसेटिव जोन में गैर-वानिकी भूमि उपयोग तथा अन्य अवसंरचना संस्थापन/विकास कार्यों की अनुमति के लिए कुल 07 प्रस्ताव, जिनमें 02 प्रस्ताव का निष्पादन बिहार राज्य वन्यप्राणी पर्षद की अनुशंसा उपरान्त तथा शेष 05 प्रस्तावों का निष्पादन राष्ट्रीय वन्यप्राणी पर्षद की स्थायी समिति की अनुशंसा उपरान्त किया जाना है, पर विचार किया गया।

बैठक की कार्यवाली सूची एवं विस्तृत कार्यवाली का परिचालन पर्षद के सदस्यों के बीच किया गया। पर्षद के विभिन्न सदस्यों से प्राप्त मंतव्य/टिप्पणी/अनुशंसा के क्रम में राज्य वन्यप्राणी पर्षद एवं माननीय अध्यक्ष, राज्य वन्यप्राणी पर्षद का अनुमोदन संचिका संख्या-वन्यप्राणी-बि०रा०व०प्रा०प० (बैठक)-08/2021 में प्राप्त है। पर्षद के सदस्यों से प्राप्त सहमति तथा माननीय उपाध्यक्ष, राज्य वन्यप्राणी पर्षद एवं माननीय अध्यक्ष, राज्य वन्यप्राणी पर्षद द्वारा दिये गये अनुमोदन के आलोक में बैठक की कार्यवाही इस प्रकार है:-

रा.व.प्रा.प. 12.1-

विगत 11वीं बैठक (परिचालन द्वारा निष्पादित) की कार्यवाही की सम्पुष्टि

विगत बैठक की कंडिका 11.1	बैठक की कार्यवाही-वन्यप्राणी ज्ञापांक 214 दिनांक 18.03.2024 (संचिका संख्या-वन्यप्राणी-बि०रा०व०प्रा०प० (बैठक)-08/2021) द्वारा निर्गत कर सभी सदस्यों को उपलब्ध करायी गयी है। पर्षद द्वारा 11वीं बैठक की कार्यवाही संपुष्ट की गयी।
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रा.व.प्रा.प. 12.2-

10वीं तथा 11वीं बैठक में लिये गये निर्णयों का अनुपालन/प्रगति प्रतिवेदन

पर्षद की आगामी बैठक में प्रस्तुत किये जाने का निर्णय लिया गया।
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रा.व.प्रा.प. 12.3-

पूर्व के बैठकों में लिये गये निर्णयों का अनुपालन प्रतिवेदन (समयाभाव के कारण 10वीं बैठक में विचारित न किये जा सके बिन्दु)

पर्षद की आगामी बैठक में प्रस्तुत किये जाने का निर्णय लिया गया।
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रा.व.प्रा.प. 12.4 -

राज्य में वन्यप्राणी आश्रयणियों एवं इको-सेन्सिटिव जोन में गैर वानिकी भूमि उपयोग तथा अन्य अवसंरचना संस्थापन/विकास कार्यों की अनुमति के प्रस्ताव।

<p>रा.व.प्रा.प. 12.4.1 कैमूर वन्यप्राणी आश्रयणी अन्तर्गत वन्यप्राणी क्लीयरेंस संबंधी प्रस्ताव</p>	<p>12.4.1.1 भारतमाला परियोजना फेज-II (Lot-9/PKG-3) के अन्तर्गत वाराणसी से कोलकाता भाया-राँची, खड़गपुर ब्रांच सहित 4/6 लेन ग्रीनफील्ड एक्सप्रेस वे के निर्माण हेतु वन्यप्राणी क्लीयरेंस का प्रस्ताव</p> <p>Name of the Project: Construction of 4/6-lane access controlled Greenfield Expressway from Varanasi to Kolkata (Package-II) via Ranchi with spur to Kharagpur under Bharatmala Pariyojana Phase-II (Lot-9/Pkg-3), Proposal No.: WL/BR/ROAD/ 401942/2022, Area involved - 36.00 Ha forest land.</p> <p>सड़क, परिवहन एवं राजमार्ग मंत्रालय, भारत सरकार द्वारा NHAI के माध्यम से भारत-माला परियोजना, फेज-II (Lot-9/Pkg-3) के अंतर्गत वाराणसी से कोलकाता (Varanasi to Kolkata via Ranchi with spur to Kharagpur) तक एक 4/6 लेन access-controlled Greenfield Highway बनाया जाना है। इस परियोजना की कुल लम्बाई लगभग 642 किमी० है, जिसमें से लगभग 162 किमी० लम्बाई बिहार राज्य में पड़ेगी। राज्य के अंदर यह राजमार्ग कैमूर, रोहतास, औरंगाबाद एवं गया जिलों से गुजरेगा। प्रस्तावित एक्सप्रेस वे के निर्माण हेतु 33.18 हे० कैमूर वन्यप्राणी आश्रयणी क्षेत्र की भूमि तथा 2.82 हे० सुरक्षित वन भूमि का उपयोग प्रयोक्ता एजेंसी द्वारा किया जायेगा।</p> <p>इस संबंध में निम्नांकित तथ्य राज्य वन्यप्राणी पर्षद के विचारार्थ प्रस्तुत किये गये:-</p> <ol style="list-style-type: none"> 1. यह भारत सरकार की महत्वकांक्षी परियोजना है। रोहतास जिलान्तर्गत वाराणसी-कोलकाता ग्रीनफील्ड एक्सप्रेसवे 4/6 लेन (भाया राँची खड़गपुर) (74.100 -109.80 कि०मी०) कुल 35.70 कि०मी० में परियोजना का निर्माण होना है। इस परियोजना का अंश भाग लगभग 5.30 किमी० की लम्बाई कैमूर वन्यप्राणी आश्रयणी क्षेत्र में पड़ेगी। 2. इस 4/6 ग्रीनफील्ड एक्सप्रेस वे के अन्तर्गत आश्रयणी क्षेत्र में 4.51 कि०मी० की लम्बाई में सुरंग निर्माण का प्रस्ताव है। 3. प्रस्तावित सुरंग मार्गरेखन का निर्माण प्रस्तावित कैमूर टाईगर रिजर्व के कोर क्षेत्र के नीचे से गुजरेगा। 4. कैमूर आश्रयणी क्षेत्र के पहाड़/पठार में भूवैज्ञानिक सर्वेक्षण/अन्वेषण किये जाने हेतु राज्य वन्यप्राणी पर्षद की अनुशंसा के आलोक में वन्यप्राणी (संरक्षण) अधिनियम, 1972 के अन्तर्गत इस कार्यालय का पत्रांक-वन्यप्राणी 215 दिनांक 18.03.2024 द्वारा अनुमति प्रदान की गयी है। अद्यतन सर्वे कार्य NHAI द्वारा सम्पन्न करा लिया गया है एवं प्रतिवेदन प्राप्त हो गया है। 5. सचिव, पर्यावरण, वन एवं जलवायु परिवर्तन विभाग, बिहार की अध्यक्षता में दिनांक 03.06.2024 को भारतीय राष्ट्रीय राजमार्ग प्राधिकरण के प्रतिनिधियों के साथ बैठक हुई। इस बैठक में वाराणसी-कोलकाता ग्रीनफील्ड एक्सप्रेसवे परियोजना के संदर्भ में वन्यप्राणी (संरक्षण) अधिनियम, 1972 के अन्तर्गत वन्यप्राणी क्लीयरेंस हेतु भारत सरकार के दिशानिर्देशों के अनुसार आश्रयणी क्षेत्र के भीतर रैखिक परियोजना प्रस्तावों के लिए कम-से-कम तीन मार्गरेखन विकल्प (alignment options) चिन्हित करने का निदेश
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प्रयोक्ता एजेंसी को दिया गया। साथ ही यह औचित्य भी दर्शाया जाना चाहिए कि इन विकल्पों में से आश्रयणी से गुजरने वाले विकल्प का चयन ही क्यों आवश्यक है। इन निदेशों का अनुपालन NHAI द्वारा कर लिया गया है। NHAI द्वारा तीन मार्गरेखन विकल्प (alignment options) औचित्य के साथ उपलब्ध कराया गया है, जिसका संक्षिप्त विवरणी निम्नवत है:-

विवरणी	विकल्प-1	विकल्प-2	विकल्प-
प्रारम्भिक बिन्दु	चैनल 90+000 ग्राम दरिगाँव के निकट से, प्रखंड सासाराम	चैनल 00+000 ग्राम दरिगाँव के निकट से, प्रखंड सासाराम	चैनल 00 ग्राम दरिगाँव के निकट से, सासाराम
अंतिम बिन्दु	चैनल 104+400 ग्राम मालपुरा के निकट से, प्रखंड तिलौथु	चैनल 31+120 ग्राम मालपुरा के निकट से, प्रखंड तिलौथु	चैनल 15 ग्राम मालपुरा के निकट से, तिलौथु
लम्बाई (कि.मी.)	14.4	31.12	15.9

प्रयोक्ता एजेंसी द्वारा सूचित किया गया है कि सड़क, परिवहन एवं राजमार्ग मंत्रालय, भारत सरकार, पथ निर्माण विभाग, बिहार तथा पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार द्वारा उक्त मार्गरेखन विकल्प में से विकल्प-1 को तीव्र गति, कम यात्रा समय, कम परियोजना लागत, न्यूनतम पर्यावरणीय और सामाजिक व्यवधान को ध्यान में रखते हुए विकसित करने हेतु अंतिम रूप से चिन्हित किया गया है।

6. एक्सप्रेस वे एक उच्च स्तरीय सड़क मार्ग है। भारत सरकार का लक्ष्य है कि एक्सप्रेस वे के माध्यम से बड़े-बड़े नगरों के बीच तीव्र, बेहतर एवं सुरक्षित सम्पर्क सुविधा उपलब्ध हो सके। इसके अतिरिक्त औद्योगिक विकास में वृद्धि, कुशल/ अकुशल रोजगार का निर्माण हो सके तथा इसके किनारे पड़ने वाले गाँवों एवं जन सामान्य को तीव्र परिवहन का लाभ मिल सके।

उक्त प्रस्ताव को निम्नांकित शर्तों के साथ राष्ट्रीय वन्यप्राणी पर्वद के अनुमोदन हेतु अनुशासित किये जाने का प्रस्ताव राज्य वन्यप्राणी पर्वद के समक्ष प्रस्तुत किया गया:-

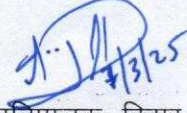
- 1) कैमूर वन्यप्राणी आश्रयणी की भूमि का वैधानिक स्वरूप यथावत रहेगा।
- 2) NHAI द्वारा समर्पित Geotechnical & Geophysical investigations प्रतिवेदन पर देश के प्रतिष्ठित NIT संस्थान से मंतव्य प्राप्त करने के उपरान्त परियोजना निर्माण कार्य क्रियान्वित किया जायेगा।
- 3) कैमूर वन्यप्राणी आश्रयणी एवं इसके Eco-sensitive Zone में वाराणसी से कोलकाता भाया-राँची, खड़गपुर ब्रांच सहित 4/6 लेन ग्रीनफील्ड एक्सप्रेस वे में Underground tunnel, Tunnel Portals, Construction of road/ bridge/ junctions के निर्माण की अनुमति दी जा सकती है किन्तु किन्हीं अन्य सुविधा संरचनाओं यथा टॉल प्लाजा, पेट्रोल पम्प, मोटल इत्यादि के निर्माण की

अनुमति नहीं होगी।

- 4) आश्रयणी क्षेत्र एवं इसके Eco-sensitive Zone में सड़क निर्माण एवं सुरंग निर्माण कार्य हेतु विस्फोटकों का प्रयोग वर्जित रहेगा।
 - 5) आश्रयणी क्षेत्र एवं इसके Eco-sensitive Zone में सड़क निर्माण एवं सुरंग निर्माण तथा इससे संबंधित कार्य यथासंभव सूर्योदय एवं सूर्यास्त के मध्य सम्पन्न किये जायेंगे।
 - 6) सड़क एवं सुरंग निर्माण कार्य/खनन के दौरान निकलने वाले टूटे-फूटे छोटे-बड़े पत्थर, खनिज पदार्थ आदि का सुरक्षित परिवहन के साथ आश्रयणी क्षेत्र के बाहर वन पदाधिकारियों के समन्वय एवं सहमति से सुरक्षित भंडारण प्रयोक्ता एजेंसी द्वारा सुनिश्चित किया जायेगा। ये सभी पदार्थ वन विभाग की सम्पत्ति होगी तथा इसका समुचित निस्तारण पर्यावरण, वन एवं जलवायु परिवर्तन विभाग, बिहार के द्वारा सुविधानुसार किया जायेगा।
 - 7) उक्त खनन पदार्थों के अतिरिक्त अपशिष्टों (Muck) का निस्तारण आश्रयणी के बाह्य क्षेत्र में समुचित रूप से प्रयोक्ता एजेंसी द्वारा किया जायेगा।
 - 8) सुरंग निर्माण के दौरान विद्युत यंत्रों/उपकरणों का समुचित ढंग से Electric Shock Proof Covered Wire (विद्युतरक्षी पदार्थ से ढके हुए तार) का प्रयोग सुनिश्चित किया जायेगा।
 - 9) निर्माण कार्यों के फलस्वरूप आश्रयणी पर पड़ने वाले कुप्रभावों के न्यूनीकरण हेतु वन प्रमण्डल पदाधिकारी अथवा ख्यातिप्राप्त एजेंसी द्वारा Wildlife Mitigation Measures Plan के अन्तर्गत समर्पित वन्यप्राणी प्रबंधन कार्य योजना की राशि प्रयोक्ता एजेंसी द्वारा परिवेश पोर्टल के माध्यम से कैम्पा फण्ड के Additional Charges for Protected Areas मद में जमा की जायेगी जो आश्रयणी क्षेत्र के अन्तर्गत निर्माण की राशि के 2 प्रतिशत से अनधिक होगी।
 - 10) प्रयोक्ता एजेंसी, संवेदक द्वारा एक्सप्रेसवे निर्माण कार्य में नियोजित कर्मी यथा निरीक्षकों/पर्यवेक्षकों/श्रमिकों इत्यादि के क्रम में वन्यप्राणी आश्रयणी अन्तर्गत आश्रयणी क्षेत्र एवं इसके संवेदी-पारिस्थितिकी जोन (ESZ) में किसी भी वन्यप्राणी को क्षति नहीं पहुँचाई जायेगी, वन सम्पदा का दोहन या विनष्टिकरण नहीं किया जायेगा तथा इन्हें बचाने के लिए सभी संभव प्रयास सुनिश्चित किये जायेंगे।
 - 11) आश्रयणी एवं इसके Eco-sensitive Zone में एक्सप्रेसवे निर्माण कार्य के दौरान मुख्य वन्यप्राणी प्रतिपालक, बिहार द्वारा विनिर्दिष्ट व्यावहारिक प्रतिबंधों एवं सावधानी का अनुपालन प्रयोक्ता एजेंसी द्वारा किया जायेगा।
 - 12) वन्यप्राणी हित में अन्य प्रासांगिक विनियमन को लागू किया जा सकेगा।
- उक्त शर्तों के अतिरिक्त पक्ष के सदस्यों द्वारा दिये गये सुझाव को निम्नवत् समाहित किया जाता है:-
- डा० नचिकेत केलकर द्वारा परियोजना का डी०पी०आर० एवं संगत दस्तावेज की मांगी की गयी है, जिसे उपलब्ध करा दिया जायेगा।
 - वन्यजीवों एवं अधिवास पर प्रतिकूल प्रभाव को कम करने के लिए सबसे कम

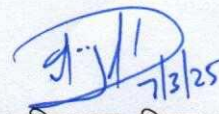
	<p>विनाशकारी और सबसे उन्नत सुरंग प्रौद्योगिकी का उपयोग प्रयोक्ता एजेन्सी द्वारा करना होगा।</p> <ul style="list-style-type: none"> • NHA के द्वारा निर्माण कार्यों के लिए आश्रयणी क्षेत्र के अन्दर समय-सीमा का उल्लेख होना चाहिए। • प्रयोक्ता एजेन्सी द्वारा जल एवं वायु प्रदूषण को रोकने हेतु अनिवार्य उपाय किये जाने चाहिए तथा निर्माण कार्यों के फलस्वरूप flora एवं fauna पर पड़ने वाले हानिकारक प्रभावों को कम करने का उपाय भी किया जाना चाहिए। <p>पर्वद द्वारा उपर्युक्त शर्तों के अधीन प्रस्ताव को अनुमोदित किया गया।</p>
<p>रा.व.प्रा.प. 12.4.2</p> <p>वाल्मीकि वन्यप्राणी आश्रयणी / वाल्मीकि व्याघ्र आरक्ष अन्तर्गत वन्यप्राणी क्लियरेंस संबंधी प्रस्ताव</p>	<p>12.4.2.1 वाल्मीकि वन्यप्राणी आश्रयणी में BSNL द्वारा भिखनाठोरी (एस०एस०बी० कैम्प) BoP अन्तर्गत 4जी मोबाईल टॉवर संस्थापन हेतु अनुमति का प्रस्ताव</p> <p>Name of the Project - Installation of new mobile tower by GOI through BSNL at Bhikhnathori (SSB CAMP), Block-Gaunaha, District-Bettiah, Bihar under 4G saturation project for provision of 4G Mobile services at BOP/BIPs location, Proposal No.: WL/BR/CommPost/468578/2024, Area involved - 0.02 Ha.</p> <p>भिखनाठोरी BoP (एस०एस०बी० कैम्प) अन्तर्गत मोबाईल टावर के संस्थापन हेतु 0.02 हे० वाल्मीकि वन्यप्राणी आश्रयणी/वाल्मीकि व्याघ्र आरक्ष क्षेत्र की भूमि का उपयोग भारत संचार निगम लि० (BSNL) द्वारा किया जायेगा। यह क्षेत्र वाल्मीकि व्याघ्र आरक्ष, प्रमंडल-1 के अन्तर्गत है।</p> <p>इस संबंध में निम्नांकित तथ्य राज्य वन्यप्राणी पर्वद के विचारार्थ प्रस्तुत किये गये:-</p> <ol style="list-style-type: none"> (1) मोबाईल टावर के संस्थापन से केवल भिखनाठोरी कैम्प के BoP में कार्यरत जवान/कर्मि एवं अन्य सरकारी कर्मि ही लाभ ले सकेंगे। इससे ऐसे उपभोक्ताओं को डाटा संप्रेशन और विडियो कॉन्फ्रेंसिंग उपलब्ध हो सकेगी। (2) इस टावर के संस्थापन से सरकारी प्राधिकरणों/ अधिकरणों/ प्रशासन/ पुलिस/ अपराध निवारण नियंत्रण एवं वन विभाग इत्यादि को सर्विलांस में सुविधा प्राप्त हो सकेगी। (3) उक्त परियोजना से वन एवं वन्यप्राणियों पर कोई प्रत्यक्ष प्रतिकूल प्रभाव नहीं होगा। (4) इससे डिजिटलीकरण में मदद मिलेगी, जिससे इन क्षेत्र में अपराध नियंत्रण हेतु दूरसंचार की सेवायें उपलब्ध हो सकेगी। (5) भारत की सीमा पर अवस्थित सुरक्षा बल के लिए काफी उपयोगी होगा। <p>उक्त प्रस्ताव को निम्नांकित शर्तों के साथ राष्ट्रीय वन्यप्राणी पर्वद के अनुमोदन हेतु अनुशंसित किये जाने का प्रस्ताव राज्य वन्यप्राणी पर्वद के समक्ष प्रस्तुत किया गया:-</p> <ol style="list-style-type: none"> 1) प्रयोक्ता एजेन्सी द्वारा मोबाईल टावर के संस्थापन में वन्यप्राणी आश्रयणी अन्तर्गत आश्रयणी क्षेत्र एवं इसके संवेदी-पारिस्थितिकी जोन (ESZ) में किसी भी वन्यप्राणी को क्षति नहीं पहुँचाई जायेगी, वन सम्पदा का दोहन या विनष्टिकरण नहीं किया जायेगा तथा इन्हें बचाने के लिए सभी संभव प्रयास सुनिश्चित किये जायेंगे। 2) मोबाईल टावर के संस्थापन कार्य के पूर्व, कार्य के दौरान तथा कार्य के बाद की अवस्था में आश्रयणी क्षेत्र के वन्यजीवों/वनस्पति के संरक्षण हेतु परियोजना लागत

	पर्वद द्वारा उक्त शर्तों के अधीन प्रस्ताव के अनुमोदन की अनुशंसा की गयी। पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार के पत्र F.No.-6-175/2017 WL (pt) दिनांक 07 फरवरी, 2023 द्वारा ऑप्टिकल फाईबर केबल संस्थापन प्रस्ताव की स्वीकृति हेतु शक्ति का प्रत्यायोजन राज्य वन्यप्राणी पर्वद को किया गया है। अतः वन्यप्राणी (संरक्षण) अधिनियम, 1972 के अन्तर्गत मुख्य वन्यप्राणी प्रतिपालक के स्तर से आवश्यक अनुमति प्रदान की जायेगी।
रा.व.प्रा.प. 12.5.3 माननीय सदस्य/ द्वारा कार्यावली के अतिरिक्त उठाये गये बिन्दु	(1) श्री दामोदर राउत, माननीय सदस्य, बिहार विधान सभा <ul style="list-style-type: none"> राज्य में नीलकंठ पक्षी की कम संख्या पर चिन्ता व्यक्त की गयी है। इसके संरक्षण हेतु एक कार्य-योजना तैयार करने एवं कार्यान्वित करने का सलाह दिया गया है। नागी-नकटी पक्षी आश्रयणी के संरक्षण-संवर्द्धन पर कार्य करने हेतु सलाह दिया गया है ताकि पर्यटकीय गतिविधियां बनी रहे। राज्य में लोमड़ियों की भी संख्या कम होने पर चिन्ता व्यक्त की गयी है। इसके संरक्षण हेतु कार्य-योजना बनाने का सलाह दिया गया है। <p>पर्वद द्वारा इसका संज्ञान लिया गया।</p>


 मुख्य वन्यप्राणी प्रतिपालक, बिहार-सह-
 सदस्य सचिव, राज्य वन्यप्राणी पर्वद

बिहार सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन विभाग
कार्यालय: प्रधान मुख्य वन संरक्षक, बिहार, पटना (वन्यप्राणी संभाग)
 अरण्य भवन, चतुर्थ तल, शहीद पीर अली खाँ मार्ग, पोस्ट-वेटनरी कॉलेज, पटना-800014,
 मोबाईल नं०-9473007788 email : cwlwbihar@gmail.com

ज्ञापांक-वन्यप्राणी- बि०रा०व०प्रा०प० (बैठक)-08/2021-139 **दिनांक - 7/03/2025**
 प्रतिलिपि: माननीय मुख्यमंत्री, बिहार-सह-अध्यक्ष, राज्य वन्यप्राणी पर्वद के प्रधान सचिव/माननीय मंत्री, पर्यावरण, वन एवं जलवायु परिवर्तन विभाग, बिहार-सह-उपाध्यक्ष, राज्य वन्यप्राणी पर्वद के आप्त सचिव/माननीय सदस्यगण, बिहार विधान सभा-सह-सदस्य, राज्य वन्यप्राणी पर्वद/सचिव, पर्यावरण, वन एवं जलवायु परिवर्तन विभाग, बिहार/प्रधान मुख्य वन संरक्षक (HoFF), बिहार/बिहार राज्य वन्यप्राणी पर्वद के अन्य सभी सदस्यों को सूचना एवं आवश्यक कार्रवाई हेतु प्रेषित।


 मुख्य वन्यप्राणी प्रतिपालक, बिहार-सह-
 सदस्य सचिव, राज्य वन्यप्राणी पर्वद

RW/NH-24036/144/2024-BP&SP-Part(1)
Government of India
Ministry of Road Transport & Highways
(BP&SP Cell)
Transport Bhawan, 1, Parliament Street, New Delhi-110001

Date: 03.06.2025
Meeting Number AAC/22/2024-25

OFFICE MEMORANDUM

Sub: Minutes of Meeting of the Alignment Approval Committee (AAC) held on 04.04.2025.

A meeting of the Alignment Approval Committee (AAC) was held under the chairmanship of Secretary (RT&H) on 04.04.2025 at 02:30 PM for the approval of alignment of the following project:

Agenda-1 – Construction of 6-lane Greenfield Varanasi- Kolkata Highway from Konki village to Lerua village balance section in the state of Bihar.

2. Based on the deliberations in the meeting, the minutes of the meeting are enclosed for kind perusal and necessary action.

Encl: As stated above

Avantika
03/06/25

(Avantika Rathore)

Assistant Executive Engineer (BP&SP)

Copy to:

- i. Chairperson, NHAI;
- ii. PSO to Secretary, RT&H;
- iii. PSO to DG (RD) & SS;
- iv. PSO to AS (H), RT&H;
- v. Sr. PPS to CE, BP&SP Cell & West Zone;
- vi. Sr. PPS to CE, Planning Cell;
- vii. Sr. PPS to CE, East Zone.

Minutes of Meeting for Alignment Approval Committee (AAC) held on 04.04.2025 at 02:30 PM chaired by Secretary (RT&H) at Transport Bhawan, New Delhi.

List of participants is attached at **Annexure-I**.

Agenda 1 – Construction of 6-lane Greenfield Varanasi- Kolkata Highway from Konki village to Lerua village balance section of Bihar state.

Member (P), NHAI has appraised that:

2.1 Background of the Corridor/Project

- The alignment of the Varanasi Ranchi Kolkata NH-319B highway was approved in the meeting held on 7th September, 2021 under the chairmanship of the then Secretary, RT&H. Accordingly, LA Committee approved the LA Plan on 82nd meeting held on 04-07-2022.
- The instant proposal is for balance for award section of NH-319 B in Bihar region. Due to pending wildlife clearances, the balance section could not be awarded under Bharatmala In order to complete the corridor, it is proposed to be taken up under NH(O).
- Meeting of Alignment Approval Committee was earlier held on 20.02.2025, where committee opined NHAI to explore the alternate brownfield option through existing State Highway 67 or any other alternative alignment and explore the feasibility of overlapping existing NH-19 and directed to resubmit the proposal at the earliest.

2.2 Alignment Option details presented before AAC

The comparison of alternate Alignment options as presented in meeting are as following:

S r. N o .	Description	Alternative 1 D etails (previou sly approved a lignment inclu ding tunnel)	Alternative 2 Details (o ver lapping SH-67 and NH-19)	Alternative 3 Details (o verlapping NH-19)	Alternative 4 Details (C omplete Gr eenfield wit hout tunnel)
1	Alignment Leng th (Km)	26+16 = 42.00	66.5	56.6	41.4
2	Proposed Lane Configuration	6- Lane Main Hi ghway + 4 lane spur	6- Lane Mai n Highway	6- Lane Mai n Highway	6- Lane Main Highway
		70 for Main Hig	60 for Main	60 for Main	

3	Proposed ROW (m)	Highway + 45 for s pur	Highway (NH-19) (45 for Dehri on Sone Portion)	Highway (NH-19) (45 for Dehri on Sone Portion)	70 for Main Highway
4	Length of Corresponding Existing Road to be Bypassed (km)	Complete green field	Existing + Green field	Existing + Green field	Complete greenfield
5	Use of Existing road	nil	39 km (SH-67 & NH-19)	18 km (NH-19)	nil
6	Geometrics	Design Speed- 120 kmph	Design Speed- 80/100 kmph	Design Speed- 80/100 kmph	Design Speed- 120 kmph
7	Tentative Land Acquisition (Hect.)	289	240	300	295
9	Bridges / Structures	Major Bridge- 01	Major Bridge- 01	Major Bridge- 01	Major Bridge - 01
		Minor Bridge- 16 Nos.	Minor Bridges- 20 Nos.	Minor Bridges- 22 Nos.	Minor Bridge - 18 Nos.
		VUPs/ LVUPs/ SVUPs/Flyovers - 40Nos.	VUPs/ LVUPs/ SVUPs/ Flyovers - 44Nos.	VUPs/ LVUPs/ SVUPs/ Flyovers - 45Nos.	VUPs/ LVUPs/ SVUPs/Flyovers - 46Nos. (Elevated structure will require at NH-19 location)
		Tunnel – 01 No.	(Elevated structure will require at NH-19 location)	(Elevated structure will require at NH-19 location)	Tunnel Nil

		ROB- 0 Nos.	ROB- 1 Nos	ROB- 1 Nos	RoB nil
		Interchanges- 02 Nos.	Interchanges- 02 Nos.	Interchanges- 02 Nos.	Interchanges- 02 Nos.
10	Forest Area (Hect.) (Reserve Forest, Protect Forest, Breeding Center etc.)	7.3	3.5	408	0
11	Structure Impacted	25 Nos. small type house	288 nos. small type and 58 nos. important buildings/houses.	202 nos. small type and 42 nos. important buildings/houses.	195 nos. small type and 20 nos. important buildings/houses.
12	Civil Cost (Rs. Crores)	3260	2810	2610	2589
13	Likely LA (Rs. Crores)	495	800	720	710
14	Overall Cost including maintenance, LA etc. (Rs. Crores)	4564	4520	4460	4292
	Recommended Option				Recommended

2.3 Stakeholder Consultation

The previous approved alignment is recommended by SBWL with a condition that use of explosive shall be prohibited.

2.4 Discussion in the Committee

- NHAI informed the committee that based on recommendation of SWLB, NBWL in its 82nd meeting held on 12th March 2025 has recommended the alignment of the tunnel with the condition of no use of explosive during construction. Considering this condition, the project will be economically unviable as tunnel construction

without use of explosive shall be quite costly and hence option with tunnel now will not be preferred since the use of TBM in place of controlled blasting method will increase the construction cost of project by about 50 %.

- ii. NHAI presented three no. of additional alignment options of balance section, where it was noted that the option 2 & 3 as opined by committee in previous meeting could not be considered as it will not able to fulfil the requirement of high speed corridor as several locations in the proposed option alignment is facing the speed restriction also overlapping with the existing NH-19 will not serve the requirement of additional high speed corridor.
- iii. Accordingly, option no. 4, i.e. complete green field outside the boundary of wildlife is recommended and agreed by the committee.

2.5 Status of Pre-Construction Activities

A) Land Acquisition	
Total Land Required	295Ha.
Land available	0 HA
Land to be acquired	295 Ha.
3 (A) Gazette notification	98.09 HA
3 (D) Gazette notification	83.79 HA
Status of 3(G)	54.82 HA
B) Wildlife Clearance	NA
C) Environmental Clearance	Environmental clearance granted by MoEF&CC in March 2023.
D) Forest Clearance	Revised proposal to be submitted for new alignment
E) ROB	Note Required
F) Irrigation Department	Note Required

3. After deliberations, the Alignment Approval Committee recommended the option 4 with 70m ROW for Main Highway for balance section of Varanasi-Kolkata Highway (NH-319B) in the state of Bihar.

4. The meeting ended with vote of thanks to the Chair.

Annexure-I

List of Participants

A. Ministry of Road Transport & Highways

- i. Shri V. Umashankar, Secretary (RT&H) - In Chair
- ii. Shri V. K. Rajawat, DG (RD) & SS
- iii. Shri Vinay Kumar, AS (Highway)
- iv. Shri Sudip Choudhury, ADG (North-I)
- v. Shri Manoj Kumar, CE (BP&SP)
- vi. Shri Rajesh Kumar, CE (Planning)
- vii. Shri Ajmer Singh, CE (East)
- viii. Shri Vishnu Murti, CE (RO, Patna through VC)
- ix. Shri Shashi Bhushan, SE (BP&SP)
- x. Shri Dheeraj, SE (East-I)
- xi. Shri Hitesh Jangid, EE (PD, Sheohar)
- xii. Shri Naresh Kumar Chopra, EE, RO Jaipur
- xiii. Shri Vipin Kumar, EE, RO Jaipur

B. NHAI

- i. Shri Anil Choudhary, Member (Project)
- ii. Shri L. P. Padhy, CGM (Tech)
- iii. Shri Navin Kumar, CGM (Tech)
- iv. Shri Bhaskar Mishra, GM (Tech)
- v. Shri Abhishek Lodhwal, Manager (Tech)
- vi. Shri Vikrant Thakur, Manager (Tech)
- vii. Shri Prashant Dwivedi, Dy. Manager (Tech)

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ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENTAL MANAGEMENT PLAN

For

Development of 4/6 lane (Greenfield) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 114.000 (near Tetarahar village) (the amended end chainage is Km. 131.955) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3), the amended length of the project is 58.155 (earlier length 40.2 km) by M/s National Highways Authority of India

Proposal No.	IA/BR/INFRA1/420526/2023
Total Length	58.155 Km

PROJECT PROPONENT:

National Highways Authority of India
(NHAI)



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ABBREVIATIONS

°C	: Degree Celsius	Dept.	: Department
°F	: Degree Fahrenheit	DFO	: Divisional Forest Officer
µmhos/cm	: micromhos per centimetre	DM&R	: Disaster Management & Relief
AADT	: Annual Average Daily Traffic	DO	: Dissolved Oxygen
AAQ	: Ambient Air Quality	E	: East
ANL	: Ambient Noise Level	E. coli	: Escherichia coli
APHA	: American Public Health Association	EAC	: Expert Appraisal Committee
AQ	: Air Quality	EC	: Environmental Clearance
ATM	: Automated Teller Machine	EIA	: Environmental Impact Assessment
Avg.	: Average	EMP	: Environmental Management Plan
BOD	: Biological Oxygen Demand	EP	: Environmental (Protection)
CaCO ₃	: Calcium Carbonate	ETC	: Electronic Toll Collection
CAGR	: Cumulative Annual Growth Rate	GoI	: Government of India
CALINE	: California Line Source Dispersion Model	GW	: Ground Water
CER	: Corporate Environmental Responsibility	Ha.	: Hectare
CGWB	: Central Ground Water Board	HDPE	: High-density Polyethylene
Cm	: Centimetre	HMP	: Hot Mix Plant
CO	: Carbon Monoxide	BSPCB	: Bihar State Pollution Control Board
COD	: Chemical Oxygen Demand	IA	: Impact Assessment
CPCB	: Central Pollution Control Board		
CPR	: Community Property Resource	IMD	: India Meteorological Department
Cr.	: Crore	INR	: Indian Rupee
cum	: Cubic Meter	IS	: Indian Standard
dB	: Decibels	PM	: Particulate Matter
DBM	: Dense Bituminous Macadam	PH	: Public Hearing
IUCN	: International Union for Conservation of Nature and Natural Resources	PHED	: Public Health Engineering Department
	: Importance Value Index		
Km/h	: Kilometre per Hour	PMC	: Project Monitoring Consultant
KM ²	: Square kilometre	PPP	: Public Private Partnership
LARR	: Land Acquisition, Rehabilitation and Resettlement	PUC	: Pollution Under Control
LCV	: Light Commercial Vehicles	PVC	: Poly Vinyl Chloride
Leq	: Equivalent Continuous Noise Level	PWD	: Public Works Department
LHS	: Left Hand Side	R&R	: Rehabilitation and Resettlement
LULC	: Land Use and Land Cover	RAP	: Resettlement Action Plan
LVUP	: Light Vehicular Under pass	RCC	: Reinforced Concrete Cement
m	: Meter	RHS	: Right Hand Side
MAV	: Multi Axle Vehicles	ROB	: Road Over Bridge
mm	: Millimetre	ROW	: Right of Way
MoEF&CC	: Ministry of Environment, Forest and Climate Change	SDM	: Sub Divisional Magistrate
MSL	: Mean Sea Level	SEIAA	: State Environment Impact Assessment Authority
N	: North	SH	: State Highways

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3)..

NAAQS	:	National Ambient Air Quality Standards	SIA	:	Social Impact Assessment
NBWL	:	National Board for Wildlife	SMA	:	Stone Matrix Asphalt
NH	:	National Highway	SO ₂	:	Sulphur Dioxide
NHAI	:	National Highways Authority of India	SO _x	:	Oxides of Sulphur
NOC	:	No-objection Certificate	SPCB	:	State Pollution Control Board
NO _x	:	Oxides of Nitrogen	SPL	:	Sound Pressure Level
NP	:	National Parks	Spp.	:	Species
PAF	:	Project Affected Family	sq. km.	:	Square kilometre
PAP	:	Project Affected Person	SVUP	:	Small Vehicular Underpass
PCU	:	Passenger Car Unit	SW	:	Surface Water
TDS	:	Total Dissolved Solids	TCS	:	Typical Cross Section
wt./ wt.	:	Weight/Weight			

Declaration by consultants

Declaration by the experts contributing to the preparation of **EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetaraha village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (Lot-9 package-3). Total Length – 58.155 Km by M/s National Highways Authority of India.** I hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

Signature :



Name of the EIA coordinator

: Mayank Kumar

Date

: 01.03.2023

Period of Involvement


: Jan 2022-till date

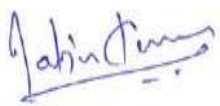
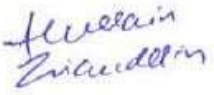

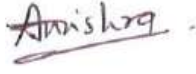

Organization: P and M Solution, C-88, Sector-65, Noida 201301, Uttar Pradesh

QCI/NABET Accredited EIA Consultant at S.No.162 as per List of Accredited consultant Organizations/ (Alphabetically) Rev. 20, March 11, 2022.

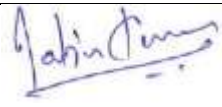

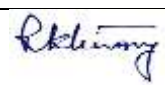
NABL approved Laboratory- Noida Testing Laboratory.

Functional Area Expert

S. No.	Functional Areas	Name of the Experts (Involvement period)	task	Signature & Date
1	Air pollution Monitoring, prevention and control- AP	Ms. Neha Singh (Jan 2022 – Jan 2023)	<ul style="list-style-type: none"> • Identification of Air Quality Monitoring Network • Supervision of ambient air quality monitoring • Review of primary air quality monitoring report and analysis • Addressing air quality issues in EIA Report and suggesting mitigation measures for impacts due to air pollution and review. • Review and analysis of primary meteorological data 	

2	Water pollution Monitoring, prevention and control-WP	Jatin Kumar Srivastava (Jan 2022 - till date)	<ul style="list-style-type: none"> • Identification of water sampling locations, their time and frequency pertaining to site conditions • Counter checking of analysis of data by literature study and consultation with local people and concerned departments • Identification of water quality by analysis report study and detection of potential hazards due to developmental activity • Checking of water availability by literature study and by interacting concerned Govt. Officials like GWB and irrigation dept. 	
3	Solid and Hazardous waste-SHW	Hussain Ziauddin & Amit Kumar (Jan 2022 - till date)	<ul style="list-style-type: none"> • Estimated the waste generation quantity due to various construction activity • Devising measures to minimize wastes; recycle and disposal • Identification methods of recycling and reuse Ensured incorporation of the same into the EIA report. 	 
4	Socio-Economic-SE	Mr. Abhay Nath Mishra (Jan 2022 - till date)	<ul style="list-style-type: none"> • Design and develop format/questionnaire for baseline survey, social changes arising out of development projects and assessment of data so collected • Evaluation of socio-economic status of tribal/ non- tribal areas • Assessment of social impact • Collection of secondary information Survey tool design • Reconnaissance study, transect walk • Community participation, Mitigation plan • Stakeholder consultation 	
5	Ecology and Biodiversity-EB	Manoj Kumar Pandey (Jan 2022 - till date)	<ul style="list-style-type: none"> • Visited site to identify the ecological condition of project area by direct field study and identification of major floral and faunal species • Identification of potential impact 	

			due to the project interventions and developing mitigation measures by direct field study and consulting the stakeholders like forest and wildlife officials, local people etc.	
6	Hydrology, Ground water and water conservation -HG	Mr. Tapan Majumdar (Jan 2022 - till date)	<ul style="list-style-type: none"> • Identification of the water sources and drainage pattern • Analyze them to identify the likely impacts • Devise mitigation measures and assisted in preparation of the EIA report. 	<i>T. Majumdar</i>
7	Geologist- GEO	Mr. Tapan Majumdar (Jan 2022 - till date)	<ul style="list-style-type: none"> • Identification of nature of geology of the project area • Identification of areas likely to be affected by soil erosion • Devised protection measures for embankment slope and water bodies 	<i>T. Majumdar</i>
8	Soil Conservation s-SC	Jatin Kumar Srivastava (Jan 2022 - till date)	<ul style="list-style-type: none"> • Identification of soil quality and soil type for establishing the baseline conditions • Assessing the impact on soil due to various activities of the project • Suggest mitigation measures to control the adverse impact • Preparation of report for incorporation in the EIA 	<i>Jatin Kumar</i>
9	Meteorology , Air quality and modelling and prediction- AQ	Mr. Neha Singh (Jan 2022 - till date)	<ul style="list-style-type: none"> • Analysis of air quality data, meteorological data, traffic data etc. as per the requirements of Pollution Dispersion model (Caline 3) • Assessment of secondary data requirements for modeling, collection of secondary data like mixing height, stability class etc. • Predict air quality using pollution dispersion model (Calaine 3) • Interpretation, analysis and presentation of predicted results of pollution dispersion modeling • Review and finalization of report 	<i>Singh</i>

10	Noise and Vibration- NV	Jatin Kumar Srivastava (Jan 2022 - till date)	<ul style="list-style-type: none"> • Identification of Noise Quality Monitoring Network and noise sensitive location along the project stretch • Supervision of ambient noise quality monitoring • Review of noise quality monitoring report • Addressing noise related issues in EIA report and suggesting measures for impacts due to noise pollution • Analysis of noise quality data, traffic data etc. as per the requirement of mathematical model of Dhawani pro. Interpretation, analysis and presentation of predicted results. 	
11	Land Use- LU	Mrs. Poonam Kumari Mangalam (Jan 2022 - till date)	<ul style="list-style-type: none"> • Identification and collection of satellite images and other associated maps for the project area • Creation of GIS data base and processing of satellite imageries • Devised measure to save sensitive and productive land uses by suggesting option of realignment, bypass and eccentric widening • Analysis of land use map and incorporation of land use details into EIA 	
12	Risk & Hazard - RH*	Dr R K Tewari (Jan 2022 - till date)	<ul style="list-style-type: none"> • Identification of the potentially hazardous material and events that might occur during various phases of the project • Devising contingency plan for each type of hazard • Incorporation of the same in the EIA report 	

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3)..

Declaration by the Head of the Accredited Consultant Organization/Authority

I, Rahul Kumar, hereby, confirm that the above-mentioned experts prepared the EIA for Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (Lot-9 package-3). Total Length – 58.155 Km by M/s National Highways Authority of India. I also confirm that I shall be fully accountable for any mis-leading information mentioned in this statement.



Name: Rahul Kumar

Designation: CMD

Name of the EIA Consultant Organization: P and M Solution, C-88, Sector-65, Noida 201301, Uttar Pradesh

NABET Certificate No. & Issue Date: S.No.133 as per List of Accredited consultant Organizations/ (Alphabetically) Rev. 20, January 17, 2023

CHAPTER 1 – INTRODUCTION

1.1 INTRODUCTION

The Ministry of Road Transport and Highways (MORTH), Government of India has proposed “Bharatmala Pariyojana” an Umbrella scheme of road development project through National Highways Authority of India (NHAI), National Highway, Industrial Development Corporation Ltd (NHIDCL) and State Public Works Departments (PWD) at an estimated cost of INR 5,35,000 crores. This is the second largest highways construction project in the country after NHDP, where in almost 50,000 km of roads are targeted across the country. This project aims to improve connectivity particularly on economic corridors, border areas and to remote areas with an aim of rapid and safe movement of cargo to boost exports. International trade considered as a key aspect in this scheme and North-eastern states have been given special focus.

SA infrastructure Consultant Pvt. Ltd. 1101A, 11th Floor, Tower A-II, Corporate Park, Plot no. 7A/1, Sector 142, Noida, U.P has been appointed as consultant to carry out consultancy services for the preparation of DPR and P & M Solution, C-88, Sector 65, Noida, U.P has been appointed as Environment consultant to carry out consultancy service for Environment Impact Assessment (EIA) report.

The proposed length of Varanasi-Kolkata Expressway (Package-1 to Package-5) is approximately 612.00 kms whose range is limited to (CH 00+000 to CH 612+000).

This introduction is about Package-2.

The Spur Joining Varanasi-Kolkata Expressway starting from Km 73.800 (near Rampur village) 24°56'25.80"N, 83°47'22.32"E and ends at Km 131.955 (near Tetaraha village) (previously Km 73.800 to Km 114.000) 24°45'30.75"N, 84° 7'8.37"E in Bihar passing through districts Rohtas & Aurangabad in the state of Bihar.

Scope of present report is confined to the (Ch. 73+800 to Ch. 131+955). The Proposed Right of Way is 70 m in genral and 90 m in Hill cutting section which all the configurations shall be fitted with. This is a green field alignment, and is proposed for 4/6-Lane. The proposed length of Project Highway is about 58.155 kms.

The road passes through the important talukas like Chenari, Shesagar, Sasaram, Tilouthu in Rohtas district & Nabinagar in Aurangabad district in the state of Bihar.

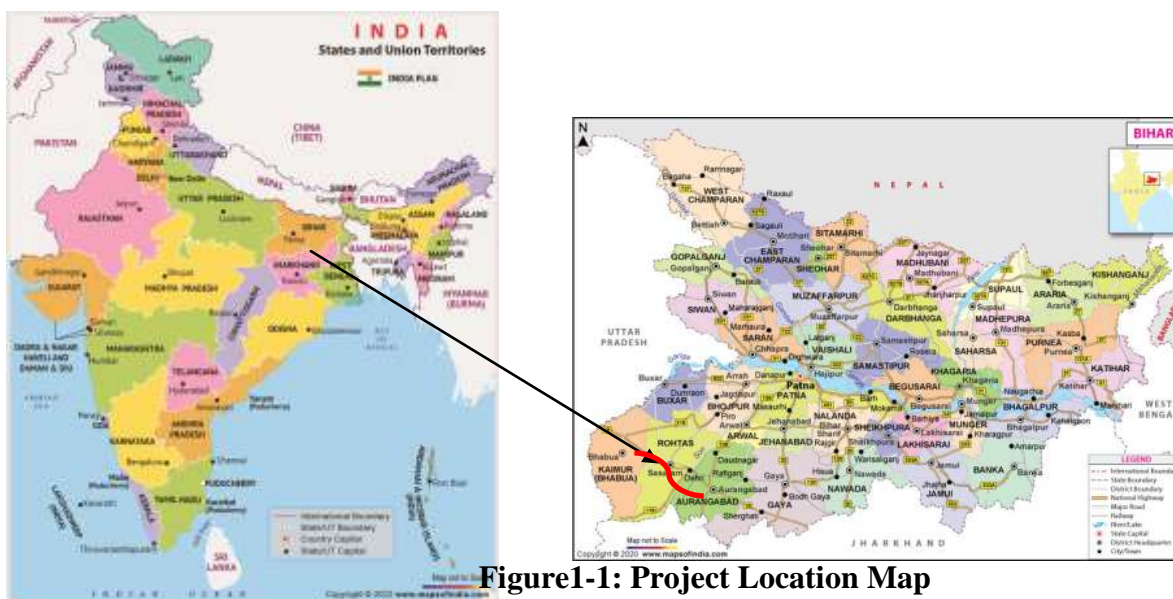


Figure1-1: Project Location Map

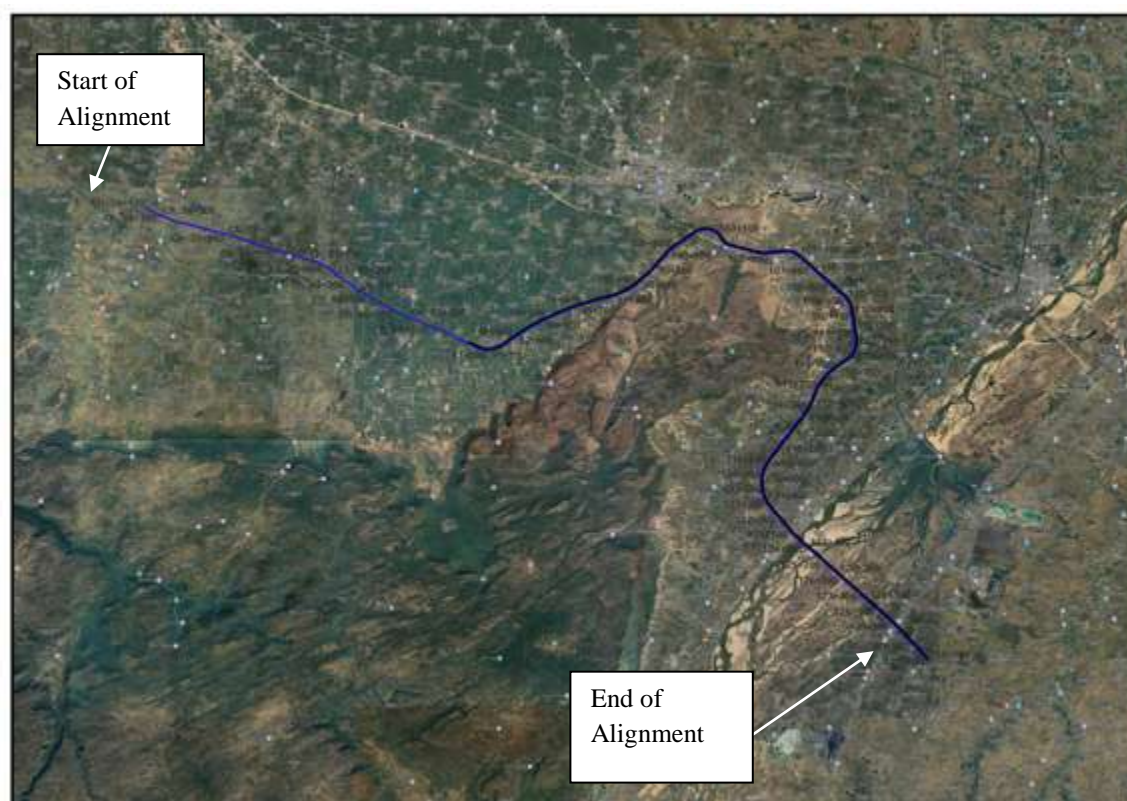


Figure 1-2: Key Plan of the project Alignment (Option 2)

1.2 PURPOSE OF THE REPORT

The purpose of this Environmental Impact Assessment (EIA) is to incorporate environmental concerns at the project planning level. The EIA has been carried out at the project planning and design stage as part of preliminary report to ensure that the project is environmentally feasible. The general objectives of EIA study are as follows:

- i. to provide information about the environmental settings of the project area as baseline data;
- ii. to provide information on potential impacts of the project and the characteristic of the impacts, magnitude, distribution, the affected group and their duration;
- iii. to provide information on potential mitigation measures to minimize the impact including mitigation costs;
- iv. to assess the best alternative project at most benefits and least costs in terms of financial, social and environment; and
- v. To provide basic information for formulating management and monitoring plan.
- vi. To provide an estimate for the budget proposed for environmental impact mitigation and management.

This EIA is structured in accordance with the requirements of the MoEF&CC.

1.3 SCOPE OF EIA STUDY

The scope of the EIA includes the following:

- i. To carry out Environment Impact Study including Environmental Impact Assessment (EIA) in accordance with MoEF&CC & State Government of Bihar guidelines;
- ii. To carry out the preliminary environmental screening to assess the direct and induced impacts due to the project works;
- iii. To assess and document the baseline environmental conditions relevant to the project;
- iv. To assess the potential positive and negative significant impacts due to the project and identify the cost effective mitigation measures to address these impacts adequately in the Environmental Monitoring and Management Plan (EMMP);
- v. To do the analysis of alternatives incorporating environmental concerns and the associated costs in the economic analysis.
- vi. To give special attention to the environmental enhancement measures in the projects for the following:

- Tree plantation along the project road;
 - Cultural property enhancement along the project roads;
 - Bus bays including a review of their location;
- vii. Traffic safety provisions like Guard post, Road Delineators, Metal Beam Crash Barrier along the Project roads, depending upon the site requirements, and
- viii. Re-development of the borrow, quarry areas located on public land.
- ix. To prepare EIA report adequate public consultation and the recommendations arising thereon.
- x. To identify all mitigation measures in the EIA and EMMP.
- xi. To provide additional inputs in the areas of performance indicators and monitoring mechanisms for environmental components during construction and operational phase of the project.
- xii. To provide the cost of mitigation measures and to ensure that environmental related staffing, training and institutional requirements are budgeted in project cost.
- xiii. The objective of this EIA study is to identify potential environmental impacts of the proposed highway and formulate strategies to avoid / mitigate the same.

1.4 METHODOLOGY

The methodology used for this study is based on the procedures described in MoEF&CC Environmental Impact Assessment Notification dated 14th September 2006 and amendments thereon.

The Environmental Impact Assessment has been carried out using current Government of India guidelines, specifically:

- Project Terms of Reference (TOR) granted by MoEF&CC through 260th meeting of Expert Appraisal Committee held on 5th - 6th April, 2021
- Environmental Impact Assessment Notification dated **14th September 2006**, Ministry of Environment and Forest (MoEF&CC) and amendment, Government of India;
- The Environmental (Protection) Act, 1986 of Government of India;
- Environmental guidelines for Road/Rail/Highway Projects, 1989, MoRTH, Government of India;
- Handbook of environmental procedures and guidelines, 1994, MoRTH, Government of India; and Guidelines for Environmental Impact Assessment of Highway Projects (IRC: 104-1988).

1.5 LITIGATION STATUS

According to the NHAI, no litigation (s) pending against the proposed project and there are no directions from any court of law/any-statutory authority against the project.

1.6 ENVIRONMENTAL LEGISLATIONS

Ministry of Environment, Forest and Climate Change (MoEF&CC): The primary responsibility for administration and implementation of the GoI policy with respect to environmental management, conservation, ecologically sustainable development and pollution control rests with the MoEF&CC Established in 1985; the MoEF&CC is the agency primarily responsible for review and approval of EIA's pursuant to GoI legislation. The MoEF&CC has set up regional offices responsible for collecting and furnishing information relating to EIA projects, pollution control measures, enforcement of legislations and environmental protection in special conservation areas such as wetlands, mangroves and biological reserves.

State Pollution Control Board (SPCB): The objective of SPCB is to control, prevent and abate pollution in the state to protect the environment from degradation by effective monitoring and implementation of state pollution control legislations and are also involved in implementation, supervision and monitoring activities pertaining to Central Pollution Control Acts and Rules vests with the Central Pollution Control Board (CPCB), Government of India.

The Government of India has formulated various policy guidelines; acts and regulations aimed at protection and enhancement of environmental resources. The following **Table 1.3** summarizes the existing legislations pertaining to the project, the various clearances required for the project and the status as on date.

Table 1-1: Summary of Relevant Environmental Laws & Regulations

Sl.No	Law/ Regulation/ Guidelines	Objectives	Implementing/ Responsible Agency
1.	The Environmental (Protection) Act. 1986, and its rules	The Umbrella Act for protection and improvement of the environment. Establishes the standards for emission of noise in the atmosphere.	MoEF&CC; GoI; Department of Forest, GoB; CPCB; SPCB,

Sl.No	Law/ Regulation/ Guidelines	Objectives	Implementing/ Responsible Agency
2.	Environmental Impact Assessment Notification (2006) and amendments made there after	To provide environmental clearance to new developmental activities following environmental impact assessment	MoEF&CC; GoI; CPCB; SPCB,
3.	Notification for use of Fly ash, 2016	Promoting the utilization of fly ash in the manufacture of building materials and in construction activity within a specified radius of 300 kilometers from coal or lignite based thermal power plants.	MoEF&CC, SPCB
4.	The Water (Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of pollutants as per prescribed standards	CPCB;SPCB
5.	The Air (Prevention and Control of Pollution) Act. 1981	Empowers to control air pollution by controlling emission of air pollutants as per prescribed standards, SPCB to set and monitor air quality standards and to prosecute offenders, excluding vehicular air and noise emission.	CPCB; SPCB &Transport Department; State Govt.
6.	Noise Pollution (Regulation and Control) Act, 1990. Noise Pollution (Regulation And Control) Rules (2000) The Noise Pollution	To regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards with respect to noise.	CPCB; SPCB, & Transport Department of State Government

Sl.No	Law/ Regulation/ Guidelines	Objectives	Implementing/ Responsible Agency
	(Regulation and Control) Amendment Rules(2006)		
7.	Indian Forest Act 1927, The Forest (Conservation) Act. 1980, Forest (conversion) Rules 1981, Forest Conservation Rules (Notification)2003	To consolidate the laws related to forest, the transit of forest produces and the duty livable on timber and other forest produce. Conservation of Forests, Judicious use of forest land for non-forestry purposes; and to replenish the loss of forest cover by Compensatory Afforestation on degraded forest land and non-forestland. Procedure for submission of the proposals seeking approval for Central Government for diversion of forest land to non-forest purposes.	MoEF&CC; Department of Forest, State Government
8.	National Forest Policy 1952, National Forest Policy (Revised) 1988	To maintain ecological stability through preservation and restoration of biological diversity.	Forest Department, GoI and State Government of Bihar
9.	National Environment Appellate Authority Act (NEAA) 1997	Address Grievances regarding the process of environmental clearance.	National Environment Appellate Authority
10.	The National Highway Act (1956)	For Land Acquisition	NHAI; Revenue Department, GoB
11.	The Land Acquisition Act 1894	Set out rule for acquisition. Of land by government	Revenue Department State Government.

Sl.No	Law/ Regulation/ Guidelines	Objectives	Implementing/ Responsible Agency
12.	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (also Land Acquisition Act, 2013)	For payment of compensation and assistance, different entitlements payment of compensation and Assistance, resettlement, and rehabilitation of project affected population due to acquisition of lands and structures.	NHAI, Competent Authority (Revenue Department)
13.	WildLifeProtectionAct ,1972The Wildlife (Protection) Amendment Act (2002)	To protect wildlife in general and National Parks and Sanctuaries in particular. To protect wild animals, birds and plants with a view to ensure the ecological and environmental security of the country.	Chief Conservator of Wildlife, Wildlife Wing, Forest Department, State Government National/ State Board for Wildlife
14.	Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010)	To provide for the preservation of Ancient and historical monuments and archaeological sites and remains of national importance and protection sculptures, carvings and other like objects.	Archaeological Department, GoI; Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH)
15.	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989	To consolidate and amend the laws related to motor vehicles. Licensing of driving of motor vehicles, registration of motor vehicles, with emphasison road safety standards and pollution	RTO Office, GoB

Sl.No	Law/ Regulation/ Guidelines	Objectives	Implementing/ Responsible Agency
		control measures, standards for transportation of hazardous and explosive materials To check vehicular air and noise pollution.	
16.	The Explosives Act (& Rules)1884 (1983)	Sets out the regulations as to regards the use of explosives and precautionary measures while blasting & quarrying.	Chief Controller of Explosives
17.	Public Liability and Insurance Act, 1991	Protection to the general public from accidents due to hazardous material	SPCB
18.	Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016	Protection to the general public against improper handling and disposal of hazardous wastes	SPCB
19.	Minor Mineral and concession Rules, 2004	For opening new quarries.	District Collector
20.	The Mining Act (1952)	The mining act has been notified for safe and sound mining activity.	Department of mining, GoB
21.	Chemical Accidents (Emergency Planning, Preparedness and Response) Rules,1996	Protection against chemical accident while handling any hazardous chemicals resulting.	District & Local Crisis Group headed by the DM and SDM
22.	Construction and Demolition Waste Management Rules	To promote an integrated approach, whereby environmental management of construction and	MoEF&CC, SPCB

Sl.No	Law/ Regulation/ Guidelines	Objectives	Implementing/ Responsible Agency
	2016	demolition waste is given due consideration through out the duration of the project	

1.6.1 THE ENVIRONMENT (PROTECTION) ACT, 1986

The Environment (Protection) Act, popularly known as EP Act, is an umbrella a legislation that supplements existing environmental regulations. Empowered by the EP Act, the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India has issued the following notifications regulating siting of industry and operations, procuring clearance to establish industries and development of projects with appropriate EIA studies, coastal zone regulations and other aspects of environment are:

- Empowers the Government of India (section 6) to make rules to regulate environmental pollution by stipulating standards and maximum allowable limits to prevent air, water, noise, soil and other environmental pollutants.
- Prohibits operations that emit pollutants more than standards (section 7).
- Regulates handling of hazardous substances and identifies persons responsible for discharges and pollution prevention (section 9).
- Section 17 deals with offences committed by Government Departments.
- Formulated Environmental (Protection) Rules, 1986, Hazardous Wastes (Management and Handling) Rules, 1989 and Manufacture, Storage & Import of Hazardous Chemical Rules, 1989 in accordance with the sections 6, 8 and 25 of EP Act.
- The act has been supplemented with EIA notification 2006.

1.6.2 ENVIRONMENTAL IMPACT ASSESSMENT NOTIFICATION, 2006

The primary responsibility for administration and implementation of the GoI policy with respect to conservation, ecologically sustainable development and pollution control rests with the Ministry of Environment, Forests and Climate Change (MoEF&CC). The MoEF&CC is responsible to enforce the regulations established pursuant to the National Conservation Strategy, National Forest Policy,

1988, the Policy for Abatement of Pollution (1992) and the Indian Environmental (Protection) Act 1986, revised in 1994 and amendments thereafter.

The GoI EIA Notification on the Environmental Clearances (September 14, 2006) replacing the EIA Notification of 1994, sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/ projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. The categorization for highways and roads projects is as given in **Table 1-2**.

Table 1-2: Categorization of Highway & Road Projects

Project or Activity		Category with threshold limit		Conditions if any
		A	B	
7(f)	Highways	New National Highway sand Expansion of National Highways greater than 100km involving additional right of way or land acquisition greater than 40m on existing alignments and 60m on realignments or by-passes.	All New State Highway projects ii) State expansion Highway projects in hilly terrain (above 1,000m AMSL) and or ecologically sensitive areas	General Condition shall apply. Note: Highway include expressways

Source: MoEF & CC's EIA Notification 2006 and its amendments thereafter

Category A projects requires EC from the National's Ministry of Environment, Forest and Climate Change (MoEF&CC).

Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA).

General Condition (GC): Any project or activity specified in Category 'B' will be treated as Category A, if located in whole or in part within 5km from the boundary of:

- Protected Areas notified under the Wildlife (Protection) Act, 1972,
- Critically Polluted areas as notified by the Central Pollution Control Board from time to time,
- Notified Eco-sensitive areas,
- Inter-State boundaries and international boundaries.

1.6.3 WATER (PREVENTION AND CONTROL OF POLLUTION) ACT, 1974

Water (Prevention and Control of Pollution) Act is the first environmental regulation that brought at the state and central levels, the pollution control boards to control/ regulate environmental pollution in India. Amended twice in 1978 and 88, the Act vests regulatory authority on the State Pollution Control Boards and empowers them to establish and enforce effluent standards for industries and local authorities discharging effluents.

- Section 73 vests regulatory authority on the State Pollution Control Boards and empowers them to enforce effluent discharge standards to prevent water pollution (both for industries and local authorities)
- Section 24 of the act prohibits use of stream or well or on land disposal for polluting substances that violate disposal standards laid down by the board
- Section 25 of the act requires an application to be made to the state board to establish any treatment and disposal system that is likely to discharge sewage or trade effluent into a stream or well or sewer on land
- Sections 41 and 44 provide for penalties for not complying with the various provisions or directives of the board
- Section 48 deals with offences committed by Government Departments
- Section 55 asserts that all local authorities shall render help & assistance and furnish information to the board as required for discharge of functions, and shall make available to the board, for inspection and examination, such records, maps, plans and other documents as may be necessary.

1.6.4 AIR (PREVENTION AND CONTROL OF POLLUTION) ACT, 1981

Like Water Act, the Air Act provides regulatory authority from the State Pollution Control Boards and empowers them to enforce air quality standards for the prevention of air pollution in the country. Section 21 of the act requires an application to be made to the state board to establish or operate any industrial operation.

1.6.5 FOREST (CONSERVATION) ACT, 1980 AS AMENDED IN 1988, 2003

As per Section 26 of Indian Forest Act, 1927 several activities are prohibited in forest areas and prior approval is required from the Central government to use forest land for non-forest purposes. The Forest(Conservation) Act, 1980 prohibits large-scale diversion of forest land for non-forest use. As

amended in 1988, no State Government or authority shall make such diversions except with the prior approval of the Central Government.

1.6.6 WILDLIFE PROTECTION ACT, 1972

This act is promulgated to provide for the protection of wild animals, birds and plants and formatters connected therewith. The provisions under this act are covered below:

- Section 9 of the Act mentions that no person shall hunt any wild animal.
- The act prohibits picking, uprooting, damaging, destroying, acquiring any specified plant from any forest land
- It bans the use of injurious substances, chemicals, explosives that may cause injury or endanger wildlife in a sanctuary
- No alteration of the boundaries of a National Park shall be made except on are solution passed by the Legislature of State
- Destruction or damage of wildlife property in a National Park is prohibited

1.6.7 MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES, 1989, 2016

These rules aim at controlling the generation, storage and import of hazardous chemicals. According to these rules, the user of hazardous chemicals has to perform the following and dispose hazardous waste as mentioned in the rules:

- Identify the potential hazards of the chemicals and take adequate steps to prevent and control such hazards
- Develop or provide information about the chemical in the form of safety data sheets
- Label the specified information on the container of the hazardous chemical

1.6.8 THE MOTOR VEHICLES ACT, 1988

In 1988, the Indian Motor Vehicles Act empowered the State Transport Authority (usually the Road Transport Office) to enforce standards for vehicular pollution prevention and control. The authority also checks the emission standards of registered vehicles, collects road taxes and issues licenses. In August 1997, the Pollution under Control certificate (PUC) program was launched as an attempt to crack down on the vehicular emissions in the States. Since this act is applicable for all states, this will be applicable for this project.

1.6.9 ANCIENT MONUMENTS AND ARCHAEOLOGICAL SITES AND REMAIN ACT, 1958

An Act formulated for the preservation of ancient and historical monuments and archaeological sites and remains of national importance, for the regulation of archaeological excavations and for the protection of sculptures, carvings and other like objects.

1.6.10 ANCIENT MONUMENTS AND ARCHAEOLOGICAL SITES AND REMAIN (AMENDMENT AND VALIDATION) ACT, 2010

This act clearly demarcates the buffer area surrounding the protected monument into prohibited area (100m) and regulated area (200m). Thus, the construction related activities shall be prohibited within the buffer area.

1.6.11 THE RIGHT TO FAIR COMPENSATION AND TRANSPARENCY IN LAND ACQUISITION, REHABILITATION AND RESETTLEMENT ACT, 2013

In India, anewbill, Land Acquisition and Rehabilitation and Resettlement Bill has been passed by the Parliament in 2013 to repeal the Land Acquisition Act of 1894. This is the first National/Central Law about Rehabilitation & Resettlement of families affected and displaced because of land acquisition. Only R&R provisions will apply when private companies purchase land for a project, and the same exceeds the area thresholds set by the State Governments for such purchase.

As per this Act, compensation will be given within a period of three months from the date of the award. Where an award has been made but the affected individuals have not accepted compensation or have not yet given up possession, and the proceedings have been pending for 5years or more, provisions of the new law will apply. This Act stipulates mandatory consent of at least 70% of affected people for acquiring land for Public Private Partnership (PPP) projects and 80% for acquiring land for private companies. Under the new legislation, compensation for the owners of the acquired land will be four times the market value in rural areas and twice in urban areas. It also stipulates that the land cannot be vacated until the entire compensation is awarded to the affected parties.

1.6.12 OTHER LEGISLATION APPLICABLE TO ROAD CONSTRUCTION PROJECTS

Environmental issues during road construction stage generally involve equity, safety and public health issues. The road construction agencies require complying with laws of the land, which include inter alia, the following:

- ***Workmen's Compensation Act 1923*** (the Act provides for compensation in case of injury by accident arising out of and during the course of employment);
- ***Payment of Gratuity Act, 1972*** (gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years);
- ***Employees PF and Miscellaneous Provision Act 1952*** (the Act provides for monthly contributions by the employer plus workers);
- ***Maternity Benefit Act, 1951*** (the Act provides for leave and some other benefits to women employees in case of confinement or miscarriage, etc.);
- ***Contact Labor (Regulation and Abolition) Act, 1970*** (the Act provides for certain welfare measures to be provided by the contractor to contract labour);
- ***Minimum Wages Act, 1948*** (the employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the act);
- ***Payment of Wages Act 1936*** (it lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers);
- ***Equal Remuneration Act, 1979*** (the Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees);
- ***Payment of Bonus Act, 1965***: The Act provides for payments of annual bonus subject to a minimum of 83.3% of wages and maximum of 20% of wages);
- ***Industrial Disputes Act, 1947***: The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment);
- ***Industrial Employment (Standing Orders) Act; 1946*** (the Act provides for laying down rules governing the conditions of employment);
- ***Trade Unions Act, 1926*** (the Act lays down the procedure for registration of trade unions of workers and employers. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities);

- ***Child and Adolescent Labour (Prohibition and Regulation) Act, 1986*** (the Act prohibits employment of children below 14-18 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in Building and Construction Industry);
- ***Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979*** (the inter-state migrant workers, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home to the establishment and back, etc.);
- ***The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996*** (all the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act; the employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for Workers near the workplace, etc.);
- ***The Factories Act, 1948*** (the Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours and rendering information-regarding accidents or dangerous occurrences to designated authorities);

1.6.13 MORTH & IRC SPECIFICATIONS

Specifications for Road and Bridge Works, Fourth Revision, MORTH, Published by IRC, 2001

All road works in India are to be in accordance with the MoRTH specifications for road and bridge works and guidelines of Indian Roads Congress (IRC). The MoRTH specifications have special provisions towards protection of environment under Clause 501 and the contractor is to satisfy the provisions. Apart from the clause 501, there are provisions for control of erosion, drainage, dust suppression, borrow area and haul road management under relevant sections. Provisions of clause 501 cover the environmental aspects as given in **Table: 1-3**.

Table 1-3: Environmental aspects as per clause 501 of IRC, 2001

General	The contractor shall take all necessary measures and precautions to carry out the work in conformity with the statutory and regulatory environmental requirements
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	<p>The contractor shall take all measures and precautions to avoid nuisance or disturbance from the work. It shall be precautionary measures than abatement measures taken after generation of nuisance</p> <p>In the event of any spoil, debris, waste or any deleterious material from site being deposited on adjacent land, the same shall be removed and affected area shall be restored to its original state</p>
Water	<p>The contractor shall prevent any interference with supply/ abstraction of water resources</p> <p>Water used for dust suppression shall be reused after settlement of material in collected water</p> <p>Liquid waste products to be disposed of such that it does not cause pollution</p> <p>No debris is to be deposited or disposed into/ adjacent to water courses</p>
Air	<p>The contractor to devise and arrange methods to control dust, gaseous or other air borne emissions in such a way that adverse impacts on air quality is minimized</p> <p>Dust shall be minimized from stored material and stockpiles by spraying water</p> <p>Covering of material likely to rise dust during transport is to be covered with tarpaulin</p> <p>Spraying of water on haul roads if found necessary</p>
Noise	<p>The contractor shall use all necessary measures to reduce noise from construction equipment and maintain all silencing equipment in good condition</p>
Control of wastes	<p>No uncontrolled disposal of wastes shall be permitted. The contractor shall make specific provisions for disposal of all forms of fuel and engine oil, all types of bitumen, cement, surplus aggregate, gravels, bituminous mixtures etc. conforming to local regulations and acceptance of the engineer</p>
Emergency Response	<p>The contractor shall plan and provide for remedial measures in case of occurrence of emergencies as spillages of oil, bitumen or chemicals</p>

In addition to the above conditions, avoidance measures and control of activities having potential for generation of environmental impacts are devised. These include:

Section 111	Precautions for safeguarding the environment
Clause 201.2	Preservation of Property/Amenities during clearing and grubbing
Clause 301.3.2	Stripping and storing of topsoil for reuse during excavation for roadway and drains
Clause 302.4	Restriction on timings for blasting operations
Clause 304.3.6	Public safety near towns and villages where excavation is carried out
Clause 305.2.2.2	Locations of borrowing and relevant regulations
Clause 305.3.3	Stripping and storing of topsoil at borrow locations
Section 306	Soil erosion and sedimentation control
Clause 407.4.2	Provisions for turfing on median and islands
Section 517	Recycling of bituminous pavement and excavated material
Clause 701.2.1	Use of geotextiles for control of soil erosion
Section 810	Use of Metal beam crash barriers for safety, relevant regulations and specifications
Clause 1010	Quality of water for curing and construction
Clause 2501	Precaution during river training works

Guidelines for Environmental Impact Assessment, IRC: 104-1988, IRC SP108:2015

The guidelines endorse application of Environmental Protection Act, 1986 for highway projects. It recommends that the methods of measuring air pollution should be in conformance with IS: 5182-1977 and in case of noise pollution: IS: 3028-1980, Measurement of noise emitted by moving road vehicles; IS: 4758-1968, Method of measurement of noise emitted by machines; IS: 10399-1982, Method of measurement of noise emitted by stationary road vehicles are to be followed. As regards Highway aesthetics, use of provisions made in IRC: SP: 21-1979, Manual on landscaping of roads are to be followed.

Guidelines for Environmental Impact Assessment, IRC: 104-198891.

The guidelines endorse application of Environmental Protection Act, 1986 for highway projects. It recommends that the methods of measuring air pollution should be in conformance with IS: 5182-1977 and in case of noise pollution: IS: 3028-1980, Measurement of noise emitted by moving road vehicles; IS: 4758-1968, Method of measurement of noise emitted by machines; IS:10399-1982, Method of measurement of noise emitted by stationary road vehicles are to be followed. As regards

Highway aesthetics, use of provisions made in IRC: SP: 21-1979, Manual on landscaping of roads are to be followed.

Table1-4: COMPLIANCE OF TOR DATED 25.04.2022

S.NO	CONDITIONS	REPLY	Reference
SPECIFIC CONDITIONS			
1.	NHAI will design the alignment as per the suggestions of the concerned Forest Department of Govt. of Jharkhand with necessary structural provisions for safe passage of wildlife and re-alignment for saving of forest patch.	Agreed	-
2.	Cumulative impact assessment study to be carried out along the entire stretch including the other packages in the current stretch under consideration.	The cumulative impact assessment will be submitted during submission of application of grant of EC of Package-V.	Refer Annexure-III for Detail status report.
3.	The proponent shall carry out a detailed traffic flow study to assess inflow of traffic from adjoining areas like airport/urban cities. The detailed traffic planning studies shall include complete design, drawings and traffic circulation plans (taking into consideration integration with proposed alignment and other state roads etc.). Wherever required adequate connectivity in terms of VUP (vehicle underpass)/ PUP (Pedestrian underpass) needs to be included.	Details regarding traffic studies and adequate connectivity in terms of VUP (vehicle underpass) PUP (Pedestrian underpass) is given in Chapter 2 of the EIA report. Accordingly, 02 Major Bridge, 01 Major Bridge cum Under Passes, 13 Minor Bridge, 12 Minor Bridge cum Under Passes 03 VUP, 08 LVUP, 04 flyovers, 59 Box culverts are provided along the project	Please refer Chapter-2 Section 2.4 page no. 2-14 to 2-17 and section 2.3.3 page no. 2-9 to 2-11. Refer Annexure-II for Detailed traffic analysis report.

		alignment.	
4.	Road safety audit (along with accident/black spots analysis) by any third-party competent organization at all stages namely at detailed design stage, construction stage and pre-opening stage to ensure that the project road has been constructed considering all the elements of road safety.	Road safety has been carried out detail of road safety audit has been given as Annexure XI.	Please refer Annexure XI.
5.	Provide compilation of road kill data on the wildlife on the existing roads (national and state highways) in the vicinity of the proposed project. Provide measures to avoid road kills of wildlife by the way of road kill management plan.	Road kill and accident data has been asked from the respective department and awaiting the receipt of the same. The safety measures of road kill has been provided in the chapter 5.	
6.	The alignment of road should be such that the cutting of trees is kept at bare minimum and for this the proponent shall obtain permission from the competent authorities. Alignment also should be such that it will avoid cutting old and large and heritage trees if any. All such trees should be geo-tagged, photographed and details be submitted in the EIA-EMP report.	Approx. 9.749 ha of forest land under Rohtas forest division of road/canal/railway side crossing that needs to be diverted for construction of proposed highway. There is approximately 2357 no. of trees (1620 no. of trees on non-forest land and approx. 737 of trees on protected forest). Joint tree enumeration with forest department has been completed for some portion and for some portion it is in progress. The	Please refer chapter 4, section 4.7.5.1, table 4-35, and page no. 4- 90 to 4-92. Refer Annexure-IV for Detailed tree list.

		Details of tree inventory is enclosed in chapter 4 of the EIA report with brief of Girth size. The tree felling will be restricted within construction zone and will be saved as best as possible.	
7.	The proponent shall carry out a comprehensive socio-economic assessment and also impact on biodiversity with emphasis on impact of ongoing land acquisition on the local people living around the proposed alignment. The Social Impact Assessment should have social indicators which can reflect on impact of acquisition on fertile land. The Social Impact Assessment shall take into consideration of key parameters like people's dependency on fertile agricultural land, socio-economic spectrum, impact of the project at local and regional levels.	The alignment does pass through forest area; EB study has been carried out for the impact on biodiversity. Conservation plan for the schedule I species (Indian Peafowl, Sloth Bear, Indian Leopard) is also enclosed as Annexure XVII. SIA studies carried out as per key parameters and has been discussed in Chapter 4 and its impact has been studied and given Chapter 5 of the EIA report.	Please refer Chapter 4, section 4.6, page no. 4-46 to 4-85. Please refer section chapter 5, section 5.7 page no 5-40 to 5-42.
8.	Passage/s for animal movement has to be detailed in the report (irrespective of an alignment is passing through Forest/protected/ecologically important area) in consultation with state forest department	02 Major Bridge, 01 Major Bridge cum Under Passes, 17 Minor Bridge, 26 Minor Bridge cum Under Passes 6 VUP, 21 LVUP, 04 flyovers, 136 Box culverts will help in crossing of the animals in habitat areas.	
	Green Belt/Tree Cutting		

9.	A comprehensive plan for plantation of three rows of native species, as per IRC guidelines, shall be provided in consultation with state forest department including the costs involved. Such plantation alongside of forest stretch will be over and above the compensatory afforestation. Tree species should be same as per the forest type	Road side and Medium Plantation will be carried out as per IRC-SP-2009 on available RoW. It is submitted three RoWs can only be planted in rural areas and where no structures proposed.	
	Compliance of Circulars/OM		
10.	As per the Ministry's Office Memorandum F. No. 22-65/2017-IA.III dated 30 th September, 2020, the project proponent, based on the commitments made during the public hearing, shall include all the activities required to be taken to fulfil these commitments in the Environment Management Plan along with cost estimates of these activities, in addition to the activities proposed as per recommendations of EIA Studies and the same shall be submitted to the Ministry as part of the EIA Report. The EMP shall be implemented at the project cost or any other funding source available with the project proponent.	All commitment made during Public Hearing is included in design & civil cost. Environment Management plan with cost estimates are given Chapter 9.	Please refer chapter 9 section 9.4, table 9-3, page no. 9-35 to 9-37.
11.	In pursuance of Ministry's OM no.	All commitment made during	Refer Annexure V

	stated above the project proponent shall add one annexure in the EIA Report indicating all the commitments made by the PP to the public during public hearing and submit it to the Ministry and the EAC.	public hearing has been given in chapter 7 of the EIA report.	
12.	The Action Plan on the compliance of the recommendations of the CAG as per Ministry's Circular No. J-11013/71/2016-IA.I (M), dated 25th October, 2017 needs to be submitted at the time of appraisal of the project and included in the EIA/EMP Report.	All the recommendations made in circular via Circular No. J-11013/71/2016-IA.I (M), dated 25th October, 2017 has been complied in the EIA report.	

GENERAL CONDITIONS

Project Description and Design

i)	Brief description of the project, project name, nature, size, its importance to the region/state and the country shall be submitted.	The Proposed highway starts at village from Km 73.800 (near Rampur village) 24°56'25.80"N,83°47'22.32" E and ends at Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) 24°45'30.75"N, 84°7'8.37"E in passing through districts Rohtas & Aurangabad in the state of Bihar. Scope of present report is confined to the (Ch.73+800	Please refer Chapter 2.
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		<p>to Ch. 114+000).</p> <p>The Proposed Right of Way is 70 m in genral and 90 m in Hill cutting section which all the configurations shall be fitted with. This is a green field alignment, and is proposed for 4/6-Lane. The proposed length of Project Highway is about 58.155 kms.</p> <p>The road passes through the districts of Rohtas & Aurangabad through important towns Chenari, Shesagar, Sasaram, Tilouthu and Nabinagar in the state of Bihar.</p>	
ii)	Details of any litigation(s) pending against the project and/or any directions (orders) passed by any court of law/any statutory authority against the project to be detailed out.	No litigation(s) and/or any directions or orders passed by any court of law/any statutory authority against the project.	
iii)	Bridge design in eco sensitive area mountains be examined keeping in view the rock classification hydrology etc.	Noted	
iv)	Examine the road design standards, safety equipment specifications and Management System training to ensure that design details take account of safety	The traffic management plan along with existing traffic scenario and traffic forecast is provided Chapter 2 of the EIA	Please refer Chapter 2 section 2.4 page no. 2-14 to 2-17.

	concerns and submit the traffic management plan.	report of this report.	
Forest/Green Belt			
iv)	In case the project involves diversion of forests land, guidelines under OM dated 20.03.2013 shall be followed and necessary action be taken accordingly,	Approx. 9.749 ha of forest land under Rohtas forest division and protected forest of road/canal/railway side crossing that needs to be diverted for construction of proposed highway. Forest Diversion proposal has been prepared as per the guidelines and consultation with concerned authorities and submitted on the Parivesh portal of MoEF&CC (Online proposal no. FP/BR/ROAD/553192/2025) on 26.09.2025 under the provision of FCA, 1980. The proposal is under examination by the concerned Forest Divisions.	
v)	The information shall be provided about the details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. The details of	There is approximately 2357 no. of trees (1620 no. of trees on non-forest land and approx. 737 of trees of trees on protected forest). Joint tree enumeration with forest department is under progress.	Please refer Chapter 4, section 4.7 page no. 4-85 to 4-125. Refer Annexure IV for Tree list.

	compensatory plantation shall be submitted. The possibilities of relocating the existing trees shall be explored.	<p>Trees shall be cut with the approval of competent authority.</p> <p>The proposed alignment finalizations are geometry design endeavoured to conserve the maximum amount of trees especially those that are falling outside the construction zone.</p> <p>The possibilities of relocating of existing trees shall be finalized in consultation with DFO.</p> <p>2 nos. of trees shall be planted for every tree to be cut. Compensatory afforestation would be carried out as per the state Forest Guidelines.</p>	
vi)	Necessary green belt shall be provided on both sides of the highway with proper central verge and cost provision should be made for regular maintenance.	<p>Approximately 19938 numbers of trees and shrubs will be planted along the roadside and in median portion respectively.</p> <p>The plantation shall be carried out as per IRC: SP: 21-2009 guidelines and Green Highway Policy-2015.</p> <p>Adequate space has been left on both sides of the road for</p>	<p>Please refer Chapter 9, Section 9.3, table 9-2, page no. 9-34.</p> <p>Please refer Chapter 9, section 9.4, table 9-3 page no. 9-35 to 9-37 for EMP budget.</p>

		greenbelt development apart from the plantation at median.	
vii)	Land use map of the study area to a scale of 1: 25,000 based on recent satellite imagery delineating the crop lands (both single and double crop), agricultural plantations, fallow lands, waste lands, water bodies, built-up areas, forest area and other surface features such as railway tracks, ports, airports, roads, and major Industries etc. along with detailed ground survey map on 1:2000 scale showing the existing features falling within the right of way namely trees, structures including archaeological & religious, monuments etc. if any, shall be submitted.	Detail land use study with Land use map has been given in chapter 4 of EIA report.	Please refer chapter 4 section 4.2.2, figure 4-5, page no. 4-7 to 4-8.
viii)	If the proposed route involves tunneling, the details of the tunnel and locations of tunneling with geological structural fraction should be provided. In case the road passes through a flood plain of a river, the details of micro-drainage, flood passages and information on flood periodicity at least of the last 50 years in the area shall be examined and submitted.	NA. Details regarding Tunnels are provided in Chapter 2 of the EIA report. The proposed project doesn't pass through the flood plain of any river. Bridges are proposed at all river crossings. Hence, no such study is required. Also the rivers being crossed by the road are not flood prone.	Refer sectionPage no.of Chapter 2 of the EIA report.

Project alignment passing through ESA/ESZ etc

ix)	If the project is passing through/located within the notified ecologically sensitive zone (ESZ) around a notified National Park/Wildlife Sanctuary or in the absence of notified ESZ, within 10 km from the boundary of notified National Park/Wildlife Sanctuary, the project proponent may simultaneously apply for the clearance for the standing committee of NBWL. The EC for such project would be subject to obtaining the clearance from the standing committee of NBWL.	The alignment does pass through Kaimur wild life sanctuary. 10 km buffer map is provided. NBWL clearance is under process. The application for seeking recommendation from NBWL has been submitted via application no. SW/100834/2022 dated 20.10.2022.	Please refer Chapter 4 section 4.1.1 figure 4-1 page no. 4-1 to 4-2. Refer Annexure VIII for 10 km buffer map clearly showing distance of nearest wild life sanctuary.
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Flora/Fauna

x)	Study regarding the animal bypasses/underpasses etc. across the habitation areas shall be carried out. Adequate cattle passes for the movement of agriculture material shall be provided at the stretches passing through habitation areas. Underpasses shall be provided for the movement of Wild animals.	Total 178 including 02 MJB, 26 MNR, 109 Culverts & 41 elevated/ Flyover/ LVUP/SVUP/ etc.) are proposed to be provided	Please refer chapter 2, section 2.3 page no. 2-6 to 2-14.
xi)	Study regarding in line with the recent guidelines prepared by Wildlife Institute of India for linear infrastructure with strong emphasis on animal movement and identifying crossing areas and mitigation measures to avoid wildlife mortality.	Total 178 including 02 MJB, 26 MNR, 109 Culverts & 41 elevated/ Flyover/ LVUP/SVUP/ etc.) are proposed to be provided Section 2.3 page no. 2-6 to 2-14.	
xii)	If there is a possibility that the construction/widening of road may cause an impact such as destruction of forest,	Approx. 9.749 ha of forest land under protected forest of road/canal/railway side	Please refer Chapter 5 section 5.6.3 page no. 5-

	poaching or reduction in wetland areas, examine the impact and submit details.	crossing that needs to be diverted for construction of proposed highway. Compensatory afforestation is planned to neutralize the effects of tree felling. There is no reduction in wetland area involved in the project. Suitable number of bridges and cross drainage structures shall be provided to avoid the impact on water bodies. Details of bridges and structures are provided in chapter 2 of EIA report.	40.
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Alignment

xiii)	Detailed alignment plan, with details such as nature of terrain (plain, rolling, hilly), land use pattern, habitation, cropping pattern, forest area, environmentally sensitive areas, mangroves, notified industrial areas, sand dunes, sea, rivers, lakes, details of villages, tehsils, districts and states, latitude and longitude for important locations falling on the alignment by employing remote sensing techniques followed by “ground truthing” and also through secondary data sources shall be submitted.	The project site is characterized by mostly plain terrain. The land-use pattern of the project is mostly agricultural with patches of protected forest and some settlements. Detailed regarding land use and environmental sensitive area has been in Chapter 4.	Please refer chapter 4 section 4.2 page no. page no. 4-3 to 4-19. Please refer figure 4-4, Refer Annexure-VI for Alignment plan. Refer Annexure-VII for Environmental Sensitivity map.
xiv)	Describe various alternatives considered,	3 different alternatives have	

	procedures and criteria adopted for selection of the final alternative with reasons.	been considered for the project. Proposed alignment has been found most suitable option in terms of Technical suitability, Socio-Economic and Environment impact associated. The detailed analysis of Alternatives has been provided in Chapter 5 of this report.	
xv)	If the proposed route is passing through a city or town, with houses and human habitation on either side of the road, the necessity for provision of bypasses/diversions/under passes shall be examined and submitted. The proposal should also indicate the location of wayside amenities, which should include petrol stations/service centres, rest areas including public conveyance, etc.	This is a Greenfield highway project. The Road is not passing through any major urban settlement. Traffic crossover facilities in the form of interchanges, under passes are provide to facilitate the traffic cross over in the entire project length. Details are provided in chapter 2 of the EIA report. There is also provison of toll plaza, Bus/truck bayes. Details have been given in chapter 2 of EIA report.	Please refer chapter 2 section 2.3-page no. 2-6 to 2-14.
xvi)	Details about measures taken for the pedestrian safety and construction of underpasses and foot-over bridges along with flyovers and interchanges shall be submitted.	Various safety measures are taken for pedestrian safety. Provision of traffic signals at intersections, direction boards and reflectors etc.	Please refer chapter 2 section 2.3 page no.2-6 to 2-14. Please refer

			chapter 7 section 7.3.3 page no. 7-7 to 7-15.
xvii)	The possibility that the proposed project will adversely affect road traffic in the surrounding areas (e.g. by causing increases in traffic congestion and traffic accidents) shall be addressed.	The proposed project is Greenfield in nature and shall reduce the traffic congestion on existing alternate roads.	Please refer Chapter 8 section 8.1 page no. 8-1 to 8-4.
xviii)	If the proposed route is passing through any hilly area, the measures for ensuring stability of slopes and proposed measures to control soil erosion from embankment shall be examined and submitted.	The proposed project doesn't pass through any hilly area. The project stretch is not prone to any kind of landslide or rock-fall.	
xix)	In case of river/creek crossing, details of the proposed bridges connecting on either banks, the design and traffic circulation at this junction with simulation studies.	There are three major bridges in the proposed alignment. A detail has been given in chapter 2 of EIA report.	Please refer Chapter 2 Section Section 2.3 Page No. 2-6 to 2-14 Please refer Annexure-XIII.
xx)	If there will be any change in the drainage pattern after the proposed activity, details of changes shall be examined and submitted.	There is no change in drainage pattern due to the project. Sufficient nos. of culverts are provided to maintain the natural drainage pattern of the area.	
xxi)	In case of bye passes, the details of access control from the nearby habitation/habitation which may come up after the establishment of road.	Proposed project is Greenfield in nature.	
xxii)	Details to ensure free flow of water in	Bridge / culvert (as the case	Please refer

	case the alignment passes through water bodies/river/streams etc.	may be) are proposed on water bodies. Hence, free flow of the water bodies shall not be affected.	Chapter 2 Section 2.3 Page No. 2-6 to 2-15.
Recycle/Reuse of Material			
i)	The details of use of fly ash in the road construction, if the project road is located within the 100 km from the Thermal Power Plant shall be examined and submitted.	The proposed project stretch is about 50 Km from NTPC Nabinagar Bihar In compliance to Fly Ash Notifications S.O. 763(E) dated 14 Sept 1999, its amendment notification on S.O 979(E) dated 27 Aug 2003, notification S.O 2804(E) dated 3 Nov 2009 and amendment notification dated 25th January, 2016 by MoEF&CC, Fly ash shall be utilized in proposed road..	Please refer chapter 5 Section 5.2.1 page no. 5-5 to 5-8.
ii)	The possibilities of utilizing debris/waste materials available in and around the project area shall be explored. The details on compliance with respect to Research Track Notification of Ministry of Road, Transport and Highways shall be submitted.	We have examined and we did found no such waste in the Area. IRC and MoRTH guidelines will be followed.	Please refer chapter 1 section 1.6.13 page no. 1-17 to 1-19.
iii)	The details of sand quarry and borrow area as per OM No.2-30/2012-IA-III dated 18.12.2012 on 'Rationalization of procedure for Environmental Clearance	Nine Borrow area locations have been identified along the project roads which are within 5 km periphery of project site.	Please refer chapter 5 section 5.2.1, Fig 5-1 & 5-2, Table 5-2, 5-

	for Highway Projects involving borrow areas for soil and earth” as modified vide OM of even No. dated 19 th March 2013, shall be examined and submitted.	One sand quarry and one aggregate quarry has been identified for the proposed project.	3 & 5-4, page no. 5-5 to 5-8. Please Refer Annexure IX for Borrow area and quarry details.
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Data Collection

iv)	Climate and meteorology (max and min temperature, relative humidity, rainfall, frequency of tropical cyclones and snow fall); the nearest IMD meteorological station from which climatological data have been obtained to be indicated.	The nearest IMD station from the project stretch is Dehri. Information for Climate and meteorology of Varanasi observatory is provided in of Chapter 4 of this report.	Please refer Chapter 4 section 4.4 page no. 4-30 to 4-33.
v)	The water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality and likely impacts on them due to the project along with the mitigation measures shall be examined and submitted.	The proposed alignment is crossing through Durgauti Nadi at design km 74+160, Belwai Nadi at design km 77+917, Dhansol Nadi, Dhunsoot River at design km 82+358, Dhoba Nadi km 96+000, Son River at design km 110+160 it also passes through other water bodies along the alignment for that suitable structures have been proposed to maintain the natural drainage pattern of these water bodies. The design of Major Bridge is designed in such a way that all	Please refer Chapter 5 section 5.4 page no. 5-30 to 5-34 for mitigation measures.

		the parameters has been taken in considered.	
vi)	The details of water quantity required and source of water including water requirement during the construction stage with supporting data and also classification of ground water based on the CGWA classification, shall be examined and submitted.	The total water demand of the project is 1250 KLD, The requirement would be sourced through Surface water for construction purpose: Construction purpose Domestic consumption and utilities requirement. (135 KLD). Gardening/ green belt development. (60 KLD). Dust Suppression(3 KLD)	
vii)	Accident data and geographic distribution shall be reviewed and analyzed to predict and identify trends in case of expansion of the existing highway and provide Post accident emergency assistance and medical care to accident victims.	It is a new project. Hence, not required.	

Pollution Control

i)	The air quality monitoring shall be carried out as per the notification issued on 16 th November, 2009, Input data used for Noise and Air quality modelling shall be clearly delineated.	The air quality monitoring has been carried out as per the new notification issued on 16 th November, 2009 and is given in Chapter 4 of this report. Air quality modelling is provided in Chapter 5 of EIA report.	Please refer chapter 4 section 4.4.1 page no.4-33 to 4-42. Please refer chapter 5 section 5.2.2 page no. 5-10 to 5-21.
ii)	The project activities during construction	Construction phase	Please refer

	and operation phases, which will affect the noise levels and the potential for increased noise resulting from this project, shall be identified. Discuss the effect of noise levels on nearby habitations during the construction and operational phases of the proposed highway. Identify noise reduction measures and traffic management strategies to be deployed for reducing the negative impact if any. Prediction of noise levels shall be done by using mathematical modelling at different representative locations.	Operation of DG sets dozers, trucks and batching plants. Operation phase Plying of vehicles The mitigation measures for reducing the effects of the above are provided in Chapter 5 of this report.	chapter 5 section 5.3 page no. 5-21 to 5-30.
iii)	The impact during construction activities due to generation of fugitive dust from crusher units, air emissions from hot mix plants and vehicles used for transportation of materials and prediction of impact on ambient air quality using appropriate mathematical model, description of model, input requirement and reference of derivation, distribution of major pollutants and presentation in tabular form for easy interpretation shall be examined and carried out.	The impacts of the construction activities due to generation of fugitive dust are provided in Chapter 5 of this report. Mathematical modeling of ambient air along with incremental load is provided in Chapter 5 of this report.	Please refer Chapter 5 section 5.2.2 page no. 5-10 to 5-21.
iv)	The details about the protection to existing habitations from dust, noise, odour etc. during construction stage shall be examined and submitted.	Measures for Dust and Noise controls are discussed in respective section of Chapter 5. IRC guidelines shall be	Please refer Chapter 5 section 5.3 page no. 5-21 to 5-30

		followed for traffic safety while passing through the habitat.	
v)	If the proposed route involves cutting of earth, the details of area to be cut, depth of cut, locations, soil type, volume and quantity of earth and other materials to be removed with location of disposal/ dump sites along with necessary permission.	Total 9 locations of borrow area for the proposed Highway have been identified that are within 5 km periphery of project site. The excavation from these areas would be carried out after having agreement with the owner. The rehabilitation of borrow are would be carried out after construction as per IRC and MoRT&H guidelines.	Please refer Chapter 5 section 5.2.1 page no.5-5 to 5-8. Please refer Annexure-IX.
vi)	If the proposed route is passing through low lying areas, details of filling materials and initial and final levels after filling above MSL shall be examined and submitted.	The project route doesn't pass through any low lying area.	Please Refer Annexure- X.
Safety			
vii)	The details of measures taken during constructions of bridges across rivers/ canals/major or minor drains keeping in view the flooding of the rivers and the life span of the existing bridges shall be examined and submitted. Provision of speed breakers, safety signals, service lanes and foot paths shall be examined at	Since it is a Greenfield project, there are no existing bridges. In this project, 02 Major Bridge, 01 Major Bridge cum Under Passes, 17 Minor Bridge, 26 Minor Bridge cum Under Passes 6 VUP, 21 LVUP, 04 flyovers, 136 Box	Please refer Annexure XI. Details regarding provision of speed breakers, safety signals, service lanes and foot paths.

	appropriate locations throughout the proposed road to avoid accidents.	culverts. The life spans of the structures are considered as per the relevant IRC standards. The approach roads for all the bridges are with adequate width to avoid sharp turns.	
viii)	The details of road safety, signage, service roads, vehicular under passes, accident prone zones and the mitigation measures, shall be submitted.	The location of underpasses and other wayside amenities are provided in the Chapter 2 of this report. Its impacts and mitigation measures are discussed in Chapter 4 of the report.	Please refer Chapter 2 section 2.3 Page No. 2-6 to 2-14. Please refer Chapter 4 section 5.7.4 Page no. 5-42 to 5-43.
ix)	IRC guidelines shall be followed for widening & upgradation of roads.	The entire road design has been carried out based on IRC/MORTH guidelines.	
x)	Details of blasting if any, methodology/technique adopted, applicable regulations/permissions, timing of blasting, mitigation measures proposed keeping in view mating season of wildlife.	No blasting is required in this project.	

Other Details

xi)	Rain water harvesting pit shall be at least 3 - 5 m above the highest ground water table. Provisions shall be made for oil and grease removal from surface runoff.	Rain water harvesting pits has been kept more than 5 mtrs above the highest ground water table. In addition, the oil interceptors will considered in design to avoid water contamination.	Please refer Chapter 5 section 5.4.3 page no. 5-31 to 5-34.
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xii)	The details of social impact assessment due to the proposed construction of the road shall be submitted.	Outcome of Social Impact Assessment is discussed in Chapter 4 of the EIA report.	Please refer Chapter 4 section 4.6 page No. 4-46 to 4-85. Please refer Annexure-XII.
xiii)	If the proposed project involves any land reclamation, details shall be provided of the activity for which land is to be reclaimed and the area of land to be reclaimed.	Not required.	
xiv)	Details of the properties, houses, business activities etc likely to be effected by land acquisition and an estimation of their financial losses, shall be submitted.	A total of 164 structures are likely to be affected by the construction of the project.	Please refer Annexure-XII.
xv)	Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternative livelihood concerns/employment and rehabilitation of the displaced people, civil and housing amenities being offered, e.t.c and the schedule of the implementation of the specific project, shall be submitted.	The R & R Plan has been prepared based on right to fare compensation and transparency in Land Acquisition, rehabilitation and resettlement act 2013.	Please refer Annexure-XII
xvi)	The environment management and monitoring plan for construction and operation phases of the project shall be submitted. A copy of your corporate	Details of environmental management and monitoring plan are discussed in Chapter 10 of this EIA report.	Please refer Chapter 9 Section 9.2, page no. 9-1 to 9-37.

	policy on environment management and sustainable development shall also be submitted.		
xvii)	Estimated cost of the project including that of environment management plan (both capital and recurring) and source of funding. Also, the mode of execution of the project, viz, EPC, BOT, etc, shall be submitted.	An amount of INR 9.36 Cr has been earmarked for implementation of EMP.	Please Refer Chapter 9 table 9.3 page no. 9-35 to 9-37.
xviii)	Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the Project should be given.	No litigation pending against the project	
xix)	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Total Project cost is 2500 cr Details of environmental management and monitoring plan are discussed in chapter 9.	Please refer Chapter 9 table 9-2 & 9-3 Page No.9-35 to 9-37.
xx)	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "http://moef.nic.in/Manual/Highways".	Noted	

CHAPTER 2 – PROJECT DESCRIPTION

2.1 IMPORTANCE OF PROJECT ROAD

The proposed access-controlled project with new alignment has been envisaged through an area which shall have the advantage of simultaneous development as well as shall result in a shorter distance to travel. The junctions with existing road will be planned in the form of interchanges and flyover to ensure uninterrupted flow of traffic.

The proposed road would act as the prime artery for the economic flow to this region. It will enhance economic development, provide employment opportunities to locals, strengthen tourist development, ensure road safety, and provide better transportation facilities and other facilities such as way side amenities. Vehicle operating cost will also be reduced due to improved road quality. The compensatory plantation and road side plantation shall further improve the air quality of the region.

2.1.1 EXISTING CARRIAGE AWAY AND PAVEMENT DETAIL

This is a completely new proposed Green Field Alignment where there is no existing road. This road is proposed to connect from Rampur village to Tetarahar village which will be a part of Bharatmala Pariyojana to improve the efficiency of the Freight movement in India. The whole section is proposed to be of Flexible Pavement type confirming to IRC: 37:2018. Rigid pavement shall be constructed in the section(s) for Toll Plaza only. The configuration of the carriageway shall confirm to IRC: SP: 84:2014 and the Structures shall be constructed as 4/6 lane configurations. The Proposed Right of Way is 70 m in non-forest Area and 60 m in Forest areas in which all the configurations shall be fitted with.

The start point of village from Km 73.800 (near Rampur village) 24°56'25.80"N, 83°47'22.32"E and ends at to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) 24°45'30.75"N, 84° 7'8.37"E in Bihar passing through districts Rohtas & Aurangabad in the state of Bihar.

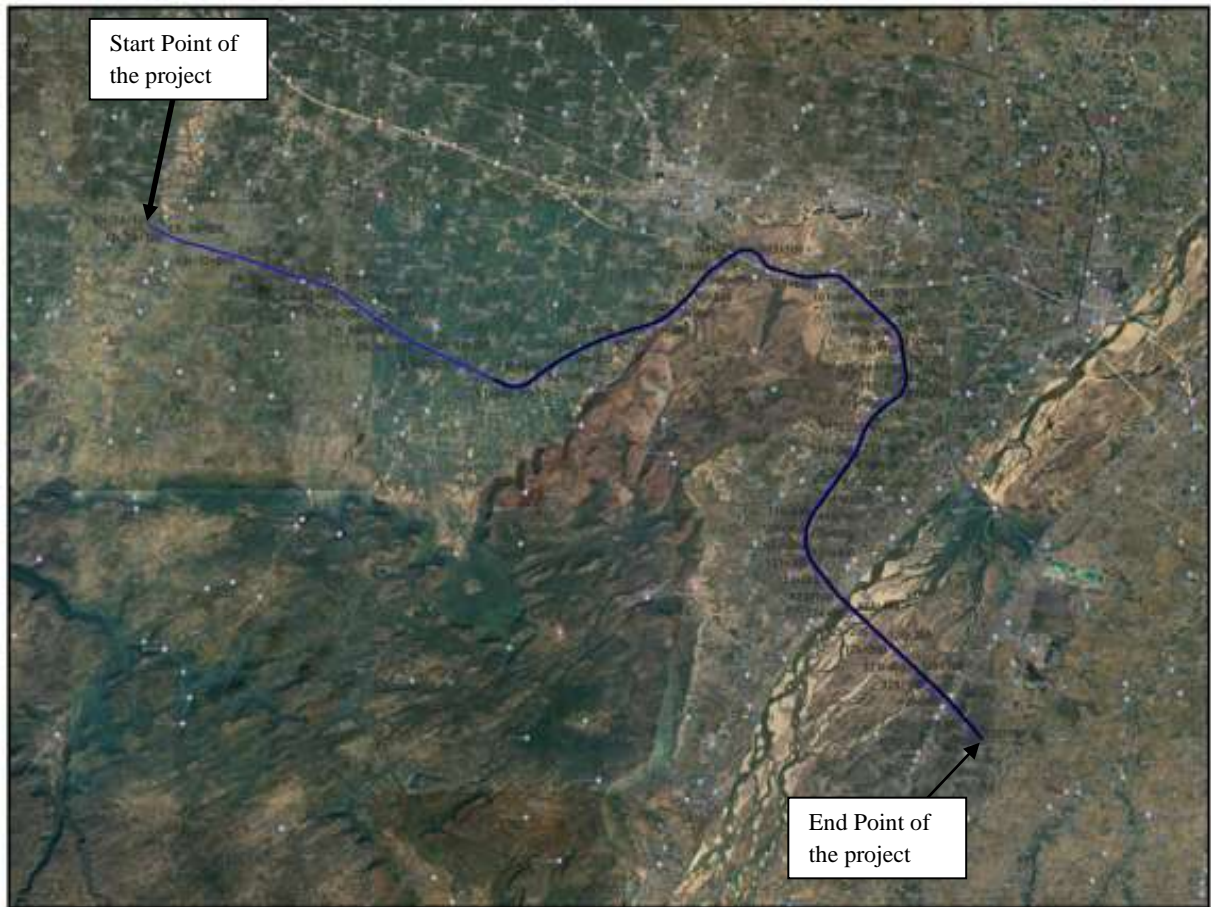


Figure 2-1: Shows the start point & end point of the project road

2.2 LOCATION & PROJECT DETAIL

2.2.1 LOCATION OF PROJECT ROAD

This project road is located geographically in the Rohtas and Aurangabad district in the state of Bihar respectively.

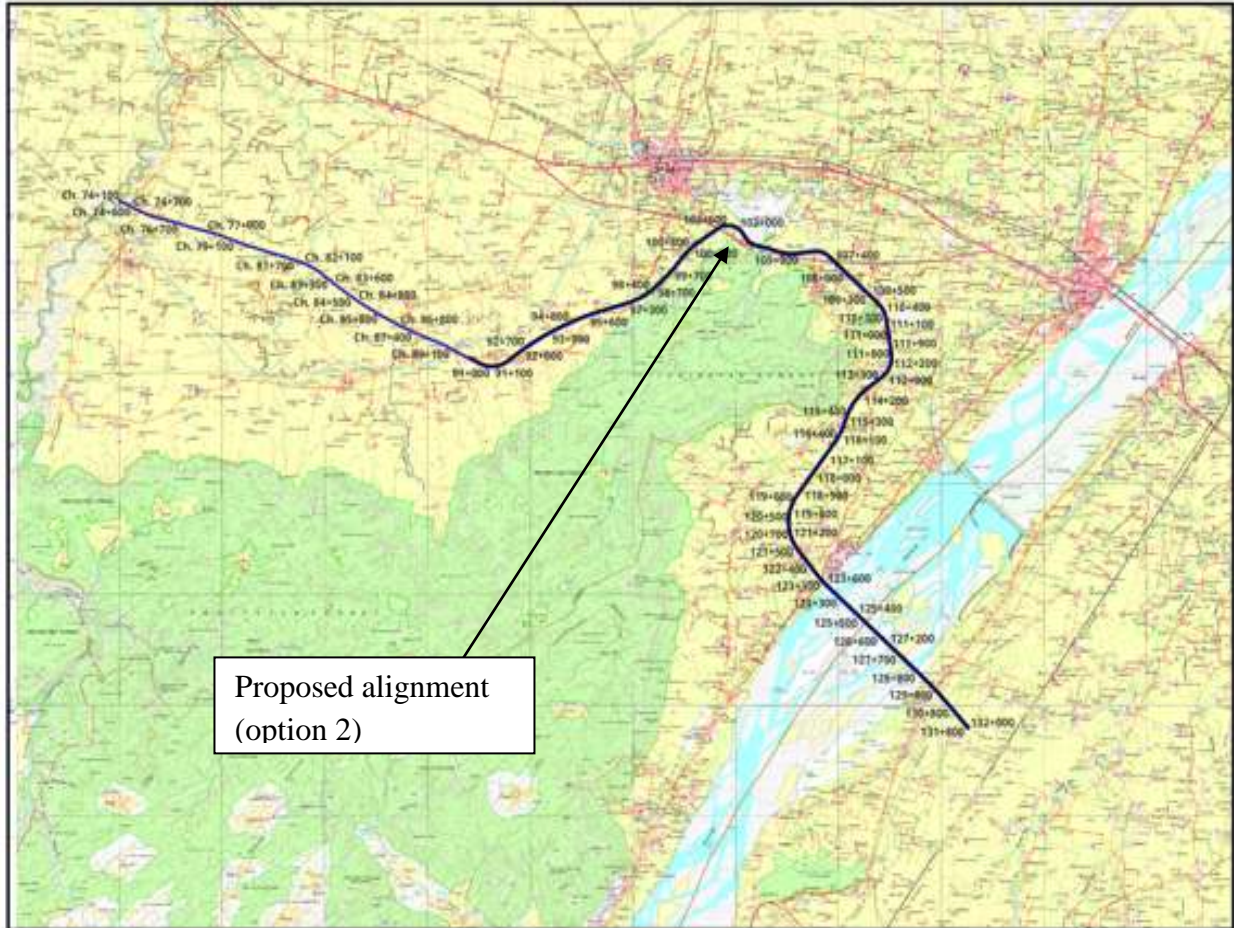


Figure 2-2: shows the location of the project road marked on Toposheet

2.2.2 THE PROJECT AREA

The project area is mainly passing through the village settlement and urban patches on a plain terrain.

2.2.3 LAND USE AND SETTLEMENTS ALONG PROJECT ROAD

The existing land use around the proposed project primarily comprises of agricultural land both under private and government ownership, land for cattle grazing, forest. The project alignment passes through approx. 51 villages, the major settlements along the alignment are Rohtas, Chenari, Shesagar, Sasaram, Tilouthu, Nabinagar and Aurangabad in the state of Bihar.

Table 2-1: Land Use

S.No.	Land use/Landover	Area (ha)	Percentage %	Remarks if any
1.	Private land	361.135	88.71	Agriculture/Barren Land
2.	Government land	36.450	8.95	Agriculture/Barren Land
3.	Forest land	9.749	2.33	PF-
	Total	407.334	100	-

2.2.4 LIST OF TOWNS AND VILLAGES ALONG PROJECT ROAD

There are total about 51 major villages/towns along the proposed highway.

S. No	State	District	Tehsil	Villages
1.	Bihar	Rohtas	Chenari	Nisja, Birnagar, Chorahi, Narayanpur, Kinarchola, Dehria, Semri, Sahasi, Bensil, Raghunathpur, Brahtali Chhotki, Barahtali barki, Sikraur, Kenar Khurd.
			Sheosagar	Majhui, Basantpur, Khurnu, Uchauli, Karma, Chenari, Khurhia, Konki, Kauria, Palangarh, Belwai.
			Sasaram	Darigaon, Karserua, Murhi, Khaira, Khairi, Dubaulia, Gharbair, Kusri, Barui, Songawan, Sikaria, Belahar, Rajokhar, Kota, Gajwahi, Kurdaun, Dhankarha, Malawan, Mundi Sarae, Sakas, Kanchanpur, kanchanpur, Lerua, Dhaudanr, Mednipur.
			Dheri	Barkunria, Durgapur, Guraila
			Tilouthu	Shivpur, Bhandokhra, Gorla, Kaithi, Chorkap, Shiupur, Bahera, Malpura, Rakian Bigha, Amra, Bhadsa, Saraiya.
		Aurangabad	Nabinagar	Mahuawan, Dihri, Terahahanr

Table 2-2: Important Villages/Towns along Project Highway

Sl. No.	Existing Location		Name of settlements
	From (km)	To (km)	
1	73+800	86+000	Chenari
2	86+000	97+000	Sheosagar
3	97+000	112+000	Sasaram
4	112+000	127+000	Dheri
5	115+000	127+000	Tilouthu
6	127+000	131+955	Nabinagar

2.2.5 TERRAIN

Terrain is classified by the general slope of the country across the highway alignment as per IRC: 73-1980 and with this criteria the entire length of the project terrain across the Rohatas & Aurangabad district in the state of Bihar is basically plain in nature.

2.2.6 ROAD SECTION AND PAVEMENT

The carriageway of the Project Highway is generally of 4/6-lane configuration.

2.2.7 ALIGNMENT

The present road alignment is linear throughout except at few locations, where alignment needs geometric improvements. The carriageway of the Project Highway is generally of 4/6-lane.

2.2.8 RIGHT-OF-WAY

The Proposed Right of Way is 70 m in non-forest Area and 60-90 m as per the requirement keeping in view the fully access controlled Highway with 4/6-lane dual carriage way configuration.

2.2.9 ROAD INTERCHANGES

There are **3 minor junctions**. The junctions will be improved as per the scenario by their category. The junction details are given below in **Table 2.3**.

Table 2-3: List of Major Junction

Sr.No.	At KM	Connecting roads	Type of Interchange
1	at Km 81+845	SH-67	Flyover with at grade Round about

2	at Km 102+137	NH-119	Full clover leaf interchange
3	at Km 107+417	NH-119	Full clover leaf interchange
4	at Km 123+500	SH-16	Flyover with at grade Round about

2.3 STRUCTURES DETAILS

The proposed alignment from Rohtas to Aurangabad mainly traverses through Plain terrain. As this is a completely new proposed Green Field Alignment, it passes through many rivers and canals. Various structures have been proposed according to the settlements, hydrology data, and convenience of traffic movements. Total there are 02 Major Bridge, 01 Major Bridge cum Under Passes, 13 Minor Bridge, 12 Minor Bridge cum Under Passes, 03 VUP, 08 LVUP, 04 flyovers, 59 Box culverts.

2.3.1 MAJOR & MINOR BRIDGES:

Table 2-4: Details of Major Bridge

Sl. No.	Design Chainage (Km)	Name (River/Streams/Nalla)	Span Arrangement c/c Expansion joint in Square direction (Nos. x Span length) (m)	Skew angle (degree)	Structure Type	Deck Configuration (m)	Width of Open Median (m)
1	74+160	Durgawati River	6 X 30	0	PSC I Girder	2x16	3
2	123+457 to 128+772	LHS: 1x35+88x60 RHS: 1x35+1x51.9+87x60	SON River	2x16	-	TCS-4	0

MAJOR BRIDGE CUM Underpass (OVER IRRIGATION CANALS)

Sl. No.	Design Chainage (in Km)	Name (Irrigation Canals)	Span Arrangement c/c Expansion joint in Square direction (m)	Skew angle	Type of Structure	Deck Configuration (m)	Width of Open Median (m)
1	89+321	Canal	1x20 + 1x43.5 + 1x15	30	RCC	2x16	3

					GIRDER & Steel GIRDER		
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Table 2-5: Details of Minor Bridge

Sl. No.	Design Chainage (Km)	Span Arrangement c/c Expansion joint/clear opening in Square direction (Nos. x Span length) (m)	Skew Angle (Deg.)	Type of Structure	Deck Configuration (m)	Width of Open Median (m)	Remarks
1	76+455	1x10	25	RCC BOX	2 X 16	3.0	-
2	77+917	2 X 8	15	RCC BOX	2 X 16	3.0	-
3	82+395	1 X 40	0	PSC I GIRDER	2 X 19.5	3.0	-
4	84+320	1 X 12	0	RCC BOX	2 X 16	3.0	-
5	85+925	1 X 12	30	RCC Box	1x10.8	NA	On Service Road
6	86+700	1 X 20	0	RCC I GIRDER	2 X 16	3.0	-
7	87+156	1 X 30	30	PSC I GIRDER	2 X 16	3.0	-
8	88+126	1 X 10	15	RCC BOX	2 X 16	3.0	-
9	89+065	1 X 15	30	RCC BOX	2 X 16	3.0	-
10	90+415	1x10	Stream	2x16	-	TCS-4	15
11	91+120	3x8	Stream	2x16	-	TCS-4	0

Sl. No.	Design Chainage (Km)	Span Arrangement c/c Expansion joint/clear opening in Square direction (Nos. x Span length) (m)	Skew Angle (Deg.)	Type of Structure	Deck Configuration (m)	Width of Open Median (m)	Remarks
12	92+840	2x20	Pond	2x16	-	TCS-4	0
13	97+650	2x7	Pond	2x16	-	TCS-4	0
14	99+000	3x20	Pond and Stream	2x16	-	TCS-4	0
15	111+000	1x12	Stream	2x16	-	TCS-4	0
16	115+000	2x30	Pond	2x16	-	TCS-4	0
17	121+535	3x10	Stream	2x16	-	TCS-4	39

MINOR BRIDGE CUM UNDERPASS (OVER IRRIGATION CANALS)

Sl. No.	Design Chainage (Km)	Span Arrangement c/c Expansion joint/clear opening in Square direction (Nos. x Span length) (m)	Skew Angle (Degrees)	Type of Structure	Deck Configuration (m)	Width of Open Median (m)	Minimum vertical clearance (m)
1.	75+020	1x17	15	RCC I Girder	2 x 16	3.0	4.5
2.	76+614	1 X 40	0	PSC I Girder	2 x 16	3.0	5.5
3.	79+030	1 X 20	15	RCC I Girder	2 x 16	3.0	4.5
4.	80+096	1 X 25	20	PSC I	2 x 16	3.0	4.5

				Girder			
5.	85+950	1 X 30	30	PSC I Girder	2 x 16	3.0	4.5
6.	90+250	1x30	Canal and Road	2 x 16	-	TCS-4	30
7.	91+860	2x26	Canal and Road	2 x 16	-	TCS-4	30
8.	93+500	1x20	Canal and Road	2 x 16	-	TCS-4	17
9.	95+325	1x25	Canal and Road	2 x 16	-	TCS-4	0
10.	95+905	1x20+1x20	Canal and Road	2 x 16	-	TCS-4	18
11.	96+740	1x35	Canal and Road	2 x 16	-	TCS-4	10
12.	100+190	2x25	Canal and Road	2 x 16	-	TCS-4	30
13.	130+735	1x30	Canal and Road	2x16	-	TCS-4	15
14.	131+105	2x10	Canal and Road	2x16	-	TCS-4	50

MINOR BRIDGE CUM UNDERPASS (OVER ROADS & NALLAS)

Sl. No.	Design Chainage (Km)	Span Arrangement c/c Expansion joint/clear opening in Square direction (Nos. x Span length) (m)	Skew Angle (Degrees)	Type of Structure	Deck Configuration (m)	Width of Open Median (m)	Minimum vertical clearance (m)
1.	80+300	1 x 12	22	RCC Box	2 x 16	3.0	4.0
2.	83+211	2 x 10	55	RCC Box	2 x 16	3.0	4.0

3.	84+955	2 x 10	38	RCC Box	2 x 16	3.0	4.0
4.	93+835	1x12	Stream and Crossroad	2x16	-	TCS-4	44
5.	94+200	2x25	Pond and Crossroad	2x16	-	TCS-4	50
6.	94+890	2x20	Nallah and Crossroad	2x16	-	TCS-4	35
7.	96+410	3x7	Stream and Crossroad	2x16	-	TCS-4	56
8.	97+060	3x7	Nallah and Crossroad	2x16	-	TCS-4	0
9.	98+313	3x7	Nallah and Crossroad	2x16	-	TCS-4	36
10.	108+955	2x12	Nallah and Crossroad	2x16	-	TCS-4	26
11.	113+900	2x7	Local stream and Crossroad	2x16	-	TCS-4	21
12.	118+587	2x12	Nallah and Crossroad	2x16	-	TCS-4	14

2.3.2 WAY SIDE AMENITIES CENTRE

Way side amenities/Rest Area shall be developed at following locations with provision of Boundary wall:-

Table 2-6: Details of Way Side Amenity Center

Sl. No.	Location (Km)		Side	Area	Length & Width	Remarks
	Start (Km)	End (Km)				
1.	88+450	88+750	LHS	6 Ha	300mX200m	facilities such as toilets, telephones, cafeteria, restaurant, parking for cars, buses and trucks, dormitory, rest rooms, shops for travel needs, fuel stations (petrol stations) and garage, first aid, etc. Drinking water facility; parking for minimum 100 trucks and 50 cars in addition to STD/ISD Telephone Facility, Shops and First Aid facilities.

2.3.3 VUP

There are 03 Vehicular under Pass proposed in this stretch to allow the users to connect across the road. The details of the VUP's are summarised below:

Table 2-7: Details of VUP

S. No.	Design Chainage (km)	Type of Crossing	Type of Structure	Clear Span/Opening in square direction (m)	Skew angle (degree)	Deck Configuration (m)	Width of Open Median (m)
1	87+266	Bedadih-Raipur-Chaur Rd.	PSC I Girder	1 x 20 x 5.5	0	2 x 16	3
2	89+475	Darigaon-Karma Rd	PSC I Girder	1 x 20 x 5.5	0	2 x 16	3
3	92+090	16	16	No	1x20	5.5	50
4	97+340	16	16	No	1x20	5.5	36
5	102+350	16	19	No	1x20	5.5	29

6	114+110	16	16	No	1x20	5.5	21
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2.3.4 LVUP (LIGHT VEHICULAR UNDER PASS)

There are 8 numbers of LVUP proposed across the Village/ODR roads to facilitate the movement of the users. The details of the LVUP are summarised below:

Table 2-8: Details of LVUP

S. No.	Design Chainage (km)	Type of Crossing	Type of Structure	Clear Opening in square direction (m)	Skew angle (degrees)	Deck Configuration (m)	Width of Open Median (m)
1.	76+148	BT Road	RCC Box	1X12.0	15	2x16	3.0
2.	77+686	Mud Road	RCC Box	1X12.0	0	2x16	3.0
3.	79+516	BT Road	RCC Box	1X12.0	0	2x16	3.0
4.	91+238	16	16	No	1 x 12	4.5	10
5.	95+560	16	16	Yes	1 x 12	4.5	50
6.	99+133	16	16	No	1 x 12	4.5	13
7.	101+228	16	16	No	1 x 12	4.5	17
8.	104+000	16	16	No	1 x 12	4.5	0
9.	104+650	16	16	No	1 x 12	4.5	0
10.	106+560	16	16	No	1 x 12	4.5	0
11.	107+895	16	16	No	1 x 12	4.5	20
12.	109+582	16	16	Yes	1 x 12	4.5	52
13.	110+045	16	16	No	1 x 12	4.5	30
14.	111+690	16	16	No	1 x 12	4.5	30
15.	112+695	16	16	No	1 x 12	4.5	0
16.	113+190	16	16	No	1 x 12	4.5	38
17.	114+350	16	16	No	1 x 12	4.5	21
18.	115+985	16	16	No	1 x 12	4.5	14
19.	118+000	16	16	No	1 x 12	4.5	30

20.	119+647	16	16	No	1 x 12	4.5	10
21.	111+310	16	16	Yes	1 x 12	4.5	45

2.3.5 CULVERTS DETAILS

Box type culverts have been proposed in this alignment as cross drainage structures and at many places culverts are being proposed to serve a pathway to the village users in the dry seasons. The details of the culverts are summarised below:

Table 2-9: Details of Culverts

S.no.	Design Chainage (Km)	Type of Culvert	Span
			No. x Width(m) x Height (m)
1.	74+500	Box Culvert	1x3x3
2.	74+760	Box Culvert	1x6x4
3.	75+355	Box Culvert	1x5x3
4.	75+575	Box Culvert	1x4x3
5.	75+900	Box Culvert	1x4x3
6.	76+810	Box Culvert	1x4x3
7.	77+170	Box Culvert	1x6x3
8.	77+420	Box Culvert	1x5x3
9.	78+300	Box Culvert	1x5x3
10.	78+640	Box Culvert	1x5x3
11.	79+260	Box Culvert	1x3x3
12.	79+700	Box Culvert	1x4x3
13.	79+940	Box Culvert	1x5x3
14.	80+500	Box Culvert	1x3x3
15.	80+680	Box Culvert	1x4x3
16.	80+892	Box Culvert	1x4x3
17.	81+180	Box Culvert	1x5x3

S.no.	Design Chainage (Km)	Type of Culvert	Span
			No. x Width(m) x Height (m)
18.	81+550	Box Culvert	1x4x3
19.	82+160	Box Culvert	1x5x3
20.	82+640	Box Culvert	1x6x4
21.	83+000	Box Culvert	1x6x3
22.	83+400	Box Culvert	1x3x3
23.	83+740	Box Culvert	1x5x3
24.	84+040	Box Culvert	1x4x3
25.	84+680	Box Culvert	1x4x3
26.	85+200	Box Culvert	1x3x3
27.	85+460	Box Culvert	1x6x3
28.	86+300	Box Culvert	1x4x3
29.	86+890	Box Culvert	1x5x3
30.	87+290	Box Culvert	1x3x3
31.	87+560	Box Culvert	1x3x3
32.	87+840	Box Culvert	1x5x3
33.	88+440	Box Culvert	1x4x3
34.	88+740	Box Culvert	1x5x3
35.	89+900	Box Culvert	1x4x3
36.	90+880	1x4x3	0
37.	91+000	1x4x3	0
38.	91+350	1x4x3	0
39.	91+450	1x4x3	0
40.	91+560	1x4x3	0
41.	91+700	1x4x3	0

S.no.	Design Chainage (Km)	Type of Culvert	Span
			No. x Width(m) x Height (m)
42.	92+400	1x4x3	0
43.	92+700	1x4x3	0
44.	93+000	1x4x3	0
45.	93+300	1x4x3	0
46.	94+700	1x4x3	0
47.	95+200	1x4x3	0
48.	95+500	1x4x3	0
49.	95+800	1x4x3	0
50.	96+100	1x4x3	0
51.	96+300	1x4x3	0
52.	97+700	1x4x3	0
53.	98+000	1x4x3	0
54.	98+700	1x4x3	0
55.	98+900	1x4x3	0
56.	99+335	1x6x3	0
57.	99+700	1x4x3	0
58.	100+500	1x4x3	0
59.	10+650	1x4x3	0
60.	100+800	1x4x3	0
61.	102+470	1x4x3	0
62.	102+700	1x4x3	0
63.	102+850	1x4x3	0
64.	104+160	1x4x3	0
65.	104+300	1x4x3	0

S.no.	Design Chainage (Km)	Type of Culvert	Span
			No. x Width(m) x Height (m)
66.	104+950	1x4x3	0
67.	105+380	1x4x3	0
68.	105+700	1x4x3	0
69.	106+000	1x4x3	0
70.	106+200	1x4x3	0
71.	106+300	1x4x3	0
72.	106+400	1x4x3	0
73.	106+800	1x4x3	0
74.	107+000	1x4x3	0
75.	107+200	1x4x3	0
76.	108+100	1x4x3	0
77.	108+300	1x4x3	0
78.	108+500	1x4x3	0
79.	108+700	1x4x3	0
80.	109+100	1x4x3	0
81.	109+300	1x4x3	0
82.	109+450	1x4x3	0
83.	109+800	1x4x3	0
84.	110+900	1x4x3	0
85.	111+180	1x4x3	0
86.	111+400	1x4x3	0
87.	111+600	1x4x3	0
88.	112+000	1x4x3	0
89.	112+300	1x4x3	0

S.no.	Design Chainage (Km)	Type of Culvert	Span
			No. x Width(m) x Height (m)
90.	112+600	1x4x3	0
91.	112+900	1x4x3	0
92.	113+100	1x4x3	0
93.	114+250	1x4x3	0
94.	114+600	1x4x3	0
95.	114+800	1x4x3	0
96.	115+050	1x4x3	0
97.	115+400	1x4x3	0
98.	115+600	1x4x3	0
99.	115+900	1x4x3	0
100.	116+100	1x4x3	0
101.	116+250	1x4x3	0
102.	116+380	1x4x3	0
103.	116+600	1x4x3	0
104.	116+700	1x4x3	0
105.	116+800	1x4x3	0
106.	117+000	1x4x3	0
107.	118+380	1x4x3	0
108.	119+300	1x4x3	0
109.	119+900	1x4x3	0
110.	129+075	1x5x3	0
111.	129+405	1x6x4	0
112.	129+655	1x4x3	0
113.	130+115	1x4x3	0

S.no.	Design Chainage (Km)	Type of Culvert	Span
			No. x Width(m) x Height (m)
114.	130+355	1x5x3	0
115.	130+575	1x4x3	0
116.	130+915	1x3x3	0
117.	131+475	1x5x3	0
118.	131+695	1x3x3	0
119.	131+895	1x5x3	0

Additional 17 (Seventeen) no. of box culverts of size 1x3x3m shall be provided across the Highway for local canal/ field canal/ utility crossings as per the site requirement. Location for such culverts shall be finalized in consultation with Independent Engineer and NHAI.

2.3.6 FLY-OVER/INTERCHANGE

At the starting of the Project road, a Trumpet Interchange has been proposed followed with Fly-Overs which are crossing the National/State Highways. The details are given below:

Table 2-10: Details of Fly-Over/Interchange

S. No.	Design Chainage (Km)	Intersecting Road	Type of Structure	Width of Open Median (m)	Minimum Vertical Clearance (m)
1	74+972	SH-67 (Kudra-Chenari)	PSC I Girder	3	5.5m
2	81+845	SH-67 (Shivsagar-Chenari)	PSC I Girder	3	5.5m
3	102+137	NH-19	PSC I Girder	3	5.5m
4	107+417	NH-19	PSC I Girder	3	5.5m
5	122+720	SH-16	PSC I GIRDER	3	5.5m
6	129+910	Japla-Barun Road	PSC I GIRDER	3	5.5m

2.3.7 TOLL-PLAZA

There is 3 Toll Plaza of 6+2 lane configuration. All the lanes shall be equipped as ETC Lanes whose details are given below:

Table 2-11: Details of Toll Plaza

Sr.No.	At KM
1	1 Nos.each at Km 81+845 on entry and exit of Loop and Ramp of Interchange
2	4 No.each at Km 102+200 on entry and exit of Loop and Ramp of Interchange
3	4 No. each at Km 123+300 on entry and exit of Loop and Ramp of Interchange
4	4 No.each at Km 129+300 on entry and exit of Loop and Ramp of Interchange
5	4 No.each at Km 130+250 on entry and exit of Loop and Ramp of Interchange

2.4 TRAFFIC SURVEY AND FINDINGS

Classified traffic counts were carried out for a period of 7 consecutive days at mid-block locations along 2 corridors. The locations selected were at the outskirts of city where the local traffic is low and regional traffic is high. The surveys were carried out mainly by trained enumerators. The data served as population base during base year and will be used to project traffic. The Survey locations are presented in **Figure 2-3.**



Figure 2-3: Traffic Survey Location Map

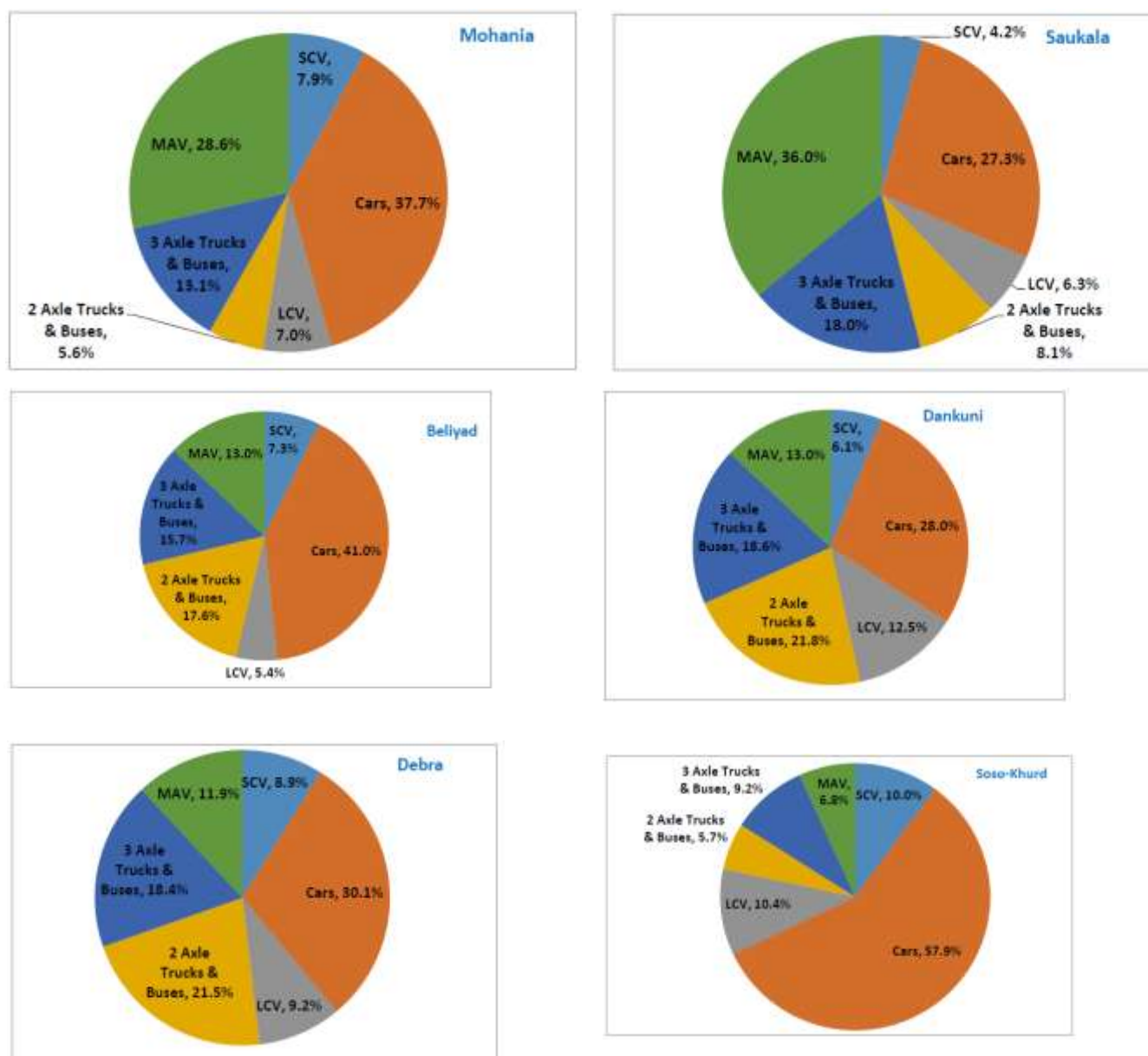
2.4.1 ANALYSIS OF TRAFFIC DATA

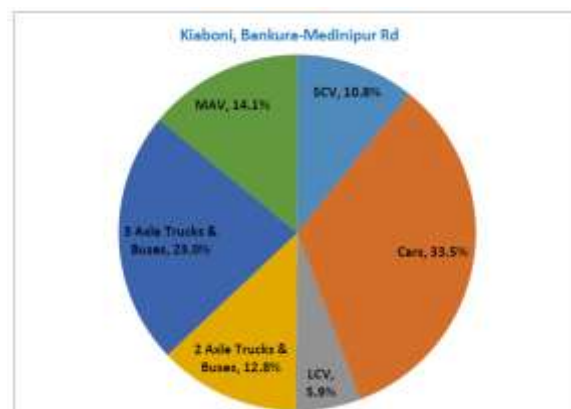
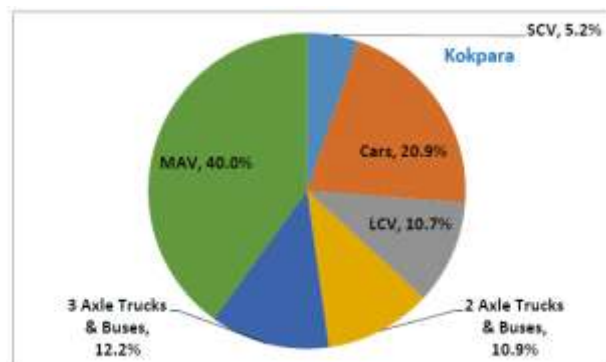
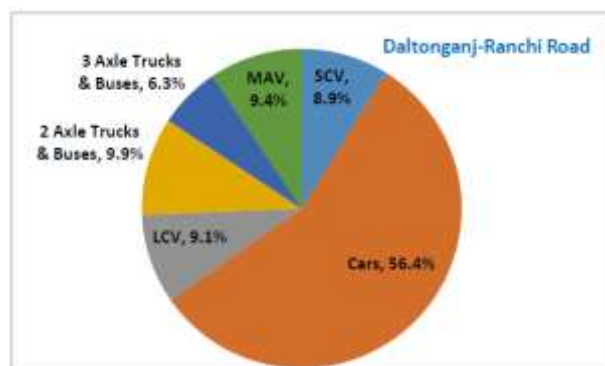
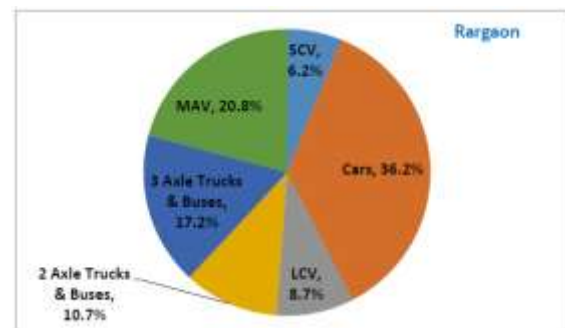
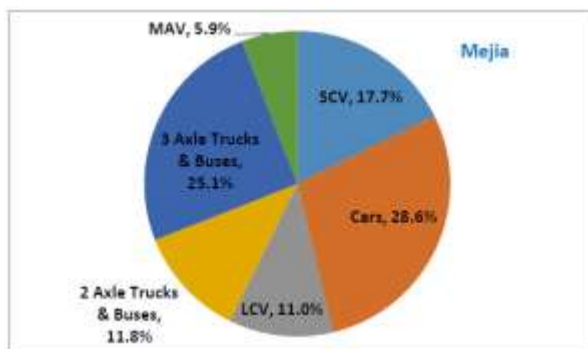
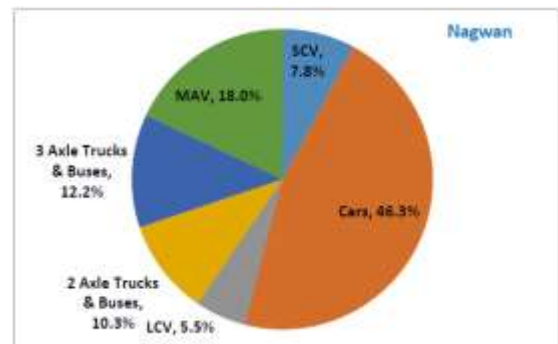
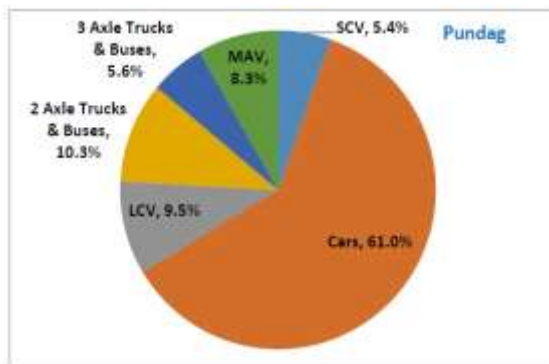
Table 2-12: Summary of ADT and AADT at survey locations

Location	ADT No.	ADT PCU	AADT No.	AADT PCU
Mohania NH-2 Of Bihar Km 860.000	25437	48262	25666	49599
Saukala NH-19 Of Bihar Km 200.100	22007	44206	22303	45569
Beliyad NH-2 Of West Bengal Km 438.500	25840	44126	26023	45234
Dankuni NH-2 Of West Bengal Km 646.005	22954	49362	23407	50934
Debra NH-6 Of West Bengal Km 112.245	26139	48789	26486	50208
Sosokhurd NH-23 Of Jharkhand Km 53.740	14555	16247	14516	16452
Pundag NH-33 Of Jharkhand Km 98.930	26118	32787	26060	33251
Nagwan NH-33 Of Jharkhand	21902	27222	21868	27731
Meija NH-NH 60 (New NH 14) Of West Bengal Km 267.250 of NH60(New NH14)	8334	10331	8372	10564
Rargaon Toll Plaza, NH-43, Ranchi-Jamshedpur	12789	22876	12894	23492

Rd				
Kokpara Toll Plaza, NH-49 and NH-18, Jamshedpur- Kharagpur Rd	6265	14063	6360	14520
Daltonganj-Ranchi Road	14146	15452	14127	15671
Kiaboni, Bankura-Medinipur Rd	13631	22600	13734	23192

FIGURE 2-4: TRAFFIC COMPOSITION OF ALL VEHICLES AT SURVEY LOCATIONS





2.4.2 TRAFFIC GROWTH

Traffic growth on a road facility is generally estimated on the basis of historical trends, in the present case traffic growth rates are estimated using econometric methods. Demand changes are usually because of shifts in the pattern of economic activities in the surrounding regions. The exercise of traffic growth rate estimation has been carried out by us using the elasticity approach. The elasticity method relates traffic growth to changes in the related economic parameters. The estimated growth rate has been mentioned in the table below:

Table 2-13: Projected growth rates of indicators in percentage

Period	Car	Bus	LCV	2A	3A
2022-26	0.90	0.76	1.02	0.53	0.77
2027-31	0.80	0.65	0.97	0.46	0.75
2032-36	0.78	0.61	0.97	0.37	0.66
2037-41	0.73	0.55	0.96	0.26	0.64
>2041	0.71	0.51	0.98	0.21	0.49

2.5 TYPICAL CROSS-SECTIONAL DRAWING

There are 06 nos. of TCS that have been used in this stretch. The details of the TCS schedule is provided in Fig 2.7 to Fig.2.11 from Design Ch. 73+800 Km to Design Ch. 114+000 Km..

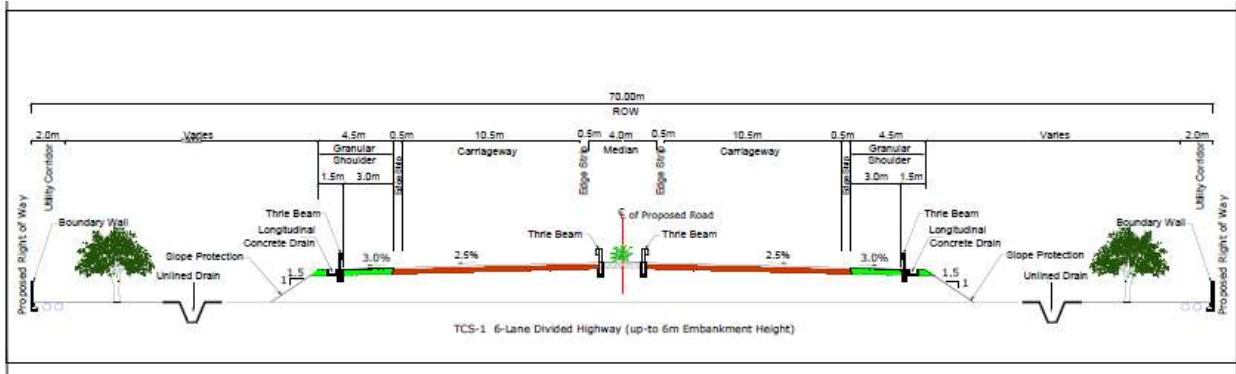


Figure 2-5: Typical Cross Section 1

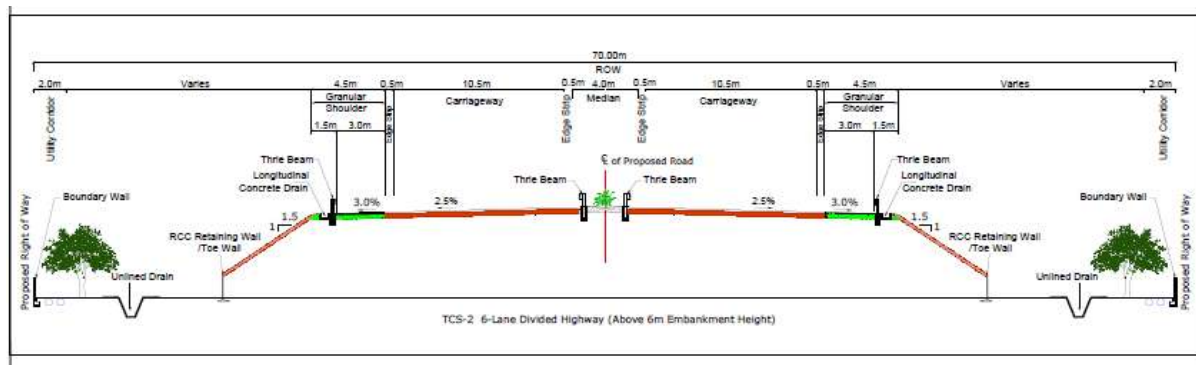
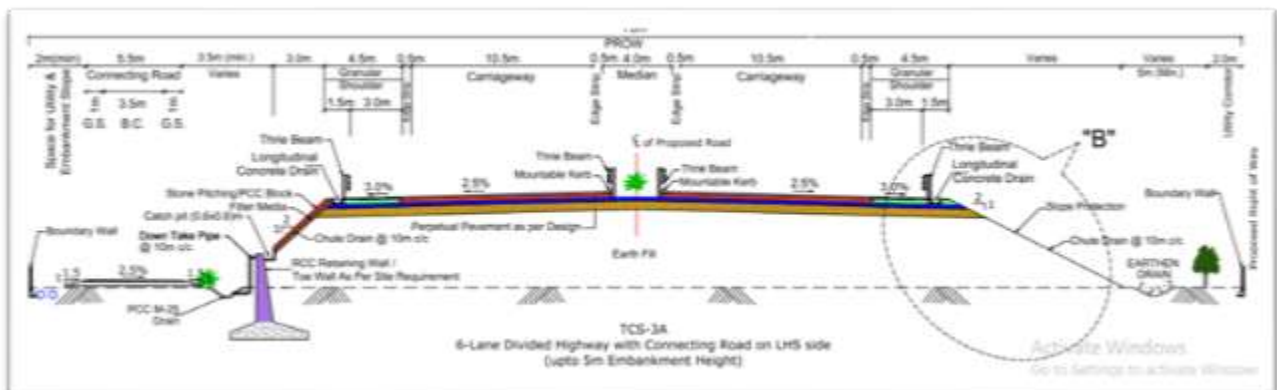
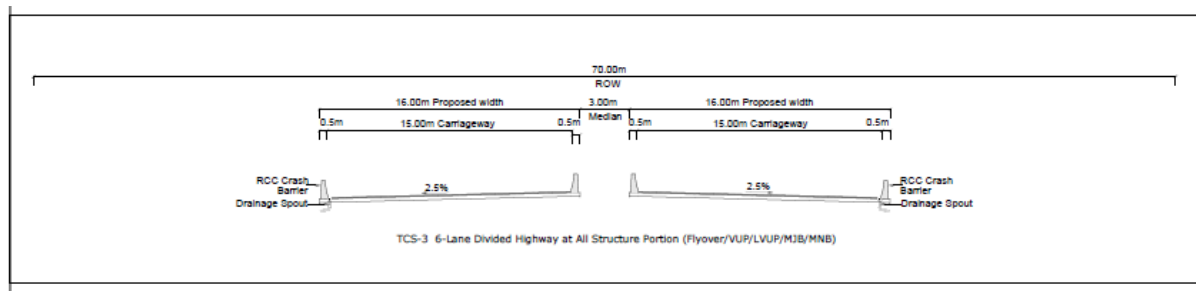


Figure 2-6: Typical Cross Section 2



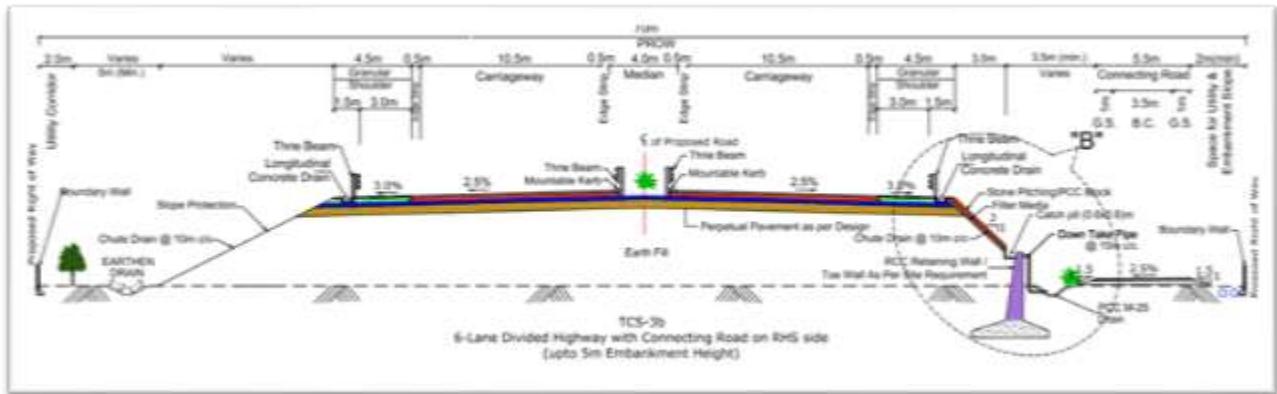
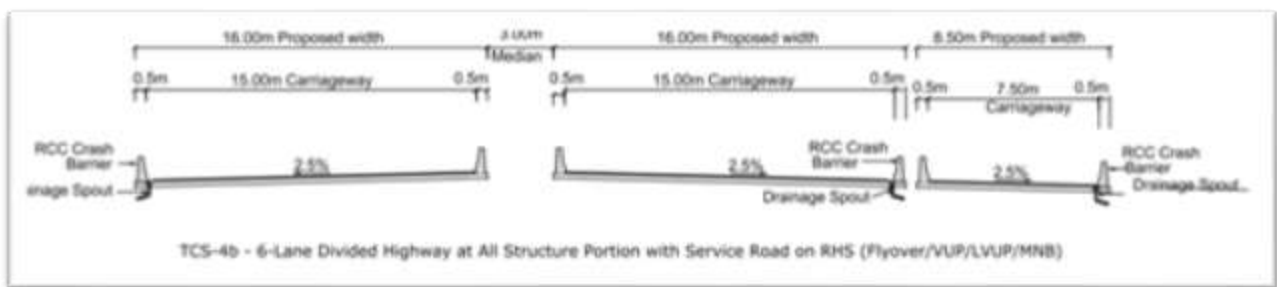
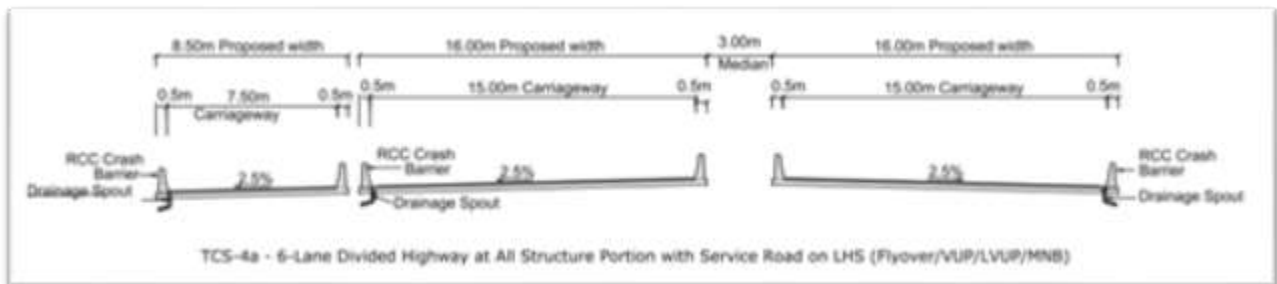
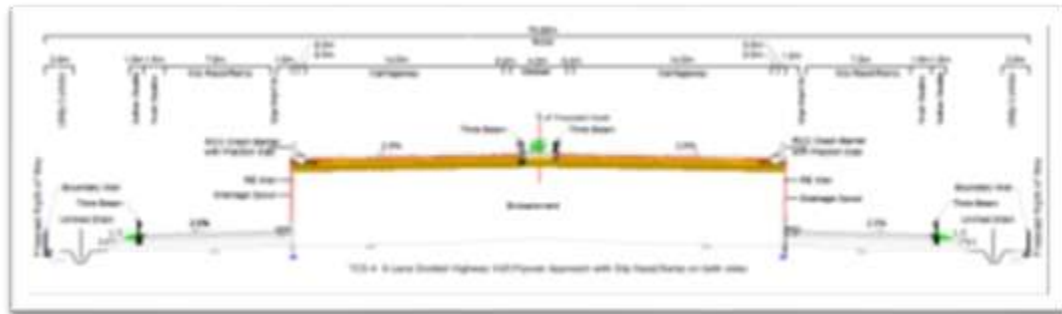


Figure 2-7: Typical Cross Section 3, 3a & 3b



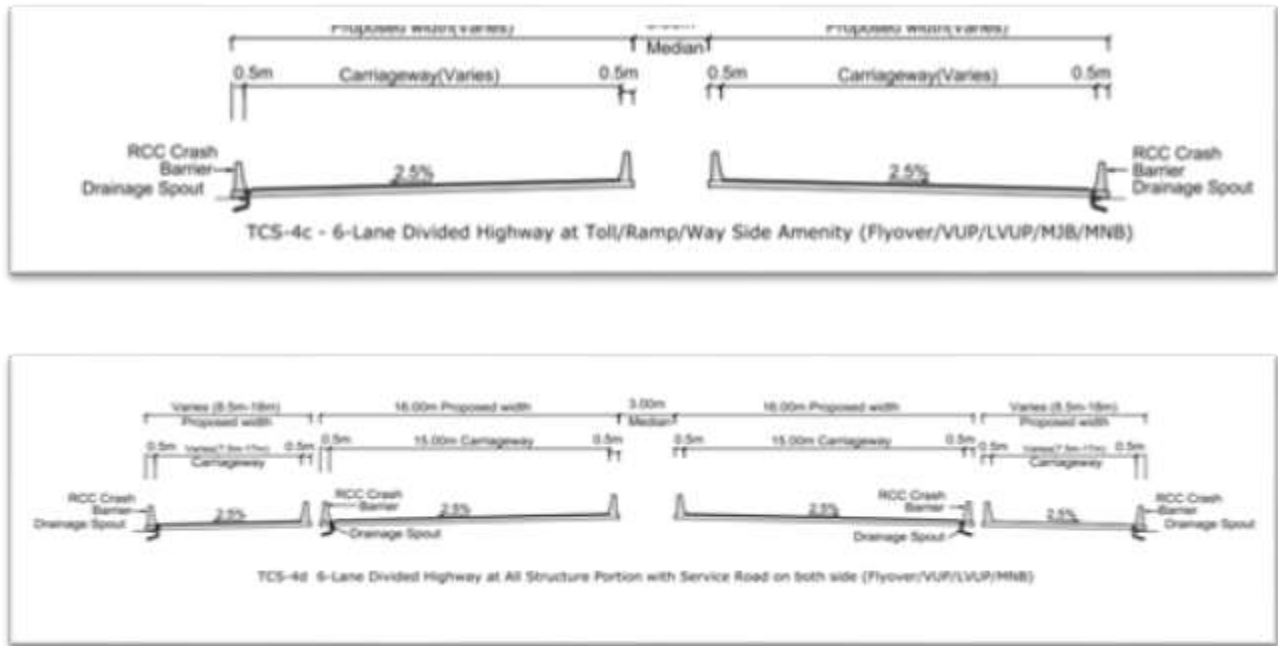


Figure 2-8: Typical Cross Section 4, 4a, 4b, 4c & 4d

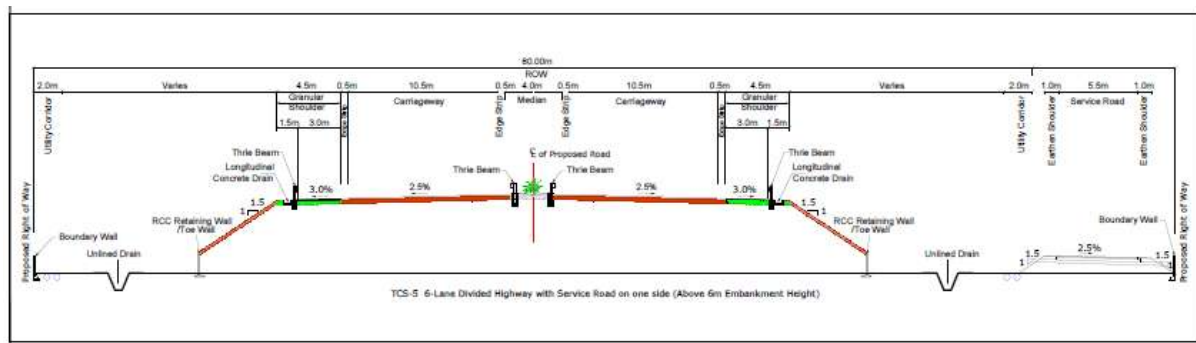
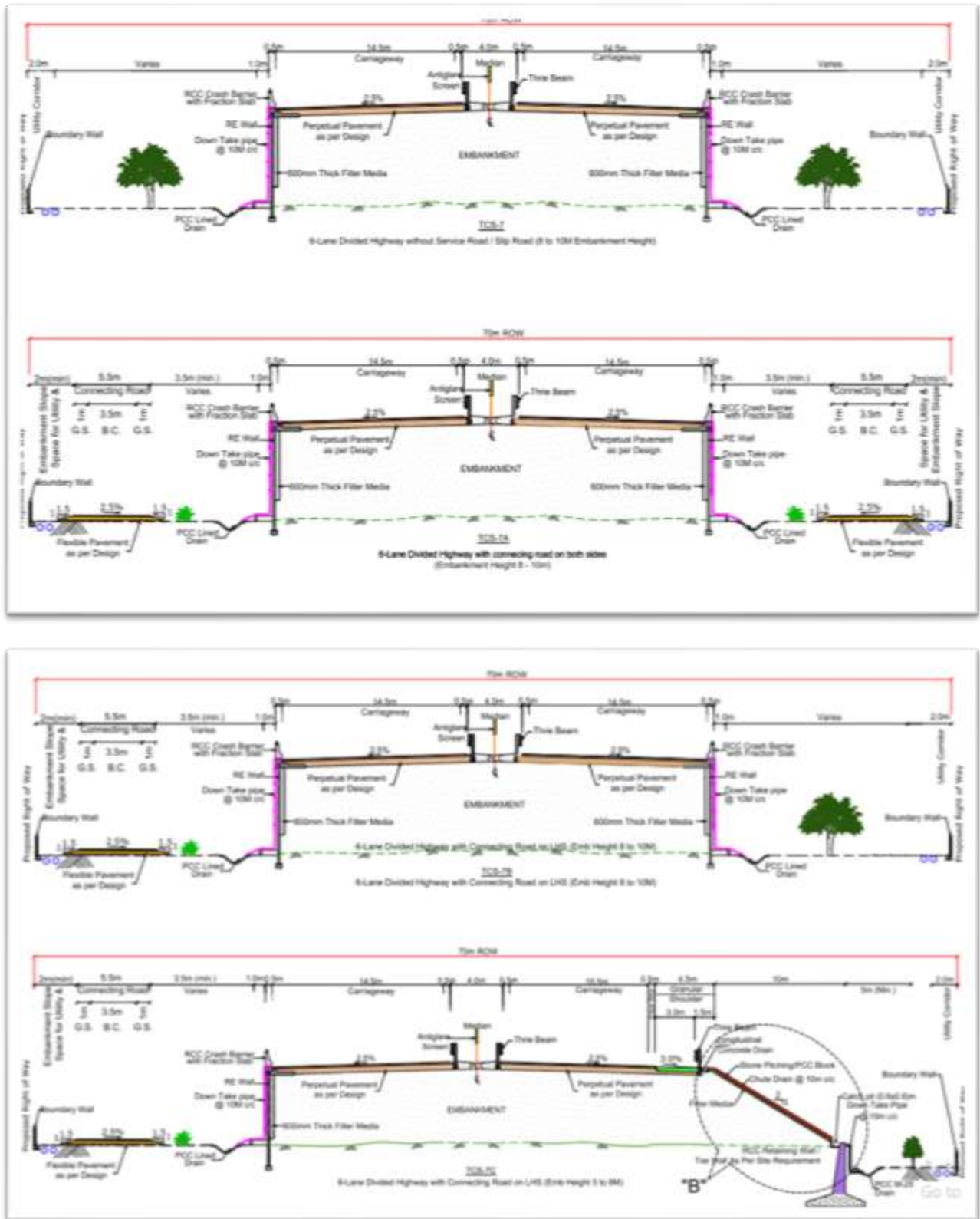


Figure 2-9: Typical Cross Section 5



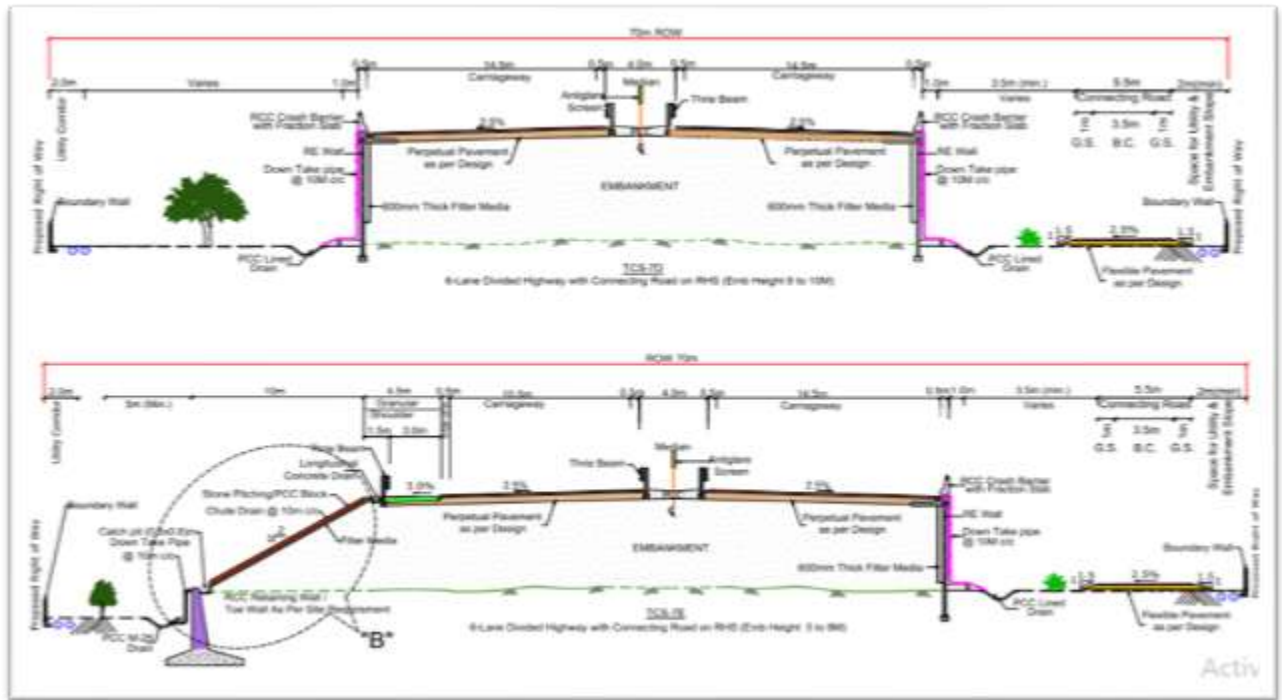


Figure 2-10: Typical Cross Section Typical Cross Section 7, 7a, 7b , 7c, 7d & 7e

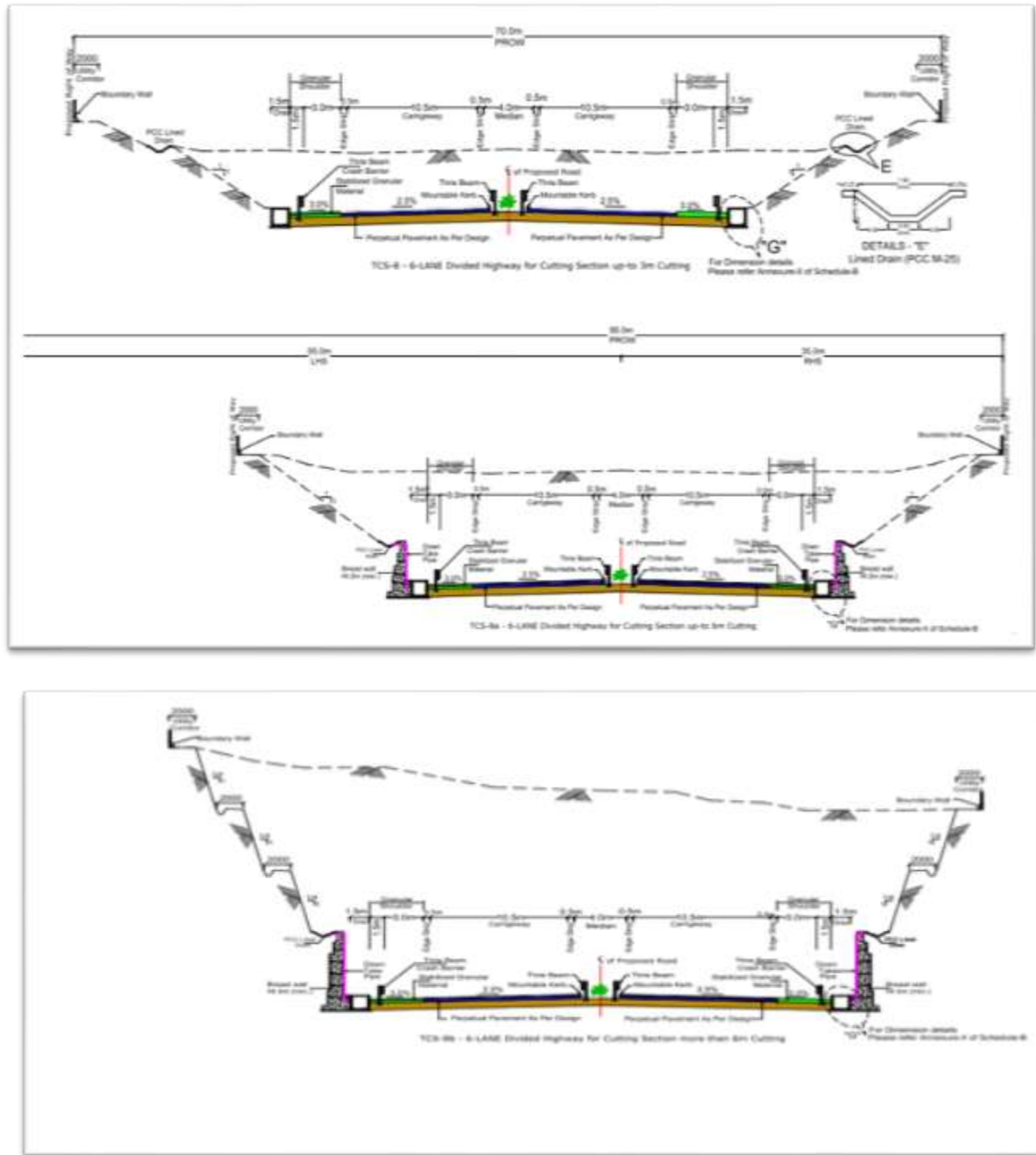


Figure 2-11: Typical Cross Section 8, 8a & 8c

CHAPTER 3: ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

3.1 INTRODUCTION

This chapter has been comparing the feasible alternatives to the proposed project with respect to site, technology, design etc. The alternatives examined taking into account all the possible and feasible options and include with and without project scenarios in terms of the potential environmental impacts of the project.

3.2 CRITERIA FOR SELECTION OF SITE

- The project road between two terminal stations should be short and straight as far as possible, but due to engineering, social and environmental considerations some deviations may be required.
- The project should be constructible and easy to maintain; the Greenfield project should reduce the vehicle operation cost with respect to the existing option already available i.e. using the NH/SHs in combination to reach from point A to point B.
- It should be safe at all stages i.e. during design, construction and operation stages.
- The project initial cost, maintenance cost, and operating cost should be optimum so as to be considered economical with respect to its options.
- The alignment should be finalized giving due consideration to siting/location of major structures including Major/Minor Bridges, Interchanges and ROBs. The space requirement of interchanges to be kept into consideration to avoid major resettlement.
- Tunnel / Box cutting of Hills should be considered as the last option and should be provided only when it is absolutely necessary.
- The location of spurs for connecting the important towns to be decided while fixing the alignment Options.
- The alignment should follow the unused / barren land to the extent possible to reduce the cost of land acquisition.
- The proposed options in the present case connects the under developed regions of Bihar which would lead to the development of new growth centres along the proposed highway i.e. paving the way for economic development of the region.

Obligatory points through which alignment options should not pass are detailed below:

Habitations: Proposed alignment is fixed in such a way that traverses at a minimum distance of 150 m from built up areas and avoiding important buildings and structures. However, few isolated buildings falling along the alignment cannot be avoided due to Geometric requirements.

Wildlife Sanctuaries, National Parks, Reserve Forest and other Eco Sensitive Zones: The proposed alignment passes through Kaimur Wildlife Sanctuary, National Park and other Eco Sensitive Zones. Also Approx. 5.5 Km of the proposed project passes through Protected Forest of Kaimur wildlife sancturay. Utmost care is taken while fixing the alignment near forest areas. The MOEF&CC guidelines have been adhered to and the alignment has been fixed keeping it away from any eco-sensitive zone. It was not possible to completely avoid the reserve forest areas. However, every effort has been made to reduce the acquisition of forest area.

Water Bodies: The proposed alignment has been fixed taking due consideration & importance of retaining the existing water bodies as far as feasible.

Railway Crossings and Important Structures: The components which increases the project cost are the presence of the Major bridges, ROB's and other structures. In order to reduce the project cost number of structures and its length were given due consideration while finalizing the alignment.

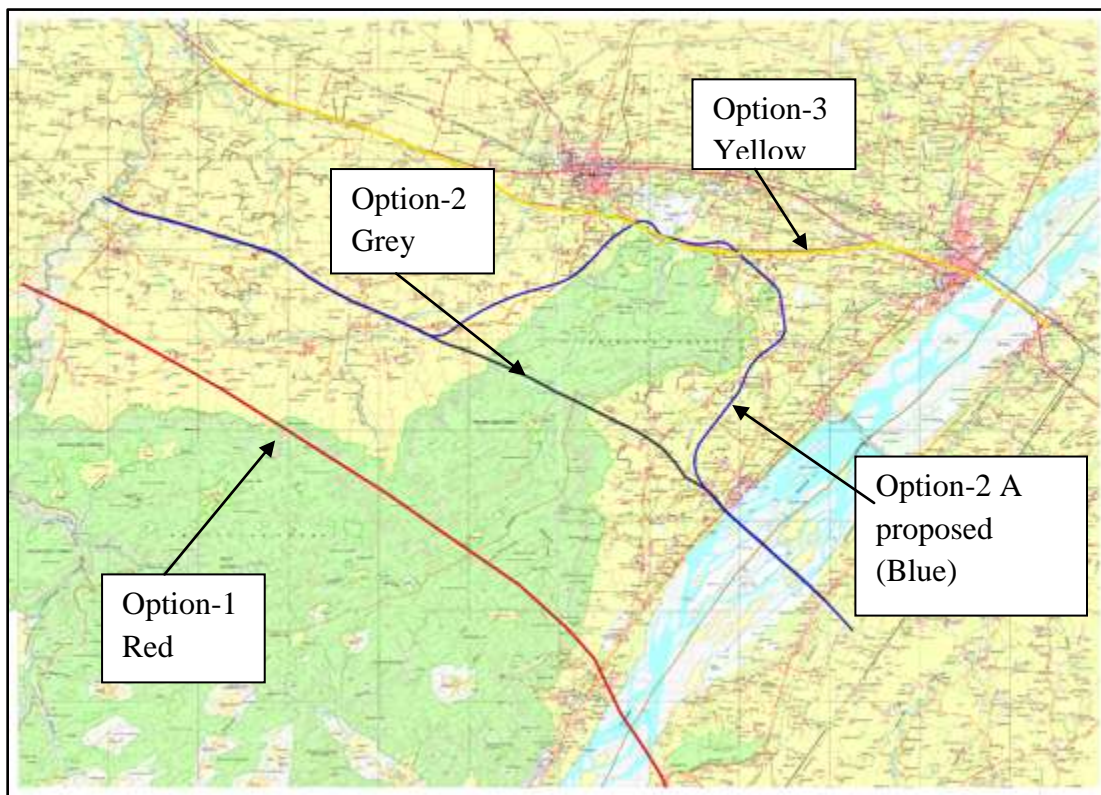


Figure 3-1: Toposheet Map showing all alignment options

Table 3-1: Comparative statement for all options

S. No	Parameters/Issues	Option 1 (Red)	Option 2a (Proposed alignment) (Blue)	Option 2 (proposed alignment)	Option 3 (Yellow)
1	Length (km)	40.4	58.155	40.2	40.9
2.	Total land acquired (ha)	318.6	407.085	345.3	348.6
	Govt. land (ha)	77.3	36.450	92.4539	76.7
	Pvt. Land (ha)	151.3	361.135	217.3	232.9
	Forest land (ha)*	90	9.7	36	39
3.	Area under protected/ important or sensitive species of flora or fauna/Wildlife Sanctuary	The alignment passes through Kaimur wild life sanctuary, approx. 15 km.	NA	The alignment passes through Kaimur wild life sanctuary, approx. 5 km; tunnel is proposed to avoid the surface and biodiversity of wild life sanctuary	The alignment passes through Kaimur wild life sanctuary, approx. 7 km.

				area	
4.	No. of trees affected	8000	2357	5347	6500
5.	Area under water bodies (ha)*	5.5	3.5	4.0	4.5
6.	No. of structure to be impacted due to proposed alignment	145 (include Semi-pucca and pucca Structure)	164 (include Semi-pucca and pucca Structure)	64 (include Semi-pucca and pucca Structure)	175 (include Semi-pucca and pucca Structure)
7.	No. of families	95	85	55	105

Based on the above study the following observations are there:-

Option 1 and 3 leads to more impact on structure and families as number affected families are high as compared to option 2 and 2a, If alignment option 1 or 3 is followed then it will leads to more impacts on Environment & Social components, and Option 2 is passing kaimur wildlife Sanctuary and to avoide kaimur wildlife section alignment option -2a shall be followed

Table 3-2: Analysis of Alternatives

Sr. No.	Factors	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
1	All weather Accessibility	—	Due to improper drainage system, road may get flooded during heavy rains.	Drainage in some sections will be improved Road will be accessible all along the year since drainage will be improved along all sections.	Only some sections may get good drainage. Due to improper drainage system, road may get flooded during heavy rains.
2	Road Safety/Accident rate	—	Due to congestion accidents may increase	With realignment in critical sections, road safety would increase in these sections. Heavily congested areas will be bypassed so less chances of traffic jam/accidents at these sections.	Indensely populated/congested areas, accidents may increase. Due to congestion accidents may increase at heavily populated areas and at critical road sections.
3	Transportation/vehicle maintenance /operating cost	—	Increased cost due to heavy traffic at populated/congested	More comfortable driving at critical sections due to section	Increased costs due to more wear & tear at heavily populated/congested areas.

Sr. No.	Factors	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
			areas. And also more wear & tear because of frequent application of sudden brakes.	improvement/realignment. Less wear & tear cost, more riding comfort	Increase in air pollution due to vehicular traffic. And short term increase in dust due to earth work during construction at micro level. Increased cost due to heavy traffic at populated/congested areas. And also more wear & tear because of frequent application of sudden brakes.
4	Travel time / increased speed	–	Travel time is more due to less speed & congestion.	Reduction in travel time and increased speed.	More chances of accidents due to increased speed Travel time is more due to less speed & congestion. No significant change in travel time or speed
5	Change in Land use	–	–	–	Minor change in land use

Sr. No.	Factors	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
	pattern				pattern. Small change in land use pattern. Change in Land use pattern with land diversion from forest to road.
6	Loss of Property and livelihood	–	–	–	More loss of property & livelihood. Very little loss of property and minor loss of livelihood. Minor Loss of property & significant loss of livelihood due to traffic diversion on bypass
7	Change in Environmental quality during construction	–	–	–	Temporary degradation of environmental quality because of vehicular traffic during construction.
8	Change in	–	Project road will	Less Noise pollution	Increase in Air pollution due

Sr. No.	Factors	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
	Environmental quality after construction		further deteriorate and more dust and noise pollution.	because of ease in congestion and diversion of traffic through bypasses.	to increased vehicular traffic.
	Loss of vegetative cover	–		Greater loss of vegetative cover than other options	No significant change Loss vegetative cover along the road side will be less. But significant loss of Agricultural land due to bypass. Small amount of vegetative cover loss.
10	Access to basic facilities such as Markets, schools, Hospitals etc.	–	Difficulty in accessing the basic facilities due to heavy traffic.	Difficulty in accessing the basic facilities due to heavy traffic.	Difficulty in accessing the facilities Easily Accessible as the traffic will be less.

Sr. No.	Factors	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
11	Employment opportunities & local economy growth.	—	Limited business opportunities. Overall development of area will be affected.	Limited business opportunities. Minor increase in business opportunities Faster transportation of agricultural/ commercial/perishable goods to prospectus markets. And local employment generation.	

Sr. No.	Factors	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
12	Others	–	Increase in fuel consumption, dust pollution & vehicular emission. And overall economy of the state will be affected.	Minor savings on fuel consumption. Tourism will flourish (Access to Wadi improved), Improved riding quality & smooth traffic flow. Will reduce accidents in congested areas.	Loss of business opportunity in the congested populated area.

CHAPTER 4: DESCRIPTION OF ENVIRONMENT

4.1 INTRODUCTION

The main objective of describing the environment which may be potentially affected, are

- i) To assess present environmental quality and the environmental impacts and
- ii) To identify environmentally significant factors that could preclude development.

Construction activities affect the existing status of environment at site. In order to maintain the existing environmental status at construction site it is essential to study the existing environmental status and assess the impact of upcoming project on various environmental components.

Baseline environmental conditions of air, noise, water, soil, biological and socio-economic environment has been collected. The proposed project as a strip, a radial distance of 10 km is considered as study area for baseline data collection and environmental monitoring. The data has been collected by P & M Solution and its associated laboratories Noida Testing laboratory for various environmental attributes so as to compute the impacts that are likely to arise due to proposed development activity.

4.1.1 STUDY AREA & STUDY PERIOD

The proposed project as a strip, a distance of 10 km within the strip is considered as study area for baseline data collection and environmental monitoring. This area is referred to as study area/ project area in the report. It includes environmental features such as forest areas, conservation areas, water bodies (rivers, lakes ponds and reservoirs), industries, wildlife/National parks and, places of historical importance, tourism etc. The baseline environment quality was carried out during month of March 2022 to May 2022.



Figure 4-1: Shows that wildlife is present within 10 km radius of the project area.

4.1.2 SECONDARY AVAILABLE DATA

The secondary data were collected from following sources has been presented in **Table 4.1:**

Table 4-1: Secondary data Sources

1.	Meteorological data	Indian Meteorological Department
2.	Irrigation and hydrogeology data	Central Ground Water Board
3.	General Land use and Cropping Pattern	Agriculture Department
4.	Relief and slope	Survey of India
5.	Rocks and minerals	Geological Survey of India
6.	Industries	District Industries Centre
7.	Maps and Topo sheets	Survey of India
8.	Forest Types, Wild life and Bio-diversity	State Forest Department, Government of Bihar
9.	Archaeological Data	Archaeological Survey of India
10.	Census of India, 2011	Socio-economic data and profile

4.2 PHYSICAL ENVIRONMENTAL SETTINGS

4.2.1 GEOGRAPHY

4.2.1.1 BOUNDARIES AND AREA

Rohtas District: Rohtas is one of the thirty-eight districts of Bihar located in the south-western part of the State and occupies an area of 3851 Sq.Km. Rohtas district extends between N. latitude 24°29' and 25°22'40" and E. longitudes 83°19' and 84°29'. It is bounded on the north by the district of Buxer and Bhojpur on the South by the district of Palamu & Garhwa of Jharkhand State on the east, by the district of Aurangabad and part of Gaya district and on the west, the district of Kaimur (Bhabhua). The river Sone forms the southern and eastern boundary of the district.

Aurangabad District: Aurangabad is one of the 38 districts in Bihar. It is one of the 5 districts of Magadh division. The head quarter of the district is Aurangabad. The district with a geographical area of 3389 Km² between the longitudes of 84°00' - 84°45' E and latitudes of 24°30' - 25°15' N is located in the South Bihar Plains (SBP) and constitute a part of the marginal alluvial plains of Ganga Basin. The Sone River forms the western boundary of the district and at the southern boundary lays the Chhotanagpur Granitic Gneissic Complex (CGGC) of Jharkhand state, which forms a part of the peninsular India. The district is bounded in the north and the east by the Arwal district and the Gaya district respectively.

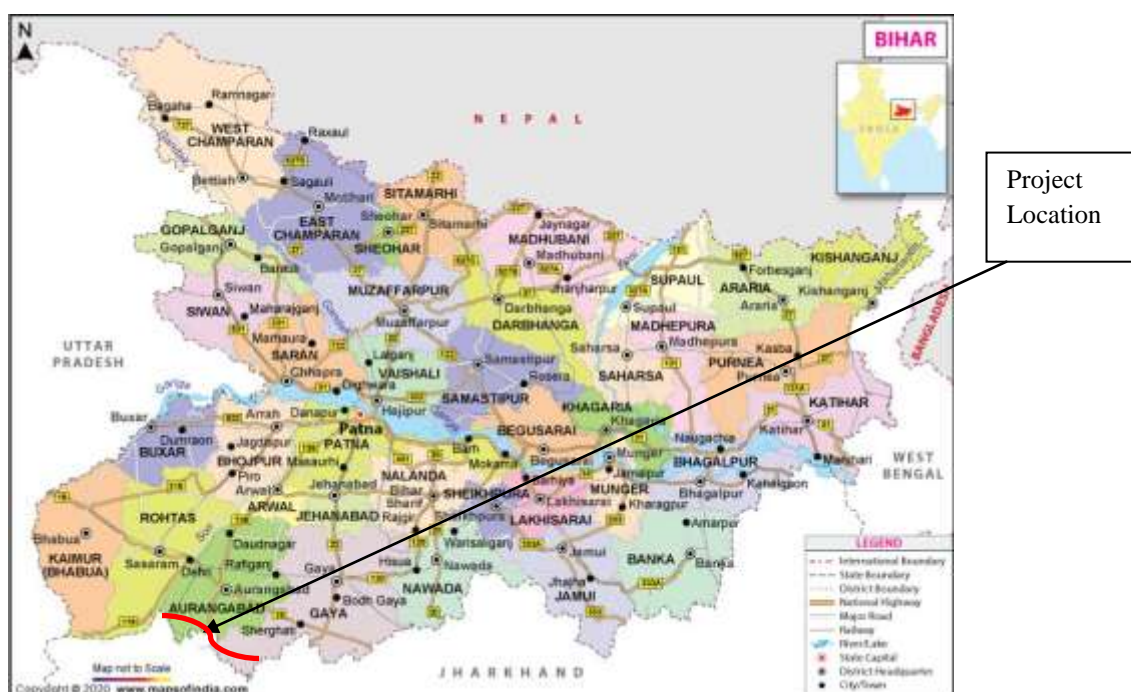


Figure 4-2: Location Map

4.2.1.2 GEOGRAPHICAL LOCATION OF THE PROJECT HIGHWAY

The proposed highway Varanasi-Kolkata Expressway starting from village from Km 73.800 (near Rampur village) 24°56'25.80"N, 83°47'22.32"E and ends at Km 131.955 (near Tetaraha village)

(previously Km 73.800 to Km 114.000) 24°45'30.75"N, 84° 7'8.37"E in Bihar passing through districts Rohtas & Aurangabad in the state of Bihar.

Scope of present report is confined to the (Ch.73+800 to Ch. 131+955).

The Proposed Right of Way is 70 m in non-forest Area and 60 m in Forest areas in which all the configurations shall be fitted with. This is a green field alignment, and is proposed for 4/6-Lane. The proposed length of Project Highway is about 58.155 kms.

The road passes through the districts of Rohtas & Aurangabad through important towns Chenari, Shesagar, Sasaram, Tilouthu and Nabinagar in the state of Bihar.

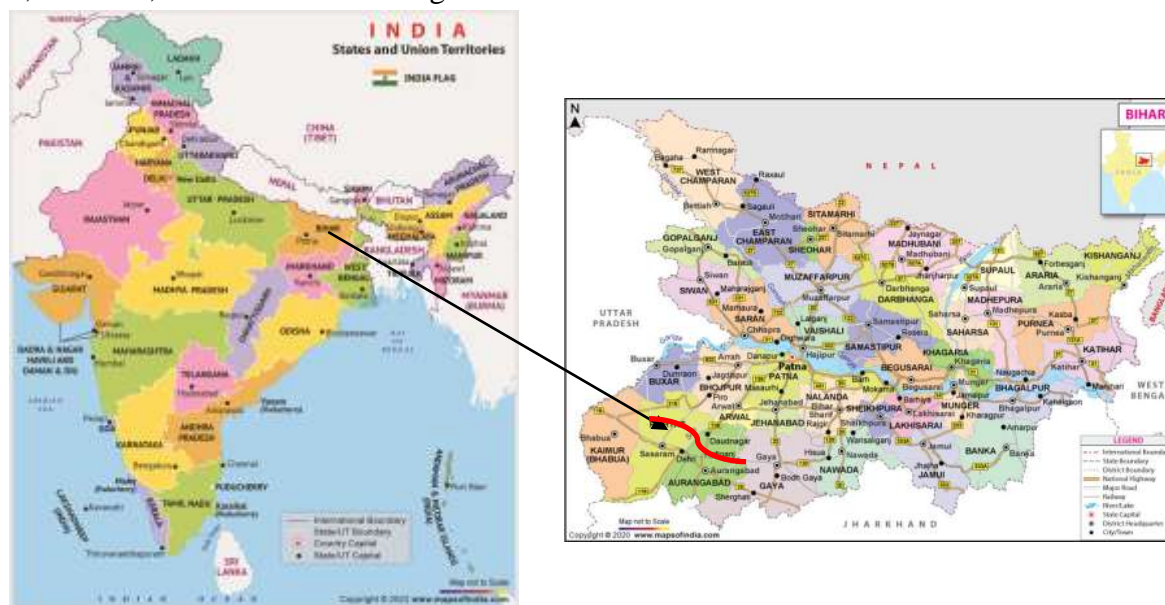


Figure 4-3: Location of project Alignment

4.2.1.3 BASINS & RIVERS:

Rohtas District: There are two sub-basins in the Rohtas district. The western part of the district is situated on 'Ghaghara confluence to Gomti confluence' sub-basin, which is a part of Upper Ganga Basin whereas the narrow eastern part, along with the river Sone, falls in Sone Sub-basin which is a part of Lr. Ganga Basin.

The Sone is a main river in the district which originates in the plateau area of Amarkantak in Madhya Pradesh State. It enters the district at the junction of Palamu, Mirzapur (U.P.) Kaimur and Rohtas district and forms southern and eastern boundary of the district. The small tract of land in the western part of the district between Kaimur plateau knows as Sone valley is formed by this river. The river is the main source of the famous Sone-sand used extensively for the construction of building.

Aurangabad District: The Aurangabad district falls in the Punpun River Sub-basin. The craton-origin Punpun River is a 3rd order stream, forming a southern tributary of the Ganga River. It forms the major drainage and the entire Aurangabad district falls in the watershed of the river. There are other drainages namely Batane, Batre, Adri, Ramrekha, Kasman, Madar, Dhawa etc, which merge with Punpun at different points within the district and the trunk river flows out of the district as a single thread. Major stretches of the river seem to follow the palaeo channels of Sone. The river in its northern stretches is highly incised and often braided. The north western peripheral part is drained by the river Sone, flowing from south-west to north-east. Though, the Sone and the Punpun bear little flow during non-monsoon periods, most of the other streams in the district remain almost dry during the same period.

The Project alignment passes through following rivers:

Table 4-2: List of water bodies

S.No.	Design Chainage	Name of Type of water bodies
1.	74+160	Durgauti Nadi
2.	76+455	Distributary
3.	77+917	Belwai Nadi
4.	-	Dhansol Nadi
5.	79+030	Distributary/Canal and BT Road
6.	80+096	Canal
7.	80+300	BT Road and Stream
8.	82+358	Dhunsoot River
9.	85+950	Canal
10.	89+321	Western son high level canal
11.	101+800	Kudra Nadi
12.	105+400	Kao river
13.	125+900	Son River

A. Drainage: Rohtas District: The Sone is an main river in the district which originates in the plateau area of Amarkantak in Madhya Pradesh State. It enters the district at the junction of Palamu, Mirzapur (U.P.) Kaimur and Rohtas district and forms southern and eastern boundary of the district.

Aurangabad District: It forms the major drainage and the entire Aurangabad district falls in the watershed of the river. There are other drainages namely Batane, Batre, Adri, Ramrekha, Kasman, Madar, Dhawa etc, which merge with Punpun at different points within the district and the trunk river flows out of the district as a single thread.

C. Forests: Approx. 9.5 Ha of forest land of has to be acquired due to the proposed highway. The forest proposal shall be prepared after consultation with concerned forest officer.

D. Rivers: The project alignment is passing through 6 no. of Rivers (Durgauti Nadi, Belwai Nadi, Dhansol Nadi, Dhunsoot River, Dhoba Nadi, Son River), 4 no. of canal (Distributary/Canal and BT

Road, Canal, Canal, Western son high level canal), 2 no. of Nala (Belwai Nala, Tutla Nala) and 1 no. of Distributary.

E. Wildlife Sanctuary: Kaimur wildlife sanctuary within 10 km and crossing along the alignment.

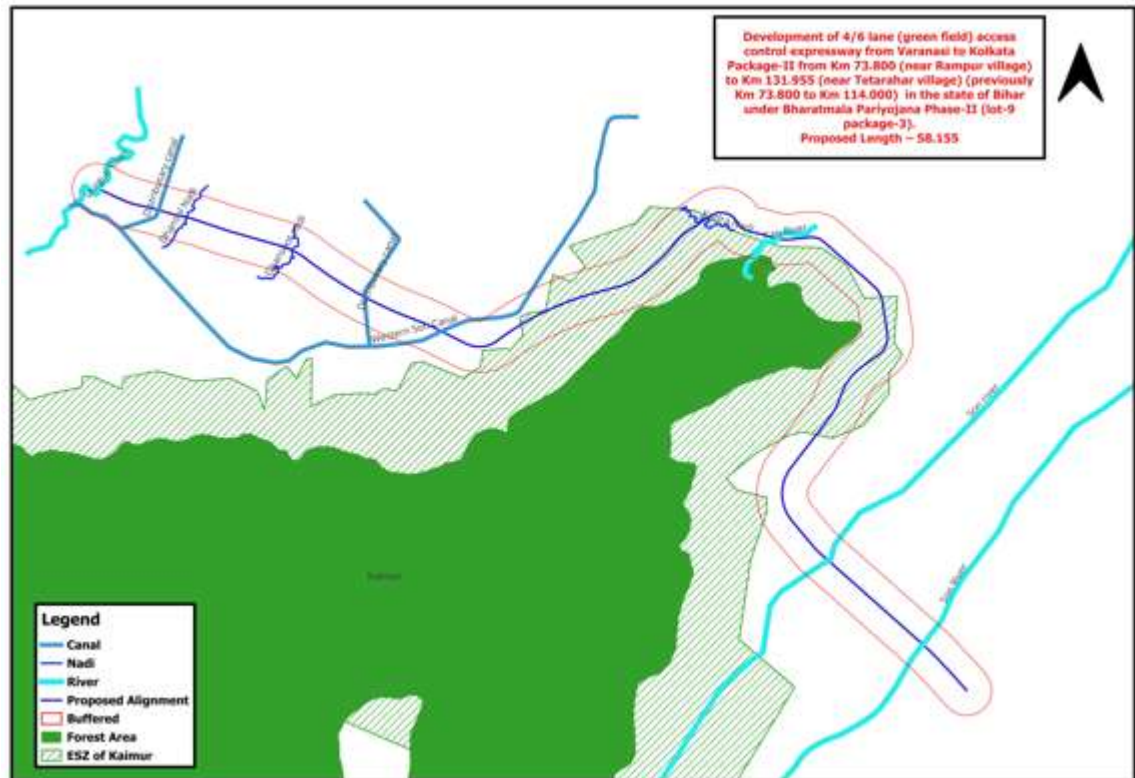


Figure 4-4: Key plan showing water bodies and Forest

4.2.2 LAND USE AND TERRAIN

4.2.2.1 LAND USE

The proposed project exhibits diversity in landuse- land cover owing to variations in the geomorphology, soils, climate groundwater quality and irrigation facilities etc. The landuse-land cover map of the proposed project depicts the distribution of forest area, agricultural land, wastelands, and water bodies, built up land, mining area and other land. The major habitation along the highway corridor are Chenari, Shesagar, Sasaram, Tilouthun and Nabinagar. The project area is located in the state of Bihar.

The altitude of relief ranges of is approx. 101m amsl. **Rohtas District:** The district comprises of 667.23 km of forestland, 2386.7 km of Net Sown Area and 2817.96 km of land is suitable for Cultivation.

Aurangabad District: The district comprises of 111 km of forestland, 1393 km of Net Sown Area, and 1393 km of land is not suitable for Cultivation.

4.2.2.2 LAND COVER

The land use map for a buffer length of 1 km around the proposed project has been prepared to a scale of 1:25000 based on recent satellite imagery. It shows features such as crop lands, agricultural plantations, fallow lands, waste lands, water bodies, built-up areas, forest areas and other surface features such as railway tracks, roads and ground survey map on 1:2000 scale showing the existing features falling within the right of way namely trees, structures including archaeological & religious, monuments etc.

Table 4.3 describes the land use of the study area. The land use map based on satellite imagery within 1km buffer length of the proposed project has been shown in **Figure 4.5**

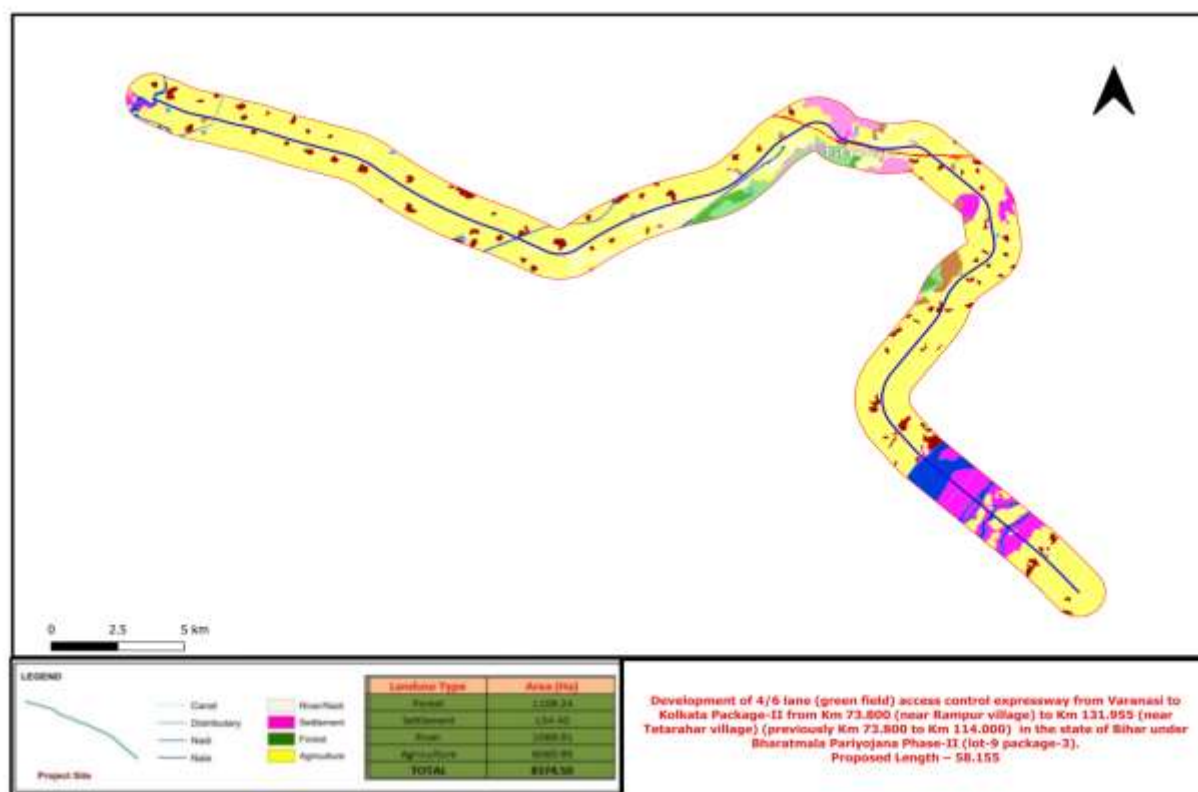


Figure 4-5: Land uses Map of the study area within 1 km

Table 4-3: Land use of the Study Area (1 Km)

S.No	Particulars	Area (Ha)	Percentage (%)
1	Forest	1109.24	13.24
2	Settlement	134.4	1.60
3	River	1069.91	12.77
4	Agriculture	6060.95	72.37
	Total	8374.5	100

4.2.3 SEISMICITY

Proposed alignment passes through Rohtas and Aurangabad, which falls under seismic zone III (moderate damage risk zone). The project corridor thus is in a zone of stability and proposed highway is located in Low Damage Risk as per Wind and Cyclone Hazard Classification of India.

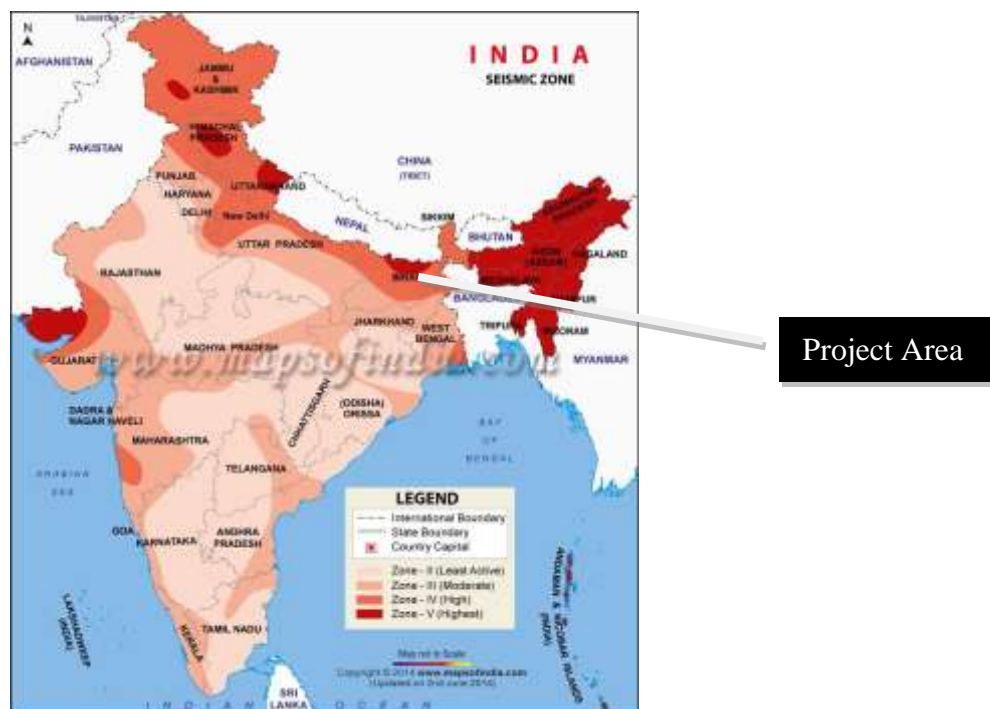


Figure 4-6: Hazard map of the areas covered in the project road

4.2.4 CLIMATE AND MICRO-METEOROLOGICAL PARAMETERS

4.2.4.1 RAINFALL AND CLIMATE

Rohtas District: The climate of the district is sub-tropical monsoonic, characterized by hot summer, high humidity and dry winter. The district gets easterly wind from June to September, whereas westerly wind blows from October till May. The district gets maximum rainfall during the months of July and August. Some winter rains occurs in January and February. About 90 % of rainfall is received during the monsoon months between June to September. The average annual rainfall is 1144.2 mm.

Aurangabad District: A warm and humid climate embraces the area. The summer (March–June) is hot with mean maximum temperature during June (peak summer) as 36.6 °C. A dry and cold winter (October to February) records mean minimum temperature as 9.2 °C in January. Humidity varies from 24.7% to 83.45% (Govt. of Bihar 1994). The districts in the SBP fall in the South Agro-Climatic Zones of Bihar and the annual rainfall in this area varies within 990-1300 mm. 88% of this rainfall comes during the southwest monsoon (June to September). The months July and August register peak rainfall in a year. The last decade rainfall distribution indicates alternate peaks and troughs in rainfall.

4.2.4.2 TEMPERATURE

Rohtas District: January is the coldest month when the minimum temperature comes down to approximately 4°C. Winter season starts from the month of November and lasts till February. The temperature begins to rise in the March and it reaches the peak in the month of May when the mercury touches about 45°C.

Rains sets sometimes in June also and lasts till middle of September.

Aurangabad District: The summer (March–June) is hot with mean maximum temperature during June (peak summer) as 36.6 °C. A dry and cold winter (October to February) records mean minimum temperature as 9.2°C in January.

4.2.4.3 HUMIDITY

Rohtas District: The relative humidity is at its minimum during March and April and maximum during January and February. It ranges between 12 to 60%.

Aurangabad District: Humidity varies from 24.7% to 83.45%.

4.2.5 GEOMORPHOLOGY AND SOIL

4.2.5.1 GEOMORPHOLOGY

Rohtas District: The district has complex features having alluvium in the northern part to the sub-hilly region in the south. The district has a general slop towards the north but the eastern narrow part of the district, along the river Sone, towards Sone (East). The major (northern) part of the district is a characteristically flat terrain without any undulation and rocky isolated patches in between. The general elevation of the flat terrain with respect to mean sea level is 80-90 m and the gradient is 0.60 m/km from south to north.

Aurangabad District: The southern hilly ranges and the northern Gangetic Plains form two physiographic units of the Aurangabad district. The southern hilly unit is undulating in character, occupied by high mountain ranges and low valleys covering parts of Kutumba, Nabinagar, Deo and Madanpur blocks. The constituting rocks of the hills dip northward and form the basement of the northern lying Gangetic Plain. At the transition parts from hard rock to alluvial plain, the hard rocks are exposed (linearly) at places as inliers. The northern alluvial plain slopes NNE. The maximum elevation is attained to heights of 411.48 m above mean sea level by the hills located south of Deo. The minimum elevation of ~80 m amsl runs at the northeastern parts around Goh.

4.2.5.2 AGRICULTURE

Principal Crops of Project area

Rohtas District: Rice and Maize are the main crops of the district.

Aurangabad District: Rice and Wheat are the main crops of the district..

4.2.5.3 SOIL TYPES

Rohtas District: The major soil group which have got strategic significance in present day land utilisation are described below:

- The forest and hilly area in the south of the GT road with yellowish brown to reddish brown soil.
- Alluvial soils, light grey to dark grey in colour of recent age occurs in the north of GT road (NH-2) in Gangetic plain.

Marginal alluvial soils, (Colluvial deposits) greyish yellow in colour to the south of GT road upto the foothill of Kaimur plateau

Aurangabad District: Three types of soil are mainly observed in the district: (1) Younger Alluvial soils, (2) Older Alluvial soils, and (3) Foot hill soils.

These soils have been formed as a narrow belt along the western periphery of the district following the Sone River. These are generally yellowish white to reddish yellow in colour, sandy to loamy sand in texture.

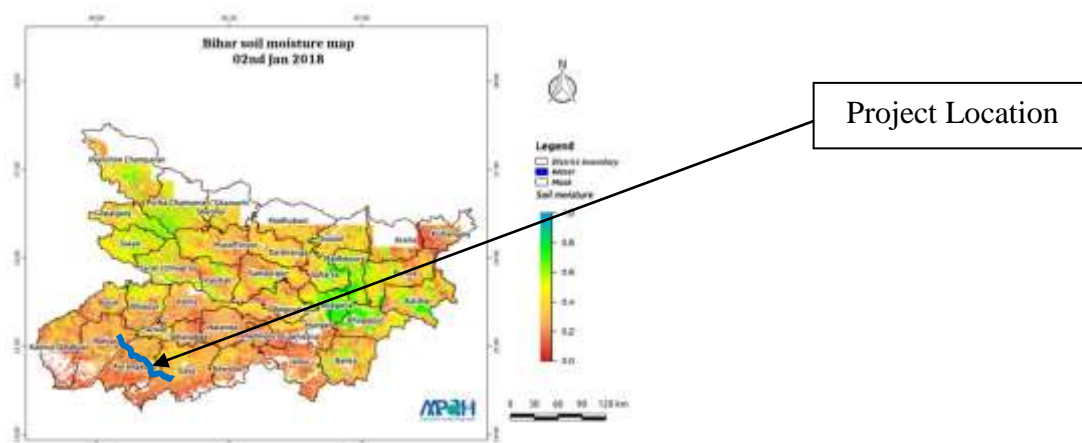


Figure 4-7: Soil Moisture Map of Bihar showing Project Area

4.2.6 SOIL CHARACTERISTICS

4.2.6.1 FIELD STUDY AND SAMPLING LOCATIONS

For studying soil quality 5 Nos. of sampling location was selected to assess the existing soil conditions in and along the project alignment representing various land use conditions during March 2022 to May 2022. The sample was collected by ramming a core-cutter into the soil up to 90-cm depth. The sample collection, preservation, storage, transportation and analysis were carried out as per the standard methods. The soil samples after collection were immediately subjected to the analysis of various parameters in the NABL Accredited laboratory. The details of the soil sampling locations have been presented in **Table 4.4 and Figure 4.8**

Table 4-4: Soil Sampling Locations

S. No.	Notation	Location	Chainage	Lat	Long
1	SQ 1	Chenari	76+000	24°54'57.40"N	83°47'42.03"E
2	SQ 2	Baddi	88+000	24°52'55.60"N	83°54'18.22"E
3	SQ 3	Karserua	92+000	24°52'44.61"N	83°57'21.73"E
4	SQ 4	Tilouthu East	123+000	24°48'24.84"N	84°5'0.50"E
5	SQ 5	Tetarahar	134+000	24°45'12.04"N	84° 7'10.64"E

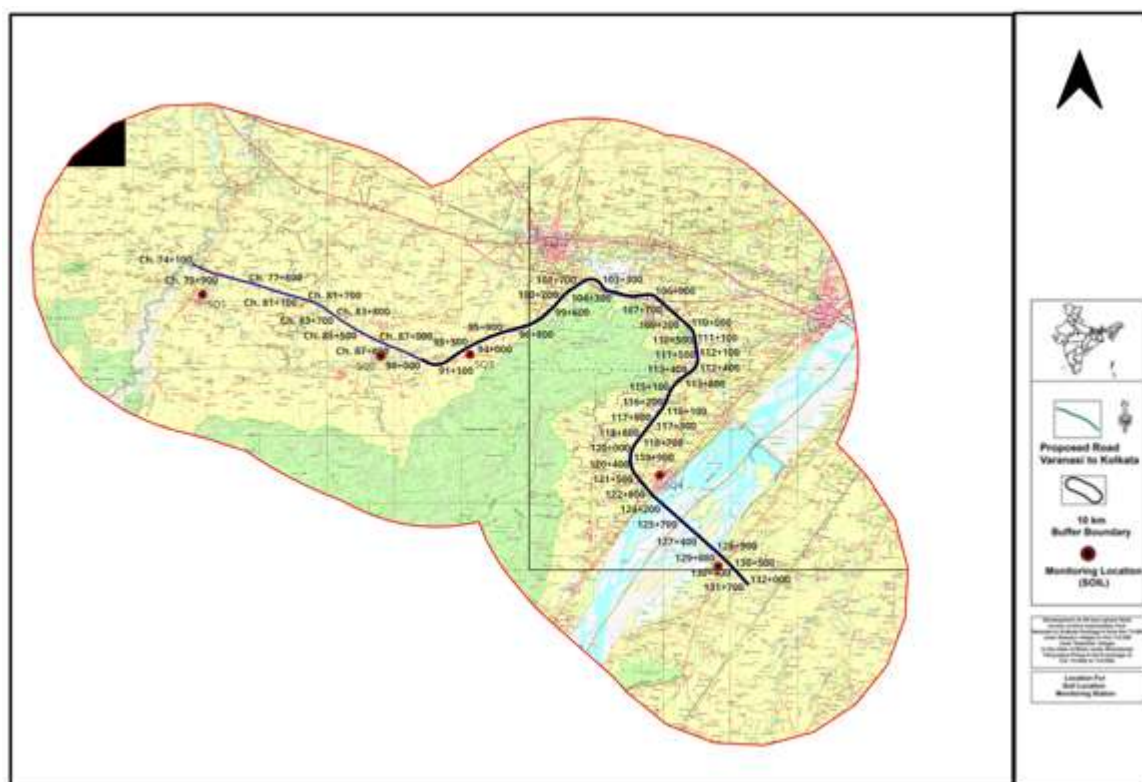


Figure 4-8: Soil Sampling Locations

4.2.6.2 SOIL QUALITY ALONG THE STUDY AREA

All these soil samples were collected along the proposed highway and analysed for the physical, chemical properties and heavy metal concentrations. They were assessed for agricultural and afforestation potential. The characteristic of the soil along the highway has been presented in **Table 4.5**.

Table 4-5: Soil Analysis report

		Location	Chenari	Baddi	Karserua	Tilouthu East	Tetarahar
Sr. No.	Parameters	Units	Results	Results	Results	Results	Results
1	pH	-	7.51	7.29	7.52	7.63	7.51
2	Bulk Density	gm/cm ³	1.62	1.33	1.25	1.42	1.22
3	Conductivity	Micro mhos/cm	316	326	296	263	351
4	Moisture	%	7.2	6.5	7.1	6.2	6.3
5	Texture	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
6	Sand	%	68.3	62.5	68.5	70.5	69.2
7	Clay	%	12.6	15.3	12.3	15.6	15.2
8	Silt	%	19.1	22.2	19.3	13.9	15.6
9	Sodium	mg/100gm	16	25	15	17	20
10	Potassium	mg/100gm	5	7	3	5	6
11	CEC	meq/100gm	9.34	10.9	9.09	10.44	10.59
12	Nitrogen	mg/100gm	30.4	32.6	29.4	26.4	35
13	Phosphorous	mg/100gm	0.62	0.45	0.63	0.35	0.59
14	Pesticides						
(i)	2,4-D Iso-Octyl Ester	mg/100gm	NA	NA	NA	NA	NA
(ii)	Captan	mg/100gm	NA	NA	NA	NA	NA
(iii)	Diazinon	mg/100gm	NA	NA	NA	NA	NA

(iv)	Fenamiphos	mg/100gm	NA	NA	NA	NA	NA
(v)	Fenpropimorph	mg/100gm	NA	NA	NA	NA	NA
(vi)	Glyphosate	mg/100gm	NA	NA	NA	NA	NA
(vii)	Imazaquin	mg/100gm	NA	NA	NA	NA	NA
(viii)	Metsulphuron Methyl	mg/100gm	NA	NA	NA	NA	NA
(ix)	Methidathion	mg/100gm	NA	NA	NA	NA	NA
(x)	Simazine	mg/100gm	NA	NA	NA	NA	NA
15	Organic Matter	mg/100gm	1.52	1.63	1.47	1.32	1.25
16	Ca	meq/100gm	7.25	6.95	7.12	7.32	6.54
17	Mg	meq/100gm	2.86	3.14	3.25	2.65	3.25
18	SAR	-	1.27	1.97	1.17	1.37	1.35
19	Iron	mg/100gm	<01	<01	<01	<01	<01
20	Lead	mg/100gm	<0.1	<0.1	<0.1	<0.1	<0.1
21	Nickel	mg/100gm	<01	<01	<01	<01	<01
22	Zinc	mg/100gm	<01	<01	<01	<01	<01
23	Copper	mg/100gm	<0.1	<0.1	<0.1	<0.1	<0.1
24	Chromium	mg/100gm	<0.01	<0.01	<0.01	<0.01	<0.01
25	Cadmium	mg/100gm	<0.001	<0.001	<0.001	<0.001	<0.001
26	Arsenic	mg/100gm	<0.001	<0.001	<0.001	<0.001	<0.001

4.2.6.3 INTERPRETATION OF RESULTS

Physical characteristics of soil were characterized through specific parameters viz bulk density, porosity, water holding capacity, pH, electrical conductivity and texture. Soil pH plays an important role in the availability of nutrients. Soil microbial activity as well as solubility of metal ions is also dependent on pH. In the study area, variations in the pH of the soil were found to be slightly neutral to alkaline (7.29 to 7.63). Electrical conductivity (EC) is a measure of the soluble salts and ionic activity in the soil. In the collected soil samples the conductivity ranged from 263-351 µmhos/cm. Moisture Content from 6.2 to 7.2 (percentage) by mass. The soils with low bulk density have favourable physical condition where as those with high bulk density exhibit poor physical conditions for agriculture crops.

Table 4-6: Standard Soil Classification of Soil

S.No.	Parameters	Classification
1	pH	< 4.5 extremely acidic
		4.51 -5.0 very strong acidic
		5.01-5.5 strongly acidic
		5.51-6.0 moderately acidic
		6.1-6.5 slightly acidic
		6.51-7.3 Neutral
		7.31-7.8 slightly alkaline
		7.81-8.5 moderately alkaline
		8.51-9.0 strongly alkaline
		> 9.0 Very strongly alkaline
	Salinity Electrical Conductivity (mho/cm) 1 mho/cm = 1 ds/m	Upto 1.0 average
		1-2 harmful to germination
		2-3 harmful to crops
3	Nitrogen (kg/ha)	Up to 50 very less
		51-100 less
		110-150 good
		151-300 better
		> 300 sufficient
	Phosphorus (kg/ha)	Up to 15 very less
		15-30 less
		31-50 medium
		51-65 on average sufficient
		66-80 sufficient
		>80 more than sufficient
	Potassium (kg/ha)	0-120 very less
		120-180 less
		180-240 medium
		241-300 average
		301-360 better
		>360 more than sufficient

4.2.7 GEOLOGY & HYDROGEOLOGY

4.2.7.1 GEOLOGY

Rohtas District: Alongside the Kaimur range & Rohtas, plateau the majority of the land is a fertile flood plain of the son river which is a tributary of the Ganges originating in M.P. The mountains of the Kaimur range which is an extension of the Vindhyan range.

Aurangabad District: General geology of Aurangabad district is Stretches hard/crystalline rocks exists along the southern parts of the district covering the parts of Nabinagar, Deo, Kutumba, Rafiganj and Madanpur blocks.

4.2.7.2 HYDROGEOLOGY

Rohtas District: Based on the behaviour and occurrence of ground water in alluvium in the district can be described under these two distinct categories:

(a) Shallow Aquifer: Occurring within the depth of 50 m

(b) Deeper Aquifer: Beyond the depth of 50 m bgl down to 300 m bgl

(a) Shallow aquifer zone: The shallow aquifer occurring within a depth of 50 m from land surface. It constitutes the mixture of sand, silt and clay with calcareous nodules at places. The thickness of saturated aquifer varies from 5 to 20 m. Ground water in these sediments occurs under water table to semi-confined condition. Open wells and shallow tube wells are used to develop groundwater from this aquifer. This aquifer gets recharged mainly from local precipitation. Separated from this shallowest water-bearing zone by few meter thick clay, second saturated horizon often tapped by dug-cum-Borewell with some boring from the base of the open wells.

(b) Deeper aquifer zone: Considerably, there is a variation of granularity and thickness of the aquifer in this zone. Even tube wells which are in proximity of each other are tapping aquifer at different depth. The aquifers consist of fine to medium sand with intercalation of clay. Within the depth range of 50 to 300 m bgl, there are three to four major aquifer zones exists within this depth range where ground water occurs under semi-confined to confined condition.

Aurangabad District: Unconsolidated Quaternary Alluvium, weathered zone and consolidated (fissured) formation-Granite gneiss form three Hydrogeological units in the district. About 95% of the geographical area of the Aurangabad district is covered with Quaternary Gangetic alluvial deposits. The groundwater occurs under unconfined conditions in the shallow aquifer whereas in the deeper aquifers it occurs under confined conditions. The shallow tube wells in the depth range of 30-50 m are capable of yielding 15-20 m³/hr discharges, whereas, the deeper aquifers are capable of yielding 50-100 m³/hr. The thickness of the weathered zone ranges from 5 m to 30 m. Ground water occurs under unconfined condition within the weathered mantle. Joints, cracks,

fractures and other types of secondary porosity control the occurrence and movement of groundwater. The discharge and yield of the wells varies from place to place due to in-homogeneity of the fractures.

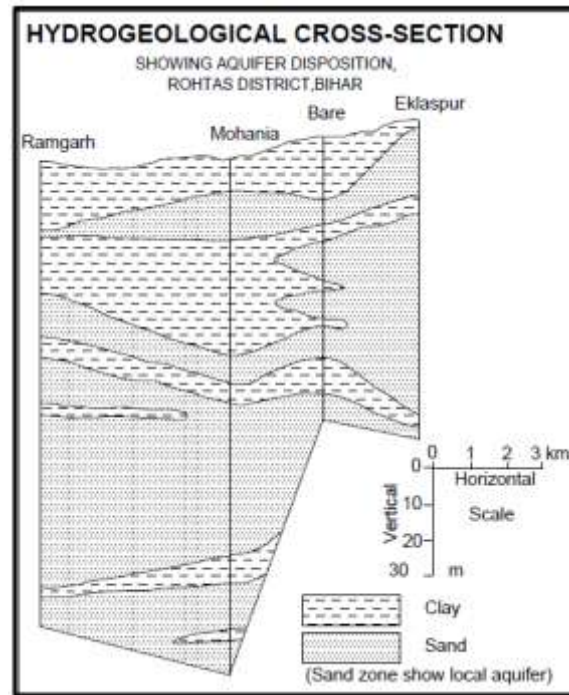


Figure 4-9: Hydrogeological Map of Rohtas District

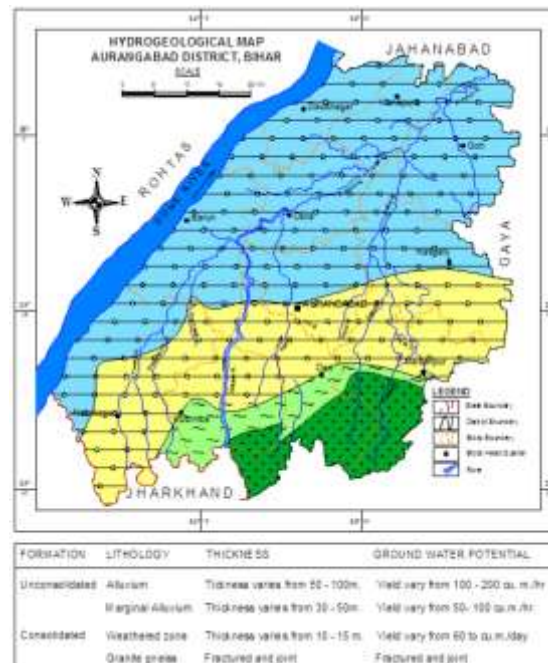


Figure 4-10: Hydrogeological Map of Aurangabad District

4.2.7.2.1 Depth of water level:

Rohtas District: Ground water level during pre-monsoon period varies between 4.98 m to 12.08 mbgl below ground level. Ground water level during post-monsoon period varies mainly between 1.25 mbgl to 7.98 mbgl below ground level. .

Aurangabad District: The pre-monsoon water level data reveals that the depth to water level in the district remains between <1.0 and 12.23 mbgl. During the post level was found varying from 1.50 mbgl to 10.40 mbgl.

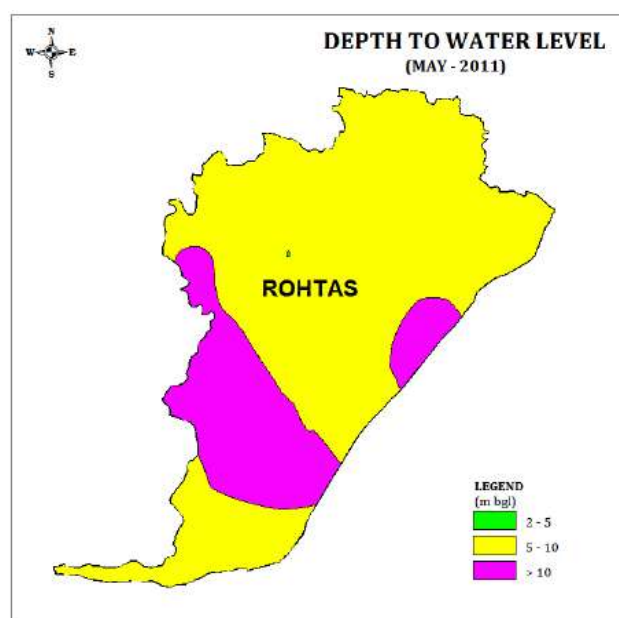


Figure 4-11: Pre-monsoon depth of water level (Rohtas District)

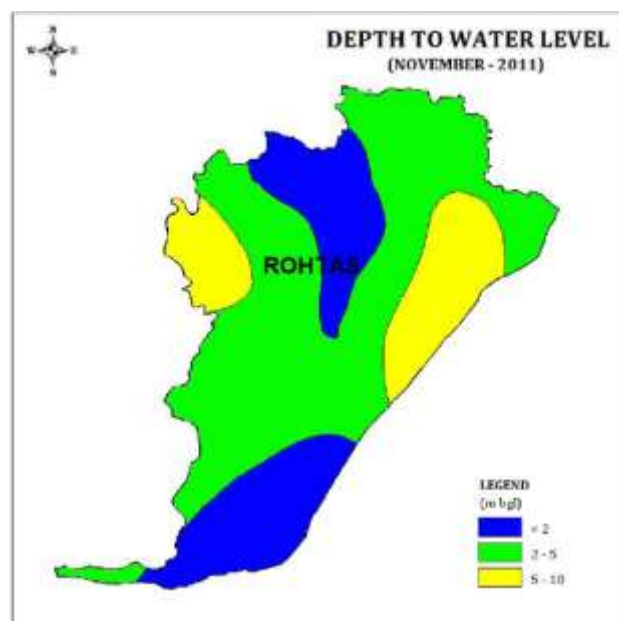


Figure 4-12: Post-monsoon depth of water level (Rohtas District)

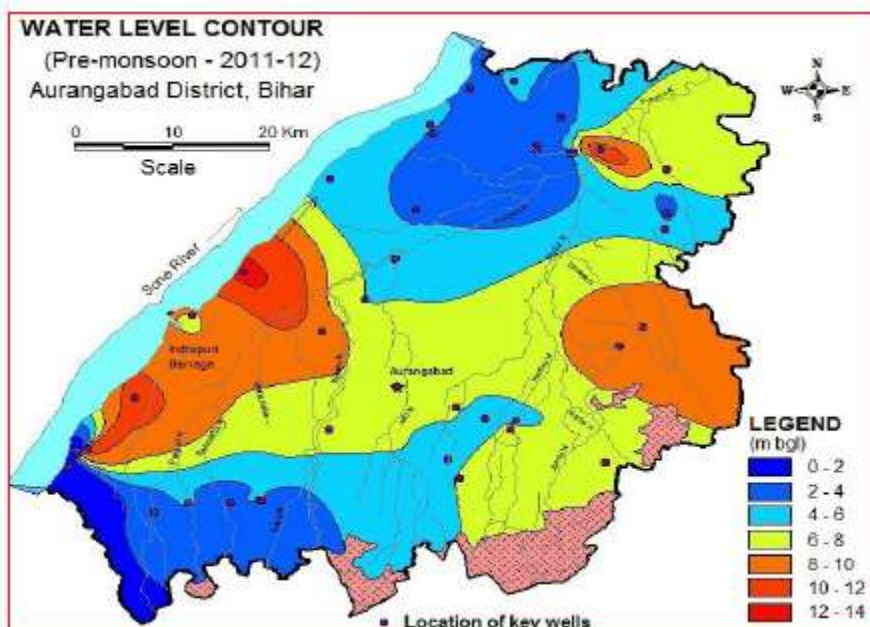


Figure 4-13: Pre-monsoon depth of water level ((Aurangabad District)

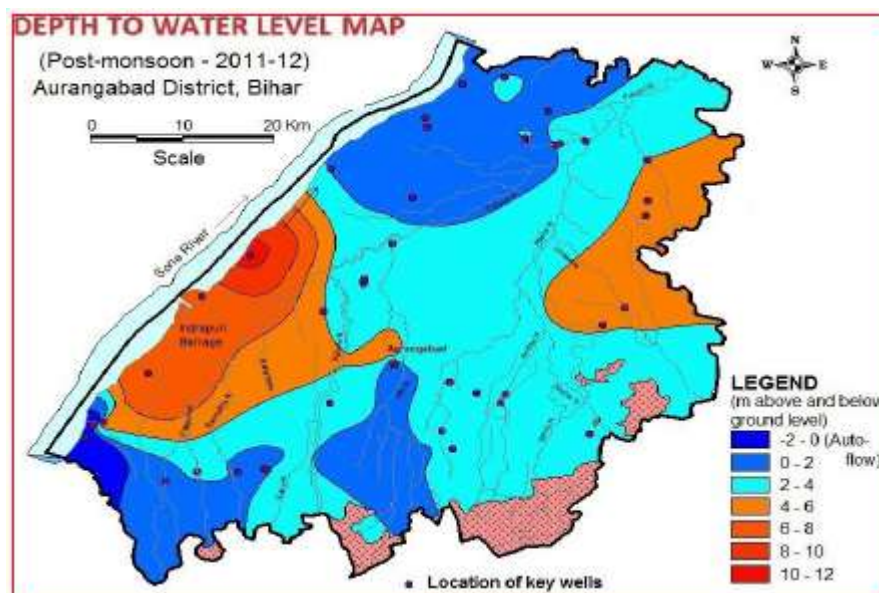


Figure 4-14: Post-monsoon depth of water level (Aurangabad District)

4.3 WATER ENVIRONMENT

Water quality assessment is one of the essential components of EIA study. Such assessment helps in evaluating the existing health of water body and suggesting appropriate mitigation measures to minimize the potential impact from development projects. Water quality of ground water has been

studied in order to assess proposed water-uses in construction, drinking, cooling and horticulture purpose.

4.3.1 STREAMS/CANALS/NALAS/WATER BODIES AND BRIDGES CROSSINGS THE PROPOSED ALIGNMENT.

Table 4-7: List of water bodies crossing the project alignments

S.No.	Design Chainage	Name of Type of water bodies
1.	74+160	Durgauti Nadi
2.	76+455	Distributary
3.	77+917	Belwai Nadi
4.	-	Dhansol Nadi
5.	79+030	Distributary/Canal and BT Road
6.	80+096	Canal
7.	80+300	BT Road and Stream
8.	82+358	Dhunsoot River
9.	85+950	Canal
10.	89+321	Western son high level canal
11.	101+800	Kudra Nadi
12.	105+400	Kao river
13.	125+900	Son River

4.3.2 GROUND WATER QUALITY

5 no. of Samples of ground water were collected from existing hand pumps, open wells and Tube-wells and analysed for parameters necessary to determine water quality (based on IS: 10500 criteria) and those which are relevant from the point of view of environmental impact of the proposed highway project in March 2022 to May 2022.

The locations of the Water sampling have been presented in **Table 4.8 and Figure 4.15**

Table 4-8: Ground water monitoring locations

S. No.	Notation	Location	Chainage	Lat	Long
1	GW1	Chenari	76+000	24°54'57.40"N	83°47'42.03"E
2	GW2	Baddi	88+000	24°52'55.60"N	83°54'18.22"E
3	GW3	Karserua	92+000	24°52'44.61"N	83°57'21.73"E
4	GW4	Tilouthu East	107+000	24°48'24.84"N	84°5'0.50"E
5	GW 5	Tetaraha	114+000	24°45'12.04"N	84° 7'10.64"E

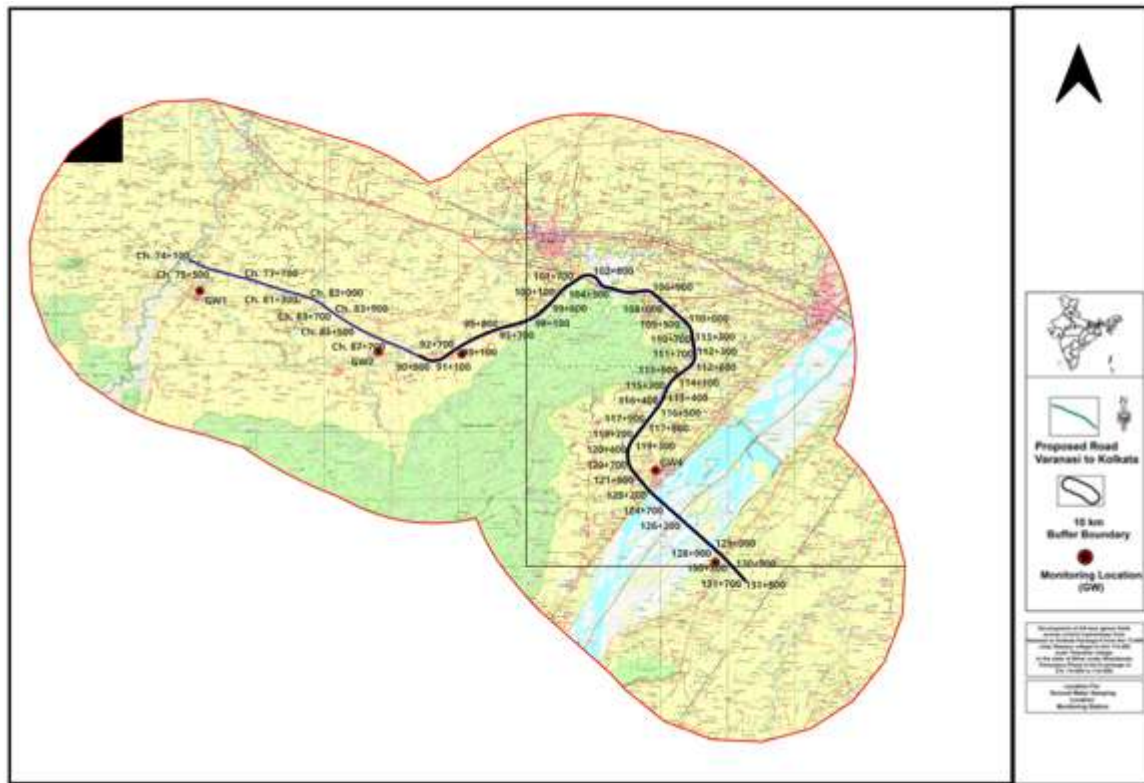


Figure 4-15: Ground water monitoring Locations

4.3.2.1 GROUND WATER QUALITY ALONG THE PROJECT ALIGNMENT

The analysis results for the ground water samples and surface water samples are given in below. The analyzed results are compared with the Acceptable and permissible limit standards (absence of Alternative source) as per IS: 10500:2012.

Table 4-9: Ground water analysis report

S.No.	Parameter	Test method	GW1	GW2	GW3	GW4	GW 5	Unit	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
1.	Colour	IS-3025(P-04)	<5	<5	<5	<5	<5	Hazen	5	15
2.	Odour	IS-3025(P-05)	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
3.	Taste	IS-3025(P-07 & 08)	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-	Agreeable	-
4.	Temperature	IS-3025(P-10)	23.00	22.00	25.00	21.00	21.00	NTU	1	5
5.	pH	IS-3025(P-04)	7.23	7.24	7.26	7.41	7.52	-	6.5-8.5	-
6.	Conductivity	IS:3025(Part-14)	641	596	585	574	601	µmhos/cm	-	-
7.	Alkalinity as CaCO ₃	IS: 3025 (P- 23)	161	153	150	148	166	mg/l	200	600
8.	Total Dissolved Solids	IS-3025(P-16)	410	381	410	362	397	mg/l	500	2000
9.	Total Hardness as CaCO ₃	IS: 3025 (P- 23)	192	17	191	160	185	mg/l	200	600
10.	Calcium as Ca	IS: 3025 (P- 40)	40	35	46	35	44	mg/l	75	200
11.	Magnesium as Mg	IS: 3025 (P-46)	22.2	21	18.8	17.6	18.5	mg/l	30	100

12.	Chloride as Cl	IS: 3025 (P- 32)	50	43	50	43	54	mg/l	250	1000
13.	Phosphate as PO ₄	IS:3025(Part-31)	0.45	0.46	0.45	0.4	0.52	mg/l	-	-
14.	Nitrate as NO ₃	IS: 3025 (P- 34)	4.5	3.6	5.7	4	4.5	mg/l	45	No Relaxation
15.	Sulphate as SO ₄	IS: 3025 (P- 24)	25	22	19	22	27	mg/l	200	400
16.	Fluoride as F	IS: 3025 (P-60)	0.57	0.53	0.59	0.58	0.51	mg/l	1.0	1.5
17.	Zinc as Zn	IS: 3025 (P- 49)	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	5.0	15
18.	Arsenic as As	IS-3025(P-37)	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
19.	Lead as Pb	IS-3025(P-47)	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	0.01	No Relaxation
20.	Iron as Fe	IS: 3025(P-52)	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	1.0	No Relaxation
21.	Nickel (as Ni)	Annex L of IS-13428	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.02	No Relaxation
22.	Copper (as Cu)	IS: 3025 (P-42)	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.05	1.5
23.	Total Chromium (as Cr)	Annex J of IS-13428	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.05	No Relaxation
24.	Cadmium (as Cd)	IS-3025(P-41)	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	0.003	No Relaxation
25.	Sodium (as Na)	IS-3025(P-45)	59	66	70	72	68	mg/l	-	-

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

Chapter 4- Description of Environment

26.	Potassium (as K)	IS-3025(P-45)	8	10	12	12	11	mg/l	-	-
27.	Total Coliform	IS-15185	Absent	Absent	Absent	Absent	Absent	MPN /100ml		
28.	Faecal Coliform	IS-15185	Absent	Absent	Absent	Absent	Absent	MPN /100ml		

4.3.3 SURFACE WATER QUALITY:

6 no. samples of surface water were collected from rivers and available local surface water body like ponds, lakes etc. of samples were analysed for parameters necessary to determine water quality in March 2022 to May 2022.

Table 4-10: Surface water locations

S No	Notation	Location	Chainage	Lat	Long
1	SW1	Durgawati River	74+000	24°56'21.60"N	83°47'32.73"E
2	SW2	Canal	78+000	24°55'41.17"N	83°49'37.60"E
3	SW3	Belwai Nadi	80+000	24°55'18.91"N	83°50'51.80"E
4	SW4	Dhansol Nadi	82+000	24°54'55.57"N	83°52'8.94"E
5	SW5	Western Son High Level Canal	90+000	24°53'1.22"N	83°55'44.36"E
6	SW6	Son River	108+000	24°47'37.91"N	84° 4'40.30"E

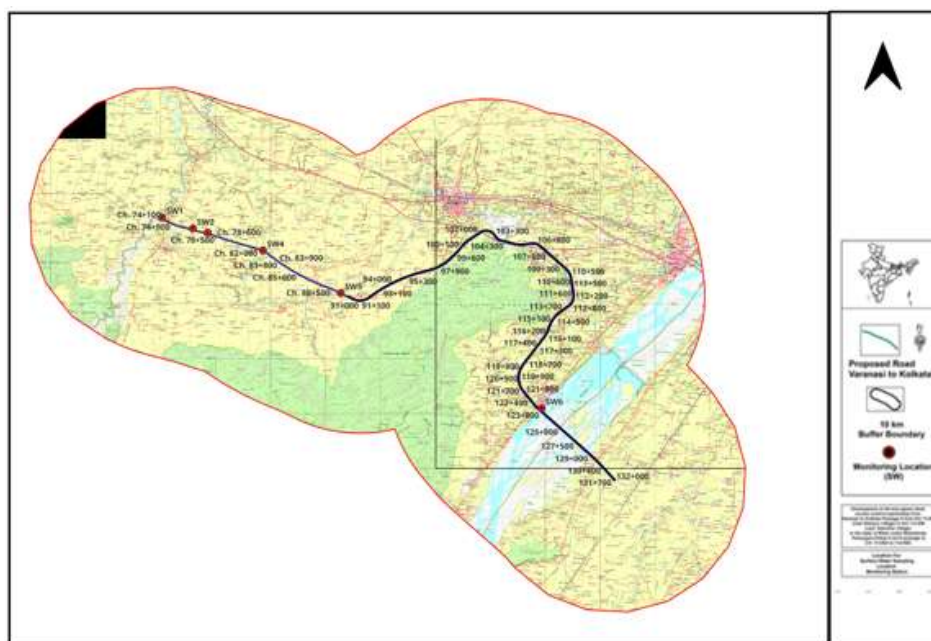


Figure 4-16: Surface water monitoring Locations

4.3.3.1 SURFACE WATER QUALITY ALONG THE PROJECT ALIGNMENT

The analysis results for the Surface water samples and surface water samples are given in Table below. The analyzed results are compared with the Acceptable and permissible limit standards (absence of Alternative source) as per IS: 10500:2012.

Table 4-11: Surface water analysis report

TEST RESULTS								
S. No.	Parameter	Units	Durgawati River	Belwai Nadi	Canal	Dhansol Nadi	Western Son High Level Canal	Son River
1	Colour	Hazen Units	<5	<5	<5	<5	<5	<5
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Not Done	Not Done	Not Done	Not Done	Not Done	Not Done
4	pH	-	7.62	7.46	7.62	7.65	7.57	7.61
5	Temperature	°C	32	31	30	32	34	32
6	Turbidity	NTU	1.5	1.6	1.8	1.5	1.6	1.4
7	Conductivity	µmhos/cm	751	779	798	782	811	831
8	Alkalinity as CaCO ₃	mg/l	196	197	199	204	205	208
9	Total Dissolved Solids	mg/l	428	430	433	446	448	451
10	Total Suspended Solids	mg/l	10	11	12	11	11	12
11	Total Hardness as CaCO ₃	mg/l	222	208	200	231	216	208
12	Calcium as CaCO ₃	mg/l	61	55	59	64	57	61
13	Magnesium as CaCO ₃	mg/l	17.0	17.1	13.1	17.7	17.8	13.7
14	Chloride as Cl	mg/l	65	66	67	67	69	70
15	Total Phosphorus	mg/l	0.70	0.73	0.75	0.72	0.76	0.79

16	Nitrate as NO ₃	mg/l	8.7	8.9	9.0	9.0	9.2	9.4
17	Sulphate as SO ₄	mg/l	38	39	40	39	40	41
18	Fluoride as F	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
19	Ammonical Nitrogen	mg/l	<1	<1	<1	<1	<1	<1
20	Arsenic as As	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
21	Lead as Pb	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
22	Zinc as Zn, Max	mg/l	0.10	0.15	0.15	0.14	0.12	0.11
23	Iron	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24	Nickel	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Copper	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
26	Chromium	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Sodium as Na	mg/l	32	31	30	32	36	34
29	Potassium as K	mg/l	10	12	10	10	12	8
30	Dissolved Oxygen	mg/l	7.4	6.2	6.1	6.1	6.5	6.8
31	BOD	mg/l	15.3	12.3	6.4	15.4	10.5	12.4
32	COD	mg/l	52	44	36	54	42	45
33	Total Coliform	MPN/100ml	1456	1234	1245	1245	1204	1165
34	Faecal Coliform	MPN/100ml	873	740	747	747	722	699

4.3.3.2 SAMPLING FREQUENCY

Parameters for analysis of water quality were selected based on the utility of the particular source of water as per CPCB guidance. Surface water quality was monitored for parameters as per Methods of Monitoring & Analysis published by CPCB and it was rated according to the CPCB Water Quality Criteria against A, B, C, D & E class of water. Water samples were collected as Grab water sample from sampling location for complete physico-chemical and bacteriological tests respectively. The samples were analysed as per standard procedure / method given in IS: 10500.

The surface water quality is compared with CPCB water quality criteria mentioned in **Table 4.12 below:**

Table 4-12: Water Quality Criteria as per Central Pollution Control Board

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be 500 or less; pH between 6.5 and 8.5; Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less; pH between 6 to 9; Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less

Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

4.4 AIR ENVIRONMENT

Meteorology is the key to understand the air quality. The essential relationship between meteorology and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

A meteorological station was set up at the proposed premises. Micro Meteorological station location is shown **Table 4.13** and **Figure 4.17**.

Table 4-13: Micro Meteorological station location

S No	Notation	Location	Chainage	Lat	Long
1	MM	Dehri	Near to CH 110+000	24°54'12.88"N	84°10'41.60"E.

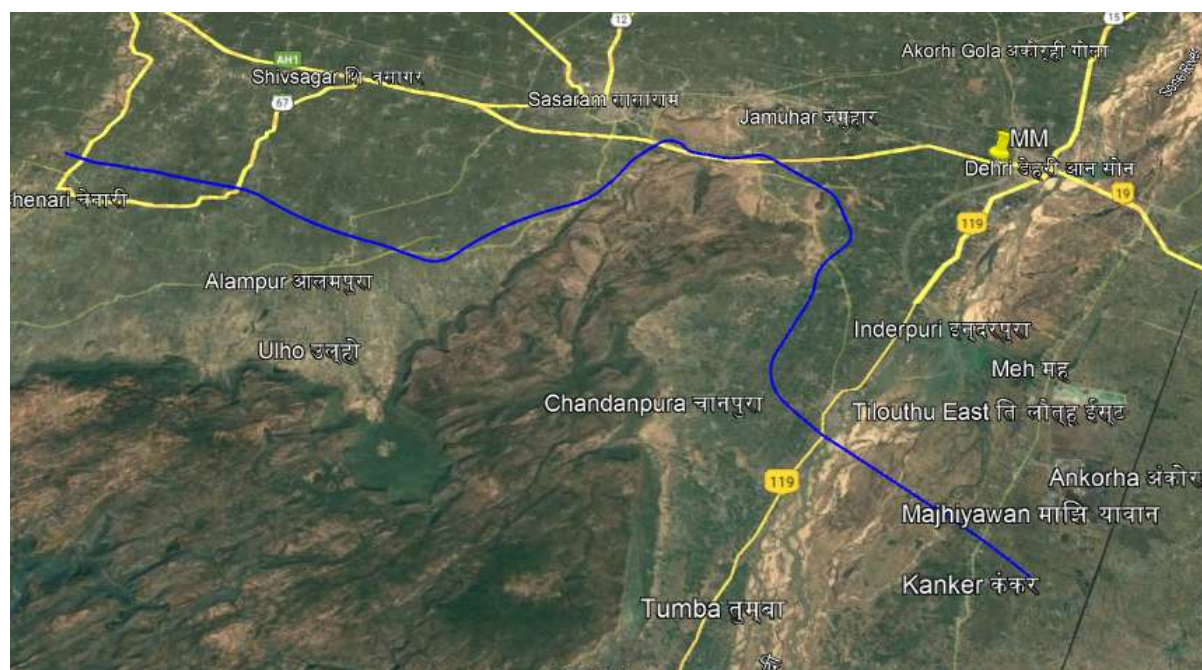


Figure 4-17: Micro Meteorological station location

Meteorological data was generated during the pre-monsoon monitoring period March 2022 to May 2022. Schedule of Monitoring and Sampling is given in **Table 4.14** and Summarized Project site Meteorological Data for Pre-Monsoon is given in **Table 4.15**. Wind rose diagram generated as per the study of meteorological data is shown in **Figure 4.18**.

The following parameters were recorded at hourly intervals continuously during monitoring period, except rainfall which was recorded on daily basis.

- Wind speed
- Wind Direction
- Air Temperature
- Micro-Meteorological
- Temp
- Humidity & rainfall

Table 4-14: Schedule of Monitoring and Sampling

Attributes		March								April								May							
AAQ1/ANL1		06	12	18	19	25	26	29	31	03	06	10	13	17	20	24	27	04	08	11	15	18	22	25	29
AAQ2/ANL2		05	08	10	15	17	22	24	30	02	05	10	12	17	18	23	25	03	07	08	11	14	18	21	28
AAQ3/ANL3		05	07	12	14	19	21	26	28	02	05	10	12	17	18	23	25	03	07	08	11	14	18	21	28
AAQ4/ANL4		05	07	12	14	19	21	26	28	02	05	13	16	20	18	23	25	03	07	08	11	14	18	21	28
AAQ5/ANL5		05	07	12	14	19	21	26	28	03	06	13	16	20	22	24	27	04	09	10	15	17	22	24	20
Micro-Meteorological Temp, Wind direction and speed, humidity, rainfall		All days																							

Table 4-15: Summarized Project site Meteorological Data for Pre-Monsoon

Month	Wind Speed (km/h)		Temperature (°C)			Rainfall (mm)	
	Max	Avg	Max	Min	Avg	Avg.	No. of Days
March 2022	1.9	1.3	38.2	9.1	42.75	8.6	0.9
April 2022	1.8	1.7	43	14.1	28.55	11.7	1
May 2022	1.9	1.8	44.6	15.8	30.2	39.3	2.4

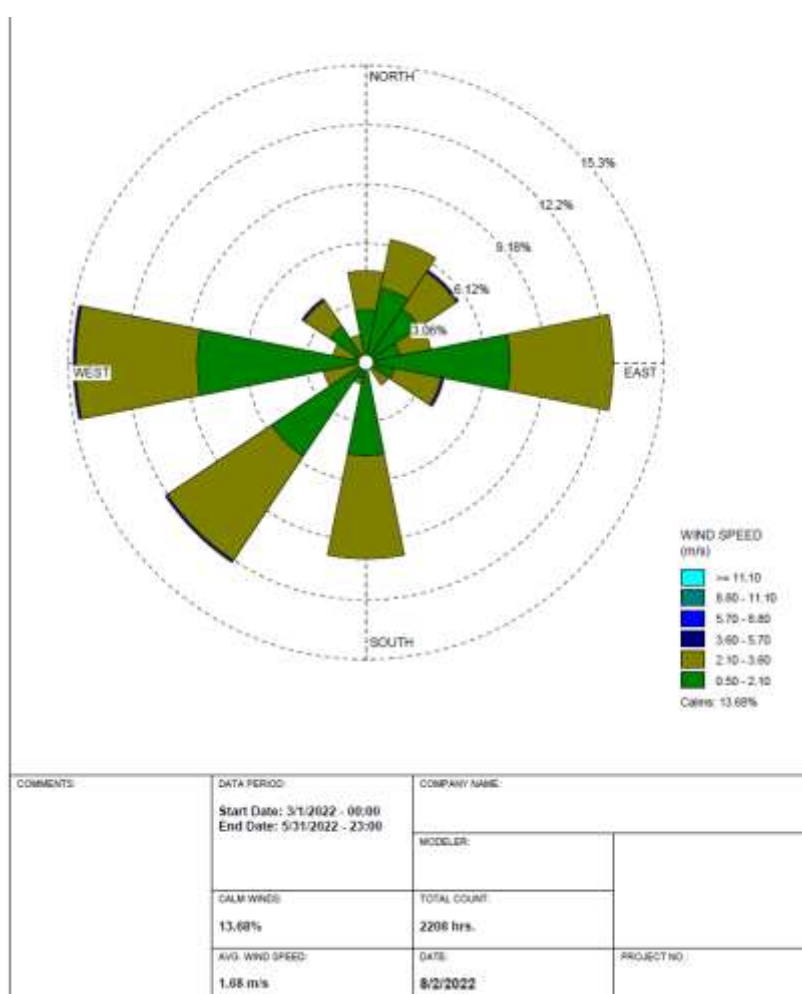


Figure 4-18: Wind Rose Diagram (at site)

4.4.1 AMBIENT AIR QUALITY

The ambient air quality has been monitored in the impact area as per MoEF & CC guidelines. The study area represents rural environment mostly.

4.4.1.1 SELECTION CRITERIA FOR MONITORING LOCATION

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance Programme has been based on the following consideration.

- Meteorological parameters including wind direction
- Topography of the study area
- Representative of regional background air quality for obtaining baseline status
- Representative of likely impact areas.

5 No. of AAQM locations were selected in downwind, upwind as well as crosswind direction of the proposed construction covering core and buffer zones. The details of the monitoring stations locations are given in **Table 4.16** and shown in map as **Figure 4.19**.

Ambient air quality monitoring was carried out twice a week with a frequency of 24 hours for three months during the study period. The common air pollutant namely Particulate Matter-10 (PM₁₀) & PM_{2.5}, Sulphur-dioxide (SO₂) and Oxides of Nitrogen (NO₂) has been measured through a planned field monitoring.

The baseline values of the air pollutants of concern are presented in Tables below statistical parameters like minimum, maximum, average and 98th percentiles have been computed from the observed field data for all sampling stations and are given **Table 4.17 to 4.21**. These are compared with the standards prescribed by Central Pollution Control Board (CPCB) for industrial, residential and rural zone.

Table 4-16: Air Monitoring Locations

S No	Notation	Location	Chainage	Lat	Long
1	AAQ 1	Chenari	76+000	24°54'57.40"N	83°47'42.03"E
2	AAQ 2	Raipur Chor	87+100	24°54'8.79"N	83°54'24.98"E
3	AAQ 3	Darigawn	91+100	24°52'51.01"N	83°56'31.32"E
4	AAQ 4	Tilouthu East	107+100	24°48'24.84"N	84°5'0.50"E
5	AAQ 5	Tetarahar	114+000	24°45'12.04"N	84° 7'10.64"E

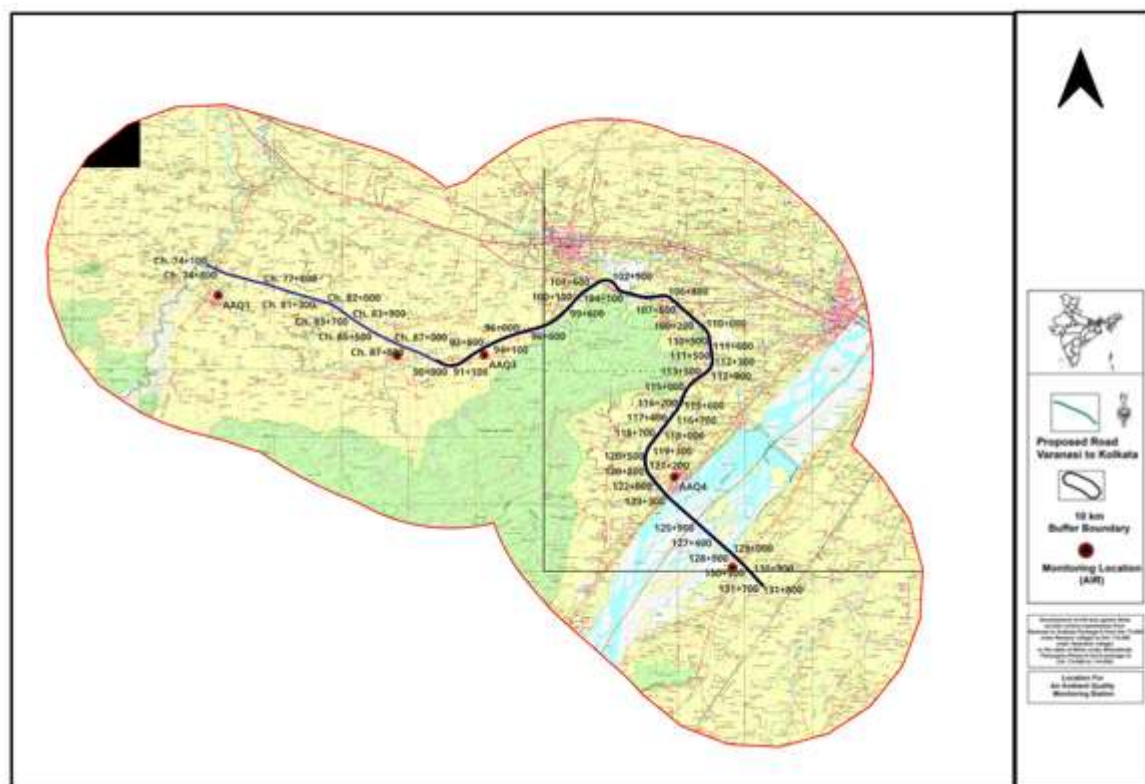


Figure 4-19: Air Monitoring Locations

4.4.1.2 AIR QUALITY ALONG THE PROJECT ALIGNMENT

Air Quality Monitoring results are presented in below Tables. The results are compared with the standards prescribed by Central Pollution Control Board (CPCB) for “Rural, Residential and other areas”.

Table 4-17: Ambient Air Quality for the location AAQ1

S. No.	Monitoring Date	PM2.5 (µg/m3)	PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	CO (mg/m3)
		CPCBVolum e-1/ Gravimetric	IS:5182(Part- 23)	IS:5182(Par t-2)	IS:5182(Part- 6)	IS:5182(Pa rt-10)
1	01.03.2022	39	70	11	22	0.48
2	04.03.2022	39	72	11	21	0.43
3	08.03.2022	36	69	10	17	0.44
4	11.03.2022	36	70	10	19	0.46
5	15.03.2022	37	72	10	15	0.31
6	18.03.2022	36	71	9	18	0.43
7	22.03.2022	39	75	11	20	0.63
8	25.03.2022	38	74	11	20	0.57
9	02.04.2022	45	76	13	24	0.62
10	05.04.2022	36	70	10	19	0.38
11	09.04.2022	39	68	12	22	0.43

12	12.04.2022	35	69	11	21	0.51
13	16.04.2022	34	65	8	15	0.31
14	19.04.2022	34	67	10	18	0.36
15	23.04.2022	35	70	12	19	0.38
16	26.04.2022	42	75	12	22	0.61
17	01.05.2022	36	70	10	20	0.59
18	04.05.2022	39	68	11	21	0.42
19	08.05.2022	40	72	14	26	0.71
20	11.05.2022	36	75	10	19	0.46
21	15.05.2022	36	70	10	16	0.32
22	18.05.2022	40	71	9	16	0.56
23	22.05.2022	41	72	11	20	0.79
24	25.05.2022	40	69	13	26	0.82
Max		45.00	76.00	14.00	26.00	0.82
Min		34.00	65.00	8.00	15.00	0.31
Avg.		37.83	70.83	10.79	19.83	0.50
98 percentile		43.62	75.54	13.54	26.00	0.81
NAAQS, For 24 hourly monitoring (except CO for Eight hour)		60 µg/m³	100 µg/m³	80 µg/m³	80 µg/m³	1 mg/m³

Table 4-18: Ambient Air Quality for the location AAQ2

S. No.	Monitoring Date	PM2.5 (µg/m3)	PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	CO (mg/m3)
		CPCBVolum e-1/ Gravimetric	IS:5182(Part-23)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-10)
1	01.03.2022	34	66	10	18	0.36
2	04.03.2022	36	67	8	19	0.4
3	08.03.2022	35	68	10	16	0.33
4	11.03.2022	36	70	10	16	0.33
5	15.03.2022	34	65	9	16	0.32
6	18.03.2022	35	68	9	17	0.43
7	22.03.2022	35	64	9	16	0.53
8	25.03.2022	41	70	12	22	0.56
9	02.04.2022	42	72	12	23	0.59
10	05.04.2022	33	65	9	15	0.44
11	09.04.2022	39	69	12	22	0.44
12	12.04.2022	36	70	11	22	0.52
13	16.04.2022	38	71	10	19	0.39
14	19.04.2022	38	70	11	18	0.37
15	23.04.2022	37	72	12	19	0.54
16	26.04.2022	43	71	10	18	0.5
17	01.05.2022	38	71	11	20	0.41

18	04.05.2022	39	70	11	20	0.41
19	08.05.2022	42	73	17	30	0.82
20	11.05.2022	36	74	10	18	0.54
21	15.05.2022	36	70	10	16	0.32
22	18.05.2022	39	68	9	16	0.54
23	22.05.2022	33	64	9	17	0.35
24	25.05.2022	37	72	11	20	0.4
Max		43.00	74.00	17.00	30.00	0.82
Min		33.00	64.00	8.00	15.00	0.32
Avg.		37.17	69.17	10.50	18.88	0.45
98 percentile		42.54	73.54	14.70	26.78	0.71
NAAQS, For 24 hourly monitoring (except CO for Eight hour)		60 µg/m³	100 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³

Table 4-19: Ambient Air Quality for the location AAQ3

S. No.	Monitoring Date	PM2.5 (µg/m3)	PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	CO (mg/m3)
		CPCBVolum e-1/ Gravimetric	IS:5182(Part-23)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-10)
1	01.03.2022	40	72	11	20	0.56
2	04.03.2022	38	70	11	20	0.42
3	08.03.2022	36	71	10	17	0.38
4	11.03.2022	38	75	11	20	0.59
5	15.03.2022	38	70	10	18	0.36
6	18.03.2022	35	68	9	17	0.44
7	22.03.2022	36	65	8	15	0.47
8	25.03.2022	36	70	9	16	0.46
9	02.04.2022	42	72	9	19	0.49
10	05.04.2022	36	71	10	19	0.38
11	09.04.2022	43	75	11	21	0.43
12	12.04.2022	37	72	11	22	0.53
13	16.04.2022	39	74	11	19	0.38
14	19.04.2022	36	71	10	19	0.38
15	23.04.2022	33	65	11	21	0.42
16	26.04.2022	38	68	11	20	0.57
17	01.05.2022	32	62	9	17	0.34
18	04.05.2022	39	67	9	16	0.32
19	08.05.2022	40	72	17	31	0.83
20	11.05.2022	36	75	10	19	0.47
21	15.05.2022	39	76	11	17	0.35
22	18.05.2022	42	74	9	17	0.58
23	22.05.2022	36	71	7	13	0.26
24	25.05.2022	38	75	10	16	0.32

Max	43.00	76.00	17.00	31.00	0.83
Min	32.00	62.00	7.00	13.00	0.26
Avg.	37.63	70.88	10.21	18.71	0.45
98 percentile	42.54	75.54	14.24	26.86	0.72
NAAQS, For 24 hourly monitoring (except CO for Eight hour)	60 µg/m³	100 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³

Table 4-20: Ambient Air Quality for the location AAQ4

S. No.	Monitoring Date	PM2.5 (µg/m3)	PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	CO (mg/m3)
		CPCBVolum e-1/ Gravimetric	IS:5182(Part-23)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-10)
1	06.03.2022	37	71	11	21	0.41
2	09.03.2022	40	74	11	21	0.45
3	13.03.2022	37	72	11	18	0.34
4	16.03.2022	38	75	11	20	0.41
5	20.03.2022	40	72	10	18	0.36
6	23.03.2022	36	70	8	15	0.38
7	27.03.2022	40	71	8	16	0.32
8	30.03.2022	36	71	10	19	0.54
9	03.04.2022	44	75	13	24	0.61
10	06.04.2022	36	70	10	19	0.38
11	10.04.2022	40	71	12	23	0.45
12	13.04.2022	35	68	8	16	0.39
13	17.04.2022	37	69	9	18	0.35
14	20.04.2022	35	68	9	17	0.35
15	24.04.2022	36	70	12	22	0.49
16	27.04.2022	32	57	9	14	0.39
17	02.05.2022	37	72	11	20	0.39
18	05.05.2022	41	71	12	22	0.45
19	09.05.2022	41	74	17	32	0.85
20	12.05.2022	35	72	10	17	0.41
21	16.05.2022	36	71	10	16	0.32
22	19.05.2022	40	70	9	16	0.55
23	23.05.2022	37	72	10	17	0.35
24	26.05.2022	41	76	12	22	0.44
Max		44.00	76.00	17.00	32.00	0.85
Min		32.00	57.00	8.00	14.00	0.32
Avg.		37.79	70.92	10.54	19.29	0.43
98 percentile		42.62	75.54	15.16	28.32	0.74
NAAQS, For 24 hourly		60 µg/m³	100 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³

monitoring (except CO for Eight hour)					
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Table 4-21: Ambient Air Quality for the location AAQ5

S. No.	Monitoring Date	PM2.5 (µg/m ³)	PM10 (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
		CPCBVolum e-1/ Gravimetric	IS:5182(Part-23)	IS:5182(Part-2)	IS:5182(Part-6)	IS:5182(Part-10)
1	06.03.2022	33	63	9	18	0.35
2	09.03.2022	35	65	10	19	0.39
3	13.03.2022	36	70	10	17	0.34
4	16.03.2022	38	75	11	17	0.35
5	20.03.2022	34	65	9	16	0.32
6	23.03.2022	37	71	9	18	0.45
7.	27.03.2022	40	72	10	18	0.6
8.	30.03.2022	42	72	12	21	0.54
9.	03.04.2022	41	74	12	22	0.57
10.	06.04.2022	38	75	10	17	0.51
11.	10.04.2022	38	65	12	21	0.43
12.	13.04.2022	38	74	12	23	0.55
13.	17.04.2022	40	75	11	20	0.41
14.	20.04.2022	35	62	10	17	0.34
15.	24.04.2022	35	63	12	18	0.51
16.	27.04.2022	38	70	8	16	0.44
17	02.05.2022	37	72	11	20	0.39
18.	05.05.2022	40	71	11	22	0.43
19.	09.05.2022	41	75	17	30	0.81
20.	12.05.2022	37	72	11	19	0.56
21.	16.05.2022	36	71	10	16	0.33
22.	19.05.2022	37	65	8	15	0.51
23.	23.05.2022	30	59	9	16	0.32
24.	26.05.2022	36	70	10	19	0.38
Max		42.00	75.00	17.00	30.00	0.81
Min		30.00	59.00	8.00	15.00	0.32
Avg.		37.17	69.42	10.58	18.96	0.45
98 percentile		41.54	75.00	14.70	26.78	0.71
NAAQS, For 24 hourly monitoring (except CO for Eight hour)		60 µg/m³	100 µg/m³	80 µg/m³	80 µg/m³	2 mg/m³

4.4.1.3 ANALYSIS OF RESULTS

A. Particulate Matters (PM₁₀ & PM_{2.5})

PM₁₀ and PM_{2.5} were monitored using a Respirable Dust sampler (RDS) and PM_{2.5} Sampler. A pre-conditioned and weighted glass fibre filter paper is used for PM₁₀ and PTFE filter paper is used for RDS/PM_{2.5} samplers. A known quantity of the air was sucked through the filter paper in a prescribed sampling time. The flow was noted from the manometer. The multiplication of time with rate gave the total quantity of air passed through the filter paper. After sampling, the filter paper was removed, conditioned and weighed finally for getting the concentrations in ambient air. The minimum and maximum level of PM_{2.5} recorded within the study area was in the range of 30 µg/m³ (at AAQ5- Tetarahar -114+000) to 45 µg/m³ (at AAQ1- Chenari -76+000). The minimum and maximum level of PM₁₀ recorded within the study area in the range of 57 µg/m³ (at AAQ4- Tilouthu East -107+100) to 76 µg/m³ (at AAQ1- Chenari -76+000). The 24 hourly average values of PM_{2.5} & PM₁₀ were compared with the National Ambient Air Quality Standards (NAAQS) and found that all sampling stations recorded in the study area are within the applicable limits i.e., 60 µg/m³ for PM_{2.5} and 100 µg/m³ PM₁₀.

B. Sulphur Di-Oxides (SO₂)

A known quantity of the air was bubbled through impingers containing tetrachloromercurate. SO₂ formed a disulfidomercurate complex, which gave a pinkish blue color with p-rosaniline and formaldehyde solution. The intensity of color produced was proportional to concentration of Sulphur dioxide. The measurement was made by using spectrophotometer at the wavelength of 560 nm.

The minimum and maximum concentration of SO₂ recorded within the study area was 7 µg/m³ (AAQ3- Darigawn -91+100) to 17 µg/m³ (AAQ3- Darigawn -91+100).

The 24 hourly average values of SO₂ were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80 µg/m³ for rural areas.

C. Nitrogen Di-Oxides (NO_x)

A known quantity of air was passed through impingers containing sodium hydroxide-sodium arsenite solution. The estimation of NO_x was done calorimetrically using hydrogen peroxide, sulphanilamide, NEDA, etc. The intensity of the color was measured at 540 nm using a spectrophotometer.

The minimum and maximum level of NO₂ recorded within the study area was in the range of was 13 µg/m³ (AAQ3- Darigawn -91+100) to 32 µg/m³. (AAQ4- Tilouthu East -107+100). The 24 hourly average values of NO₂ were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80 µg/m³ for rural areas.

D. Carbon Monoxide (CO)

NDIR based samplers are used to monitor the carbon monoxide levels. The minimum and maximum level of CO recorded within the study area was in the range of was 0.26 mg/m³ (AAQ3- Darigawn - 91+100) to 0.85 mg/m³. (AAQ4- Tilouthu East -107+100).

4.4.1.4 INSTRUMENT USED FOR SAMPLING

Respirable Dust Samplers APM-250 of Lata Envirotech Services make were installed for monitoring Suspended Particulate Matter (SPM), Respirable fraction (<10 microns) and gaseous pollutants like SO₂ and NO_x whereas the concentration Particulate matter 2.5 was monitored by installing Envirotech made APM 50MFC particulate matter sampler.

4.4.1.5 TECHNIQUES FOR AMBIENT AIR QUALITY MONITORING

The techniques used for Ambient Air Quality monitoring have been presented in **Table 4.22**.

Table 4-22: Techniques used for Ambient Air Quality Monitoring

Parameter	Technique	Technical Protocol
Suspended Particulate Matter	Respirable Dust Sampler (Gravimetric method)	IS-5182 (Part-IV)
Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric method)	IS-5182 (Part-IV)
PM 2.5	PM 2.5 APM 550 Fine Particle Sampler	
Sulphur Dioxide	West and Gaeke	IS-5182 (Part-II)
Oxides of Nitrogen	Jacob and Hochheiser	IS-5182 (Part-IV)
CO	Non – dispersive Infrared (NDIR) Spectroscopy	IS-5182 (Part-IV)

4.5 NOISE ENVIRONMENT

Noise can be defined as any sound that is undesirable because it interferes with speech and hearing, and is intense enough to damage hearing or is otherwise annoying. Noise impacts can be of concern during construction and operational phases of the project. Factors those are important in

determining noise levels include distance from the noise source, natural or manmade barriers between the source and the receptors, whether conditions, etc

4.5.1 NOISE STANDARDS

The Ambient Noise Quality Standards with respect to noise have been stipulated by Govt. of India vide Gazette Notification dt. 14.02.2000. **Table 4.23** describes the Ambient Noise Standards.

Table 4-23: Ambient Noise Standards

Area Code	Category of Area	Limits in dB (A), Leq	
		Day time	Night time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone*	50	40

*Silence zone is defined as an area up to 100 meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent authority;

4.5.2 NOISE MONITORING LOCATIONS

An assessment of baseline noise quality was undertaken to (a) establish the status of exposure of the major sensitive receptors, and (b) to identify the noise pollution levels along the alignment. The noise monitoring was done following CPCB protocol of Noise Monitoring. The details of the Noise level monitoring locations have been presented in **Table 4.24** and **Figure 4.20**.

Table 4-24: Noise level Monitoring Locations

S No	Notation	Location	Chainage	Latitude	Longitude
1	ANL 1	Chenari	76+000	24°54'57.40"N	83°47'42.03"E
2	ANL 2	Raipur Chor	87+100	24°54'8.79"N	83°54'24.98"E
3	ANL 3	Darigawn	91+100	24°52'51.01"N	83°56'31.32"E
4	ANL 4	Tilouthu East	107+100	24°48'24.84"N	84°5'0.50"E
5	ANL 5	Tetarahar	114+000	24°45'12.04"N	84° 7'10.64"E

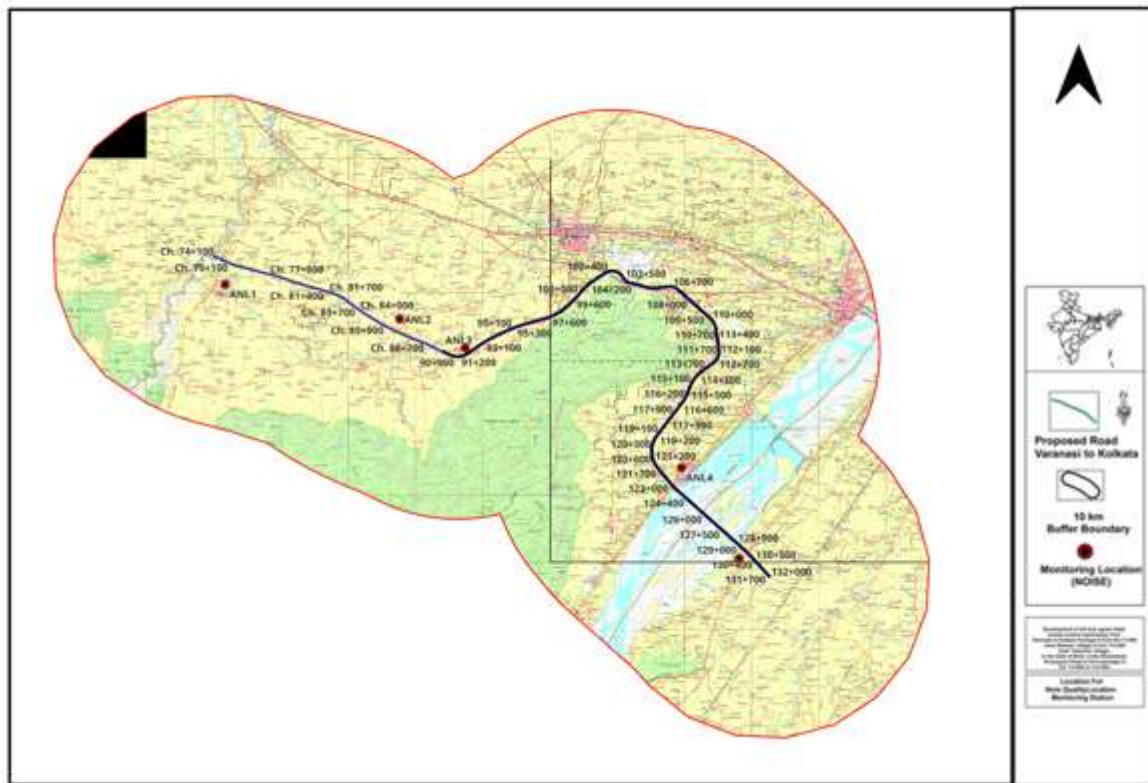


Figure 4-20: Ambient Noise Monitoring Location

4.5.3 NOISE QUALITY ANALYSIS ALONG THE PROPOSED PROJECT

Observations noticed from the monitoring results summarized in **Table 4.25** can be illustrated as:

Table 4-25: Noise quality Analysis report

S. No	Test Parameters	ANL1	ANL2	ANL3	ANL4	ANL5	Units	Requirement (as per CPCB Guidelines Limits in dB (A) Leq		
								Category of Area/ Zone	Day Time	Night Time
1.	L _{day} (6.0 AM TO 10.0 PM)	54.2	53.1	52.4	50.5	51.4	dB(A)	Industrial Area	75	70
								Commercial Area	65	55
2.	L _{night} (10.0 PM TO 6.0 AM)	42.2	40.1	38.8	41.6	38.4	dB(A)	Residential Area	55	45
								Silence Zone	50	40

4.5.4 INTERPRETATION OF RESULTS

The measured value for Leq-day & Leq-night has been found well within the prescribed limit.

4.6 SOCIALENVIRONMENT

4.6.1 INTRODUCTION

Ministry of Road Transport and Highways, Government of India, has decided to improve the efficiency of freight movement in India. National Highways Authority of India (NHAI) has been entrusted for preparation of DPR to improve the road networks in the state of Uttar Pradesh, Bihar, and Jharkhand & West Bengal.

In pursuance of the above SA Infrastructure Consultant Pvt. Ltd. has been appointed as Consultant for preparation of DPR for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojana.

The proposed highway starts at village from Km 73.800 (near Rampur village) and ends at to Km 131.955 (near Tetarhar village) (previously Km 73.800 to Km 114.000) in Bihar. This is a green field alignment, access control and is proposed for 4/6-Lane. The main objective of the proposed project is to reduce the distance and travel time between Varanasi and Kolkata and to give connectivity to remote area. The approx. length of proposed alignment is 40.2 Km.

4.6.2 NATURE FOR THE PROJECT

The proposed Greenfield Highway project is for the Development of 4/6 Lane, which falls under item no. 7(f) i.e. Highways as per the EIA notification, September 14, 2006 (as amended time to time), it is to be treated as Category A, and needs to obtain the prior Environmental Clearance from MoEF & CC, New Delhi.

4.6.2.1 NEED OF THE PROJECT

The proposed access controlled project with new alignment has been envisaged through an area which shall have the advantage of simultaneous development as well as shall result in a shorter distance to travel. The junctions with existing road will be planned in the form of interchanges and flyover to ensure uninterrupted flow of traffic.

The proposed road would act as the prime artery for the economic flow to this region. It will enhance economic development, provide employment opportunities to locals, strengthen tourist development, ensure road safety, and provide better transportation facilities and other facilities such as wayside amenities. Vehicle operating cost will also be reduced due to improved road quality.

4.6.3 DEMOGRAPHY & SOCIO-ECONOMIC FEATURES

4.6.3.1 DEMOGRAPHY

Demography is one of the important indicators of environmental health of an area. It includes population, sex ratio, number of households, literacy, population density, etc. In order to assess the

Demographic & Socio-economic features of the area, Census data 2011, for the concerned 2 Districts named Rohtas & Aurangabad of Bihar state respectively was compiled and placed in the form of tabulation and graphical representation. The proposed road passes through mainly 2 districts viz. Rohtas & Aurangabad of Bihar state respectively.

4.6.3.2 DEMOGRAPHY OF THE CONCERNED DISTRICT

❖ District Rohtas, Bihar

As per the census records 2011, the total population of Rohtas district was observed as 29, 59,918 persons followed by 15, 43,546 males and 14, 16,372 females respectively. The decadal variation of the district has been found to be at 20.1 per cent during the decade 2001-2011. The Urban area of the district has attained a higher decadal variation of 30.9 percent as compared to that of rural area at 18.5 percent.

As per 2011 Census Sex Ratio of the district is 918 females per 1,000 males. The same for rural and urban areas of the district stands at 921 and 899 respectively. As per the census records 2011, the sex ratio of population in the age group 0-6, which works out to 931, is much higher than the sex ratio of the total population (918) in the district of Rohtas. While the sex ratio of (0-6) population in the rural areas of the district is 933, the sex ratio of (0-6) population for the urban areas is only 914.

The proportion of scheduled castes and scheduled tribes population to the total population of the district is found to be only 18.57 and 1.07 percent respectively. For rural areas, the respective proportion of scheduled castes and scheduled tribes to the total population of the district comes out to be 20.11 and 1.12 percent. Similarly, in urban areas, the percentage of scheduled castes and scheduled tribes population to the total population of the district comes out to 9.45 and 0.75 percent respectively.

It is observed from the census records 2011, that the district has registered a literacy rate of 73.4%. As regards to rural and urban areas of the district the literacy rates have been registered 72.5% and 78.4% respectively. The work participation rate (WPR) in the district is 18.33 percent for main workers and 12.9% for marginal workers. Proportion of non-workers in the district is 68.8%.

❖ District Aurangabad, Bihar

As per the census records 2011, the total population of Aurangabad district was observed as 25, 40,073 persons followed by 13, 18,684 males and 12, 21,389 females respectively. The decadal variation of the district has been seen at 26.2% during the decade 2001-11. The Urban area of the district has attained a higher decadal variation of 39.3 percent as compared to that of rural area at 25.0%.

As per 2011 census sex ratio of the district is 926 females per 1,000 males. The same for rural and urban areas of the district stands at 928 and 909 respectively.

It is observed from the table that sex ratio of population in the age group 0-6, which works out to 944, is much higher than the sex ratio of the total population (926) in the district of Aurangabad. While the sex ratio of (0-6) population in the rural areas of the district is 945, the sex ratio of (0-6) population for the urban areas is only 933.

It is observed that the proportion of scheduled castes and scheduled tribes population to the total population of the district is found to be only 24.1 & 0.04% respectively. The work participation rate (WPR) in the district is 18.9% for main workers and 14.1% for marginal workers. Proportion of non-workers in the district is 67.0%.

Religion and Mother Tongue

Hindus constitute 89.37 & 90.20% in the both i.e. Rohtas & Aurangabad districts followed by Muslims 10.15 & 9.34% respectively.

As per distribution of different mother tongues (languages mentioned under 8th Schedule of Constitution of India) as returned during the 2011 Census for both Rohtas & Aurangabad districts, Hindi, the main mother tongue of the district was returned by 93.3 & 92.3% to the total population of both districts respectively. The corresponding percentage for the Urdu, the second most prominent language spoken in both districts, was 6.3 & 7.6% respectively. Speakers of other Scheduled languages were very thin in number than the two described above.

4.6.3.3 METHODOLOGY

In order to assess the Demographic & Socio-economic features along with the 1.0km distance based on field surveys and public consultations undertaken during the baseline field study period and Census records 2011, for the concerned districts namely Rohtas & Aurangabad of Bihar state respectively was compiled and placed in the form of tabulation and graphical representation. Entire study area is observed predominantly rural and urban.

4.6.4 PURPOSE OF THE STUDY

Socio-economic study was conducted to establish the baseline demographic features and impacts due to proposed new highway project, as construction of any major project invariably leads to Socio-economic changes. The construction of the project could lead to unplanned and haphazard development of slums of various size and description with little or rudimentary.

4.6.5 DESCRIPTION OF SOCIAL ENVIRONMENT

As per the Census Records of India 2011, the study zone of 1.0 km has a total of 44 villages and one town of 2 districts mainly Rohtas (41 villages & one town) and partly Aurangabad (only 03 villages) of Bihar state respectively. All revenue villages/towns are mainly under 05 tehsils namely, Chenari, Sheosagar, Sasaram, Tilouthu of Rohtas district and Nabinagar of Aurangabad district respectively in

Bihar state. There is only one town named Saraiya (CT) of Tilouthu tehsil in Rohtas district in the 1.0km study zone of the project.

There are 3 other towns named Sasaram & Dehri of Rohtas District and Nabinagar of Aurangabad district in Bihar, which are available for the study area villages in the range of <5km, 5-10km and >10km. Out of the total 45 villages/towns of the study zone, four villages i.e. Uchauli, Palangarh, Kauria & Belwai of Rohtas district were observed as uninhabited villages.

Details of the affected villages covered in the 1.0km study zone are given as follows;

Table 4-26: Details of Affected Villages (1.0km)

State Code	State Name	District Code	District Name	Sub District Code	Sub District Name	Village Code	Name of the Village/Town
10	BIHAR	234	Rohtas	01468	Chenari	251890	Basantpur
10	BIHAR	234	Rohtas	01468	Chenari	251891	KenarKhurd
10	BIHAR	234	Rohtas	01468	Chenari	251899	Raghunathpur
10	BIHAR	234	Rohtas	01468	Chenari	251900	BarahtaliChhotki
10	BIHAR	234	Rohtas	01468	Chenari	251901	BarahtaliBarki
10	BIHAR	234	Rohtas	01468	Chenari	251939	Charahi
10	BIHAR	234	Rohtas	01468	Chenari	251940	Narayanpur
10	BIHAR	234	Rohtas	01468	Chenari	251941	Kinarchola
10	BIHAR	234	Rohtas	01468	Chenari	251945	Bansil
10	BIHAR	234	Rohtas	01468	Chenari	251946	Sahasi
10	BIHAR	234	Rohtas	01468	Chenari	251950	Semri
10	BIHAR	234	Rohtas	01468	Chenari	251951	Dehria
10	BIHAR	234	Rohtas	01468	Chenari	251955	Birnagar
10	BIHAR	234	Rohtas	01468	Chenari	NA	Nisja
10	BIHAR	234	Rohtas	01470	Sheosagar	252190	Doriawan
10	BIHAR	234	Rohtas	01470	Sheosagar	252199	Khatolla
10	BIHAR	234	Rohtas	01470	Sheosagar	252202	Khurhia
10	BIHAR	234	Rohtas	01470	Sheosagar	252203	Konki
10	BIHAR	234	Rohtas	01471	Sasaram	252334	Belahar
10	BIHAR	234	Rohtas	01471	Sasaram	252335	Sikaria
10	BIHAR	234	Rohtas	01471	Sasaram	252336	Kota
10	BIHAR	234	Rohtas	01471	Sasaram	252337	Rajokhar
10	BIHAR	234	Rohtas	01471	Sasaram	252443	Gajdwahi
10	BIHAR	234	Rohtas	1471	Sasaram	252444	Kanchanpur
10	BIHAR	234	Rohtas	01471	Sasaram	252445	Kurdaun

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10	BIHAR	234	Rohtas	01471	Sasaram	252446	Dhankarha
10	BIHAR	234	Rohtas	01471	Sasaram	252447	Kanchanpur
10	BIHAR	234	Rohtas	01471	Sasaram	252448	Lerua
10	BIHAR	234	Rohtas	01471	Sasaram	252449	Mednipur
10	BIHAR	234	Rohtas	01471	Sasaram	252450	Dhaudanr
10	BIHAR	234	Rohtas	01471	Sasaram	252456	Murhi
10	BIHAR	234	Rohtas	01471	Sasaram	252457	Karserua
10	BIHAR	234	Rohtas	01471	Sasaram	252458	Gharbair
10	BIHAR	234	Rohtas	01471	Sasaram	252459	Barui
10	BIHAR	234	Rohtas	01471	Sasaram	252460	Songawan
10	BIHAR	234	Rohtas	01471	Sasaram	252461	Mundi Sarae
10	BIHAR	234	Rohtas	01471	Sasaram	252462	Molawan
10	BIHAR	234	Rohtas	01471	Sasaram	252463	Sakas
10	BIHAR	234	Rohtas	01471	Sasaram	252465	Kusri
10	BIHAR	234	Rohtas	01471	Sasaram	252466	Dubaulia
10	BIHAR	234	Rohtas	01471	Sheosagar	252467	Khairi
10	BIHAR	234	Rohtas	01471	Sasaram	252469	Khaira
10	BIHAR	234	Rohtas	01471	Sasaram	252471	Darigawan
10	BIHAR	234	Rohtas	01471	Dheri	252571	Bharkunria
10	BIHAR	234	Rohtas	01473	Dheri	252572	Guraila
10	BIHAR	234	Rohtas	01473	Dheri	252573	Durgapur
10	BIHAR	234	Rohtas	01473	Tilouthu	252592	Maheshdih
10	BIHAR	234	Rohtas	01474	Tilouthu	252593	Lewara
10	BIHAR	234	Rohtas	01474	Tilouthu	252594	Dubauli
10	BIHAR	234	Rohtas	01474	Tilouthu	252595	Kusdihra
10	BIHAR	234	Rohtas	01474	Tilouthu	252596	Koidih
10	BIHAR	234	Rohtas	01474	Tilouthu	252597	Ramdihra
10	BIHAR	234	Rohtas	01474	Tilouthu	252600	Sewahi
10	BIHAR	234	Rohtas	01474	Tilouthu	252601	Bardiha

10	BIHAR	234	Rohtas	01474	Tilouthu	252602	Hurka
10	BIHAR	234	Rohtas	01474	Tilouthu	252617	Patluka
10	BIHAR	234	Rohtas	01474	Tilouthu	252618	Mitarsenpur
10	BIHAR	234	Rohtas	01474	Tilouthu	252619	Mirzapur
10	BIHAR	234	Rohtas	01474	Tilouthu	252622	Tilauthu Arazi
10	BIHAR	234	Rohtas	01474	Tilouthu	252623	Chemni Chak
10	BIHAR	234	Rohtas	01474	Tilouthu	252624	Dharampur
10	BIHAR	234	Rohtas	01474	Tilouthu	252626	Malpura
10	BIHAR	234	Rohtas	01474	Tilouthu	252627	Rakian Bigha
10	BIHAR	234	Rohtas	01474	Tilouthu	252628	Amra
10	BIHAR	234	Rohtas	01474	Tilouthu	252629	Bhadsa
10	BIHAR	235	Aurangabad	01483	Nabinagar	253751	Mahuawan
10	BIHAR	235	Aurangabad	01483	Nabinagar	253766	Tetraharnr
10	BIHAR	235	Aurangabad	01483	Nabinagar	253767	Dihri
Source-Census of India, 2011, NA-Not Available							

4.6.5.1 POPULATION DISTRIBUTION WITHIN 1.0 KM STUDY ZONE

As per the Census Records 2011, the total population of 1.0 km study zone was recorded as 56512 persons of 45 villages/towns falling in 2 districts mainly in Rohtas and partly in Aurangabad of Bihar state respectively.

Total number of 'Households' was observed as 8963 in the 1.0km study zone along with the alignment of 40.2km. Male-female wise total population was recorded as 29557 males (52.3%) and 26955 females (47.7%) respectively. Scheduled Caste ('SC') population was observed as 13186 persons consisting of 6943 males (52.6%) and 6243 females (47.4%) in the 1.0km study zone. Scheduled Tribes ('ST') population was observed as 671 persons consisting of 334 males (49.8%) and 337 females (50.2%) in the 1.0 km study zone.

The child population of the study area is recorded as 10032, which accounts as 17.8% to the total population (56512 Persons) and comprising of 5196 (51.8%) males & 4836 (48.2%) females respectively.

Village-wise details of population distribution are given as follows in **Table 4.27 & 4.28**.

Table 4-27: Village-wise Population Distributions (1.0 km)

Name of the Village/Town	No of Households	Total Population			Child Population (0-6 Years)		
		Total	Male	Female	Total	Male	Female
1. District Rohtas, Bihar							

Basantpur	103	685	350	335	113	65	48
KenarKhurd	215	1249	650	599	208	109	99
Raghunathpur	28	138	71	67	22	12	10
BarahtaliChhotki	117	718	375	343	171	82	89
BarahtaliBarki	142	969	501	468	158	86	72
Charahi	195	1234	625	609	184	86	98
Narayanpur	239	1496	798	698	251	131	120
Kinarchola	121	843	449	394	164	89	75
Bansil	78	556	285	271	83	48	35
Sahasi	54	372	191	181	45	22	23
Semri	115	582	296	286	149	76	73
Dehria	254	1452	743	709	337	164	173
Birnagar	105	595	301	294	118	55	63
Nisja	Unhabitated						
Doriawan	184	1286	699	587	211	120	91
Khatolla	79	489	260	229	26	18	8
Khurhia	217	1364	689	675	253	118	135
Konki	179	1129	598	531	217	119	98
Belahar	229	1199	632	567	224	117	107
Sikaria	866	4934	2574	2360	1030	543	487
Kota	414	2303	1138	1165	452	211	241
Rajokhar	0	0	0	0	0	0	0
Gajdwahi	399	2678	1404	1274	484	261	223
Kanchanpur	447	2865	1493	1372	470	251	219
Kurdaun	145	711	370	341	160	77	83
Dhankarha	422	2696	1404	1292	539	286	253
Kanchanpur	165	1274	696	578	243	147	96
Lerua	537	2984	1573	1411	537	267	270
Mednipur	383	2084	1081	1003	407	210	197
Dhaudanr	1049	5816	3066	2750	991	529	462
Murhi	325	2071	1115	956	402	227	175
Karserua	396	2309	1184	1125	354	180	174
Gharbair	238	1344	709	635	232	111	121
Barui	236	1238	655	583	224	116	108
Songawan	360	2188	1143	1045	412	215	197
Mundi Sarae	0	0	0	0	0	0	0
Molawan	465	2638	1384	1254	543	273	270
Sakas	167	1014	533	481	184	105	79
Kusri	211	1417	728	689	253	126	127
Dubaulia	0	0	0	0	0	0	0
Khairi	13	72	35	37	11	4	7
Khaira	172	831	460	371	118	72	46
Darigawan	1049	5964	3115	2849	1097	586	511
Bharkunria	273	1737	910	827	238	119	119
Guraila	316	1933	991	942	316	155	161
Durgapur	240	1461	755	706	278	149	129

Maheshdih	62	430	224	206	103	62	41
Lewara	207	1413	699	714	239	116	123
Dubauli	39	254	128	126	33	14	19
Kusdihra	281	1873	971	902	341	175	166
Koidih	84	444	223	221	83	43	40
Ramdihra	309	1950	1039	911	341	181	160
Sewahi	579	3377	1756	1621	604	319	285
Bardiha	151	1104	581	523	178	87	91
Hurka	494	3145	1628	1517	517	268	249
Patluka	319	2102	1095	1007	386	205	181
Mitarsenpur	76	440	237	203	85	46	39
Mirzapur	302	2200	1136	1064	421	224	197
Tilauthu Arazi	0	0	0	0	0	0	0
Chemni Chak	0	0	0	0	0	0	0
Dharampur	0	0	0	0	0	0	0
Malpura	746	4392	2311	2081	792	404	388
Rakian Bigha	167	1151	616	535	196	101	95
Amra	169	1089	574	515	178	96	82
Bhadsa	72	397	197	200	80	38	42
2. District Aurangabad, Bihar							
Mahuawan	313	2130	1111	1019	385	195	190
Tetrahanr	252	1833	959	874	328	181	147
Dihri	23	142	78	64	21	12	9
TOTAL (1.0km)	16587	100784	52592	48192	10032	5196	4836
<i>Source-Census of India, 2011</i>							

Table 4-28: Village-wise SC & ST Population Distribution (1.0km)

Name of the Village/Town	Total Population	Scheduled Castes			Scheduled Tribes		
		Persons	Males	Females	Persons	Males	Females
1. District Rohtas, Bihar							
Basantpur	685	37	17	20	0	0	0
Kenar Khurd	1249	423	229	194	0	0	0
Raghunathpur	138	0	0	0	0	0	0
Barahtali Chhotki	718	405	215	190	0	0	0
Barahtali Barki	969	166	87	79	0	0	0
Charahi	1234	214	113	101	0	0	0
Narayanpur	1496	372	206	166	0	0	0
Kinarchola	843	590	312	278	0	0	0
Bansil	556	9	5	4	0	0	0
Sahasi	372	0	0	0	0	0	0
Semri	582	249	132	117	3	1	2
Dehria	1452	0	0	0	0	0	0
Birnagar	595	205	95	110	0	0	0

Nisja	Data not available						
Doriawan	1286	125	72	53	0	0	0
Khatolla	489	0	0	0	0	0	0
Khurhia	1364	371	196	175	0	0	0
Konki	1129	223	123	100	74	41	33
Belahar	1199	880	463	417	3	2	1
Sikaria	4934	1734	914	820	4	3	1
Kota	2303	213	119	94	535	268	267
Rajokhar	0	0	0	0	0	0	0
Gajdwahi	2678	289	151	138	3	1	2
Kanchanpur	2865	533	267	266	0	0	0
Kurdaun	711	551	287	264	62	33	29
Dhankarha	2696	480	248	232	87	43	44
Kanchanpur	1274	145	71	74	0	0	0
Lerua	2984	456	254	202	0	0	0
Mednipur	2084	587	295	292	0	0	0
Dhaudanr	5816	893	479	414	354	195	159
Murhi	2071	740	398	342	0	0	0
Karserua	2309	760	382	378	0	0	0
Gharbair	1344	247	130	117	57	30	27
Barui	1238	583	304	279	0	0	0
Songawan	2188	470	241	229	0	0	0
Mundi Sarae	0	0	0	0	0	0	0
Molawan	2638	346	171	175	0	0	0
Sakas	1014	417	223	194	0	0	0
Kusri	1417	250	125	125	1	0	1
Dubaulia	0	0	0	0	0	0	0
Khairi	72	0	0	0	0	0	0
Khaira	831	251	140	111	0	0	0
Darigawan	5964	1499	769	730	0	0	0
Bharkunria	1737	124	69	55	133	70	63
Guraila	1933	330	165	165	0	0	0
Durgapur	1461	199	103	96	0	0	0
Maheshdih	430	250	130	120	0	0	0
Lewara	1413	368	182	186	0	0	0
Dubauli	254	0	0	0	0	0	0
Kusdihra	1873	609	308	301	0	0	0
Koidih	444	430	216	214	0	0	0
Ramdihra	1950	1085	579	506	0	0	0
Sewahi	3377	877	432	445	0	0	0
Bardiha	1104	2	2	0	0	0	0
Hurka	3145	469	245	224	0	0	0
Patluka	2102	116	58	58	0	0	0
Mitarsenpur	440	225	125	100	15	7	8
Mirzapur	2200	383	194	189	0	0	0
Tilauthu Arazi	0	0	0	0	0	0	0

Chemni Chak	0	0	0	0	0	0	0
Dharampur	0	0	0	0	0	0	0
Malpura	4392	659	338	321	75	37	38
Rakian Bigha	1151	364	185	179	0	0	0
Amra	1089	45	21	24	0	0	0
Bhadsa	397	0	0	0	0	0	0
2. District Aurangabad, Bihar							
Mahuawan	2130	412	210	202	0	0	0
Tetrahanr	1833	393	206	187	0	0	0
Dihri	142	58	34	24	0	0	0
TOTAL (1.0km)	100784	23111	12035	11076	1406	731	675
<i>Source-Census of India, 2011</i>							

4.6.5.2 SEX RATIO

The 'Sex Ratio' of the study area is a numeric relationship between females and males of an area and bears paramount importance in the present day scenario where the un-ethnic pre-determination of sex and killing of female foetus during pregnancy is practiced by unscrupulous medical practitioners against the rule of the law of the country. It is evident that by contrast the practice of female foeticide is not prevalent in the study area.

The 'Sex Ratio' was observed as 918 & 926 females per 1000 males in Rohtas& Aurangabad district of Bihar. The same was recorded as 912 females for every 1000 males in the study area. The child (0-6 year age) sex ratio of both the districts was observed as 931 & 944 female children per 1000 male children.

The village wise male-female population distribution for the study area is depicted and shown by graphical representation in **Figure 4.21**.

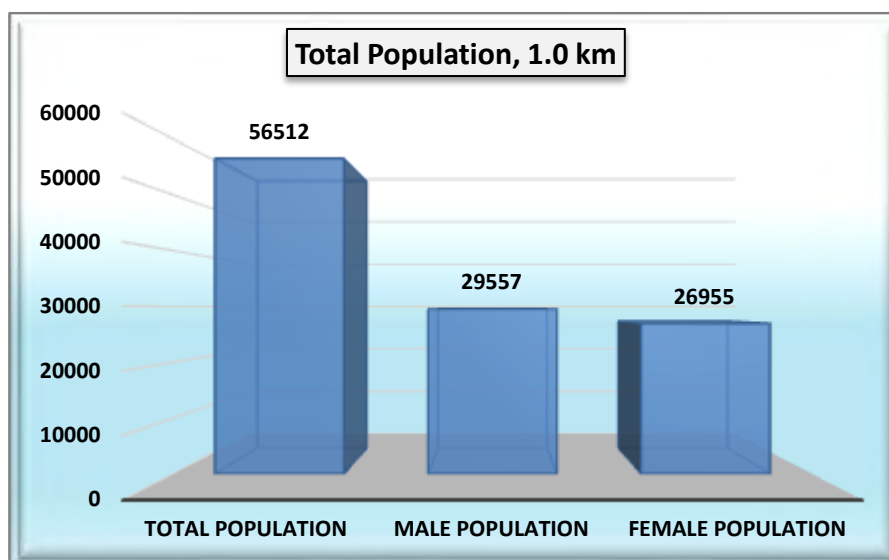


Figure 4-21: Male-Female wise Population Distribution

4.6.5.3 SCHEDULED CASTE & SCHEDULED TRIBE POPULATION

On the basis of the village wise SC & ST population distribution of the study area during 2011, the ‘Scheduled Castes’ population was observed as 13186 persons consisting of 6943 males and 6243 females respectively in the study area which accounts as 23.3% to the total population (56512 persons) of the study area. ‘Scheduled Tribes’ population was observed as 671 persons consisting of 334 males and 337 females respectively in the study area which accounts as 1.2% to the total population (56512 persons) of the study area. It implies that the rest 75.5% to the total population belongs to the General category. Male-female wise distribution of ‘SC’ & ‘ST’ population in the study area is graphically shown in **Figure 4.22. & 4.23.**

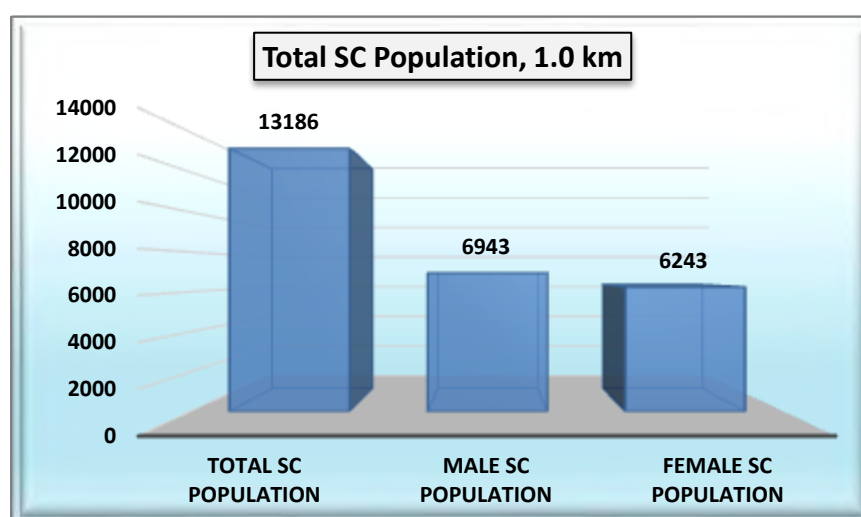


Figure 4-22: Scheduled Caste Population in the Study Area

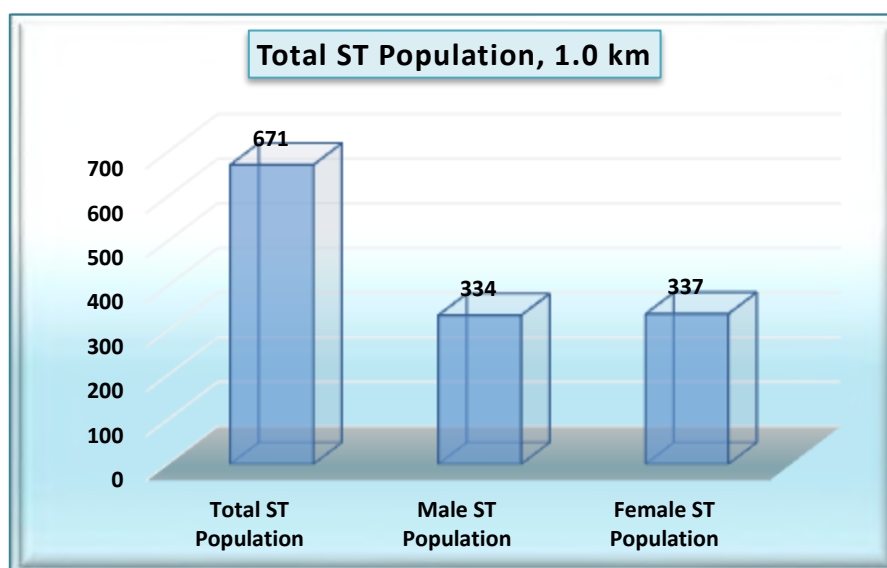


Figure 4-23: Scheduled Tribes Population in the Study Area

4.6.5.4 LITERACY RATE

Literacy level is quantifiable indicator to assess the development status of an area or region. Male-Female wise literates and illiterates population is represented in Table 3.22 Total literates population was recorded as 32025 persons (56.7%) in the study area Table 3.22 reveals that Male-Female wise literates are observed as 19065 & 12960 persons respectively, implies that the 'Literacy Rate' is recorded as 56.7% with male-female wise percentages being 33.7% & 23.0% respectively. The total illiterate's population was recorded as 24487 persons (43.3%) in the study area. Male-Female wise illiterates were 10492 (18.6%) and 13995 (24.8%) respectively. The Male-Female wise graphical representation of literates & illiterates population in study area villages/town is shown in **Figure 4.24**.

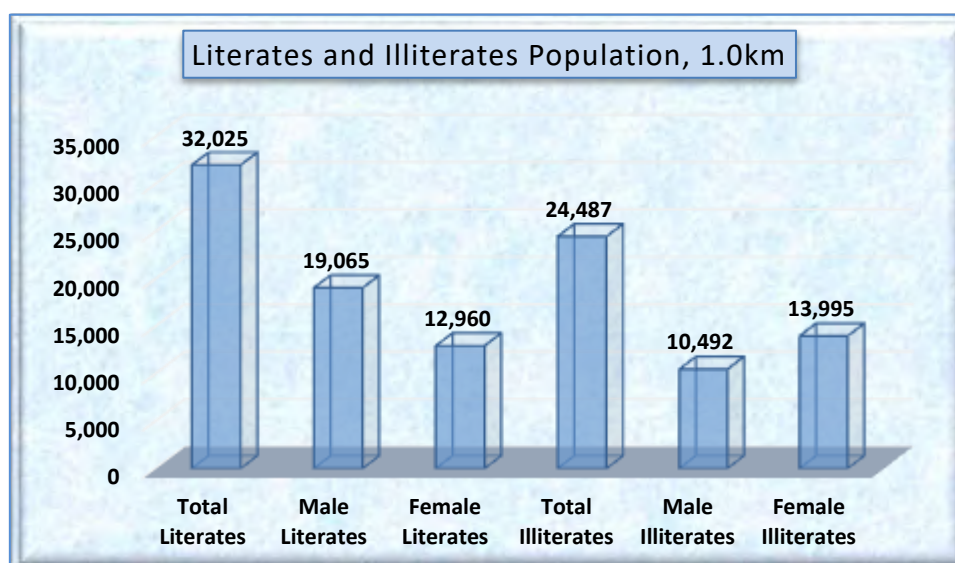


Figure 4-24: Male-Female wise Distribution of Literates & Illiterates

Table 4-29: Male-Female wise Literates and Illiterates

Name of the Village/Town	Total Population	Literates			Illiterates		
		Persons	Males	Females	Persons	Males	Females
1. District Rohtas, Bihar							
Basantpur	685	483	257	226	202	93	109
KenarKhurd	1249	695	423	272	554	227	327
Raghunathpur	138	93	52	41	45	19	26
BarahtaliChhotki	718	227	149	78	491	226	265
BarahtaliBarki	969	711	377	334	258	124	134
Charahi	1234	756	444	312	478	181	297
Narayanpur	1496	923	544	379	573	254	319
Kinarchola	843	527	325	202	316	124	192
Bansil	556	383	206	177	173	79	94
Sahasi	372	268	155	113	104	36	68
Semri	582	181	121	60	401	175	226
Dehria	1452	626	382	244	826	361	465

Birnagar	595	286	168	118	309	133	176
Nisja	Data not available						
Doriawan	1286	820	497	323	466	202	264
Khatolla	489	405	223	182	84	37	47
Khurhia	1364	652	398	254	712	291	421
Konki	1129	673	395	278	456	203	253
Belahar	1199	444	275	169	755	357	398
Sikaria	4934	2427	1488	939	2507	1086	1421
Kota	2303	1230	708	522	1073	430	643
Rajokhar	0	0	0	0	0	0	0
Gajdwahi	2678	1545	922	623	1133	482	651
Kanchanpur	2865	1899	1080	819	966	413	553
Kurdaun	711	300	199	101	411	171	240
Dhankarha	2696	1521	910	611	1175	494	681
Kanchanpur	1274	804	476	328	470	220	250
Lerua	2984	1761	1073	688	1223	500	723
Mednipur	2084	1318	778	540	766	303	463
Dhaudanr	5816	3393	1967	1426	2423	1099	1324
Murhi	2071	1148	686	462	923	429	494
Karserua	2309	1231	758	473	1078	426	652
Gharbair	1344	572	345	227	772	364	408
Barui	1238	578	371	207	660	284	376
Songawan	2188	1111	668	443	1077	475	602
Mundi Sarae	0	0	0	0	0	0	0
Molawan	2638	1346	860	486	1292	524	768
Sakas	1014	642	378	264	372	155	217
Kusri	1417	685	430	255	732	298	434
Dubaulia	0	0	0	0	0	0	0
Khairi	72	42	25	17	30	10	20
Khaira	831	589	335	254	242	125	117

Darigawan	5964	3318	1972	1346	2646	1143	1503
Bharkunria	1737	1176	702	474	561	208	353
Guraila	1933	1166	675	491	767	316	451
Durgapur	1461	800	458	342	661	297	364
Maheshdih	430	185	112	73	245	112	133
Lewara	1413	915	519	396	498	180	318
Dubauli	254	189	108	81	65	20	45
Kusdihra	1873	1025	620	405	848	351	497
Koidih	444	209	121	88	235	102	133
Ramdihra	1950	1087	681	406	863	358	505
Sewahi	3377	2024	1188	836	1353	568	785
Bardiha	1104	734	436	298	370	145	225
Hurka	3145	1942	1127	815	1203	501	702
Patluka	2102	1263	737	526	839	358	481
Mitarsenpur	440	237	152	85	203	85	118
Mirzapur	2200	1382	812	570	818	324	494
Tilauthu Arazi	0	0	0	0	0	0	0
Chemni Chak	0	0	0	0	0	0	0
Dharampur	0	0	0	0	0	0	0
Malpura	4392	2589	1535	1054	1803	776	1027
Rakian Bigha	1151	538	342	196	613	274	339
Amra	1089	709	425	284	380	149	231
Bhadsa	397	207	136	71	190	61	129
2. District Aurangabad, Bihar							
Mahuawan	2130	1187	732	455	943	379	564
Tetraharnr	1833	1038	622	416	795	337	458
Dihri	142	90	60	30	52	18	34
TOTAL (1.0km)	100784	57305	34120	23185	43479	18472	25007
<i>Source-Census of India, 2011</i>							

4.6.5.5 ECONOMY OF THE DISTRICT:

❖ District Rohtas

[Source-https://en.wikipedia.org/wiki/Rohtas_district#Economy](https://en.wikipedia.org/wiki/Rohtas_district#Economy)

Economic activity may be gauged from the pattern of distribution of main workers according to broad fourfold classification namely cultivators, agricultural laborers, household industry workers and other workers. Economy of the district is agriculture based. Paddy, wheat and maize are the main crops. Rohtas is called “Rice bowl of Bihar”. Until 1980, Dalmianagar was one of the major industrial cities in India. It had sugar, vegetable oil, cement, paper, and chemical factories (Rohtas Industries) but now they are closed. As major source of income in the district is from the agriculture sector and per capita income is Rs. 20,927/-. Labour force participation rate was observed as 30.64% during the year 2017-18. Total cropped area is 3, 86,075 ha and the forest area was recorded as 672.23 Sq. km during the year 2019.

[Source-https://www.indiastatpublications.com/District_Factbook/Bihar/Rohtas](https://www.indiastatpublications.com/District_Factbook/Bihar/Rohtas)

It Dehri on Sone is an industrial town of Rohtas district. Its coal depot brings traders from all over north India. There is also a hydropower generation unit. Until 1980, Dalmianagar was one of the major industrial cities in India. Rohtas Industries which has now closed down, had sugar, vegetable oil, cement, paper, and chemical factories. The campus of Dalmianagar factory has been taken by railways for the establishment of railway factory there.

Rohtas has mineral resources such as lime stone, pyrites, sand and sandstone. 15% of the total geographical area of Rohtas district is under forest having trees such as karan, chandan, teak, gamahar, khair, asan, tendu, mahua, shisam, bahera, kathal and bamboo. There are micro & small enterprises relating to the manufacture of Katha, wooden furniture, Biri, bamboo- tokri/basket and leaf plates. The district is suitable for setting up mineral and forest based small scale industries.

In 2006 the Ministry of Panchayati Raj named Rohtas one of the country's 250 most backward districts (out of a total of 640). It is one of the 36 districts in Bihar have received funds from the Backward Regions Grant Fund Programme (BRGF).

[Source- https://www.udyogmitrabihar.in/docs/dp/rohtas.pdf](https://www.udyogmitrabihar.in/docs/dp/rohtas.pdf)

❖ District Aurangabad

Aurangabad has an agrarian economy. It lies in a drought-prone area. The main crops are rice, wheat, gram lentil and rapeseed. The soil of this district is highly suitable for the agriculture of paddy, wheat and sugar cane.

It mainly includes heavy electricity production industries like Nabinagar Super Thermal Power Plant, It is one of the third largest power plant in India. On 6th Sept 2019, the power plant commissioned the

first 660 MW unit of 4380 MW (NTPC, Nabinagar) and Cement Production(Shree Cement). Manufactured products include carpets, blankets and brassware. Aurangabad is one of the backward districts in Bihar and receives funds from the Backward Regions Grant Fund Program. The district receives funds from the Backward Regions Grant Fund Programme (BRGF).

[Source-https://www.udyogmitrabihar.in/docs/dp/aurangabad.pdf](https://www.udyogmitrabihar.in/docs/dp/aurangabad.pdf)

4.6.5.6 WORKERS SCENARIO:

‘Occupational Pattern’ was studied to assess the skills of people in the study area. Occupational pattern helps in identifying major economic activities of the area. In the study area the Main and Marginal Workers population was observed as 9362(16.6%) and 9162(16.2%) respectively to the total population (56512) while the remaining 37988(67.2%) persons were recorded as non-workers. Thus it implies that the semi-skilled and non-skilled work-force required in study area for the project is available in aplenty.

The village wise main and marginal workers population with further classification as casual, agricultural, households and other workers is shown as follows in **Table 4.30**.

Table 4-30: Village-wise Occupational Pattern in the Study Area (1.0km)

Name of the village/Town	MAIN_WORK_P	MAIN_CL_P	MAIN_AL_P	MAIN_HH_P	MAIN_OT_P	MARG_WORK_P	MARG_CL_P	MARG_AL_P	MARG_HH_P	MARG_OT_P
1. District Rohtas, Bihar										
Basantpur	102	51	48	1	2	16	0	1	0	15
KenarKhurd	82	40	9	3	30	440	54	346	25	15
Raghunathpur	29	26	1	0	2	1	1	0	0	0
BarahtaliChhotki	150	35	112	0	3	29	1	4	23	1
BarahtaliBarki	374	33	323	4	14	3	0	1	1	1
Charahi	481	153	273	22	33	276	16	250	4	6
Narayanpur	260	97	103	6	54	184	1	178	2	3
Kinarchola	77	62	2	0	13	194	0	193	0	1
Bansil	114	96	4	0	14	10	3	2	0	5
Sahasi	54	53	0	0	1	5	2	0	0	3
Semri	9	3	2	0	4	110	10	97	0	3
Dehria	172	29	117	11	15	293	13	265	10	5
Birnagar	119	45	16	0	58	57	0	0	0	57
Nisja	Data not available									
Doriawan	180	74	10	1	95	211	12	105	1	93
Khatolla	19	2	3	1	13	213	4	7	1	201
Khurhia	75	51	0	0	24	224	25	177	0	22
Konki	281	107	153	2	19	198	35	142	1	20
Belahar	404	38	341	8	17	74	23	40	2	9
Sikaria	1016	256	510	24	226	264	48	119	13	84
Kota	875	24	401	8	442	31	7	13	0	11

Rajokhar	0	0	0	0	0	0	0	0	0	0
Gajdwahi	406	129	144	8	125	153	17	66	9	61
Kanchanpur	451	163	190	6	92	258	16	191	13	38
Kurdaun	31	14	1	5	11	133	5	128	0	0
Dhankarha	371	201	103	13	54	279	14	196	21	48
Kanchanpur	155	78	5	24	48	148	25	88	6	29
Lerua	345	30	95	2	218	435	13	326	9	87
Mednipur	149	30	64	6	49	364	56	259	25	24
Dhaudanr	1251	358	341	12	540	569	45	305	23	196
Murhi	199	80	70	11	38	488	76	385	11	16
Karserua	215	51	18	27	119	402	8	126	41	227
Gharbair	164	106	15	1	42	320	67	98	4	151
Barui	108	42	3	0	63	189	6	162	0	21
Songawan	353	41	159	2	151	283	12	268	1	2
Mundi Sarae	0	0	0	0	0	0	0	0	0	0
Molawan	493	53	380	7	53	128	12	71	7	38
Sakas	152	35	48	0	69	185	2	1	0	182

Kusri	260	90	142	3	25	91	15	54	1	21
Dubaulia	0	0	0	0	0	0	0	0	0	0
Khairi	1	0	0	0	1	30	4	25	0	1
Khaira	128	71	19	0	38	122	5	102	1	14
Darigawan	860	141	337	41	341	776	55	551	20	150
Bharkunria	500	163	311	1	25	267	11	252	0	4
Guraila	309	116	134	4	55	573	74	429	5	65
Durgapur	385	197	75	8	105	27	9	11	5	2
Maheshdih	37	32	1	0	4	72	2	70	0	0
Lewara	302	97	98	33	74	86	1	31	34	20
Dubauli	62	27	23	2	10	35	8	24	3	0
Kusdihra	380	107	132	29	112	126	40	54	4	28
Koidih	107	15	91	0	1	0	0	0	0	0
Ramdihra	332	29	125	24	154	195	1	106	25	63
Sewahi	361	139	162	12	48	707	25	659	8	15
Bardiha	149	114	31	1	3	411	28	247	4	132
Hurka	645	199	192	70	184	145	3	98	4	40

*EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3).
Proposed Length – 58.155 Km*

Chapter 4- Description of Environment

Patluka	370	326	32	0	12	139	16	119	3	1
Mitarsenpur	52	27	1	11	13	80	4	60	7	9
Mirzapur	299	263	5	7	24	233	3	220	2	8
Tilauthu Arazi	0	0	0	0	0	0	0	0	0	0
Chemni Chak	0	0	0	0	0	0	0	0	0	0
Dharampur	0	0	0	0	0	0	0	0	0	0
Malpura	688	169	403	0	116	750	47	583	1	119
Rakian Bigha	46	24	6	2	14	159	44	64	3	48
Amra	57	22	3	1	31	248	11	195	1	41
Bhadra	103	98	1	0	4	9	0	8	0	1
2. District Aurangabad, Bihar										
Mahuawan	960	149	702	67	42	237	12	34	20	171
Tetraharnr	288	77	133	39	39	196	15	114	8	59
Dihri	32	1	24	0	7	2	0	2	0	0
TOTAL (1.0km)	17429	5379	7247	570	4233	12883	1062	8722	412	2687

Source-<http://www.censusindia.gov.in/2011census/dchb/DCHB.html>

Abbreviations:

Educational Facilities: P-Primary School, M-Middle School, SS-Higher Secondary Schools, SSS- Senior Secondary School

Medical Facilities: CHC- Community Health Centre, PHC-Primary Health Centre, PHSC-Primary Health Sub-Centre, MCWC-Maternity and Child Welfare Centre, H-Hospital, D- Dispensary, FWC-Family Welfare Centre

Drinking Water Facilities: T-Tap Water, W-Well Water, HP-Hand Pump, TW-Tube Well Water, R-River Water, Tk-Tank Water, O-Other Drinking Water Facility

Communication and Transport Facilities: PO-Post Office, SPO-Sub-Post Office, PTO- Post & Telegraph Office, Tel. - Telephone Connection, Mob.- Mobile Phone Coverage, BS-Bus Services, RS-Railways Services

Approach to Village: PR- Paved Roads, KR-Kuchha Road, FP-Foot Path

Power Supply: ED-Power Supply for Domestic use, E Ag.- Power Supply for Agricultural use, EC- Power supply for Commercial use, EA-Electricity for All Purposes

Distribution of work participation rate of the study area population is shown in **Table 4-31** as follows;

Table 4-31: Distribution of Work Participation Rate in (1.0km)

Occupation Class	Year, 2011
Main Workers	17429 (17%)
Male	12564(72.08%)
Female	4865(21.92%)
Marginal Workers	12883(13%)
Male	7653(59.40%)
Female	5230 (40.6.0%)
Non-Workers	70472(70 %)
Male	32375 (45.95%)
Female	38097(54.05%)
Total Population	56512
<i>Source: Census of India Records, 2011</i>	

Graphical representation of Workers Scenario is given below as **Figure 4-25**.

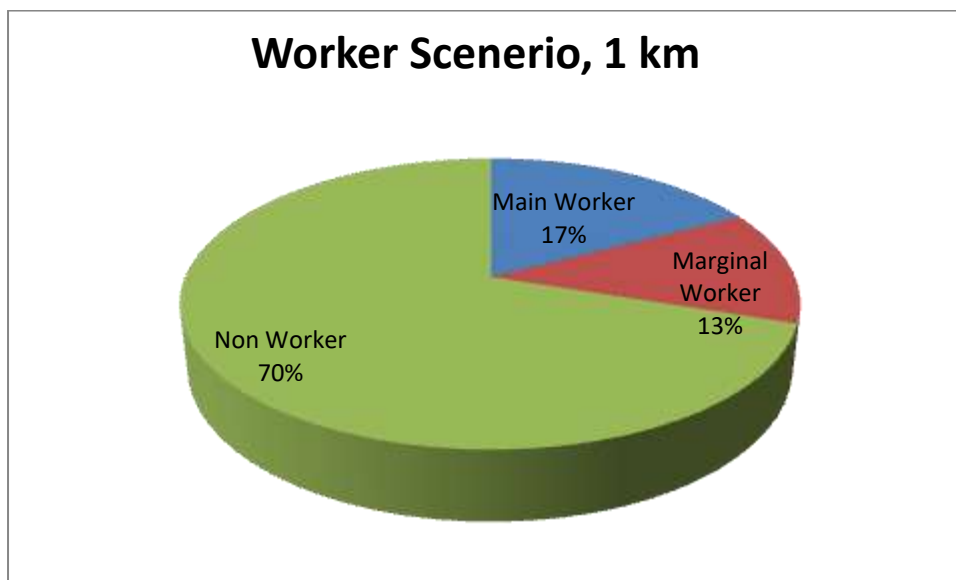


Figure 4-25: Workers Scenario of Study Area

4.6.5.6.1 Composition of Main Workers:

The 'Main Workers' were observed as 17429 persons (17.29%) to the total population (100784 persons) of the study area and its composition is made-up of Casual laborers as 5379 (31%), Agricultural laborers as 7247(42.0%), Household workers 570(3.0%) and other workers as 4233 (24%) respectively. Composition of Main workers is shown below as **Figure 4.26**.

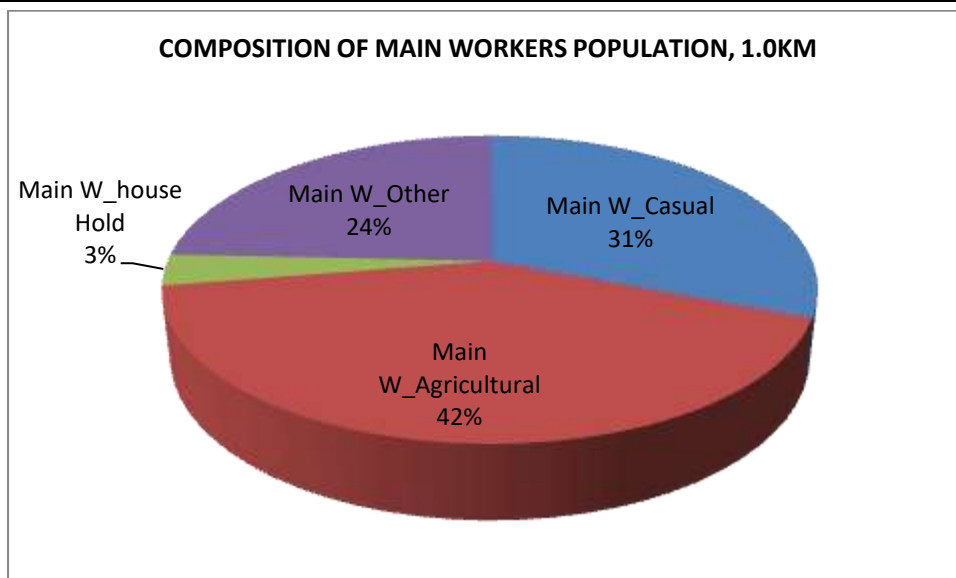


Figure 4-26: Composition of Main Workers Population

4.6.5.6.2 Composition of Marginal Workers:

The total marginal workers are observed as 12883 which constitute 12.7% to the total population (100784) comprising of Marginal Casual Laborers as 1062 (8.2%), Marginal Agricultural Laborers as 8722 (67.70%), Marginal Household laborers as 412 (3.19%) and marginal other workers were observed as 2687 (20.85%) to the total marginal workers respectively. Details about marginal workers in the study area are tabulated in **Table 4.31**. Composition of Marginal workers is shown in **Figure 4.27** as follows.

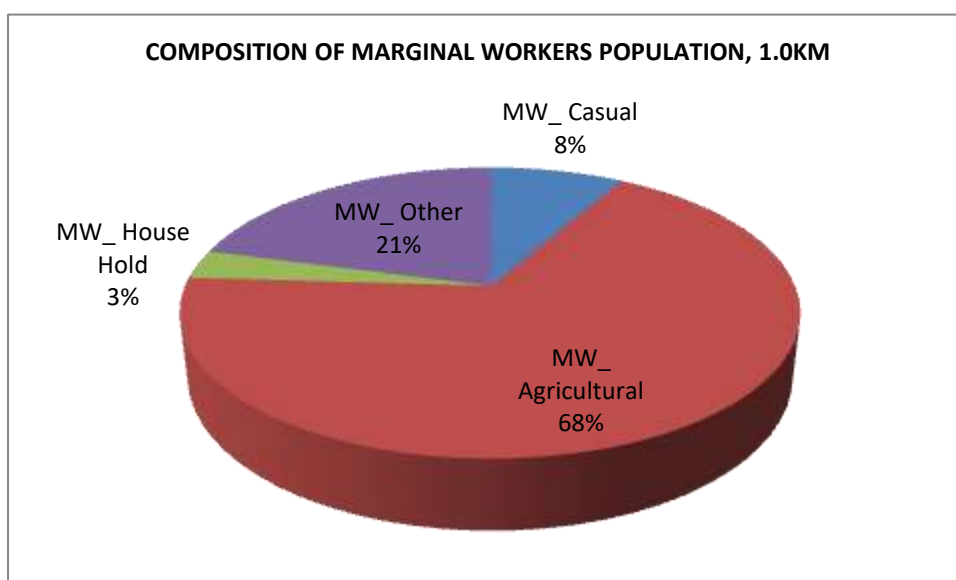


Figure 4-27: Composition of Marginal Workers

4.6.5.6.3 Composition of Non-Workers:

The total Non-workers population was observed as 37988 which constitute 67.2% to the total population (56512 persons) of the study area. Male-female wise Non-workers population was recorded as 16059 Males (42.2%) and 21929 Females (57.7%) respectively. Details about Total Non-workers in the study area are compiled in **Table 4.32** Graphical representation of Non-workers population is shown as follows in **Figure 4.28**.

Table 4-32: Composition of Non-Workers

Non-Workers Population		
Persons	Males	Females
37988	16059(42.3%)	21929(57.7%)

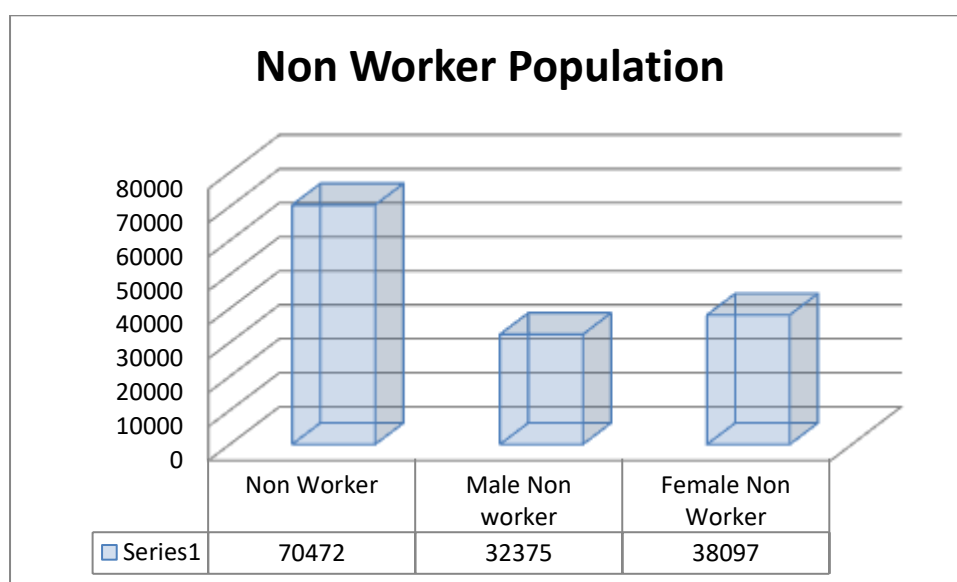


Figure 4-28: Male-Female Composition of Non-Workers

4.6.5.7 BASIC INFRASTRUCTURE FACILITIES AVAILABILITY (as per the census records of 2011)

A review of Basic infrastructure facilities (Amenities) available in the study area has been done on the basis of the field survey and Census records, 2011 for the study area inhabited villages of 2 districts, mainly Rohtas & partly Aurangabad of Bihar state respectively. The study area has moderate level of basic infrastructure facilities like educational, medical, potable water, power supply, and transport & communication network.

As per the Census Records of India 2011, the study zone of 1.0km has a total of 44 villages and one town of 2 districts i.e. mainly Rohtas (41 villages & one town) and partly Aurangabad (only 03

villages) of Bihar state respectively. All revenue villages/towns are mainly under 05 tehsils namely, Chenari, Sheosagar, Sasaram, Tilouthu of Rohtas district and Nabinagar of Aurangabad district respectively in Bihar state. There is one town named Saraiya (CT) of Tilouthu tehsil in Rohtas district was found in the 1.0km study zone of the project.

There are 3 other towns named Sasaram & Dehri of Rohtas District and Nabinagar of Aurangabad district in Bihar, which are available for the study area villages in the range of <5km, 5-10km and >10km. Out of the total 45 villages/towns of the study zone, four villages i.e. Uchauli, Palangarh, Kauria & Belwai of Rohtas district were observed as uninhabited villages.

4.6.5.7.1 Educational Facilities

There is a total no. of 27 Primary schools existing in the rural part of the 1.0km study area. Seven (07) Middle schools are recorded in the rural part of the study area. Only one number of each Higher Secondary Schools (SS) and Senior Secondary School (SSS) are available in the rural part of the study area. The educational facilities have been further strengthening now and a number of private public schools and colleges are functioning in the surroundings of the study area. Besides, there are Engineering and Medical colleges available in Towns and District headquarters only. Higher education facilities are available in Towns of the area. There is considerable improvement in educational facility. The villages/towns of the study area have no such facilities can reach within 5.0 to 10.0km range.

Availability of University Education

There are several affiliated and constituted colleges of the Magadh University, Bodh Gaya which impart under graduate and post graduate education in the district. IGNOU (Indira Gandhi National Open University) has opened Special study centre in S.P. Jain College, Sasaram of the district where one can study many distance courses of under graduate, post graduate and vocational e.t.c.

4.6.5.7.2 Medical Facilities

The medical facilities are provided by different agencies like Govt. & Private individuals and voluntary organizations in the study area. As per the district census handbook information of 2011, no primary health center found in the study zone; most of the study area villages depends upon the towns / district HQ of the study zone having such facility. One of each Primary Health Sub-center, Mother & Child Welfare Centre, Medical Dispensary, Family Welfare Center are found only in one village named Mahuawan of Nabinagar tehsil in Aurangabad district partly falling in the study zone. No, Community Health Centre and Allopathic Hospital was found in the entire study zone. Overall study area villages of Rohtas district are served by poor medical facilities. Specialized medical facilities are available only in towns and District Headquarter (HQ) only.

4.6.5.7.3 Potable Water Facilities

Potable water facility is available in most of the villages/towns of the study area. The entire study area has good level of potable water facilities. Hand Pump (HP) facility was commonly observed in the study area as potable water facility. Out of total 45 villages/towns, about 15 villages (37.5%) being served with River/Canal water in the study area. As per the census records of 2011, only one village named Murhi of Sasaram tehsil in Rohtas district being served with Tank/Pond/Lake facility in the study area.

4.6.5.7.4 Communication, Road & Transport Facilities

Apart from Post & Telegraph (P & T) services, transport is the main communication linkage in the study area. Only Six (6) villages were found serving with Post Office facilities in the study zone, all villages are depending upon towns of the study region and district headquarter. The study area has average rail and road network, passes from the area.

Only one village named Birnagar under Chenari tehsil of Rohtas district was found with railway station facility in the study area. Nearest railway station are Kudra and Sasaram Railway station located at 12.1 & 23.32km in North & NE direction respectively from the starting point.

Nearest town is Kudra located at approx. 9.37km in North direction, Sasaram also located at approx. 15km in NE direction, Dehri approx. 17km in North and Tilouthu town is situated at 5km in NE Direction from end point. Nearest airport is Gaya Airport situated at approx. 70km, aerial, from starting point of proposed alignment.

The district of Rohtas is well served by a network of roads. Road communication is the main mode of transportation in this district. The roads are classified as the National Highways, State Highways, Major district roads and other district roads. They are maintained by the Public works Department, the Rural Engineering Organization, the Zila Parishad and Municipalities. It is also connected with the interior of the district by metalled road. Two State Highway (SH) cross the district. SH-6 and SH-18 also pass through the district. NH-2 crosses the district. The Grand Trunk Road traverses within the district. This old road has been improved a lot and serves as the main road links between Calcutta and Delhi.

Banking Facility

The study area has almost all the schedule commercial banks with ATM facility at urban areas and the district HQ.

Power Supply

It is revealed from the compiled information on Amenities availability as per the census record of 2011; most of the villages and towns are electrified for Domestic, Agriculture, and Commercial& for all purposes.

As per the compiled information on power supply facilities in the villages/towns of the study zone, about 32 villages (80.0%) are electrified for domestic, agricultural, commercial and for all purposes in the study area. Out of the total 45 villages/towns of the study area, about Six (06) villages (15.0%) were observed not electrified for any purpose in the study area.

As per the census records, the district Rohtas & Aurangabad both receives its entire power supply from Bihar State Electricity Board. All the towns in both districts have electricity. In the rural areas, the Government is trying to extended electric line to the maximum number of villages by implementing various schemes for rural electrification. As per data available in village directory of 2011 census 1412 and 1071 Villages of the district were electrified in both districts respectively. The possibility of tapping solar energy is also great in the Aurangabad district.

Village/town wise Basic Infrastructure and Amenities availabilities data for the entire study area is compiled and presented in **Table 4.33** as follows;

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

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Table 4-33: Village wise Basic Amenities Availability

Name of the Village/Town	Educational				Medical						Drinking Water						C T	Communication & Transport				Approach to the Village				Power Supply				Nearest Town & Distance, km	
	P	M	SS	SS	CHC	PHC	PHSC	MWC	H	D	FWC	T	W	HP	TW	R		Tk	PO	PTO	BS	RS	PR	KR	NW	FP	ED	EAg.	EC		EA
1. District Rohtas, Bihar																															
Basantpur	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,27km	
KenarKhurd	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,27km	
Raghunathpur	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	1	2	2	1	2	2	2	2	Sasaram,30km	
BarahtaliChhotki	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	2	1	2	2	2	2	Sasaram,30km	
BarahtaliBarkhi	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,27km	
Charahi	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,38km	
Narayanpur	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	1	2	1	1	2	1	1	1	1	1	Sasaram,33km	
Kinarchola	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	1	2	1	1	2	1	1	1	1	1	Sasaram,35km	

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

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Bansil	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	Sasaram,22km		
Sahasi	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,30km	
Semri	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Sasaram,28km	
Dehria	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	Sasaram,26km	
Birnagar	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	1	1	1	1	2	1	1	1	1	1	Sasaram,38km	
Nisja	Data Not Available																															
Doriawan	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,6km	
Khatolla	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,18km	
Khurhia	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	1	2	1	1	1	1	1	1	1	1	Sasaram,15km	
Konki	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,15km	
Belahar	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,7km	
Sikaria	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	Sasaram,7km
Kota	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	2	1	2	2	2	2	2	Sasaram,10km
Rajokhar	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	Sasaram,3km
Gajdwahi	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	Sasaram,3.5km
Kanchanpur	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	1	2	1	1	2	1	1	1	1	1	1	Sasaram,4km

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

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Kurdaun	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	1	2	1	1	2	1	1	1	1	1	Sasaram,4.5km
Dhankarha	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	Sasaram,5km
Kanchanpur	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,5.5km
Lerua	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Sasaram,6km
Mednipur	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	Sasaram,6.5km
Dhaudanr	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	1	1	1	1	2	1	1	1	1	1	Sasaram,7km
Murhi	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,7km
Karserua	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,8km
Gharbair	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	1	2	1	1	1	1	1	1	1	1	Sasaram,8km
Barui	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	Sasaram,8km
Songawan	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	2	2	1	1	2	1	1	1	1	1	Sasaram,12km
Mundi Sarae	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	2	2	2	1	1	1	1	1	1	1	Sasaram,9km
Molawan	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	Sasaram,9.5km
Sakas	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,10.5km
Kusri	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Sasaram,10.5km
Dubaulia	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	Sasaram,11km

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

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Khairi	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Sasaram,12km
Khaira	1	1	1	1	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	2	2	1	1	2	1	1	1	1	1	Sasaram,13.5km
Darigawan	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Sasaram,15km	
Bharkunria	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 7 km
Guraila	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	Dehri, 7.5 km
Durgapur	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Dehri,8 km
Maheshdih	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 8.5 km
Lewara	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	Dehri,9 km
Dubauli	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 9.5 km
Kusdihra	1	1	1	1	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	2	2	1	1	2	1	1	1	1	1	Dehri, 9.5 km
Koidih	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	Dehri, 9.5 km
Ramdihra	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 9.5 km
Sewahi	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	Dehri, 9.5 km
Bardiha	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 9.5 km
Hurka	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	Dehri, 10 km
Patluka	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 10.5 km

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

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Mitarsenpur	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	Dehri, 11.0 km
Mirzapur	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 11.0 km
Tilauthu Arazi	1	1	1	1	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	2	2	2	1	1	2	1	1	1	1	1	Dehri, 11.5 km
Chemni Chak	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	1	1	2	1	2	2	2	2	Dehri, 12.5 km
Dharampur	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Dehri, 12.5 km
Malpura	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	Dehri, 13.5 km
Rakian Bigha	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	1	2	1	1	2	1	1	1	1	1	Dehri, 14.5 km
Amra	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri, 14.5 km
Bhadsa	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Dehri,15km
2. District Aurangabad, Bihar																															
Mahuawan	1	1	0	0	0	0	1	1	0	1	1	2	2	1	1	1	2	2	1	2	2	2	1	1	2	1	1	1	1	1	Nabinagar,32km
Tetrahanr	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Nabinagar,30km
Dihri	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	2	1	2	2	2	2	2	Nabinagar,24km
TOTAL (1.0km)	27	7	1	1	0	0	1	1	0	1	1	Status for Availability and Non-Availability is shown as A (1) & NA (2) respectively																			

Source-<http://www.censusindia.gov.in/2011census/dchb/DCHB.html>

Abbreviations:



EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

Chapter 4- Description of Environment

Educational Facilities: P-Primary School, M-Middle School, SS-Higher Secondary Schools, SSS- Senior Secondary School

Medical Facilities: CHC- Community Health Centre, PHC-Primary Health Centre, PHSC-Primary Health Sub-Centre, MCWC-Maternity and Child Welfare Centre, H-Hospital, D- Dispensary, FWC-Family Welfare Centre

Drinking Water Facilities: T-Tap Water, W-Well Water, HP-Hand Pump, TW-Tube Well Water, R-River Water, Tk-Tank Water, O-Other Drinking Water Facility

Communication and Transport Facilities: PO-Post Office, SPO-Sub-Post Office, PTO- Post & Telegraph Office, Tel. - Telephone Connection, Mob.- Mobile Phone Coverage, BS-Bus Services, RS-Railways Services

Approach to Village: PR- Paved Roads, KR-Kuchha Road, FP-Foot Path

Power Supply: ED-Power Supply for Domestic use, E Ag.- Power Supply for Agricultural use, EC- Power supply for Commercial use, EA-Electricity for All Purposes

4.6.5.8 BRIEF DESCRIPTION OF PLACES OF RELIGIOUS, HISTORICAL OR ARCHAEOLOGICAL IMPORTANCE AND TOURIST INTEREST IN VILLAGES AND TOWNS OF THE DISTRICT: (DISTRICT LEVEL INFORMATION ONLY)

❖ District Rohtas, Bihar

Akbarpur - It is situated at the foot of Kaimur hills at a distance of about 5 km from Rohtasgarh. It is said to be named after Mughal ruler Akbar. It is very near to the present block headquarters of Rohtas. It contains the tomb of Malik Wishal Khan, the Daroga of Rohtas garh during the reign of emperor Shahjahan. The inscription in Persian on the tomb indicates that Akbarpur was a Pargana during the Mughal period.

Dehri - It is a large industrial town and an important junction on the Eastern Railway in the Grand Chord section. It has the remains of an ancient fortress on the river Sone known as Rohtas garh. The Sone canal system originates from Dehri.

Deo Markandey - Situated 18 km East of Nasriganj in Bikramganj subdivision, it is famous for temples of Lord Vishnu and Surya. It is said that the temple was built in 6th century A.D. by the queen of Raja Phoolchand Cheroo.

Nasriganj - The town is situated on the river Sone and is the headquarters of the block of the same name. It is believed to have been named after Abdul Nasir with whom the village was settled in 1740 situated on the Arrah Sasaram Road. Here large annual fairs are held on the occasion of Maker Sankranti and Kartik Purnima.

Rohtasgarh -Its name is said to be after the name of Rohitasava the son of Raja Harishchandra. Rohitasava is said to have settled and built a fort here.

Tarachandi - There is a temple of Goddess Tarachandi and a small inscription of Pratap Dhawal on the rock close to the temple of Chandi Devi. Hindus in large number assemble to worship the Goddess.

Bhaluni Dham – Bhaluni Dham is a famous for temple of Goddess Durga, called “Yakshini Bhagawati”. Here is also an ancient temple of god Shirac Bhankhandi Mahadeo. There is a math of a saint “Dariyadas”.

❖ **District Aurangabad, Bihar**

Deo - A village, situated 10km southeast of Aurangabad, has a temple dedicated to God Sun, which is known as Surya Mandir. With an umbrella like top, the temple is about 100 feet high and is believed to have been built in the 15th century by Bhairvendra Singh, a Chandravanshi King of Umga.

Piru - Piru is believed to be 'Pritikuta' of the old days which was the birth place of Vanabhata, the great poet and State chronicler of Harshvardhana.

Siris - Siris was a pargana under Sher Shah and the Mughal Empire. Later on it became the playground of Raja Narain Singh and the heroes of 1857. A mosque believed to have been built during the reign of Aurangzeb with Persian inscriptions stands there.

4.6.5.9 MAJOR SOCIAL & CULTURAL EVENTS

In the district of Rohtas and Aurangabad, no major social or cultural event has taken place during the decade. However, the district has been famous for fairs and Melas held at different places throughout the year. Fairs and festivals are held regularly in the district. There are some shopkeepers who keep on moving from fair to fair throughout the year. Some of the fairs held in the district are quite old.

4.6.5.10 REHABILITATION & RESETTLEMENT (R & R)

Policy to be adopted (central/state) in respect of the project affected persons including home oustees, land oustees and landless labour. Hence, any planning with respect to rehabilitation & resettlement is applicable.

About 345.30 ha land likely to be acquired as per NH Act 1956; compensation will be given as per RFCT LARR Act, 2013.

Benefit to the Local People

The proposed access controlled project with new alignment has been envisaged through an area which shall have the advantage of simultaneous development as well as shall result in a shorter distance to travel. The junctions with existing road will be planned in the form of interchanges and flyover to ensure uninterrupted flow of traffic.

The proposed road would act as the prime artery for the economic flow to this region. It will enhance economic development, provide employment opportunities to locals, strengthen tourist

development, ensure road safety, and provide better transportation facilities and other facilities such as wayside amenities. Vehicle operating cost will also be reduced due to improved road quality.

Employment Generation

During the construction phase, around 365000 man-days will be requiring and approx. 1000 persons or more would be employed temporarily for a period of two (02) years. However due to construction of toll plazas approx. 100 persons will be employed on permanent basis. Preference will be given to local people for employment. The Project will enhance economic development in the area through industrial growth, agricultural, and commercial development and consequent employment generation, savings in travel time & shall provide easy access to social infrastructure.

4.7 BIOLOGICAL ENVIRONMENT

4.7.1 INTRODUCTION

The ecological study reflects the potential of a regional ecosystem and its biological components. In India, the biological diversity of plants and animals varies from region to region on account of their diversity and density. Producers (plants), consumers (animals), and decomposers (microbes) govern the whole cycle of ecology. Plant and animals both are interdependent on each other.

The biological study is essential to understand the impact of any developmental project on the existing flora and fauna of the study area. Studies on various aspects of the ecosystem play an important role in identifying sensitive issues for undertaking appropriate action to mitigate the impact if required.

The Environment baseline data generation report in respect of flora-fauna has been prepared to assess the current ecology & biodiversity scenario of the area and then based on the proposed project activities, to carry out Environmental Management Plan. The plan will identify and address the impacts, where these are adverse in nature, and thereafter design mitigation measures to manage such impacts in a manner as to conserve the environment and ecology of the area. Conservation of biodiversity is essential for sustainable development.

The main objective of the ecological survey is aimed to find out the baseline status of flora and fauna (terrestrial and aquatic ecosystem) of the study area before the start of developmental works of the proposed 4/6 lanes Varanasi-Kolkata Expressway Project.

4.7.2 DESCRIPTION OF THE STUDY AREA

The proposed 4/6 lanes Varanasi-Kolkata Expressway Project (length 40.2 KM) is proposed to develop from the Rampur village of Rohtas district to Tetarahar village of Aurangabad district (Bihar) under the Bharatmala Pariyojana. The total length of the proposed expressway is 40.2 km. Proposed expressway alignment is passing through the purely rural agricultural field of Rohtas district of Bihar. There is no Natural Forest involved in the alignment (core zone) of the proposed expressway project, whereas, at some locations (crossing point of roads/canals), the proposed project falls in notified protected forest areas declared for management purposes. The forest proposal shall be prepared after consultation with the concerned authority if it attracts FC under section 2, 1980. On the other hand, agricultural land, village land, canals, rivers, and village roads are involved in the project area. The proposed area falls under Seismic Zone-III, which is categorized as a moderate intensity seismic zone (As per 1893:2002). The landuse details are given in **Fig. 4.29**.

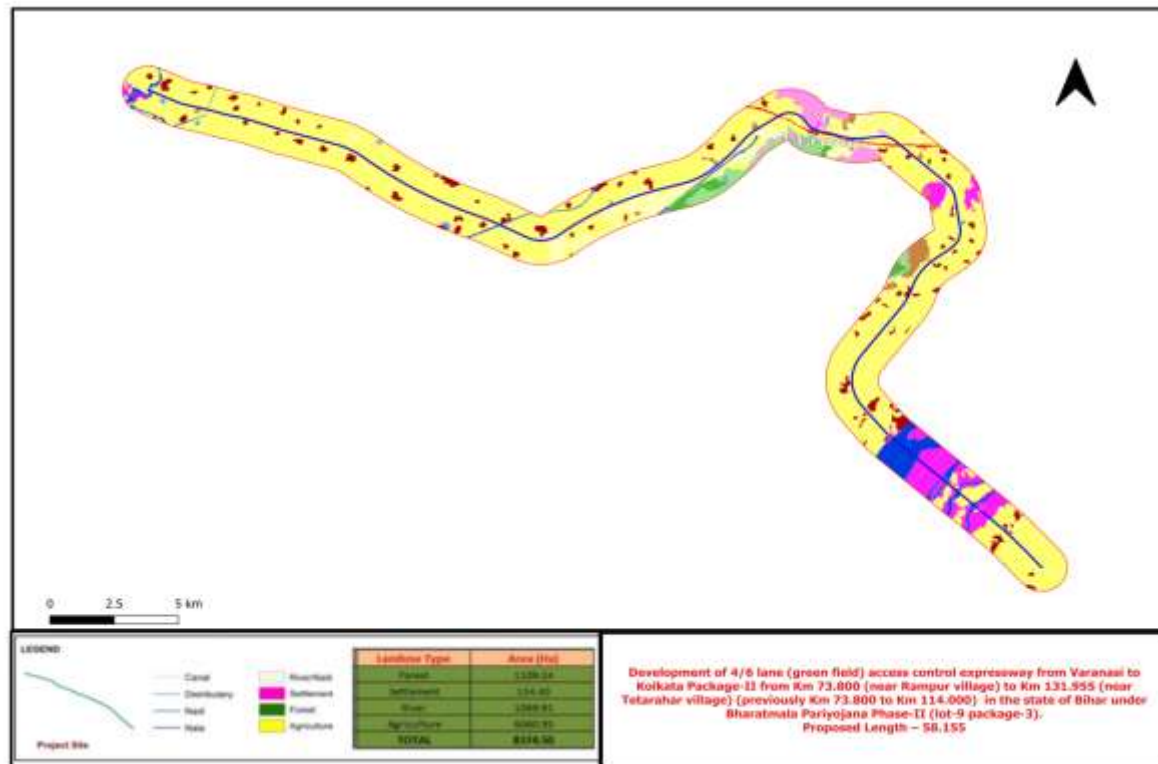


Figure 4-29: Landuse map of the study area



Figure 4-30: Map of Eco-Sensitive Zone of the Study Area

4.7.3 DESCRIPTION OF ECO-SENSITIVE ZONES IN THE STUDY AREA (WILDLIFE SANCTUARY/ NATIONAL PARKS/ANIMAL OR ELEPHANT CORRIDORS/ PROTECTED WETLANDS ETC.)

There are no National parks, Biosphere Reserves, Wildlife corridors, Tiger/Elephant reserves (existing as well as proposed), within 10 km from the present alignment of the expressway development project.. Also, areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value are doesn't exist in the core and buffer zone of the present project except Kaimur Wildlife Sanctuary. On the other hand, the proposed alignment will cross over some riverine channel (7 No.), Canals & Nallahs (3 No.),

and Pond (1 No.) in the core zone. Adequate structure for cross drainage shall be constructed in order to maintain the natural hydrology and protection of all forms of biota found there in all the water bodies of the area.

4.7.3.1 DRAINAGE /WATER BODIES OF THE STUDY AREA

The Proposed project area as a whole is located in the southern part of the Ganga River basin. Durgawati and Son River are the major drainage of the core and buffer zone. Different seasonal streams of the both the rivers are also present in the study area. Apart from these, some seasonal (monsoon-fed) riverine channel/streams are also present in the study area. Few ponds are also recorded nearby the different villages mainly used for Fish farming, Cattle feeding, Irrigation purpose, etc.

4.7.4 SCOPE AND OBJECTIVES OF THE STUDY

The above study aims in identifying potential impacts on flora and fauna and to suggest relevant compensatory and mitigatory measures to protect/conservate biodiversity in the likely impacted area due to the project activity. Following points to be covered under the scope of work:

- Survey of terrestrial & aquatic flora & fauna for core & buffer zone separately.
- Details of endemic species found in the study area and their IUCN status, Schedule status (as per WPA, 1972).
- Survey of the study area in terms of features like breeding & spawning grounds, habitats, flight paths, and the migratory path of the animals.
- Survey of flora covering types e.g. agriculture crop, commercial crop, plantation, natural vegetation/forest type, grass land. The endangered & endemic species of flora & fauna beside any other flora, if present are also to be identified.
- The survey has been covering a total listing of the faunal population. The survey has also covered endangered, endemic, migratory & detail of aquatic fauna.
- The assessment of potential damage to terrestrial & aquatic flora and fauna. The impact should be categorized as primary & secondary, temporary and long term, unavoidable & risk trans-boundary impacts, possible irreversible change.

4.7.5 METHODOLOGY/ DATA COLLECTION

A primary field survey was carried out within a 1 km radius of the proposed alignment during the Pre-Monsoon period (March to May, 2022). Both terrestrial and aquatic ecosystems have been studied to understand the biological environment. Secondary data were collected from authentic sources like the Forests Department, Fisheries Department, Agriculture Department of Rohtas district, and available published literature.

4.7.5.1 FLORA (AQUATIC AND TERRESTRIAL)

For the collection of data for aquatic flora, the methodology prescribed in the standard book of Adoni (1985), NEERI (1998), and APHA (2015) has been adopted. A total of **06** sampling points were selected for the collection of samples for the study of aquatic flora.

On the other hand, for the terrestrial data, community analysis was carried out during the summer season. For the collection of terrestrial data, a total of **09** sampling points were selected. In every study site, quadrates of 10m X 10m (100 sq.m.) size were randomly laid to study tree species. The circumference of all the adult individuals [≥ 30 cm circumference at breast height (CBH)] was measured with Freeman's tape. The study of communities was carried out by using qualitative characteristics, and quantitative characteristics. Qualitative characteristic mainly involved presence/absence of the species, genera, and family. This showed the community structures, composition and other characteristic can be readily described by visual observation without actual measurements. The quantitative analysis involved the structure and composition of vegetation across vegetation types and compared in terms of frequency, density, abundance, and basal area of tree species.

4.7.5.2 FAUNA (AQUATIC AND TERRESTRIAL)

For the collection of data for aquatic fauna, the methodology prescribed in the standard book of Adoni (1985), NEERI (1998), and APHA (2015) has been adopted. A total of **06** sampling points were selected for the collection of samples for the study of aquatic fauna.

On the other hand, for the terrestrial data an extensive field survey was conducted at **09** different locations in the study area. During the survey, the Line Transect method was used for the study of mammals and Transact & Patch sampling were used for Amphibians, visual encountered methods was used for reptiles and butterflies. The presence of wildlife was also confirmed from the animal

calls, footmarks, excreta, and from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area which was later confirmed from the different government offices like the forest department or wildlife department, etc.

Observations of birds were made during a walk-through in the chosen transect for sighting birds. The number of birds observed in each sampling location was listed. Birds were noted and identified with the help of binocular and standard field identification guides.

4.7.6 SAMPLING SITES

A total of 9 sites (TS-1 to TS-9) were selected for the terrestrial vegetation, avian fauna, and other terrestrial animals like reptiles, mammals, etc. For the collection of samples and data of aquatic flora and fauna, 6 separate sites (AS-1 to AS-6) were selected at different locations of the study area (Table 4.34 and Figure 4.32 & 4.33).

Table 4-34: List of Sampling Location Selected for Study of Biological Environment

Terrestrial Sampling				
S.N.	Location Name	Zone	Latitude	Longitude
1	Rampur	Core and Buffer	24°56'23.98"N	83°47'27.06"E
2	Birnagar	Core and Buffer	24°56'9.61"N	83°47'57.56"E
3	Dehariya	Core and Buffer	24°55'42.18"N	83°49'37.53"E
4	Kenar Khurd	Core and Buffer	24°54'54.12"N	83°52'7.08"E
5	Gitaghat-Murhi	Core and Buffer	24°51'57.52"N	83°58'7.28"E
6	Belawain	Core and Buffer	24°50'38.01"N	84° 0'48.46"E
7	Rakin Bigha	Core and Buffer	24°48'14.75"N	84° 4'12.08"E
8	Tilauthu- River Son	Core and Buffer	24°47'44.09"N	84° 4'41.34"E
9	Tetarahar	Core and Buffer	24°45'38.38"N	84° 6'60.00"E
Sampling Stations for Aquatic Flora and Fauna				
S.N.	Location Name	Zone	Latitude	Longitude
1	Durgawati River-Rampur	Core and Buffer	24°56'21.41"N	83°47'31.94"E
2	Hatta- Canal	Core and Buffer	24°55'52.91"N	83°48'52.96"E
3	Kenar Khurd- Canal	Core and Buffer	24°54'54.71"N	83°52'6.64"E
4	Konar-High level Son Canal	Core and Buffer	24°52'59.17"N	83°55'39.34"E
5	Murhi- Durgawati distributary	Core and Buffer	24°52'4.34"N	83°57'51.09"E
6	Son River- Tilauthu	Buffer zone	24°47'35.66"N	84° 4'51.29"E

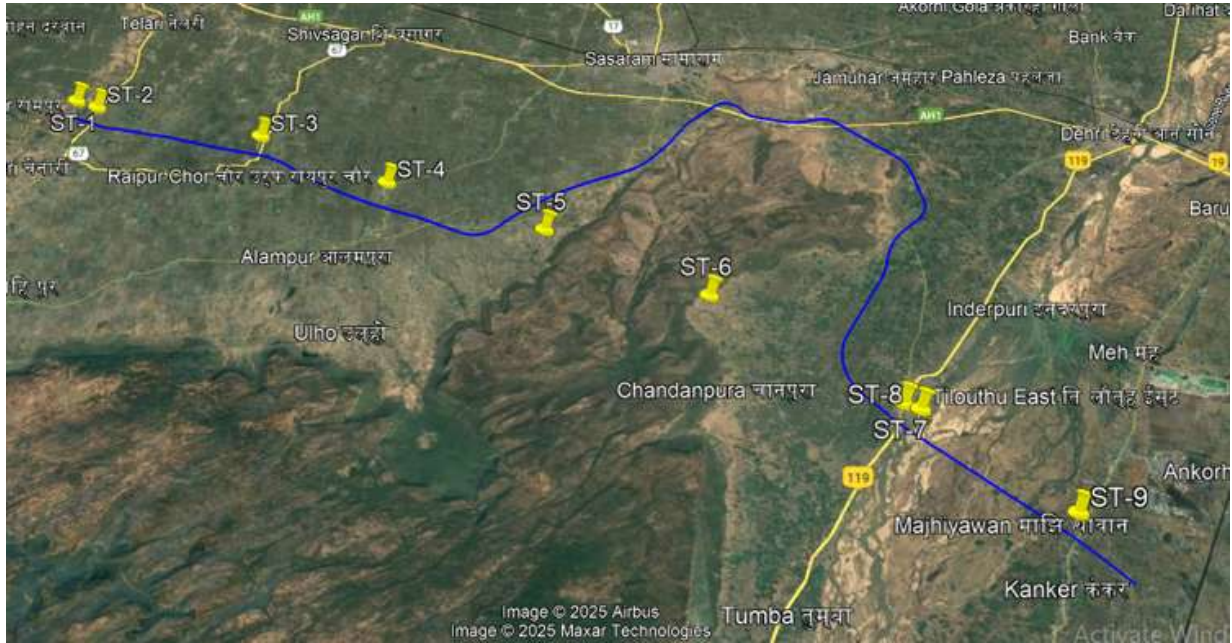


Figure 4-31: Location of sampling sites of Terrestrial Flora-Fauna

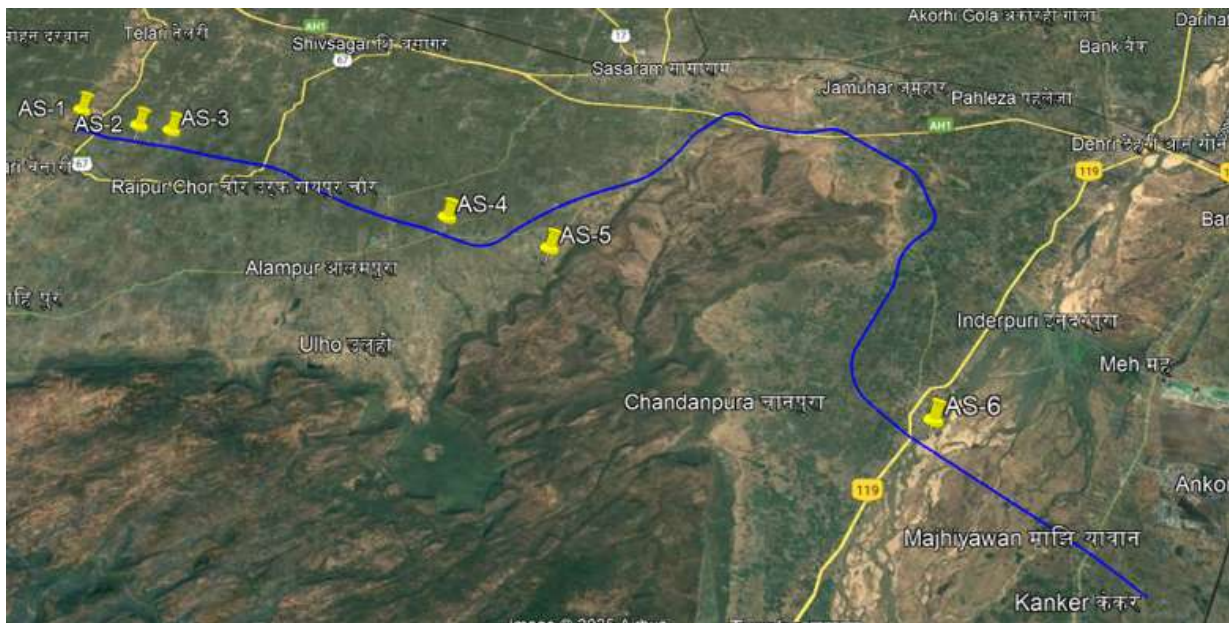


Figure 4-32: Location of sampling sites of Aquatic Flora-Fauna

4.7.7 FLORA OF THE STUDY AREA

A major part of the core and buffer zone of the project is agricultural land having some major vegetation. Some part of the Kaimur Wildlife Sanctuary and other Protected forests land area

involved in the core as well as buffer zone of the study area.. Approximately 9.5 Ha of forest land has to be acquired for the various developmental activities of proposed highway. The forest proposal shall be prepared after consultation with concerned forest department for Forestry Clearance under section 2, 1980. The alignment will require cutting of approximately 2357 no of trees for the development of the expressway. Most of the trees falling along the alignment are the part of agro forestry. Against the cutting of the trees, compensatory plantation will be done along the expressway, on government land, nearby the villages, etc. on account of counting of the tree for this developmental work. Most of the trees will be relocated/ translocated.

The common species grown near villages are mostly edible or useful plants. The most dominant tree species in the study area are *Aegle marmelos* (Bel), *Azadirachta indica* (Neem), *Emblica officinalis* (Amla), *Dalbergia sissoo* (Sisam), *Ficus bengalensis* (Bargad), *Musa paradisiacal* (Kela), *Syzygium cumini* (Jamun), *Cassia siamea* (Kasod/Siris), *Mangifera indica* (Aam) and in case of shrubs *Antigonum leptopus*, *Ricinus communis*, *Lantana camara*, *Jatropha gossipifolia* and *Cassia auriculata* etc. Small patches of moderate scrubby land are present on both side of the riverine bank in the Rohtas district. Details of the forest are given in the table 4.35.

Table 4-35: Details of forest (sq.km) in Rohtas district as per the India State of Forest Report-2019.

District	Geographical Area	Very dense forest	Mod. Dense forest	Open forest	Total	% of GA	Change	Scrub
Rohtas	3,881	0.00	352.52	319.71	672.23	17.32	-33.77	42.14

Source: India State of Forest Report-2019.

4.7.8 FLORA OF CORE ZONE

4.7.8.1 TERRESTRIAL FLORA OF CORE ZONE (NATURAL VEGETATION ETC.).

Vegetation details of the core zone were collected from 09 selected sites of the study area. During the survey 20 plant species were recorded from the core zone. Apart from these, 13 species of shrubs/herbs and 6 grass species were recorded. The details of the vegetation recorded from the core zone are given in Table 4.36.

Table 4-36: List of Trees, Shrubs, Herbs and Grasses Species observed in Core Zone

S.No.	Botanical Name	Common/Hindi Name	Name of class/family
Trees			

1.	<i>Acacia arabica</i>	Babul	Leguminosae
2.	<i>Acacia nilotica</i>	Desi babool	<i>Fabaceae</i>
3.	<i>Aegle marmelos</i>	Bel	<i>Rutaceae</i>
4.	<i>Azadirachta indica</i>	Neem	<i>Meliaceae</i>
5.	<i>Bambusa arundinacea</i>	Katang bamboo	<i>Poaceae</i>
6.	<i>Bauhinia purpurea</i>	Koenar	Fabaceae
7.	<i>Butea monosperma</i>	Palas	<i>Leguminosae</i>
8.	<i>Cassia siamea</i>	Chikundi	<i>Mimosaceae</i>
9.	<i>Dalbergia sissoo</i>	Shisam	<i>Leguminosae</i>
10.	<i>Diospyros melanoxylon</i>	Tendu	<i>Ebenaceae</i>
11.	<i>Emblica officinalis</i>	Amla	Phyllanthaceae
12.	<i>Eugenia heyneana</i>	Katjamun	Myrtaceae
13.	<i>Ficus religiosa</i>	Pipal	<i>Moraceae</i>
14.	<i>Litchi chinensis</i>	Litchi	Sapindaceae
15.	<i>Madhuca longifolia</i>	Mohua tree	<i>Sapotaceae</i>
16.	<i>Phoenix sylvestris</i>	Khajur	<i>Arecaceae</i>
17.	<i>Pongamia pinnata</i>	Karanj	<i>Leguminosae</i>
18.	<i>Syzygium cumini</i>	Jamun	<i>Myrtaceae</i>
19.	<i>Tamarindus indica</i>	Imli	<i>Cesalpiniaceae</i>
20.	<i>Zyziphus mauritiana</i>	Ber	<i>Rhamnaceae</i>
Shrub & Herbs			
21.	<i>Ipomoea carnea</i>	Besharam	<i>Convolvulaceae</i>
22.	<i>Xanthium strumarium</i>	Chota Dhatura	<i>Asteraceae</i>
23.	<i>Ricinus communis</i>	Arand	<i>Euphorbiaceae</i>
24.	<i>Lantana camara</i>	Ghaneri	<i>Verbenaceae</i>
25.	<i>Calotropis procera</i>	Aakra	<i>Asclepiadaceae</i>
26.	<i>Solanum surattense</i>	Bhuiringani	<i>Solanaceae</i>
27.	<i>Datura metel</i>	Datura	<i>Solanaceae</i>
28.	<i>Parthenium hysterophorus</i>	Gajar grass	<i>Asteraceae</i>
29.	<i>Tridax procumbens</i>	Kambarmodi	<i>Asteraceae</i>
30.	<i>Euphorbia hirta</i>	Mothi dudhi	<i>Euphorbiaceae</i>
31.	<i>Argemone mexicana</i>	Pila dhatura	<i>Papaveraceae</i>
32.	<i>Cassia tora</i>	Tarota /Takla	<i>Caesalpiniaceae</i>
33.	<i>Hemidesmus indicus</i>	Anantamul	<i>Apocynaceae</i>
Grasses			

34.	<i>Apluda mutica</i>	Mauntian grass	<i>Poaceae</i>
35.	<i>Cynodon dactylon</i>	Doob	<i>Poaceae</i>
36.	<i>Cyperus rotundus</i>	Motha	<i>cyperaceae</i>
37.	<i>Apluda mutica</i>	Banjura grass	<i>Poaceae</i>
38.	<i>Dactyl aegyptium</i>	Crow foot grass	<i>Poaceae</i>
39	<i>Digitaria ternate</i>		<i>Graminae</i>
Source: Present Survey data supported by data of Department of Forest, Rohtas District, Bihar			

4.7.9 AGRICULTURAL VEGETATION/ COMMERCIAL VEGETATION OF THE CORE ZONE.

Details of the agricultural vegetation and commercial crops were collected from the 09 selected sites of the core zone and the details are given in table 4.37. These crops are similar to the crops of buffer zone also. So, the same information is applicable for the core and buffer zone.

Table 4-37: List of Crops seasonally planted by respective farmers in the study area

Family Name	Botanical Name	Local/Trade Name
Poaceae	<i>Zey mays</i>	Makkha/Maize
	<i>Triticum aestivum</i>	Wheat
	<i>Oryza sativa</i>	Paddy
Fabacea	<i>Cicer arietinum</i>	Channa
Apiaceae	<i>Coriander sativum</i>	Dhaniya
Amaranthacea	<i>Abelmoschus esculentus</i>	Bhendi
Cucurbiataceae	<i>Mamordica charanta</i>	Karela
Solanaceae	<i>Capsicum annum</i>	Mirchi
	<i>Lycopersicon lycopersicum</i>	Tomato
	<i>Solanum melongena</i>	Brinjal
	<i>Capsicum annum</i>	Mirchi
	<i>Solanum tuberosum</i>	Potato
Amaryllidaceae	<i>Allium cepa</i>	Onian
Fabaceae	<i>Cajanus cajan</i>	Pigeon pea
Caricaceae	<i>Carica papaya</i>	Papaya
Malvaceae	<i>Okra</i>	Ladyfinger/ Bhindi
Cucurbitaceae	<i>Lagenaria siceraria</i>	Bottle gourd/ Lauki
Source: Present Survey Data Supported by Rohtas Agriculture Department, Bihar.		

4.7.10 AQUATIC FLORA OF CORE ZONE (PHYTOPLANKTON/ MACROPHYTES).

Vegetation details of the core zone were collected from 8 selected sites of the study area. Details of phytoplankton and macrophytic vegetation of the core and buffer zone are given in tables 4.38 to 4.40 and Figures 4.34 and 4.35. The aquatic vegetation recorded from the core zone was similar to the aquatic vegetation of the buffer zone also. So, the same information is applicable for the core and buffer zone.

Table 4-38: List of Aquatic Macrophytic vegetation of Core and Buffer Zone

S.N.	Name of the Taxa	Family Name	IUCN Status	S-1	S-2	S-3	S-4	S-5	S-6
1	<i>Azolla pinnata</i>	Salviniaceae	LC	+	+	+	+	+	+
2	<i>Cyperus alopecuroides</i>	Cyperaceae	LC	+	+		+	+	+
3	<i>Cyperus difformis</i>	Cyperaceae	LC	+	+	+	+	+	+
4	<i>Eichhornia crassipes</i>	Pontederiaceae	LC	+	+	+	+	+	+
5	<i>Hydrilla verticillata</i>	Hydrocharitaceae	LC	+	+		+	+	+
6	<i>Ipomea aquatica</i>	Convolvulaceae	LC	+	+	+	+	+	+
7	<i>Ipomea carnea</i>	Convolvulaceae	LC	+	+	+	+	+	+
8	<i>Lemna minor</i>	Araceae	LC	+	+	+	+	+	+
9	<i>Ludwigia parviflora</i>	Onagraceae	LC	+	+	+	+		+
10	<i>Nelumbo sp.</i>	Nelumbonaceae	LC	+					
11	<i>Nymphoides aquatica</i>	Menyanthaceae	LC			+		+	+
12	<i>Phragmites karka</i>	Poaceae	LC						+
13	<i>Pistia stratiotes</i>	Araceae	LC	+		+	+		+
14	<i>Polygonum glabrum</i>	Polygonaceae	LC	+	+	+	+	+	+
15	<i>Typha latifolia</i>	Typhaceae	LC	+			+		+
16	<i>Typha orientalis</i>	Typhaceae	LC	+	+		+	+	+
Total No. of Species				14	11	10	13	11	15

Source: Primary Survey Data of P&M Solution Pvt. Ltd., Noida

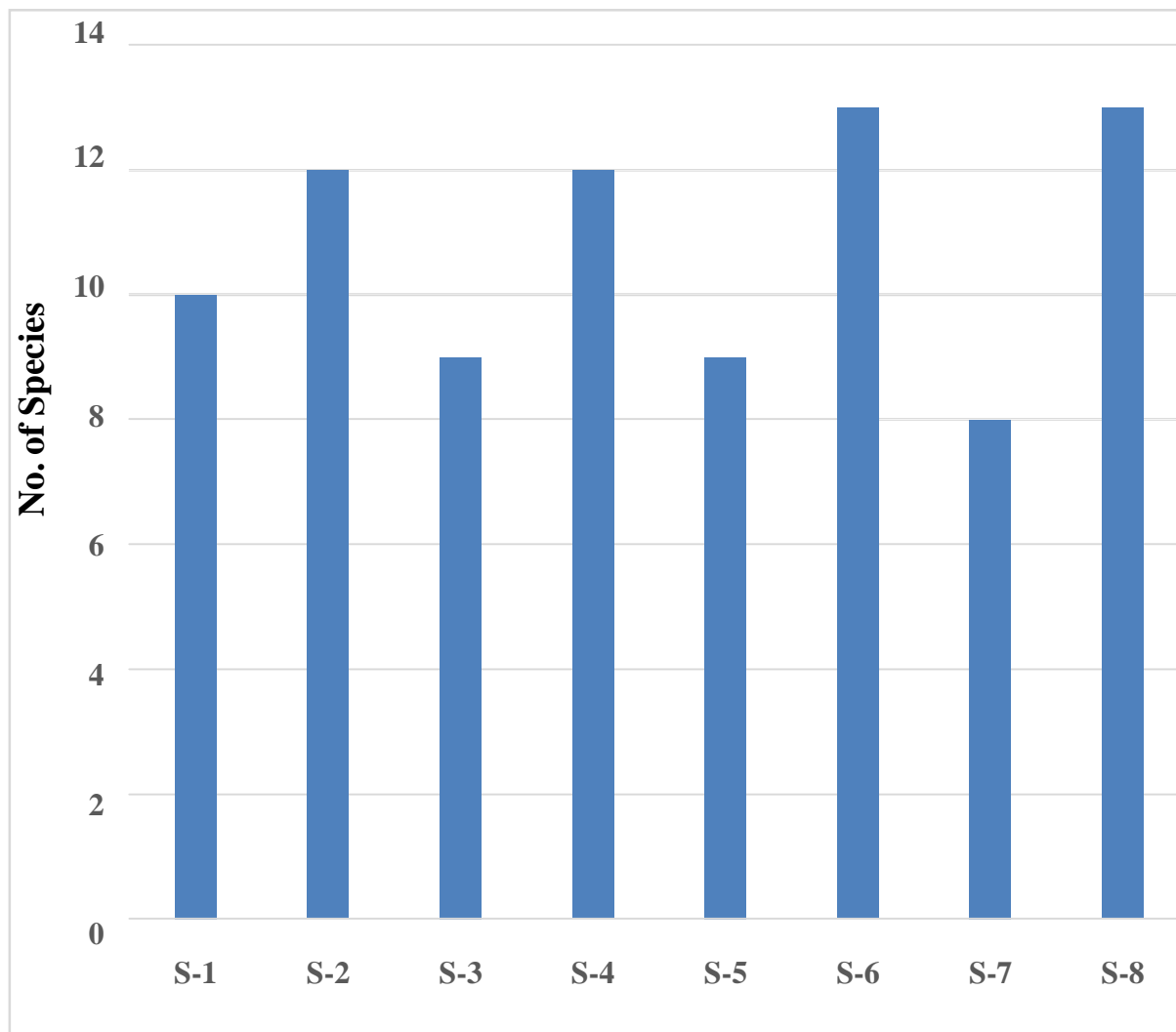


Figure 4-33: Qualitative list of Aquatic Macrophytic vegetation of Core and Buffer Zone

Phytoplankton species were collected from 6 selected sites from the study area. Details of Phytoplankton species are given in table 4.39 and Figure 4.35.

Table 4-39: List of Phytoplankton species present in different water bodies in study area (Core and Buffer Zone).

S.N.	Taxonomic Details	S-1	S-2	S-3	S-4	S-5	S-6	Schedule Status in WPA (1972)	IUCN Status
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	Chlorophyceae							NA	NA
1	<i>Ankistrodesmus</i> sp.		+	+	+	+	+	NA	NA
2	<i>Ankistrodesmus falcatus</i>	+				+	+	NA	NA
3	<i>Arthrodesmus</i> sp.	+		+	+	+	+	NA	NA
4	<i>Chlorella vulgaris</i>	+	+	+	+			NA	NA
5	<i>Closteriopsis</i> sp.	+	+	+	+			NA	NA
6	<i>Closterium quadratum</i>					+	+	NA	NA
7	<i>Cosmarium formii</i>	+		+	+	+	+	NA	NA
8	<i>Cosmarium margaritatum</i>		+	+			+	NA	NA
9	<i>Gonium</i> sp.		+		+		+	NA	NA
10	<i>Oocystis crassa</i>	+			+	+	+	NA	NA
11	<i>Pediastrum duplex</i>	+		+	+		+	NA	NA
12	<i>Pediastrum simplex</i>	+	+	+	+			NA	NA
13	<i>Spirogyra</i> sp.	+	+		+	+	+	NA	NA
14	<i>Tetraedron trigonum</i>	+	+	+	+		+	NA	NA
15	<i>Tetrastrum</i> sp.	+					+	NA	NA
16	<i>Ulothrix zonata</i>	+			+	+	+	NA	NA
17	<i>Volvox</i> sp.	+			+		+	NA	NA
18	<i>Zygnema</i> sp.	+	+	+				NA	NA
	Total	14	9	10	13	8	14		
	Cyanophyceae							NA	NA
1	<i>Anabaena</i> sp.	+	+	+	+		+	NA	NA
2	<i>Anabaena circinalis</i>	+	+	+	+	+	+	NA	NA
3	<i>Anabaena flosaque</i>	+		+	+		+	NA	NA
4	<i>Anacystis</i> sp.		+			+		NA	NA
5	<i>Aphanocapsa</i> sp.		+	+	+	+	+	NA	NA
6	<i>Aphanothece</i> sp.	+		+	+		+	NA	NA
7	<i>Chroococcus</i> sp.		+	+		+	+	NA	NA
8	<i>Gloeocapsa</i> sp.	+	+			+		NA	NA
9	<i>Lyngbya</i> sp.		+		+	+	+	NA	NA
10	<i>Merismopedia</i> sp.	+		+		+		NA	NA
11	<i>Merismopedia tenuissima</i>	+		+		+	+	NA	NA
12	<i>Microcystis</i> sp.	+	+		+	+	+	NA	NA
13	<i>Microcystis aeruginosa</i>		+	+	+			NA	NA
14	<i>Nostoc</i> sp.	+				+	+	NA	NA
15	<i>Oscillatoria subbrevis</i>	+		+	+	+	+	NA	NA
16	<i>Spirulina</i> sp.		+			+	+	NA	NA
17	<i>Spirulina laxissima</i>	+	+		+			NA	NA
	Total	11	11	10	10	12	12		
	Bacillariophyceae							NA	NA

1	<i>Achnanthes</i> sp.	+	+		+	+	+	NA	NA
2	<i>Amphora ovalis</i>			+			+	NA	NA
3	<i>Cocconeis</i> sp.	+	+	+	+		+	NA	NA
4	<i>Cyclotella</i> sp.	+			+	+	+	NA	NA
5	<i>Cymbella affinis</i>	+	+	+	+	+	+	NA	NA
6	<i>Eunotia major</i>	+				+	+	NA	NA
7	<i>Fragillaria pinnata</i>	+	+		+			NA	NA
8	<i>Gomphonema</i> sp.				+		+	NA	NA
9	<i>Gomphonema lanceolatum</i>	+		+	+	+	+	NA	NA
10	<i>Melosira granulata</i>	+	+	+			+	NA	NA
11	<i>Navicula subrhyncocephala</i>	+	+		+	+	+	NA	NA
12	<i>Nitzschia palea</i>	+		+		+	+	NA	NA
13	<i>Synedra ulna</i>	+	+		+	+	+	NA	NA
	Total	11	7	6	9	8	12		
	Euglenophyceae		+		+	+	+	NA	NA
1	<i>Euglena acus</i>	+	+	+	+		+	NA	NA
2	<i>Euglena</i> sp.	+			+	+	+	NA	NA
3	<i>Euglepha</i> sp.	+	+	+	+		+	NA	NA
4	<i>Phacus</i> sp.	+	+	+	+		+	NA	NA
5	<i>Phacus caudatus</i>	+		+		+	+	NA	NA
6	<i>Trachelomonas</i> sp.	+	+	+	+		+	NA	NA
	Total	6	5	5	6	3	7		

Source: Primary Survey Data of P&M Solution, Noida

Table 4-40: Site wise Qualitative list of Phytoplankton species study area (Core and Buffer Zone)

Class	S-1	S-2	S-3	S-4	S-5	S-6
Chlorophyceae	14	9	10	13	8	14
Cyanophyceae	11	11	10	10	12	12
Bacillariophyceae	11	7	6	9	8	12
Euglenophyceae	6	5	5	6	3	7
Total no. of species	42	32	31	38	31	45

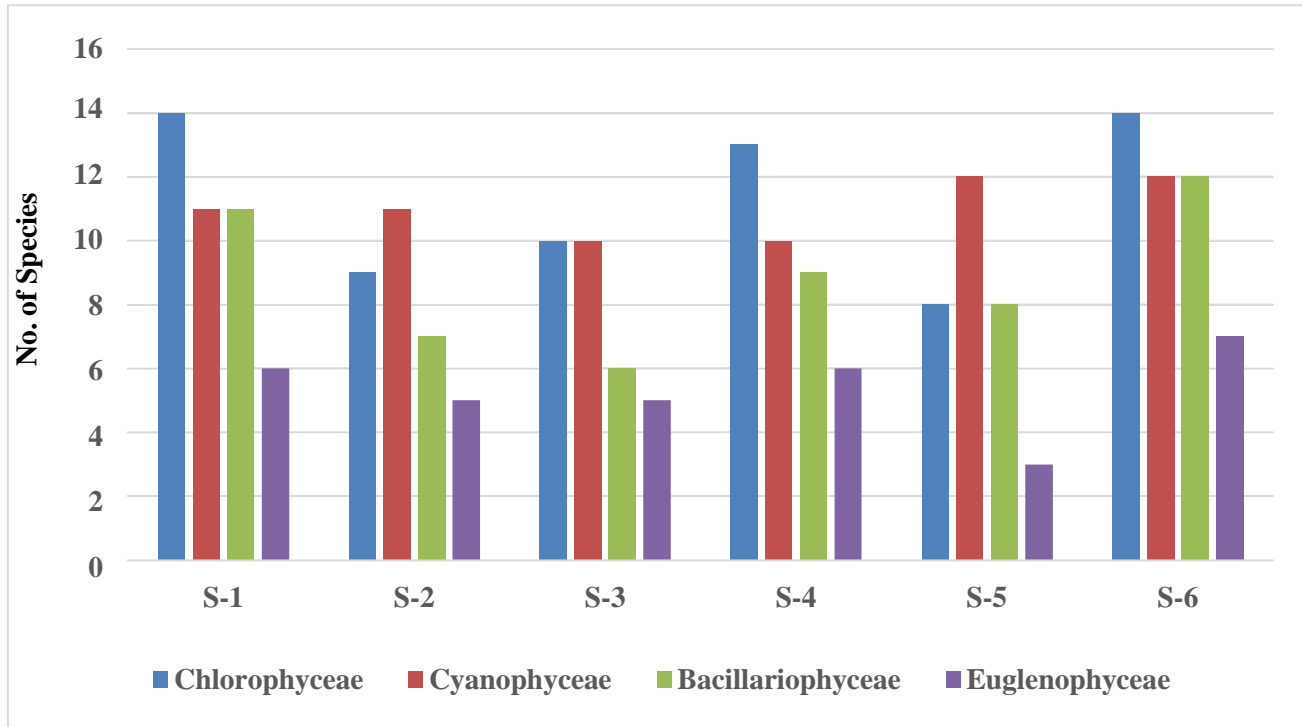


Figure 4-34: Site wise qualitative list of Phytoplankton species recorded from the study area

4.7.11 FLORA OF BUFFER ZONE

4.7.11.1 TERRESTRIAL FLORA OF BUFFER ZONE (NATURAL VEGETATION/COMMERCIAL VEGETATION)

During the present survey, a total of 54 species of trees, 24 species of shrubs/ herbs, 10 species of Grass, and 6 species of Climbers were recorded from the buffer zone of the present study area. The below-mentioned vegetation details have been collected from the Core as well as Buffer zone of the present study area. All the details have been furnished based on the field survey at 09 different locations and data supported by the Department of Forest, Rohtas district, Bihar.

Table 4-41: List of Trees, Shrubs, Herbs and Grasses Species observed in Buffer Zone

S.No.	Botanical Name	Common/ Hindi Name	Name of family
1.	<i>Acacia auriculiformis</i>	Austrelia babul	<i>Fabaceae</i>
2.	<i>Acacia leucophloea</i>	Safed babul	<i>Mimosaceae</i>
3.	<i>Acacia nilotica</i>	Babool	<i>Mimosaceae</i>
4.	<i>Acacia nilotica</i>	Desi babool	<i>Fabaceae</i>
5.	<i>Aegle marmelos</i>	Bel	<i>Rutaceae</i>
6.	<i>Ailanthus excels</i>	Adusa	<i>Simaroubaceae</i>
7.	<i>Albizia amara</i>	Siris	<i>Mimosoideae</i>
8.	<i>Albizia lebeck</i>	Sirish	<i>Mimosaceae</i>
9.	<i>Alstonia scholaris</i>	Saptaparni	<i>Apocynaceae</i>
10.	<i>Anogeissus latifolia</i>	Dhaura,	<i>Combretaceae</i>
11.	<i>Anthocephalus cadamba</i>	Kadamb	<i>Rubiaceae</i>
12.	<i>Artocarpus heterophyllus</i>	Jack fruit	<i>Moraceae</i>
13.	<i>Azadirachta indica</i>	Neem	<i>Meliaceae</i>
14.	<i>Bambusa arundinacea</i>	Katang bamboo	<i>Poaceae</i>
15.	<i>Bauhinia racemosa</i>	Apta	<i>Leguminosae</i>
16.	<i>Bauhinia variegata L.</i>	Kachnar	<i>Leguminosae</i>
17.	<i>Bombax ceiba</i>	Semal	<i>Malvaceae</i>
18.	<i>Bombax malabaricum</i>	Semal tree	<i>Malvaceae</i>
19.	<i>Borassus flabellifer</i>	Nariyal	<i>Palmae</i>
20.	<i>Butea monosperma</i>	Palas	<i>Leguminosae</i>
21.	<i>Cassia fistula</i>	Bahawa	<i>Caesalpinaceae</i>
22.	<i>Cassia siamea</i>	Chirkundi	<i>Mimosaceae</i>
23.	<i>Dalbergia latifolia</i>	Shisam	<i>Leguminosae</i>
24.	<i>Dalbergia sissoo</i>	Shisam	<i>Leguminosae</i>
25.	<i>Delonix regia</i>	Gulmohar	<i>Fabaceae</i>
26.	<i>Dendrocalamus strictus</i>	Bamboo	<i>Poaceae</i>
27.	<i>Diospyros melanoxylon</i>	Tendu	<i>Ebenaceae</i>
28.	<i>Diospyros melanoxylon</i>	Timru	<i>Ebenaceae</i>
29.	<i>Eucalyptus globules</i>	Nilgiri	<i>Myrtaceae</i>
30.	<i>Ficus benghalensis</i>	Vad	<i>Moraceae</i>
31.	<i>Ficus benghalensis</i>	Bargad	<i>Moraceae</i>
32.	<i>Ficus religiosa</i>	Pipal	<i>Moraceae</i>
33.	<i>Madhuca longifolia</i>	Mohua tree	<i>Sapotaceae</i>
34.	<i>Magnifera indica</i>	Aam	<i>Anacardiaceae</i>
35.	<i>Melia azedarach</i>	Bukkam Neem	<i>Meliaceae</i>

36.	<i>Moringa olerifera</i>	Munga	<i>Moringanaceae</i>
37.	<i>Musa paradisiacal</i>	Banana	<i>Musaceae</i>
38.	<i>Nerium oleamder</i>	Kaner	<i>Apocynaceae</i>
39.	<i>Phoenix sylvestris</i>	Date palm	<i>Arecaceae</i>
40.	<i>Phyllanthus emblica</i>	Awla	<i>Euphorbiaceae</i>
41.	<i>Pisidium guava</i>	Guava	<i>Myrtaceae</i>
42.	<i>Pongamia pinnata</i>	Karanj	<i>Leguminosae</i>
43.	<i>Prosopis juliflora</i>	Vilayati babool	<i>Fabaceae</i>
44.	<i>Pterocarpus marsupium</i>	Bija	<i>Leguminosae</i>
45.	<i>Punica malus</i>	Anar	<i>Lythraceae</i>
46.	<i>Sarracca indica</i>	Ashok	<i>Annonaceae</i>
47.	<i>Shorea robusta</i>	Sal	<i>Depterocarpaceae</i>
48.	<i>Syzygium cumini</i>	Jamun	<i>Myrtaceae</i>
49.	<i>Tectona grandis</i>	Sagwan	<i>Verbenaceae</i>
50.	<i>Terminalia arjuna</i>	Arjun	<i>Combretaceae</i>
51.	<i>Terminalia arjuna</i>	Arjun	<i>Combretaceae</i>
52.	<i>Terminalia chebula</i>	Harhar	<i>Combretaceae</i>
53.	<i>Zizyphus jujube</i>	Ber	<i>Rhamnaceae</i>
54.	<i>Zyziphus mauritiana</i>	Ber	<i>Rhamnaceae</i>
Shrub & Herbs			
55.	<i>Acanthospermum hispidum</i>	Kanti	<i>Asteraceae</i>
56.	<i>Acheranthus aspera</i>	Aghada	<i>Amaranthaceae</i>
57.	<i>Antigonum leptopus</i>	Coral vine	<i>Polygonaceae</i>
58.	<i>Argemone mexicana</i>	Pila dhtura	<i>Papaveraceae</i>
59.	<i>Bougainvillia glabra</i>	Paper flower	<i>Nyctaginaceae</i>
60.	<i>Calotropis procera</i>	Aakra	<i>Asclepiadaceae</i>
61.	<i>Cassia auriculata</i>	Tarwar	<i>Fabaceae</i>
61.	<i>Cassia auriculata</i>	Tarwar	<i>Fabaceae</i>
62.	<i>Cassia tora</i>	Tarota /Takla	<i>Caesalpinaceae</i>
63.	<i>Chenopodium album</i>	Manure weed	<i>Amaranthaceae</i>
64.	<i>Cleome viscosa</i>	Pivali tilval	<i>Cleomaceae</i>
65.	<i>Dalura metel</i>	Dhotra	<i>Solanaceae</i>
66.	<i>Echinops echinatus</i>	Unthkantali	<i>Asteraceae</i>
67.	<i>Ervatamia divaricata</i>	Chandani	<i>Apocynaceae</i>
68.	<i>Euphorbia hirta</i>	Mothi dudhi	<i>Evphorbiaceae</i>
69.	<i>Ipomoea carnea</i>	Besharam	<i>Convolvulaceae</i>
70.	<i>Jatropha gossipifolia</i>	Cotton-leaf	<i>Euphorbiaceae</i>
71.	<i>Lantana camara</i>	Ghaneri	<i>Verbenaceae</i>

72.	<i>Mimosa pudica</i>	Chui Mui	<i>Mimosaceae</i>
73.	<i>Ocimum sanctum</i>	Tulsi	<i>Labiatae</i>
74.	<i>Parthenium hysterophorus</i>	Gajar grass	<i>Asteraceae</i>
75.	<i>Ricinus communis</i>	Arand	<i>Euphorbiaceae</i>
76.	<i>Ricinus communis</i>	castor oil plant	<i>Euphorbiaceae</i>
77.	<i>Solanum surattense</i>	Bhuiringani	<i>Solanaceae</i>
78.	<i>Tridax procumbens</i>	Kambarmodi	<i>Asteraceae</i>
79.	<i>Xanthium strumarium</i>	Chota Dhatura	<i>Asteraceae</i>
Grasses			
80.	<i>Apluda mutica</i>	Mauntian grass	<i>Poaceae</i>
81.	<i>Apluda mutica</i>	Banjura grass	<i>Poaceae</i>
82.	<i>Commelina benghalensis</i>	Bokna	<i>Commelinaceae</i>
83.	<i>Cynodon dactylon</i>	Doob	<i>Poaceae</i>
84.	<i>Cyperus rotundus</i>	Motha	<i>cyperaceae</i>
85.	<i>Dactyl aegyptium</i>	Crow foot grass	<i>Poaceae</i>
86.	<i>Digitaria ternate</i>	--	<i>Graminae</i>
87.	<i>Kyllinga tenuifolia</i>	--	<i>Cyperaceae</i>
88.	<i>Pennisetum purpureum</i>	Elephant grass	<i>Poaceae</i>
89.	<i>Saccharum spontaneum</i>	kans	<i>Poaceae</i>
Climbers			
90.	<i>Hemidesmus indicus</i>	Anantamul	<i>Apocynaceae</i>
91.	<i>Abrus precatorius</i>	Gunja	<i>Fabaceae</i>
92.	<i>Celastrus paniculata</i>	Kujari	<i>Celastraceae</i>
93.	<i>Cissampelos pareira</i>	Khariya lata	<i>Menispermaceae</i>
94.	<i>Cuscuta reflexa</i>	Amarbel	<i>Convolvulaceae</i>
95.	<i>Zizyphus oenoplia</i>	Makor	<i>Rhamnaceae</i>
Source: Primary Survey data supported by Data of Department of Forest, Rohtas, Bihar			

4.7.12 Aquatic Flora of Buffer zone (Phytoplankton/ Macrophytes/ Aquatic Weeds)

The diversity of aquatic macrophytes was similar in both core and buffer zone. The details of the phytoplankton and macrophytic vegetation of the buffer zone is given in Table 4.38 & 4.39 and Figure 4.35.

4.7.12 AGRICULTURAL VEGETATION/COMMERCIAL VEGETATION OF THE BUFFER ZONE.

The variety of cropping patterns was similar in core and buffer zone in the study area. Vegetation details of the buffer zone were collected from 09 selected sites and the details are given in Table 4.37.

4.7.13 FAUNA OF THE STUDY AREA

Proposed alignment passing through the rural and purely in the agricultural field except some ESZ area of the Kaimur Wildlife Sanctuary. At some places, it will pass adjacent to some villages in the study area. Apart from the Kaimur Wildlife Sanctuary, rest of the study area is devoid of any natural forest, so, wildlife animals are rarely found in the area. Only some moving animals were observed. Domesticated animals mainly constitute the faunal population within the project area.

The assessment of faunal population was done on the basis of primary survey as well as secondary data collected from different government offices like the forest department, wildlife department, etc. The presence of wildlife was also confirmed by the local inhabitants depending on the animal sightings and the frequency of their visits in the project area especially the of Kaimur Wildlife Sanctuary. During the present study period, a large number of local birds are noticed in the buffer zone of the study area. But, there are no bird habitats like nesting, breeding, and foraging patterns are noticed in the core zone.

4.7.14 FAUNA OF THE CORE ZONE

4.7.16.1 Terrestrial fauna of core zone (Mammals/Reptiles/amphibians/birds/insects etc.).

TABLE 4-42: List of Mammals/Reptiles/Amphibians/Birds Recorded From the Core Zone

S. No.	Common Name	Scientific Name	Family	Schedule status (as per WPA-1972)	IUCN status
Mammals					
1	Jungle cat	<i>Fellis chaus</i>	Felidae	II	NE
2	Five striped palm	<i>Funambulus pennanti</i>	Sciuridae	IV	LC

	squirrel				
3	Indian Fulvous Fruit-Bat	<i>Rousettus leschenaultia</i>	Pteropodidae	V	LC
4	Indian Field Mouse	<i>Mus booduga</i>	Muridae	V	LC
5	Common House Rat	<i>Rattus rattus</i>	Muridae	V	LC
6	Bandicoot Rat	<i>Bandicotabengalensis</i>	Muridae	V	LC
7	Indian Grey Mongooe	<i>Herpestesedwardsi edwardsi</i>	Herpestidae	II	LC
Reptiles & Amphibians					
8	Garden lizard	<i>Calotes versicolor</i>	Agamidae	IV	NE
9	Common skink	<i>Eutropis carinata</i>	Scincidae	IV	LC
10	King cobra	<i>Ophiophagus hannah</i>	Elapidae	II	LC
11	Cobra	<i>Naja naja</i>	Elapidae	II	LC
12	Pit viper	<i>Crotalus sp</i>	Viperidae	II	LC
13	Garden lizard	<i>Calotes versicolor</i>	Agamidae	IV	NE
14	House Gecko	<i>Hemidactylus flaviviridis</i>	Gekkonidae	--	
Avian Fauna					
1	<i>Acridotheres tristis</i>	Myna	Sturnidae	IV	LC
2	<i>Acridotheres tristis</i>	Common myna	Sturnidae	IV	LC
3	<i>Amandava amandava</i>	Red munia	Estrildidae	IV	LC
4	<i>Ardea cinerea</i>	Grey heron	Ardeidae	IV	LC
5	<i>Ardeola grayii</i>	Indian pond heron	Ardeidae	IV	LC
6	<i>Bubulcus ibis</i>	Cattle egret	Ardeidae	IV	LC
7	<i>Columba livia</i>	Pigeon	Columbidae	IV	LC
8	<i>Corvus macrorhynchos</i>	Jungle crow	Corvidae	IV	LC
9	<i>Corvus splendens</i>	Crow	Corvidae	V	LC
10	<i>Dicrurus adsimilis</i>	Black drango	Dicruridae	IV	LC
11	<i>Gallinule chloropus</i>	Common moorhen	Rallidae	IV	LC
12	<i>Milvus migrans</i>	Black Kite	Accipitridae	IV	LC
13	<i>Passer domesticus</i>	House sparrow	Passeridae	IV	LC
14	<i>Phalacrocorax niger</i>	Little cormorant	Phalacrocoracidae	IV	LC
15	<i>Pycnonotus cafer</i>	Red-vented bulbul	Pycnonotidae	IV	LC
16	<i>Saxicoloides fulicatus</i>	Indian robin	Psittaculidae	IV	LC
17	<i>Turdoides caudate</i>	Common babbler	Leiothrichidae	IV	LC
18	<i>Upupa epops</i>	Common hoopoe	Upupidae	IV	LC
19	<i>Vanellus indicus</i>	Red-wattle lapwing	Charadriidae	IV	LC

IUCN Status =LC: Least Concern, NE: Not Evaluated.

Source: Primary Survey data and the data supported by Department of Forest, Rohtas District, Bihar.

Table 4-43: Butterflies observed in the Core zone

S. No.	Common Name	Scientific Name	Family	IUCN Status
1.	Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae	LC
2.	Common emigrant	<i>Catopsilia pomona</i>	Pieridae	LC
3.	Common crow	<i>Euploea core</i>	Nymphalidae	LC
4.	Small grass yellow	<i>Eurema brigitta</i>	Pieridae	LC
Source: Primary Survey data and the data supported by Department of Forest, Rohtas District, Bihar				

4.7.16.2 Aquatic Fauna of Core zone (Zooplankton/ Macro-invertebrates/ Fishes/ Amphibians/ Turtles etc.)

All the aquatic fauna recorded from the core zone were also recorded from the buffer zone and most of the sampling sites are the same for the core and buffer zone as given in Table 4.34. So, the list of aquatic fauna of the core zone is merged with the details of the buffer zone and is given in Table 4.46, 4.48, 4.49.

4.7.15 FAUNA OF BUFFER ZONE

To prepare a detailed report on the status of faunal biodiversity of the present study area of Rohtas district (1 km buffer) and to assess the impacts due to digging/ leveling of alignment route/ construction of bridge/ operational activity which evolves suitable mitigation measures to protect & conserve biodiversity following components were studied: terrestrial biodiversity, wildlife survey (diversity), habitat study (feeding, breeding, roosting areas), distribution of birds, rare & endangered species of the study area.

The fauna of the study area (Core and Buffer zone) vary upon the local topography and different types of habitats. The fauna of the study area has been categorized into two categories based on their habitat, i.e. (i) Aquatic fauna and (ii) Terrestrial fauna.

During the present survey, there are some seasonal, perennial and private water body was observed along with the proposed alignment, which will also be affected due to the present project activities. The alignment of the expressway will cross a few seasonal and perennial streams.

4.7.17.1 Terrestrial Fauna of Buffer zone (Mammals/Reptiles/Amphibians/Birds/ Insects etc.)

The major part of the study area lies under rural agricultural fields which restricts the wildlife habitat significantly. However, due to the presence of Kaimur Wildlife Sanctuary some wild animals like Wild boar, Jackal, Wild cat, Mongoose, Common monitor lizard, is found nearby site 5 and site 6. According to the local inhabitants Leopard and Indian Bear have been seen at site 5 and 6 occasionally, but during the field survey these animals were not recorded at both the location. Apart from these, Peafowl (Mor) have been recorded at site 5 and 6 of the study area. A list of the animals of the study area has been prepared on the basis of field survey, inquire from the local people and with help of secondary data of forest department. The animals, thus recorded were cross-checked with Wildlife (Protection) Act, 1972 for their schedule status. Faunal details of the study area are given in Tables 4.44 to 4.46.

i. Mammals and Reptiles/ Amphibians

The domesticated animals like Goat (*Capra aegagrus*); Buffalo (*Bubalus bubalis*); Cow (*Bos primigenius*); Horse (*Equus caballus*); Ass (*Equus hemionus*) and Dog (*Canis lupus familiaris*) were observed moving in different parts of the study area, especially nearby villages. Other mammals and reptiles found in the study area are listed in Table 4.44.

Table 4-44: List Mammals, Reptiles and Amphibians recorded from the Buffer Zone

S. No.	Common Name	Scientific Name	Family	Status as per WPA-1972	IUCN status
Mammals					
1	<i>Bandicota bengalensis</i>	Bandicoot Rat	Sciuridae	IV	LC
2	<i>Canis auris</i>	Jackal	Pteropodidae	V	LC
3	<i>Fellis chaus</i>	Jungle cat	Soricidae	IV	LC
4	<i>Funambulus palmarum</i>	Three-striped Squirrel	Suidae	III	LC
5	<i>Funambulus pennanti</i>	Five striped palm		III	LC

		squirrel	Hyaenidae		
6	<i>Herpestes edwardsi</i>	Indian Grey Mongoose	Canidae	II	LC
7	<i>Hyaena hyaena</i>	<i>Stripped hyena</i>	<i>Leporidae</i>	V	LC
8	<i>Lepus nigricollis</i>	Indian Hare	Canidae	II	LC
9	<i>Mus booduga</i>	Indian Field Mouse	Sciuridae	IV	LC
10	<i>Presbytis entellus</i>	Common langur	Cercopithecidae	II	LC
11	<i>Pteropus giganteus</i>	Indian Flying Fox	Pteropodidae	V	LC
12	<i>Rattus rattus</i>	Common House Rat	Muridae	V	LC
13	<i>Rousettus leschenaultia</i>	Indian Fulvous Fruit-Bat	Muridae	V	LC
14	<i>Suncus murinus</i>	Grey musk Shrew	Muridae	V	LC
15	<i>Sus scrofa</i>	Wild Boar	Canidae	III	LC
16	<i>Vulpes bengalensis</i>	Indian fox	Felidae	II	LC
17	<i>Panthera pardus</i>	Indian Leopard	Felidae	I	VU
18	<i>Melursus ursinus</i>	Sloth Bear	Ursidae	I	VU

Reptiles and Amphibians

1	<i>Bufo melanostictus</i>	Common toad	Bufonidae	IV	LC
2	<i>Bungarus caeruleus</i>	Krait	Elapidae	IV	NE
3	<i>Calotes versicolor</i>	Garden lizard	Agamidae	IV	NE
4	<i>Crotalus</i> sp.	Pit viper	Viperidae	II	LC
5	<i>Enhydryis enhydryis</i>	Smooth water snake	Homalopsidae	IV	LC
6	<i>Euphyctis hexadactyla</i>	Common frog	Dicroglossidae	IV	LC
7	<i>Eutropis carinata</i>	Common skink	Scincidae	IV	LC
8	<i>Hemidactylus flaviviridis</i>	House Gecko	Gekkonidae	--	NE
9	<i>Naja naja</i>	Cobra	Elapidae	II	LC
10	<i>Ophiophagus hannah</i>	King cobra	Elapidae	II	LC
11	<i>Ptyas mucosa</i>	Rat Snake	Colubridae	II	NE
12	<i>Rana temporaria</i>	Common frog	Ranidae	IV	LC
13	<i>Testudo graeca</i>	Common Tortoise	Testudinidae	IV	VU
14	<i>Varanus</i> sp.	Monitor lizard	Varanidae	II	LC

IUCN Status =LC: Least Concern, VU: Vulnerable. NT: Near Threatened, EN: Endangered; NE: Not Evaluated,

Source: Primary Survey data and the data supported by Department of Forest, Rohtas district of Bihar.

ii. Avian Fauna

Table 4-45: Avian Fauna observed from the study area (01 KM Buffer area)

S.No	Scientific Name	Common Name	Family	Schedule Status (WPA-1972)	IUCN Status
1	<i>Acridotheres tristis</i>	Myna	Sturnidae	IV	LC
2	<i>Acridotheres tristis</i>	Common myna	Sturnidae	IV	LC
3	<i>Alcedo atthis</i>	Small blue Kingfisher	Alcedinidae	IV	LC
4	<i>Amandava amandava</i>	Red munia	Estrildidae	IV	LC
5	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	Rallidae	IV	LC
6	<i>Ardea cinerea</i>	Grey heron	Ardeidae	IV	LC
7	<i>Ardea purpurea</i>	Purple heron	Ardeidae	IV	LC
8	<i>Ardeola grayii</i>	Indian pond heron	Ardeidae	IV	LC
9	<i>Athene brama</i>	Spotted Owlet	Strigidae	IV	LC
10	<i>Bubulcus ibis</i>	Cattle egret	Ardeidae	IV	LC
11	<i>Butorides striatus</i>	Striated heron	Ardeidae	IV	LC
12	<i>Casmerodius albus</i>	Great egret	Ardeidae	IV	LC
13	<i>Centropus sinensis</i>	Crow pheasant	Cuculidae	IV	LC
14	<i>Ceryle rudis</i>	Pied kingfisher	Alcedinidae	IV	LC
15	<i>Charadrius dubius</i>	Little ringed plover	Charadriidae	IV	LC
16	<i>Ciconia episcopus</i>	White-necked stork	Ciconidae	IV	NT
17	<i>Cinnyris asiaticus</i>	Purple Sunbird	Psittaculidae	IV	LC
18	<i>Columba livia</i>	Pigeon	Columbidae	IV	LC
19	<i>Corvus macrorhynchos</i>	Jungle crow	Corvidae	IV	LC
20	<i>Corvus splendens</i>	Crow	Corvidae	V	LC
21	<i>Dendrocygna icolour</i>	Fulvous whistling Duck	Anatidae	IV	LC
22	<i>Dicrurus adsimilis</i>	Black drongo	Dicruridae	IV	LC
23	<i>Egretta alba</i>	Larger egret	Ardeidae	IV	LC
24	<i>Egretta garzetta</i>	Little egret	Ardeidae	IV	LC
25	<i>Francolinus pondicerianus</i>	Titar	Phasianidae	IV	LC
26	<i>Gallinule chloropus</i>	Common moorhen	Rallidae	IV	LC
27	<i>Gallus gallus</i>	Jungle hen	Phasianidae	IV	LC
28	<i>Halcyon smymensis</i>	White-throated kingfisher	Alcedinidae	IV	LC

29	<i>Milvus migrans</i>	Black Kite	Accipitridae	IV	LC
30	<i>Nycticorax nycticorax</i>	Black-crowned night heron	Ardeidae	IV	LC
31	<i>Passer domesticus</i>	House sparrow	Passeridae	IV	LC
32	<i>Pelecanus onocrotalus</i>	Great white pelican	Pelecanidae	IV	LC
33	<i>Phalacrocorax carbo</i>	Great cormorant	Phalacrocoracidae	IV	LC
34	<i>Phalacrocorax niger</i>	Little cormorant	Phalacrocoracidae	IV	LC
35	<i>Pluvialis fulva</i>	Pacific golden plover	Charadriidae	IV	LC
36	<i>Pseudibis papillosa</i>	Red-naped ibis	Threskiornithidae	IV	LC
37	<i>Psittacula krameri</i>	Rose ringed Parakeet	Psittacidae	IV	LC
38	<i>Pycnonotus cafer</i>	Red-vented bulbul	Pycnonotidae	IV	LC
39	<i>Sarkidiornis melanotos</i>	Knob-billed duck	Anatidae	IV	LC
40	<i>Saxicoloides fulicatus</i>	Indian robin	Psittaculidae	IV	LC
41	<i>Spilopelia senegalensis</i>	Little brown dove	Columbidae	IV	LC
42	<i>Sturnia pagodarum</i>	Brahminy Starling	Sturnidae	IV	LC
43	<i>Sturnus contra</i>	Asian pied starling	Sturnidae	IV	LC
44	<i>Tachybaptus ruficollis</i>	Little grebe	Podicipitidae	IV	LC
45	<i>Tadorna ferruginea</i>	Ruddy shelduck	Anatidae	IV	LC
46	<i>Tringa tetanus</i>	Common redshank	Charadriidae	IV	LC
47	<i>Turdoides caudate</i>	Common babbler	Leiothrichidae	IV	LC
48	<i>Upupa epops</i>	Common hoopoe	Upupidae	IV	LC
49	<i>Vanellus indicus</i>	Red-wattled lapwing	Charadriidae	IV	LC
50	<i>Pavo cristatus</i>	Peafowl / Mor	Phasianidae	I	LC

IUCN Status =LC: Least Concern, VU: Vulnerable.

Source:Primary Survey data and the data supported by Department of Forest, Rohtas district, Bihar.

iii. Butter Flies

Table 4-46: Butterflies observed from the Buffer zone of the study area

S.No.	Common Name	Scientific Name	Family	IUCN Status
1.	Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae	LC
2.	Common emigrant	<i>Catopsilia pomona</i>	Pieridae	LC
3.	Scarlet dragonfly	<i>Crocothemis erythraea</i>	Libellulidae	LC
4.	Sunflower	<i>Chlosyne lacinia</i>	Nymphalidae	LC
5.	Stripped Tiger	<i>Danaus genutia</i>	Nymphalidae	LC
6.	Common crow	<i>Euploea core</i>	Nymphalidae	LC

7.	Blue tiger	<i>Tirumala limniace</i>	Nymphalidae	LC
8.	Small grass yellow	<i>Eurema brigitta</i>	Pieridae	LC

Source: Primary Survey data and the data supported by Department of Forest, Rohtas district of Bihar.

4.7.17.2 Aquatic Fauna of Buffer zone (Zooplankton/Macro-invertebrates/Fishes/Amphibians/Turtles etc.)

Aquatic fauna is referred to as any form of an animal that has adapted to living in the aquatic environments such as rivers, lakes, ponds, dams, streams, etc.). Durgawati and Son River are the major perennial riverine system in the study area. Few other seasonal water bodies like village ponds, streams, and irrigation canals are also present in the study area. In general, faunal account of any water bodies can be divided into following categories, i.e., (i) zooplankton, (ii) Macro-invertebrates/Insects/Benthos (iii) Fishes (iv) Amphibians/ Reptiles/ etc. Details of Zooplankton; Macro-invertebrates/insects/benthos; Amphibians/Reptiles and Fishes recorded from the different water bodies situated in the buffer zone of the present project in Rohtas district are given in tables 4.47, 4.48, 4.49.

i. Zooplankton

Zooplankton is commonly found in all types of aquatic habitats. These are recognized as secondary producers and considered as one of the best tools for the environmental monitoring program. During the present study period, a total of 60 zooplankton species was recorded and identified comprising of class Protozoa (10 species), Rotifera (23 species), Cladocera (12 species), Copepoda (11 species), and Ostracoda (4 species). The zooplankton diversity of different habitats and their details are given in Table 4.47.

Table 4-47: Zooplankton species found in the different water bodies situated in the buffer zone

S.No.	Name of the Taxa	S-1	S-2	S-3	S-4	S-5	S-6	Schedule Status in WPA (1972)	IUCN Status
	Protozoa								
1	<i>Arcella</i> sp.	+	+		+	+		NA	NA

2	<i>Arcella discoides</i>			+		+	+	NA	NA
3	<i>Arcella vulgaris</i>	+	+		+	+	+	NA	NA
4	<i>Centropyxis</i> sp.	+	+	+		+	+	NA	NA
5	<i>Centropyxis ecornis</i>	+	+		+	+	+	NA	NA
6	<i>Diffugia</i> sp.	+		+		+	+	NA	NA
7	<i>Diffugia cuminata</i>	+	+		+	+	+	NA	NA
8	<i>Euglypha</i> sp.		+	+		+	+	NA	NA
9	<i>Metopus</i> sp.	+		+	+		+	NA	NA
10	<i>Opercularia</i> sp.	+			+			NA	NA
	Total	8	6	5	6	8	8		
	Rotifera								
1	<i>Anuraeopsis</i> sp.	+	+	+	+	+	+	NA	NA
2	<i>Anuraeopsis fissa</i>	+	+		+		+	NA	NA
3	<i>Asplanchna</i> sp.		+	+	+	+	+	NA	NA
4	<i>Asplanchna brightwelli</i>	+	+		+		+	NA	NA
5	<i>Brachionus</i> sp.		+	+		+	+	NA	NA
6	<i>Brachionus angularis</i>	+	+		+			NA	NA
7	<i>Brachionus calyciflorus</i>	+		+	+	+	+	NA	NA
8	<i>Brachionus quadridentata</i>	+	+		+		+	NA	NA
9	<i>Brachionus falcatus</i>		+			+	+	NA	NA
10	<i>Brachionus forficula</i>	+				+		NA	NA
11	<i>Cephalodella gibba</i>		+	+	+		+	NA	NA
12	<i>Filinia</i> sp.	+			+	+	+	NA	NA
13	<i>Filinia longiseta</i>		+	+	+		+	NA	NA
14	<i>Keratella</i> sp.	+	+			+		NA	NA
15	<i>Keratella Cochlearis</i>	+	+	+	+		+	NA	NA
16	<i>Keratella Tropica</i>		+		+	+	+	NA	NA
17	<i>Lecane</i> sp.	+		+			+	NA	NA
18	<i>Lecane luna</i>	+	+		+	+	+	NA	NA
19	<i>Monostyla quadridentatus</i>				+			NA	NA
20	<i>Mytilina</i> sp.		+			+	+	NA	NA
21	<i>Polyarthra vulgaris</i>	+		+		+		NA	NA
22	<i>Testudinella patina</i>	+	+		+		+	NA	NA
23	<i>Trichocerca</i> sp.		+	+				NA	NA
	Total	14	17	10	15	12	17		

Cladocera									
1	<i>Alona</i> sp.	+	+		+	+	+	NA	NA
2	<i>Alona intermediate</i>	+		+	+		+	NA	NA
3	<i>Bosmina</i> sp.		+			+	+	NA	NA
4	<i>Bosmina longirostris</i>	+	+	+		+	+	NA	NA
5	<i>Ceriodaphnia</i> sp.	+			+			NA	NA
6	<i>Chydorus sphaericus</i>	+		+	+	+	+	NA	NA
7	<i>Daphnia</i> sp.	+	+		+		+	NA	NA
8	<i>Daphnia pulex</i>		+	+		+	+	NA	NA
9	<i>Diaphnosoma excisum</i>	+		+	+	+	+	NA	NA
10	<i>Leydigia</i> sp.	+	+		+			NA	NA
11	<i>Moina daphnia</i>						+	NA	NA
12	<i>Simocephalus</i> sp.	+	+	+		+		NA	NA
	Total	9	7	6	7	7	9		
Copepoda									
1	<i>Cyclops</i> sp.	+	+		+		+	NA	NA
2	<i>Diaptomus</i> sp.	+	+	+		+	+	NA	NA
3	<i>Eucyclops</i> sp.	+		+	+	+	+	NA	NA
4	<i>Heleodiptomus viduus</i>		+		+	+	+	NA	NA
5	<i>Mesocyclops</i> sp.	+		+		+		NA	NA
6	<i>Nauplius larvae</i>	+	+	+		+	+	NA	NA
7	<i>Neodiptomus</i> sp.				+		+	NA	NA
8	<i>Nitzii amphibia</i>		+	+	+	+		NA	NA
9	<i>Paradiaptomus</i> sp.	+		+		+	+	NA	NA
10	<i>Thermocyclops</i> sp.	+	+					NA	NA
11	<i>Thermocyclops crassus</i>		+		+	+	+	NA	NA
	Total	7	7	6	6	8	8		
Ostracoda									
1	<i>Cyprinotus</i> sp.		+			+	+	NA	NA
2	<i>Cypris</i> sp.	+			+		+	NA	NA
3	<i>Stenocypris</i> sp.		+	+	+	+	+	NA	NA
4	<i>Stenocypris malcolmsoni</i>	+	+	+	+	+	+	NA	NA
	Total	2	4	2	3	3	4		
Source: Primary Survey data of P&M Solution, Noida									

No. of Species

Figure 4-35: Site wise qualitative variation in Zooplankton species in the study area
ii. Macro-invertebrates (Insects/Benthos)

Macro-invertebrates are commonly found in all types of aquatic habitats such as streams, rivers, wetlands, lakes, and ponds. The term macro-invertebrate is used for those animals that have no backbone and can be seen with the naked eye. These animals generally include insects, crustaceans, mollusks, and annelids. They are significant within the food chain as larger animals such as fish and birds rely on them as a food source. Various macro-invertebrate species were collected and identified from the present study area and listed in Table 4.48.

Table 4-48: Macro-invertebrates recorded from the different water bodies of the study area

Sl. No.	Taxonomic details	S-1	S-2	S-3	S-4	S-5	S-6	Schedule Status in WPA (1972)	IUCN Status
	Insecta								
1	<i>Amphiops</i> sp.	+				+	+	NA	NE
2	<i>Baetis nymph</i>	+	+		+			NA	NE

3	<i>Berosus pulchellus</i>	+		+	+	+	+	NA	NE
4	<i>Caenid mayfly</i>			+		+		NA	NE
5	<i>Chaoborus sp.</i>	+		+	+		+	NA	NE
6	<i>Chironomus plumosus</i>	+	+		+	+	+	NA	NE
7	<i>Chironomus sp.</i>			+			+	NA	NE
8	<i>Cybister limbatus</i>	+	+	+	+	+	+	NA	NE
9	<i>Damsel flies nymphs</i>		+	+	+	+		NA	NE
10	<i>Dragon flies nymphs</i>	+			+	+	+	NA	NE
11	<i>Ephydra larvae</i>	+	+			+		NA	NE
12	<i>Hirudineria glossophonia</i>	+	+	+	+		+	NA	NE
13	<i>Hirudineria sp.</i>		+	+		+	+	NA	NE
14	<i>Hydropsyche sp.</i>	+			+		+	NA	NE
15	<i>Limnodrillus hoffmeisteri</i>	+	+	+	+	+	+	NA	NE
16	<i>Mayflies nymphs</i>	+						NA	NE
17	<i>Mosquitos larvae</i>		+	+	+	+		NA	NE
18	<i>Ranatra elongata</i>	+	+		+	+	+	NA	NE
19	<i>Ranatra filliformis</i>	+	+		+		+	NA	NE
20	<i>Stone flies nymphs</i>	+		+			+	NA	NE
21	<i>Tubifex tubifex</i>				+		+	NA	NE
	Total	15	11	11	14	12	15		
	Mollusca								
1	<i>Bellamya bengalensis</i>	+		+	+	+	+	NA	NE
2	<i>Bellamya dissimilis</i>		+	+		+	+	NA	NE
3	<i>Corbicula fluminalis</i>	+	+		+		+	NA	NE
4	<i>Corbicula sp.</i>	+	+		+	+	+	NA	NE
5	<i>Gyraulus convexus</i>			+	+	+	+	NA	NE
6	<i>Gyraulus sp.</i>	+	+	+	+	+	+	NA	NE
7	<i>Indoplnorbis exustus</i>	+	+		+		+	NA	NE
8	<i>Lymnaea acuminata</i>	+	+			+	+	NA	NE
9	<i>Lymnaea sp.</i>	+		+	+		+	NA	NE
10	<i>Melanoides lineatus</i>			+	+	+	+	NA	NE
11	<i>Melanoides tuberculatus</i>		+					NA	NE
12	<i>Pila globosa (apple snail)</i>	+	+	+	+		+	NA	NE
13	<i>Pila sp.</i>		+			+	+	NA	NE
14	<i>Pisidium clarkeanum</i>	+		+	+	+		NA	NE
15	<i>Thira sp.</i>		+	+	+	+	+	NA	NE
16	<i>Thira tuberculata</i>	+	+	+	+		+	NA	NE
17	<i>Unio tigridis</i>	+	+		+	+	+	NA	NE
18	<i>Vivipara bengalensis</i>	+				+	+	NA	NE
	Total	12	12	10	13	12	16		

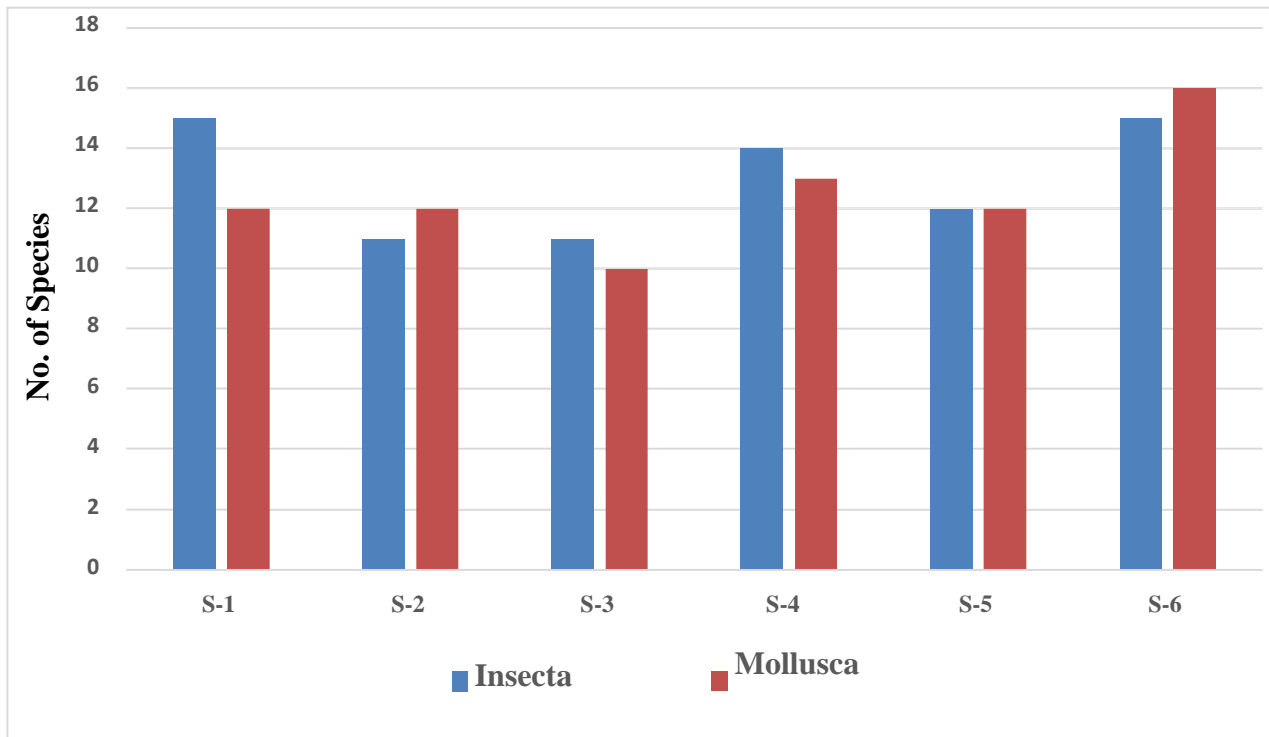


Figure 4-36: Site wise qualitative variation in macro-invertebrates in the study area

iii. Amphibians

Amphibians and reptiles are commonly found at places along the margin of aquatic and terrestrial systems. The presence of water bodies like rivers, streams, etc. in the study area are providing shelter to many amphibian species. Some of the commonly reported amphibian species in the present study areas are *Bufo melanostictus* (common Indian toad), *Euphlyctis cyanophlyctis* (Indian skipper frog), and *Hoplobatrachus tigerinus* (Indian bullfrog). None of the Amphibians and reptiles have been observed under the of Rare, Endangered, and threatened category.

(iii) Fishes

The study area of the present expressway development project area has several lentic and lotic water bodies in which few are perennial and most of the water bodies are seasonal or monsoon fed. Durgawati and Son river are major lotic systems in the study area. Some private ponds are also present in the study area which are mainly used for the culture of fishes. All these water bodies support some fish species. Fishes found in the study area are listed in Table 4.49.

Table 4-49: Fish Fauna found in different seasonal and perennial water bodies in the study area

S.No.	Name of the Taxa	Family Name	S-1	S-2	S-3	S-4	S-5	S-6	IUCN Status	Schedule Status in WPA (1972)
1	<i>Catla catla</i>	Cyprinidae	+	+	+	+	+	+	VU	NA
2	<i>Channa stiatius</i>	Chandadae	+	+		+	+	+	LC	NA
3	<i>Channa punctatus</i>	Chandadae	+		+			+	LC	NA
4	<i>Cirrhinus carpio</i>	Cyprinidae	+		+	+	+	+	LC	NA
5	<i>Cirrhinus mrigala</i>	Cyprinidae	+			+		+	LC	NA
6	<i>Cirrhinus reba</i>	Cyprinidae	+	+	+		+	+	LC	NA
7	<i>Labeo bata</i>	Cyprinidae	+		+	+	+	+	LC	NA
8	<i>Labeo rohita</i>	Cyprinidae	+	+	+		+	+	LC	NA
9	<i>Macrobrachium malcomsoni</i>	Palaemonidae	+	+	+	+	+	+	LC	NA
10	<i>Mastacembelus</i>	Mastacembelidae				+		+	LC	NA
11	<i>Mystus bleekeri</i>	Bagridae	+		+	+	+	+	LC	NA
12	<i>Mystus tengara</i>	Bagridae	+	+	+	+	+	+	LC	NA
13	<i>Puntius sarana</i>	Cyprinidae	+	+	+		+	+	LC	NA
14	<i>Puntius sophore</i>	Cyprinidae	+	+	+	+	+	+	LC	NA
15	<i>Puntius stigma</i>	Cyprinidae		+	+	+	+	+	LC	NA
16	<i>Puntius ticto</i>	Cyprinidae	+	+	+	+	+	+	LC	NA
17	<i>Xenentodon cancila</i>	Belonidae	+		+	+		+	LC	NA
18	<i>Pangasius bichanani</i>	Pangasiidae	+		+	+		+	LC	NA
			16	10	15	14	13	18		

Note: VU= Vulnerable, LC= Least Concern and NA= Not Application.

Source: Primary Survey data of P&M Solution and data supported by Department of Fisheries, Rohtas, Bihar.

4.7.16 OBSERVATIONS OF PRESENT STUDY (FLORA & FAUNA)

4.7.16.1 FLORA

Maximum part of the study area in the Rohtas district are agricultural fields and barren land with few patches of forests. The forest of the district comprises tropical deciduous vegetation due to high temperature and humidity. No any rare, endangered and threatened floral species were observed from the core and buffer zone of the present study.

4.7.16.2 FAUNA

The Kaimur Wildlife Sanctuary is part of the project area. However, there is are no National parks, Biosphere Reserves, Wildlife corridors, Tiger / Elephant reserves (existing as well as proposed), within 10 km of the project area. On the other hand, there is three (3) Schedule-I fauna such as **Indian Leopard (*Panthera pardus*); Sloth Bear (*Melursus ursinus*), and Indian Peafowl (*Pavo cristatus*)** were recorded from the study area as per the Wildlife (Protection) Act, 1972. A detailed site specific conservation plan for the above faunal species will be prepared and submitted with the final EIA-EMP report. However, care will be taken during the developmental activities if any other wildlife species will be found.

CHAPTER 5: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

5.1 INTRODUCTION

This section identifies and assesses the potential impacts on different environmental parameters due to planning and design, construction and the operation of the proposed greenfield road development. After studying the existing baseline environmental scenario, analysing project activities, initial field surveys, reviewing the process and related statutory norms, the anticipated potential adverse impacts have been identified and assessed for design, construction and the operation phases. Potential positive impacts or improvements have also been reviewed. The appropriate mitigation measures have been formulated to limiting the anticipated potential adverse impacts to acceptable levels for each stage of the project. The potential impacts and their suitable mitigation measures are described here.

5.1.1 PROJECT INFLUENCE AREA

Direct Corridor of Impact (COI) is within toe lines, except for noise sensitive receptors such as education and health institutes which is considered up to 100 m on either side. General corridor of impact is up to 300 m on either sides of the project road, wherein ecologically sensitive areas such as national park, wildlife sanctuary, reserve and protected forests, major water bodies (including downstream water quality of flowing water bodies) etc. have been observed. Ancillary sites such as borrow area, quarry site, waste disposal sites and construction camp sites.

5.1.2 IMPACTS IDENTIFICATION

5.1.2.1 POSITIVE IMPACTS

Development of the Greenfield highway project will have following positive environmental impacts:

- Reduction of travel time for traffic along other major route;
- Reduction of vehicle operating cost including fuel cost, and saving national economy;
- Improved drainage condition, and reducing flooding at submergence section; and
- Stimulating economic development by providing better accessibility between remote part of the State and the State capital.

5.1.3 ADVERSE ENVIRONMENTAL IMPACTS

Development of Greenfield highway related adverse impacts occur at three stages of the project:

- Planning and Design phase
- Construction phase
- Operation phase

Planning and Design covers the road alignment, drainage provision, materials of construction, roadside amenities etc. that ultimately decides the impact during later phases. Most of the anticipated impacts are expected during construction and operation phase. While some of the construction phase impacts will be temporary, some are expected to be of longer term or permanent. Operation phase impacts will be continuous in nature or long term.

Environmental impacts were identified and screened during screening stage of this project. Environmental parameters for road sector project, “non-significant impacts” have been screened out from those with significant adverse impacts (if any).

Various environmental impacts identified for this highway are mentioned below:

Physical Environment

- Impact on land use
- Impact due to collection of construction material
- Impact due to soil erosion and sedimentation
- Impact on drainage and water logging
- Impact on water resources
- Impact on ambient air quality
- Impact on noise environment

Ecological Environment

- Impact on ecologically sensitive area
- Impact on flora and fauna

Socioeconomic Environment

- Impact on cultural properties
- Impact on common property resources (CPRs)
- Impact on residential properties

- Impact on commercial properties
- Impact on agricultural land

The environmental impact issues or attributes as mentioned above were identified based on the existing environmental conditions in the project areas and project interventions under the project. The actual and potential impacts on above attributes due to this subproject is discussed subsequently in this section.

Table 5-1: Checklist of Impacts due to the Proposed Project

Project Phase / Environmental Impact	Impact		No Change	Short Term	Long Term
	+ve	- ve			
Impacts due to Project Location					
Loss of Land and Trees				*	*
Loss of Infrastructure				*	*
Public Utilities			*		
Cultural Properties			*		
Risk Due to Earthquake			*		
Impacts due to Construction					
Change of land use	*				*
Soil erosion at construction sites		*		*	
Pollution by construction spills			*		
Health risks & Cultural Hazards			*		
Dust Problem		*		*	
Noise Pollution		*		*	
Disturbance to traffic		*		*	

Project Phase / Environmental Impact	Impact		No Change	Short Term	Long Term
	+ve	- ve			
Effect on Economic Activities		*		*	
Impacts due to Project Operation					
Noise Pollution			*		
Traffic Disturbance	*				*
Odour Problem			*		
Release of Treated Effluent			*		
Positive Impacts					
Health Benefits	*				*
Improved Aesthetics	*				*
Better infrastructure facilities	*				*
Improved Air Quality	*				*
Increased Socio-economics	*				*
Increased Agricultural activity	*				*
Employment Opportunity	*				*

5.1.4 APPROACH TO MITIGATION MEASURES

The road design, construction activities and operation can have various levels of environmental impacts and corresponding mitigation measures could be formulated. The approach to mitigation measures has been in the following order:

- Avoiding adverse impacts by integrating environmental issues into project design;
- Minimising adverse impacts by design modification and adopting mitigation measures;

Compensating adverse impacts for those which could neither been minimized nor avoided

The anticipated potential adverse environmental impacts and corresponding mitigation measures, for each stage of the project, are discussed in the following paragraphs.

5.2 AIR ENVIRONMENT

Besides, direct impacts of three phases of any road development project, the growth of towns or cities taking place along the main national or state highway also results in impacting the ambient environment along the road. Such ribbon development on one hand adds to the pollution load all along the corridor and on the other, its impact proves being abject to receptors the road.

Motor vehicles have emerged as one of the most important source of vehicular air pollution especially in urban area. The greenfield road development projects like this are aimed at to enhance the connectivity of road transport system and there by the introduction of new traffic, so impact assessment on ambient air environment is among the most significant impacts of all such projects.

Air quality all along the project corridor will be impacted during all the three phases of the project i.e., pre-construction, construction and post construction (operational) phase. The operational stage impacts though may not be as serve terms of PM level as that of construction phase impacts, which are localized and temporary. The impacts during this phase will be of a long term nature and the intensity will be confined to the band of width of 75m to 100m from the edge of RoW on the both side of the corridor depending up wind direction. However, both the construction and operational stage impacts can be effectively mitigated if the impacts are correctly assessed at the design stage itself and adequate mitigation measures are delineated and also properly implemented. Impacts due to the construction activities will be higher nearer to the construction sites and asphalt mixing plants. Movement of vehicles carrying construction materials are also a source of air pollution and it is severe because their movement will be mostly on unpaved roads.

Particulate Matter levels at the various settlements locations could be of concern if they cross the standards for residential areas. Mitigation measures have to be worked out to decrease the Particulate Matter concentrations near sensitive areas.

5.2.1 NATURE AND CHARACTERISTICS OF POLLUTION SOURCES

a. Pre-construction Phase

The pre-construction stage activities include site clearance, shifting of various obstruction including trees falling within proposed carriage way, transportation of men and material, construction of labour colonies, offices, material storage and maintenance yards etc. Besides it also focuses on the proper selection of borrow pits and other sources of raw materials for (aggregates) supplier and establishment of transport roads etc.

Typical pre-construction tasks during this phase include:

- Use of heavy vehicles and machinery etc. during site clearance and for trees obstruction and shifting of centre.
- Men and material transportation to the construction sites and installing camps and yard.
- Organization and construction of approach road for transport of earth from borrow pits/ quarries to construction site in the pre-construction phase.

Use of Fly Ash

Fly ash is available from NTPC Nabinagar Bihar which is close to the proposed project and located within 50 km.

For replacing a part of OPC in Concrete pavements, paving blocks, kerb stones etc. Embankments and backfills – Reinforced or unreinforced. Stabilization of sub-grade, sub-base and base course.

Use of Aggregate

A reconnaissance survey was carried out along the entire stretch of highway and identified 01 stone metal quarries are listed in **Table 5.2**, samples of these quarries have been collected from their respective crushers. Samples of various sizes of aggregate dust have been collected from each of the crusher separately.

Table 5-2: Details of Aggregates Quarries

S No.	Village	Average distance of quarry site from mid-point of project road (Km)
1	From Chhatarpur, Jharkhand	105

Use of Sand

River is the main source of natural Sand. Sand source locations are tabulated below **Table 5.3**. One sample from each source was collected during the material investigation work and the following tests have been conducted in the laboratory: Sieve Analysis and calculation of Fineness Modulus.

Table 5-3: Details of Sand Quarries

S No.	Village	Average distance of quarry site from mid-point of project road km
1	From Koilwar	128

Dust during such activities would be the predominant pollutant during pre-construction stage and particularly so in case the pre-construction tasks are per found during dry summer or during pre-monsoon season.

But the impacts will be confined to specific location of stockyards labour colonies, width of RoW. Thus, the magnitude of impacts cannot be quantified because they will be location specific.

It may be pertinent to mention that such impacts could be significant on the proposed highway because disturbance and these activities without precaution can become adverse impacts because virgin area and agricultural fields are involved.

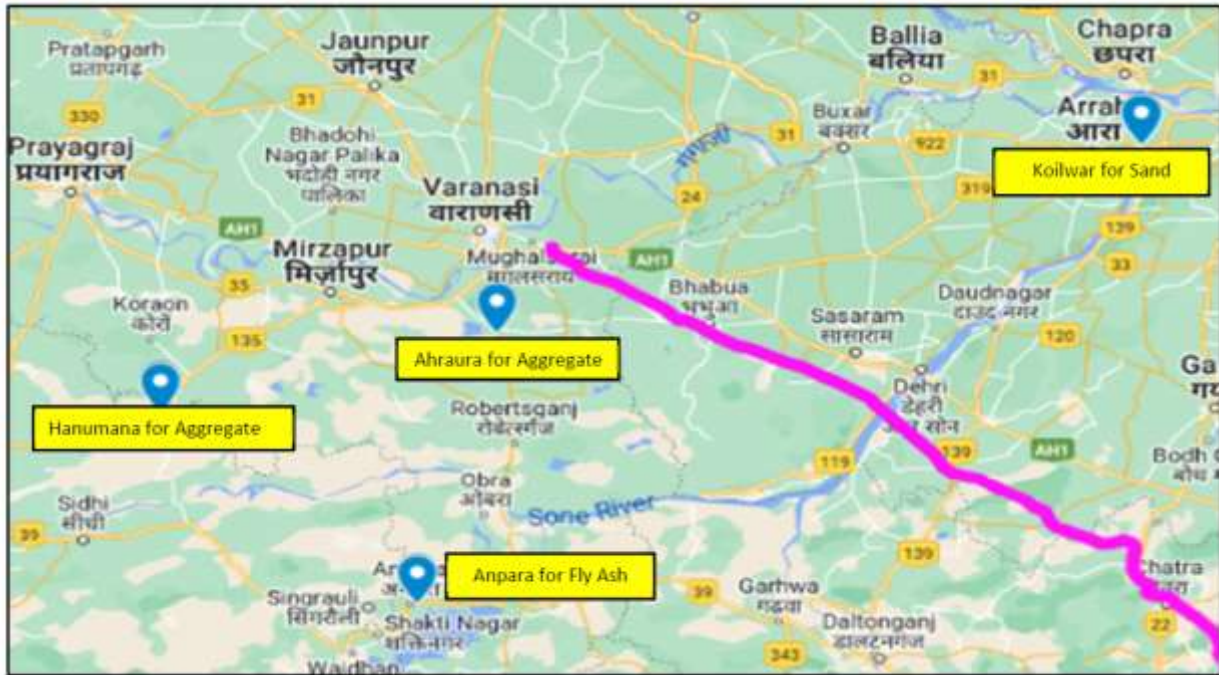


Figure 5-1: Location Map of Quarries

Use of Soil

Borrow Areas

The soils to be used, as sub-grade, select sub-grade and shoulder materials need to be hauled from designated borrow areas. The borrow area along the project section with relevant consent/NOC from individual land owner will be obtained before operation of borrow area during construction stage. Location Chart from showing Borrow Areas between Km 73+800 to Km 114+000 is given in below **Table 5-4** and shown in **Figure 5-2**.

Table 5-4: Details of borrow areas

BA. No.	CHAINAGE	SIDE	LEAD(KM)	VILLAGE
1	76+000	LHS	1.00	NARAYANPUR
2	78+600	RHS	0.45	SONBARSA
3	81+100	LHS	0.60	JAG DEHRA
4	84+400	RHS	0.50	BASANTPUR
5	87+700	RHS	0.65	KALA SHAHAR
6	93+100	LHS	0.50	MURHI

7	100+600	LHS	1.00	BHADOKHRA
8	104+600	LHS	1.20	MITARSENPUR
9	113+900	LHS	1.0	OBIPUR

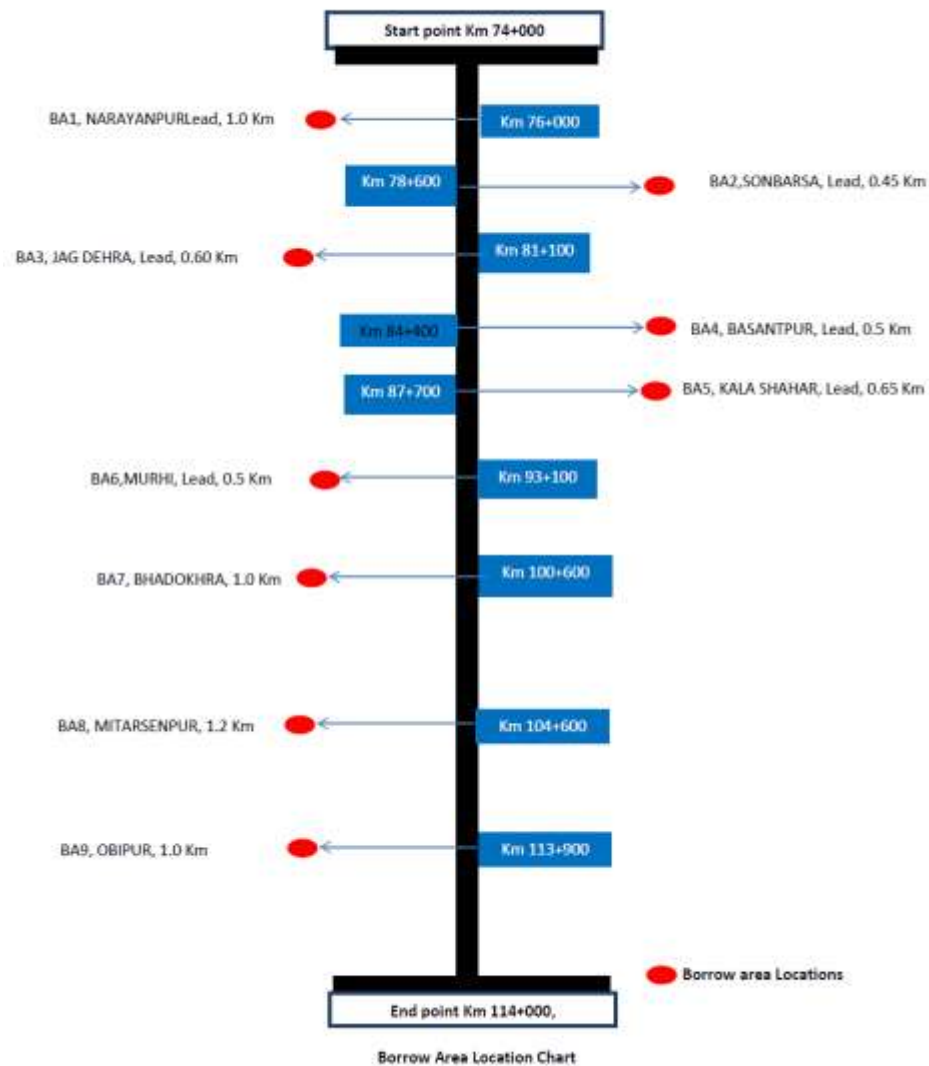


Figure 5-2: Borrow area location chart

Mitigation Measures

- However, preventive action measures such as proper sprinkling of water on ROW around sites where pre-construction activities concerning site clearances are being undertaken,
- Covering all the material being transported in trucks especially carrying filling materials such as earth aggregates, sand, should be adequate to mitigate the impacts during pre-construction. All such activities may generate dust but the level of activities at a single location will not be intensive to cause any significant adverse health impact.

b. Construction Phase

During construction stage the most predominated air pollutant would be:

- Particulate matter along with various other gaseous pollutants due to different type of fuels used (in different types of vehicles, and in toxic construction equipment, domestic fuel in construction/labours camps etc.) along with certain other hazardous emission which are highly toxic pollutants from hot mix plants and leakage/ spillage of hazardous chemical used during construction.
- Dust and other pollutants generation will be high on the road stretches (under construction), and around construction yards/ plants etc. due to different construction activities including:
- Asphalt mix plant generating emission of various hazardous toxic pollutants due to heating and mixing of aggregate with bitumen.
- Material storage, transportation and handling (loading/unloading) of different construction materials such as sand, fly ash, earth from borrow pits, aggregate from stone quarries etc.
- Stone-crushing operation in the aggregate yards.
- Construction and other allied activities particularly more intensive on new bypass (new alignments for borrow pits).
- Concrete batching plants.

Mitigation Measures

- Road has been designed in such as manner that no traffic congestion in the populated area along the proposed road.
- Vehicles carrying loose particles like sand and fine aggregates shall be covered to reduce spills on existing road.

- Water may be spread on earthworks, on a regular basis.
- During and after compaction of the sub-grade, water will be sprayed at regular intervals to prevent dust generation.
- All slopes and embankments will be turfed to minimize dust generation during operation of the road.
- Sprinkling water will control fugitive dust emissions. Regular maintenance of machinery and equipment will be carried out.

c. Operational Phase

However, during construction phase, the major air pollutant of concern was particulate matter, but during operational stage:

- Dust generation from vehicular movements on highway roads are primarily confined to diesel powered vehicles besides toxic dust emission for vehicular tyres.
- Further road side dust will have minor impact on surrounding environment as road shoulder has been proposed unpaved.
- The toxic dust emission form diesel vehicles as well as due to abrasive action of tyres on roads shall continue to pollute the project corridor.
- The severity of impact of gaseous pollutants due to vehicles plying on the highway at any given time shall depend upon the traffic volume emission rates of auto exhausted pollutants and prevailing meteorological condition within the project corridor. However, such emission is a part and parcel of an overall infrastructural (roads and transport system) development process and efficiency augmentation of transport system.

5.2.2 PREDICTION OF IMPACT ON AMBIENT AIR QUALITY

5.2.2.1 ATMOSPHERIC DISPERSION MODELING

Atmospheric dispersion modeling is the mathematical simulation of how air pollutants disperse in the ambient atmosphere. It is performed with computer programs that solve the mathematical equations and algorithms which simulate the pollutant dispersion. The dispersion models are used to estimate or to predict the concentration of air pollutants by using various inputs such as meteorological parameters viz. temperature, wind speed and direction, mixing depths, inversion level, etc. and source emissions emitted from sources on the desired area. Such models are helpful

to the government agencies for protecting and managing the ambient air quality. The models are typically employed to determine whether the ambient air quality level due to proposed project will comply with the National Ambient Air Quality Standards (NAAQS) or not. Over and above the prediction of the concentration of pollutant at a particular area / locations, it also assists in the designing of effective control measures / strategies to reduce emissions of harmful air pollutants during operation.

CALINE pro is based on steady-state Gaussian plume models specifically designed to calculate air quality impacts from vehicle emissions near highways. Given source strength, meteorology and site geometry, the model can predict pollutant concentrations for receptors located within 500 meters of the roadway. It also has special options for modelling air quality near intersections, bridge and parking facilities.

The model is based on CALINE3's algorithm. It divides individual highway links into a series of elements from which incremental concentrations are computed and then summed to form a total concentration estimate for a particular receptor location. Downwind concentrations from the element are modelled using the crosswind FLS (Finite Line Source) Gaussian formulation, but σ_y and σ_z are modified to consider the mechanical turbulence created by moving vehicles and the thermal turbulence created by hot vehicle exhaust in the region directly over the highway, region considered as a zone of uniform emissions and turbulence.

Terminology used in CALINE3 models

The model is broadly divided into five screens such as Job Parameters, Link Geometry, Link Activity, Run Condition, and Receptor Positions.

Job Parameters: contains general information that identifies the job, defines general modelling parameters, and sets the units (feet or meters) that will be used to input data on the Link Geometry and Receptor Positions Screens.

Run Type: determine averaging times and how the hourly average wind angle(s) will be determined. In the present case modeling exercise were made to predict the impact on worst case scenario. Multi-Run/Worst Case Hybrid type was used for CO impact modeling.

Aerodynamic Roughness Coefficient: determine the amount of local air turbulence that affects plume spreading. CALINE offers the 4 choices for aerodynamic roughness Coefficient namely;

Rural, Suburban, Central Business District and Other. For the present modelling rural roughness options have been considered.

Altitude above Sea Level: Define the altitude above mean sea level. This input is used to determine the rate of pollutant spreading. The project corridor has an average altitude of 124 m above MSL.

Link Type: 5 choices available such as At Grade, Fill, Depressed, Bridge and Parking lot. In this particular model study At Grade link type is used.

Link Height: For the project link height is being considered as zero. Mixing Zone Width- Mixing zone is defined as the width of the roadway, plus 3m on either side.

Traffic Volume: The hourly traffic volume anticipated to travel on each link, in units of vehicles per hour.

Emission Factor: The weighted average emission rate of the local vehicle fleet, expressed in terms of grams / mile per vehicle.

Wind Speed - Expressed in meters per second. USEPA recommends a value of 1 m/s as the worst-case wind speed.

Wind Direction– The direction the wind has been recorded.

5.2.2.2 PRESENTATION OF RESULT

**Table 5-5: Result and discussion for Carbon Monoxide (CO)
(In Year 2023)**

Sl. No.	Receptor	(Incremental Value (mg/m ³))
1	1	0.0079
2	2	0.0095
3	3	0.0116
4	4	0.0021
5	5	0.000

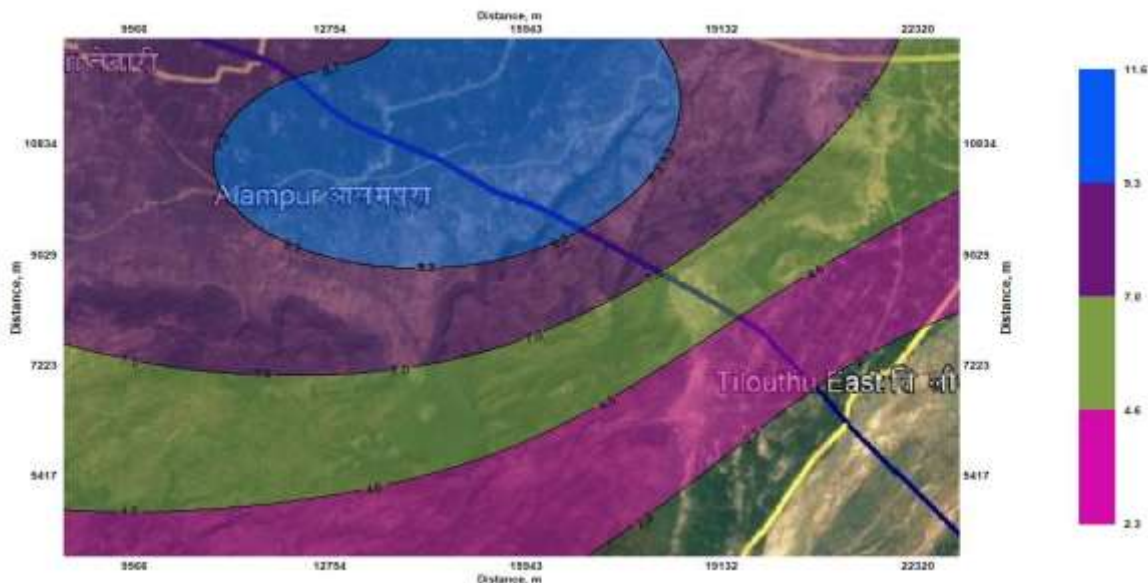


Figure 5-3: Isopleth Year 2023

**Table 5-6: Result and discussion for Carbon Monoxide (CO)
(In Year 2030)**

Sl. No.	Receptor	(Incremental Value (mg/m ³))
1	1	0.0128
2	2	0.0152
3	3	0.0185
4	4	0.0034
5	5	0.000

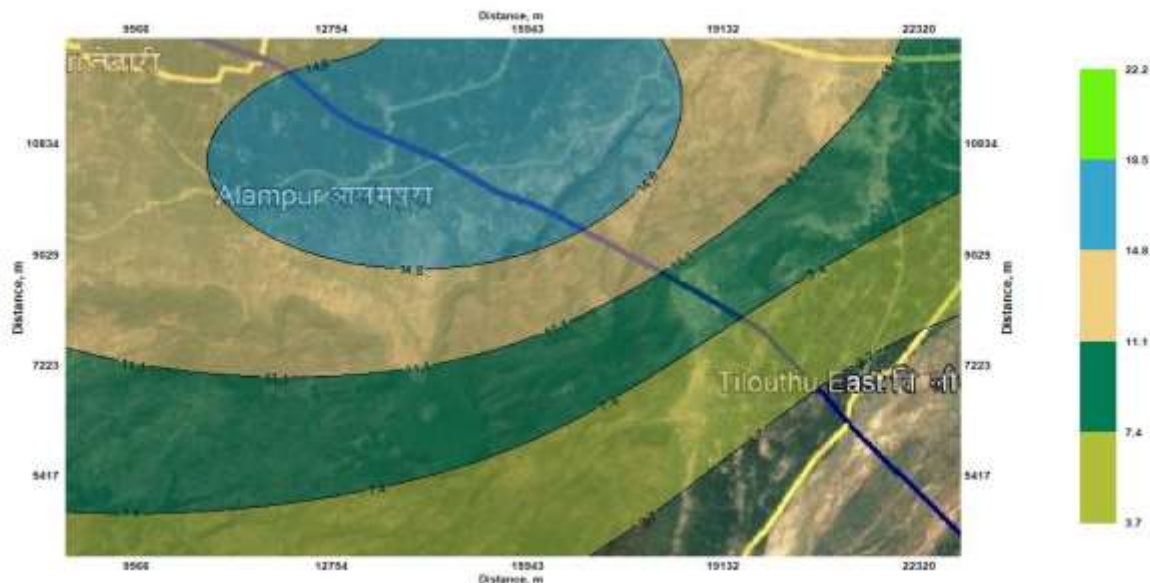


Figure 5-4: Isopleth Year 2030

**Table 5-7: Result and discussion for Carbon Monoxide (CO)
(In Year 2040)**

Sl. No.	Receptor	(I ncremental Value ($\mu\text{g}/\text{m}^3$)
1	1	0.0208
2	2	0.0248
3	3	0.03
4	4	0.0055
5	5	0.0000

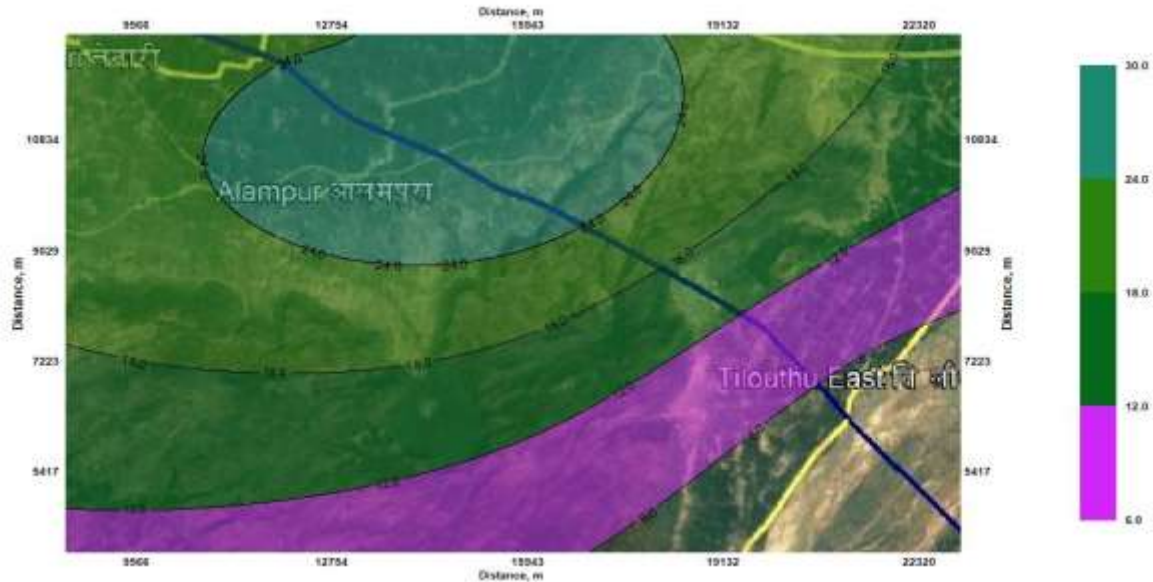


Figure 5-5: Isopleth Year 2040

**Table 5-8: Result and discussion for Carbon Monoxide (CO)
(In Year 2046)**

Sl. No.	Receptor	(Incremental Value (mg/m ³))
1	1	0.0259
2	2	0.0309
3	3	0.0372
4	4	0.0069
5	5	0.000

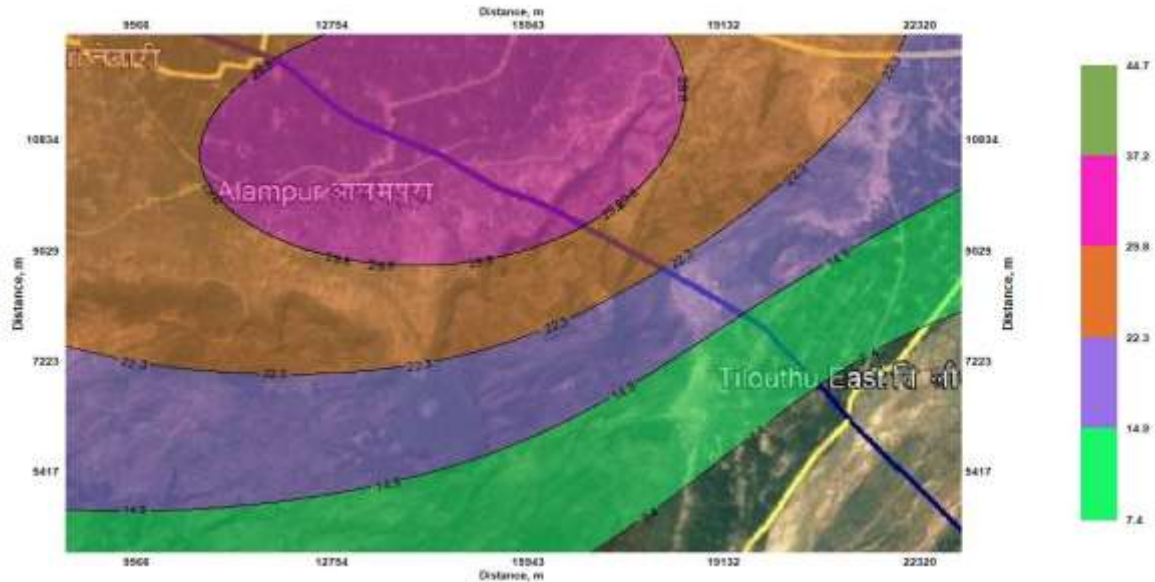


Figure 5-6: Isopleth Year 2046

**Table 5-9: Result and discussion for PM₁₀
(In Year 2023)**

Sl. No.	Receptor	Incremental Value (µg/m ³)
1	1	0.700
2	2	0.800
3	3	0.900
4	4	0.200
5	5	0.000

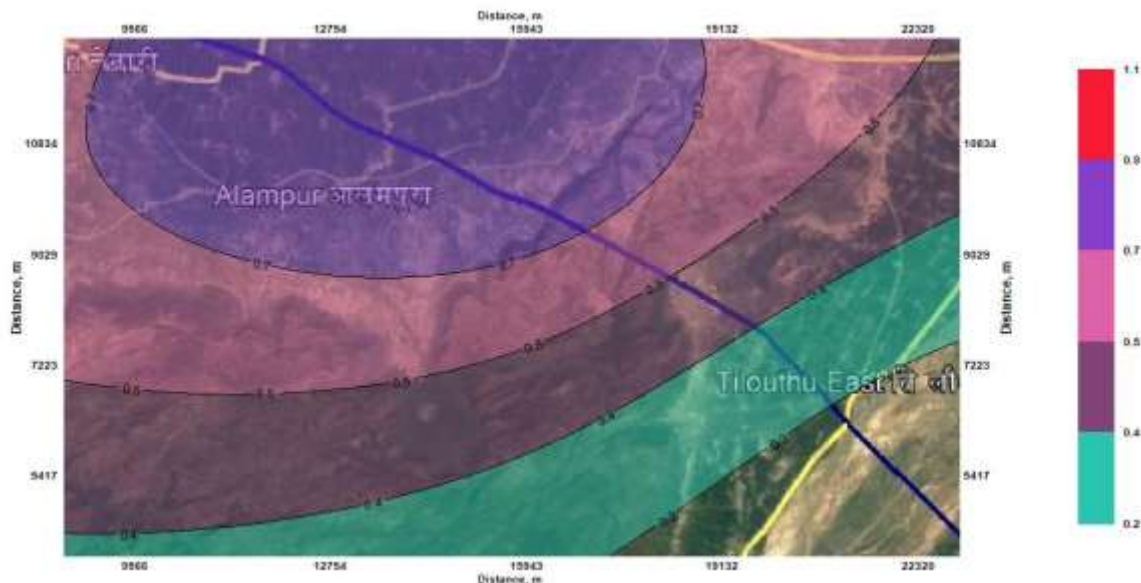


Figure 5-7: Isopleth Year 2023

**Table 5-10: Result and discussion for PM₁₀
(In Year 2030)**

Sl. No.	Receptor	Incremental Value (µg/m ³)
1	1	1.100
2	2	1.200
3	3	1.500
4	4	0.300
5	5	0.000

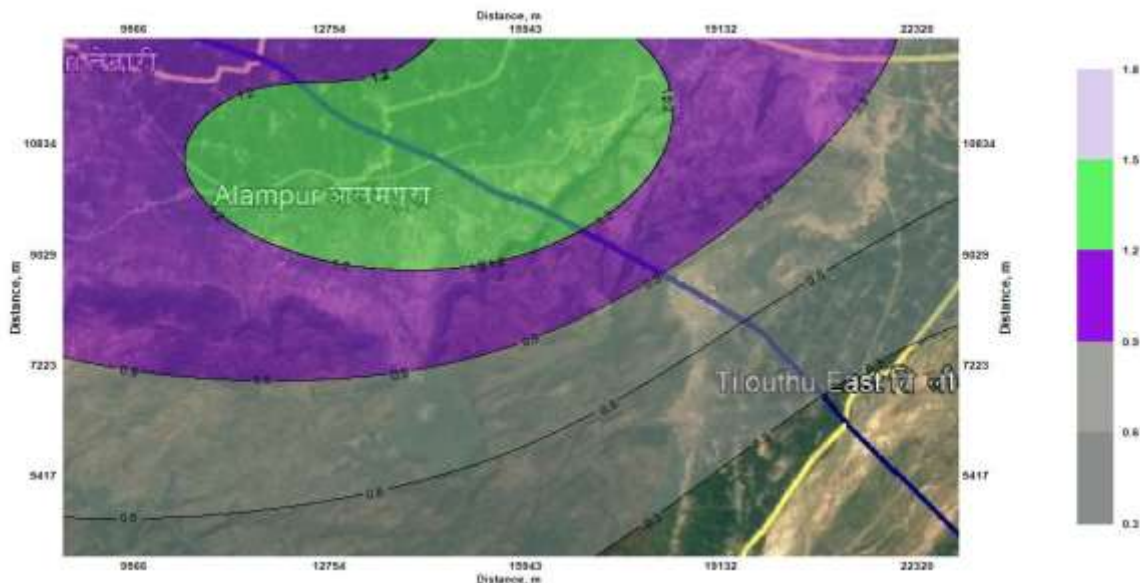


Figure 5-8: Isopleth Year 2030

**Table 5-11: Result and discussion for PM₁₀
(In Year 2040)**

Sl. No.	Receptor	Incremental Value (µg/m ³)
1	1	1.700
2	2	2.000
3	3	2.400
4	4	0.400
5	5	0.000

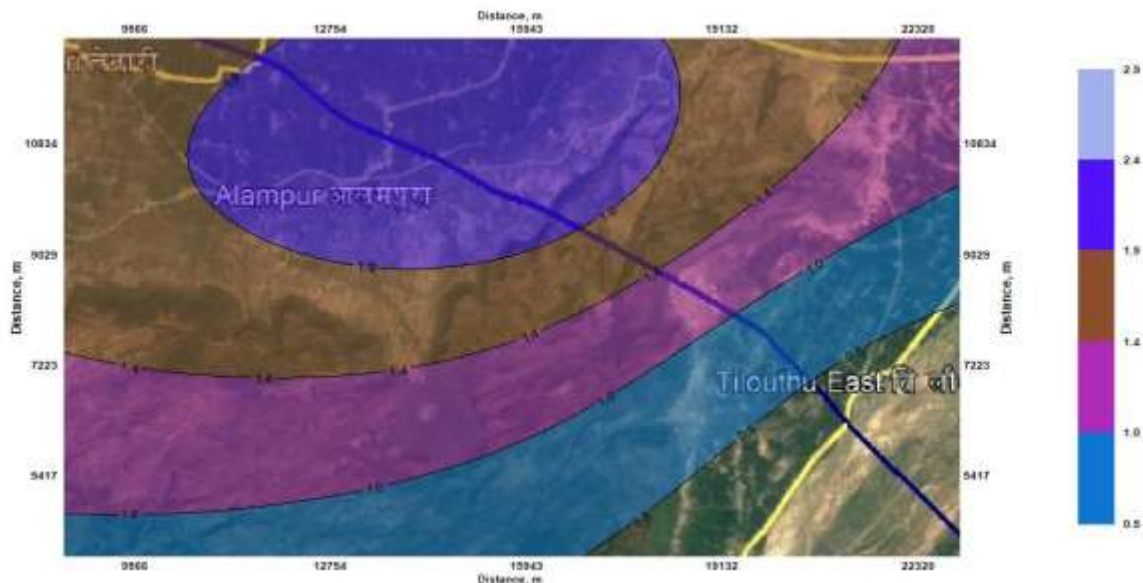


Figure 5-9: Isopleth Year 2040

Table 5-12: Result and discussion for PM₁₀

(In Year 2046)

Sl. No.	Receptor	Incremental Value ($\mu\text{g}/\text{m}^3$)
1	1	2.100
2	2	2.500
3	3	3.000
4	4	0.600
5	5	0.000

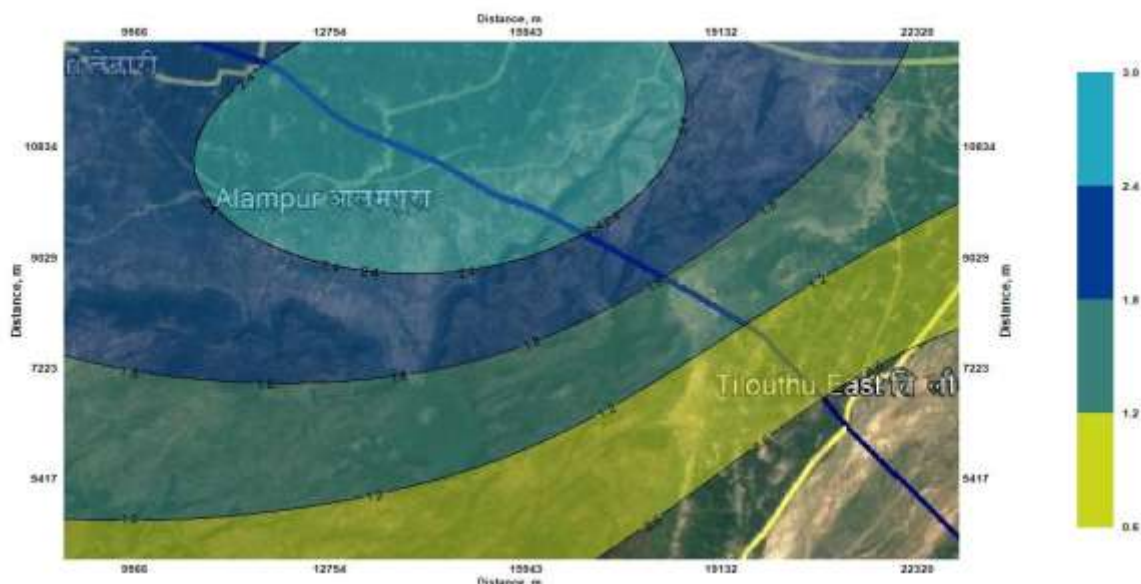


Figure 5-10: Isopleth Year 2046

Conclusion

For CO

Considering the maximum baseline ambient concentration of CO i.e. 0.85 mg/m³ and predicted incremental concentration of 0.0372 mg/m³ at row edge (nearest possible receptor), the maximum resultant CO concentration shall be in the tune of 0.8872 mg/m³ in respect to 2 mg/m³ of Ambient Air Quality Standards. Hence, predicted CO concentration including ambient level shall remain well within the National Ambient Air Quality Standards for the projected years 2050-60.

For PM₁₀

Considering the maximum baseline ambient concentration of PM₁₀ i.e. 76 µg/m³ predicted incremental concentration of 3.000 µg/m³ at row edge (nearest possible receptor), the maximum resultant PM₁₀ concentration shall be in the tune of 79 µg/m³ in respect to 100 µg/m³ of Ambient Air Quality Standards. Hence, predicted PM₁₀ concentration including ambient level shall remain well within the National Ambient Air Quality Standards for the projected years 2050-60.

5.2.2.3 MITIGATION MEASURES:

- By having a better road surface during operational stage of this project the toxic dust from vehicular tyres shall be less.

However, compliance of future statutory regulatory requirements and policy plan with respect to emission limits, auto-technology, vehicular fuel quality (including adulteration etc.) which is a dynamic process and charges with economic development along with implementation of preventive/mitigative measures for control pollution exposure should be adequate to prevent any public health impacts of this project.

- Project road will be designed in such a manner that there is no traffic congestion in the populated area along the project road
- Road will be designed in such a manner that there is no bottlenecks.
- All slopes and embankments will be turfed to minimize dust generation.
- Plantation of pollutants adsorbing fast growing trees species along the project road.

5.3 NOISE ENVIRONMENT

Noise impacts are perceived in both construction and operation stages of the project. Noise generated from the construction activities will be of high intensity and the construction workers and the residents in settlements around the construction sites will be adversely impacted due to continuous exposure to high noise levels due to the construction activities. Due to the various construction activities, there will be temporary noise impacts in the immediate vicinity of the project corridor. The construction activity will include the excavation for foundation and grading of the site and construction of structures and facilities. Noise levels exceeding the norms at all places, especially around the settlement stretches along the corridor have to be attenuated at least to the daytime noise criteria for residential areas.

5.3.1 NATURE OF IMPACTS AND SOURCE CHARACTERISTICS

From an acoustical point of view, environmental noise particularly highway traffic noise is a complex phenomenon because its intensity and characteristics varies with time depending upon the frequency as well as type of vehicle that passes on the road.

- A large number of vehicles on road will make the exposure situation of the road side receptors one of almost continuous nature of noise exposure, fluctuating between the high levels generated by typical noisy vehicles such as trucks/ buses and the lower noise generated by cars. A few events with a high noise levels will have the same Leq as a large number of exposure events but at a lower

noise levels. But from biological point of view, it is unlikely that these two noise scenario's sharing same Leq but different exposure character will cause an equal effects on the exposed pollution.

- So main problems in road side traffic noise exposure is the question of to what extent is the number of different exposure events related to the human perception of environmental stimulation. The health effects are measured in the exposed population may be discrete physiological reactions particularly of certain complex human responses, such as sleep disturbance or an effect on work performance efficiency. For human responses, those appearing after a single but a rare high exposure as well as those accruing after repeated low noise exposures (Chronic exposure) need to be evaluated carefully.

Noise emission characteristics the mean noise levels in major urban locations of India of four different categories are presented in the following table 4.4. This table shows that actual noise emission from automobiles in Indian cities is higher than the CPCB standards (at manufacturing stage) in use.

Table 5-13:Mean Noise Emission Levels from Vehicles

Type	Mean Sound Pressure level Emission (dBA)	CPCB*(Std) dBA
2 Wheeler (2 Stroke)	82 dBA	80
3 Wheeler (2 Stroke)	87 dBA	80
Motor Car (Taxi Private Car)	85 dBA	82
Heavy Vehicles (Trucks)	92 dBA	85

Auto noise emission on roads depend on many factors such as traffic density, the type and condition of the vehicles plying on the road, vehicle operational changes (acceleration/deceleration/gear changes) depending on the level of congestion and smoothness of road surface (IRC: 104-1988). As far as impact assessment of road development project such as this are concerned, the impacts of noise pollution generated are associated with all the three phases of the project; pre-construction phase, construction phase and operational phase.

a. Pre-construction Phase

The typical on site pre-construction phase activates include:

- Man and material movements, ROW clearing of obstructions and trees and establishment of labour camps, on-site offices, stock yards, construction material plants and maintenance yards etc.
- Among all these activities perhaps ROW clearing involve use of heavy machine and equipment otherwise all other activities will prevail for a short duration and also shall be localized in nature; besides this they are not likely to generate high noise pollution. The impacts of even such noise generating activities can be mitigated by not placing such project site infrastructure near to any residential or commercial activities or even labour colonies. Whereas the other activities during this phase will prevail only for a short duration during the pre-construction phase and therefore are not likely to be of significance.

b. Construction Phase

The impacts on community noise exposure during construction stage will be quite significant and characteristics of exposure to different receptors shall also be varying widely. But all such impacts shall again be of temporary in nature as the construction site will go on changing with the progress of the road development along different road stretches. The construction phase activities at during this phase can be broadly divided into two categories;

- one type include the excavation for foundation and grading of the site (including large scale material transportation and its handling using heavy vehicles), and
- Second is construction of structure and facility along with road development. Besides such construction site specific activities, the other types of construction phase activities which emit noise include stone crushing, asphalt production plant and batching plants, etc.
- The activities of such plant operations shall relatively prevail for longer than other on-site activities and shall produce significantly high noise levels.

Mitigation Measures

Construction camp shall be established at least 1000m away from nearest habitation and forest area. Temporary noise barriers should be provided surrounding the high noise generating construction equipment during work near to settlement area. Stationary noise source like generator sets shall be provided with an acoustic shield around them. The plants, equipment and vehicle used for construction should strictly conform to CPCB standards. Vehicles and equipment should be fitted with silencer and maintained accordingly.

Noise generating activities should be scheduled based on community welfare. Noise level should regularly be monitored as per monitoring plan and if the noise level at any time found to be higher, then immediate measure to reduce noise in that area should be ensured. The following mitigation measures as given in table below need to be worked out for the noise impacts associated with the various construction activities.

Table 5-14: Summary of Mitigation Measures for Construction Stage

Source of Noise Pollution	Impacts	Generic Mitigation Measures
Utilisation of heavy construction machinery; Construction of structures and facilities; Crushing plants, asphalt production plants; and Loading, transportation and unloading of construction materials	Increased Noise Levels causing discomfort to local residents and workers	All construction equipment, plants, machinery and vehicles will follow prescribed noise standards. All construction equipment used for an 8 hour shift shall conform to a standard of less than 90 dB (A). If required, machinery producing high noise as concrete mixers, generators etc. must be provided with noise shields; At construction sites within 500 m of human settlements, noisy construction activities shall be stopped between 9.00 PM and 6.00 AM; Vehicles and construction machinery shall be monitored regularly with particular attention to silencers and mufflers to maintain noise levels to minimum; Workers in the vicinity of high noise levels must wear ear plugs, helmets and should be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 90 dB (A) per 8 hour shift;

Source of Noise Pollution	Impacts	Generic Mitigation Measures
		<p>Hot mix plant, batching or aggregate plants shall not be located within 1000 m of sensitive land use and settlements;</p> <p>The proposed corridor will take away traffic pressure from existing highways passing through various cities hence it will reduce traffic congestion as well as Noise emission due to traffic.</p>

c. Operation Phase

Uninterrupted movement of heavy and light vehicles at high speeds will give rise to increase in ambient noise levels along the proposed roadway. It may have negative environmental impacts on the sensitive receptors located within the zone of influence. Some of sensitive receptors like hospitals (Health Centre), schools (High School Raipur Chore) and temples (Shiv Mandir Hatta Chenari) has been indentified within the zone of influence of the project. In the period of operation of the proposed road the residential areas on either side of the highway are likely to experience high day as well as night time noise levels. Noise propagation from a road is influenced by distance, ground surface meteorological conditions (wind and temperature), reflecting obstacles and increasing through barrier.

5.3.2 PREDICTION OF NOISE IMPACT ON NOISE LEVEL

5.3.2.1 NOISE MODELLING

Impact due to construction operation and Vehicular emission

As this is a highway project so the main sources of noise pollution are Vehicular movements or transportation activities.

Equivalent sound pressure level, 8 hrs average, (Leq 8 hrs), is used to describe exposure to noise from traffic. The damage risk criteria for hearing, enforced by Occupational Safety and Health Administration, (OSHA), USA is that noise levels up to 90 dBA are acceptable for eight hour exposure per day. Ministry of Labour, Government of India has also recommended similar criterion

vide factories Act, Schedule No. XXIV (Government Notification FAC/1086/CR-9/Lab- 4, dated 8/2/1988). However, the proposed green belt will help to reduce noise.

For computing the noise levels at various distances with respect to the place in the highway where maximum daily noise is envisaged. Noise levels are predicted by a user friendly model the details of which are elaborated below.

5.3.2.2 MODEL FOR SOUND WAVE PROPAGATION

For an approximate estimation of dispersion of noise in the ambient air from the source, a standard mathematical model for sound wave propagation is used. The noise generated by equipment decreases with increased distance from the source due to wave divergence. An additional decrease in sound pressure level with distance from the source is expected due to atmospheric effect or its interaction with objects in the transmission path.

For hemispherical sound wave propagation through homogenous loss free medium, one can estimate noise levels at various locations, due to different source using model based on first principles, as per the following equation:

$$L_{P2}=L_{P1} - 20\text{Log} (r2 / r1) - AE \dots\dots\dots (1)$$

LP2 and LP1 are the Sound Pressure Levels (SPL) at points located at a distances of r2 and r1 from the source. AE is attenuations due to Environmental conditions (E). The combined effect of the entire source can be determined at various locations by the following equation.

$$L_P (\text{total}) = 10\text{Log} (10^{(L_{pa})/10} + 10^{L_{pb})/10} + 10^{L_{pc})/10} + \dots\dots\dots (2)$$

Where L_{pa} , L_{pb} , L_{pc} are noise pressure levels at a point due to different sources.

5.3.2.3 ENVIRONMENT CORRECTION (AE)

The equivalent sound pressure level can be calculated from the measured sound pressure level (L_{eq} measured) averaged over the measurement surface area ‘S’ and from corrections K_1 and K_2 and is given by; (L_{eq} measured)

$$= (L_{eq} \text{ measured}) - K_1 - K_2 \quad (3)$$

Where,

K_1 = Factor for the background noise correction. The correction was not applied in this modeling exercise, as it was not possible to measure the background noise levels by putting off machines hence it was considered as zero.

K_2 = Environmental correction

In the present study dhvani PROVersion 3.6, a noise propagation modelling software developed by Envitrans Info solutions Pvt. Ltd. to undertake construction, industrial and traffic noise propagation studies. A variety of scenarios can be created quickly in dhvaniPRO, allowing the user to determine the impact of changing the source, layout and adding /removing the effects of shielding due to noise mitigation devices such as barriers.

Input for the model

Base Map, Point Source and Receptors

Base map identifying the location of the site, noise sources, receptors and other important characteristics of the surrounding area is the foremost requirement. In this study *.jpeg raster maps created in Google map showing the locations of the project site where the maximum noise is to be achieved has been captured and imported for registering the map and setting up of the scale. The source is the location is one point of bridge to predict the noise.

Hourly noise level

Hourly noise levels observed for 8 hours at the location of bridge have been observed and adopted in studies. The noise levels to be generated intermittently due to running of vehicles for different hours have also been incorporated. Besides this, the background level at the receptors has been entered into the corresponding windows.

Model outputs

After running the model the graphical results in the form of noise level contours (Figure 1.1) have been produced which has been captured and exported. Besides this the output in the tabular form showing the estimated noise levels at different receptors owing to the impact of running of mining machinery has been generated. (Table 5.15)

Table 5-15: Noise results during Day time

Title: Sound Propagation Model Run
Unit: dB(A)

Receptor ID Name	X-Coordinate m	Y-Coordinate m	Predicted Level dB(A)	Baseline dB(A)	Resultant^
R_001	-122459	-59866	52.5	0	52.5
R_002	-88965	-66675	53.5	0	53.5
R_003	-52926	-101149	45.7	0	45.7
R_004	-21976	-105831	42.7	0	42.7
R_005	20847	-144987	37.1	0	37.1
R_006	75964	-159883	35.9	0	35.9

S. No	Location	Value	Permissible Value
N1	Chenari	52.5	55
N2	Raipur Chor	53.5	55
N3	Darigawn	47.5	55
N4	Tilouthu East	42.7	55
N5	Tetarahar	37.1	55

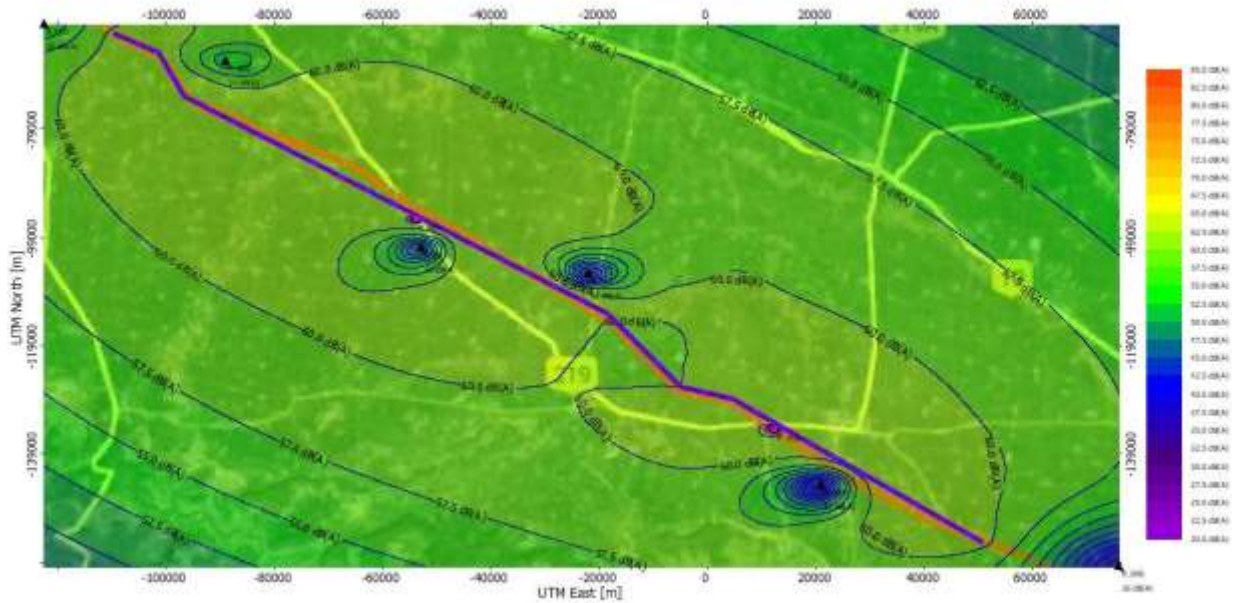


Figure 5-11: Isopleth showing Noise concentration during day time

Mitigation Measures

The following are the mitigation measures to reduce noise pollution:

- Noise standards will be strictly enforced for all vehicles, plants, equipment, and construction machinery. All construction equipment used for an 8-hour shift will conform to a standard of less than 75dB (A). If required, high noise producing generators such as concrete mixers, generators, graders, etc. must be provided with noise shields.
- Machinery and vehicles will be maintained regularly, with particular attention to silencers and mufflers, to keep construction noise levels to minimum.
- Workers in the vicinity of high noise levels will be provided earplugs, helmets and will be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 75 dB(A) per 8 hour shift.

- During construction vibratory compactors will be used sparingly within the urban areas. In case of complaints from roadside residents, the engineer will ask the site engineer to take suitable steps of restricting the work hours even further or use an alternative roller.
- Proposed tree and shrub plantations planned for avenue plantation especially close to settlements, may form an effective sound buffer during the operation stage.
- The noise barrier will be provided below mentioned sensitive locations-

Table 5-16: Noise results during Day time

S.No	Location		Length (km)	Habitation	Temple	School
	From	To				
1	74+000	75+000	0.38			Government Primary School, Virnagar
2	77+000	78+000	0.27	Dihriya		
3	80+000	81+000	0.23	Raghunathpur		
4	83+000	84+000	0.29		Maa kali Mandir Kenar Khurd	
5	88+000	89+000	0.30			Primary school, Chanari
6	90+000	91+000	0.07		Shiv temple konki	
7	98+000	99+000	0.08		Maa Belwai Bhawani Mandir, Belwai	
8	103+000	104+000	0.28			Prathmik Vidyalay Bahera
9	113+400	114+000	0.40			Government middle school tetarahar

5.4 WATER RESOURCES

Road development can lead to three types of modifications to the natural hydrological environment. These are:

5.4.1 MODIFICATION OF THE SURFACE WATER FLOW

Impacts

- Alteration of the surface water regime is expected due to proposed bypass construction
- Surface water bodies along the project road might be subject to adverse impacts due to the various construction activities
- Project section is crossing, The project alignment is passing through 6 no. of Rivers (Durgauti Nadi, Belwai Nadi, Dhansol Nadi, Dhunsoot River, Dhoba Nadi, Son River), 4 no. of canal (Distributary/Canal and BT Road, Canal, Canal, Western son high level canal), 2 no. of Nala (Belwai Nala, Tutla Nala) and 1 no. of Distributary.

Mitigation Measures

- Cross drainage structures are designed to avoid any compromise on the flow part.
- Cross drainage structures are proposed at ponds to limit the affected area and to maintain the catchment unaffected. Compensatory digging is proposed to maintain the storing capacity of the ponds.
- Continuous both side drains has been proposed along the proposed bypass. Surface runoff shall be drained to the nearest cross drainage structure. The engineering design includes design of cross drainage structures, which should take care of the extra flow.
- Structure on the Irrigation Canals and Minors shall be designed in concurrence of Irrigation dept.
- No local water supply will be used for construction purposes. Water will be taken from nearby surface water sources such as canals etc. which are available at regular interval of the proposed highway. Water sources have been identified along the project stretch in form of rivers and Canals, are listed.
- To avoid flooding of rivers and canals, the height of the bridge has been kept significantly more than the maximum level of water flow during monsoons.

Table 5-17: Details of Water Resource

S.No.	Design Chainage	Name of Type of water bodies
1.	74+160	Durgauti Nadi
2.	76+455	Distributary
3.	77+917	Belwai Nadi
4.	-	Dhansol Nadi
5.	79+030	Distributary/Canal and BT Road

6.	80+096	Canal
7.	80+300	BT Road and Stream
8.	82+358	Dhunsoot River
9.	85+950	Canal
10.	89+321	Western son high level canal
11.	96+000	Dhoba Nadi
12.	99+000	Belwai Nala
13.	105+000	Tutla Nala
14.	110+160	Son River

5.4.2 MODIFICATION OF THE GROUNDWATER FLOW

The water level fluctuation varies from 1 and 12.23 mbgl. The overall composition of ground water indicates that it is moderately alkaline and predominantly CaHCO₃ type (calcium bicarbonate).

5.4.3 RAINWATER HARVESTING

This is a green field alignment project. The proposed project will increase of surface run-off due to more paved road surface. It will have adverse impact on ground water recharging if measures are not taken during the design. Therefore, compensation is required to recharge ground water.

The Contractor will construct Rain water harvesting pits at an average distance of 500 m on either side of the highway which will be connected with longitudinal drains.

- The pits should be at least 5 m above the highest ground water table.
- The Contractor shall submit a detailed layout plan for all such sites in consultation with Central Ground Water Board and approval of the PMC shall be necessary prior to their establishment.
- The schematic diagram of Rain water harvesting pit is presented as

Rain Water Harvesting Structure along the Project road total nos = 112 nos.

Cost of each Rain Water Harvesting Structure = 40,000

Total cost of Rain Water Harvesting Structure = 44, 80,000 Rs.

IMPACTS:

- Loss of ground water table due to withdrawal of ground water for construction.
- Increase of surface run-off due to more paved road surface.

MITIGATION MEASURES:

- Detailed hydrological survey will be conducted and adequate drainage facilities provided to discharge the run-off to existing catchments area.
- Provision of recharge pits, in the design to recharge ground water, in the urban area.
- Longitudinal road-side drains on both sides of the highway and out fall should be nearby culverts/ bridges on nalas/ rivers/ drains.
- All the construction preparatory activities for culverts, bridges and other structure will be carried out during dry seasons.
- Water for construction will be arranged by the contractor from the existing sources.
- Minimum use of water from existing sources for construction purpose will be ensured promoted at construction site/camps to minimize likely impacts on other users.
- Rainwater harvesting structures shall be provided near the disposal point of the side drains as prescribed by CGWB guidelines. The typical rain water harvesting structure has been shown in **Figure 5-12.**

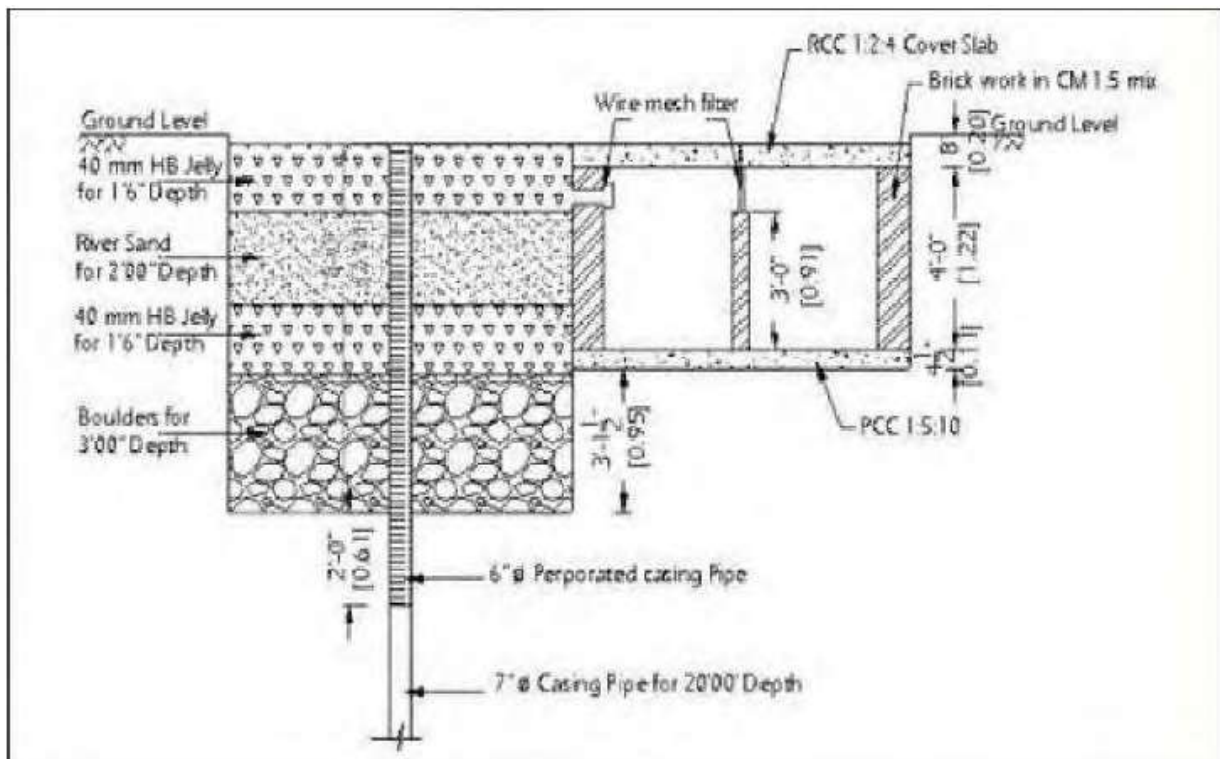


Figure 5-12: Rain water harvesting structure

- Oil interceptor:** Oil and grease from road run-off is another major concern during construction as well as operation. During construction, discharge of oil and grease is most likely from workshops, oil and waste oil storage locations, and vehicle parking areas of construction camps. Waste having hazardous properties will be stored in designated area only. 1 nos. each construction package site of oil interceptors shall be provided at camp sites to arrest oil and grease, as per below figure. The arrested products shall be disposed as per MoEF&CC and SPCB guidelines. The location of fuel storage and vehicle cleaning area will be at least 500 m from the nearest drain / water body.
- No contamination of any water source is envisaged during the operation period. However, water quality may be impacted due to washing of the vehicles near the water bodies, run-off from the oil spillage area due to wear and tear of vehicles, etc. Road run-off can contain oil, which may end up reaching into local water bodies.

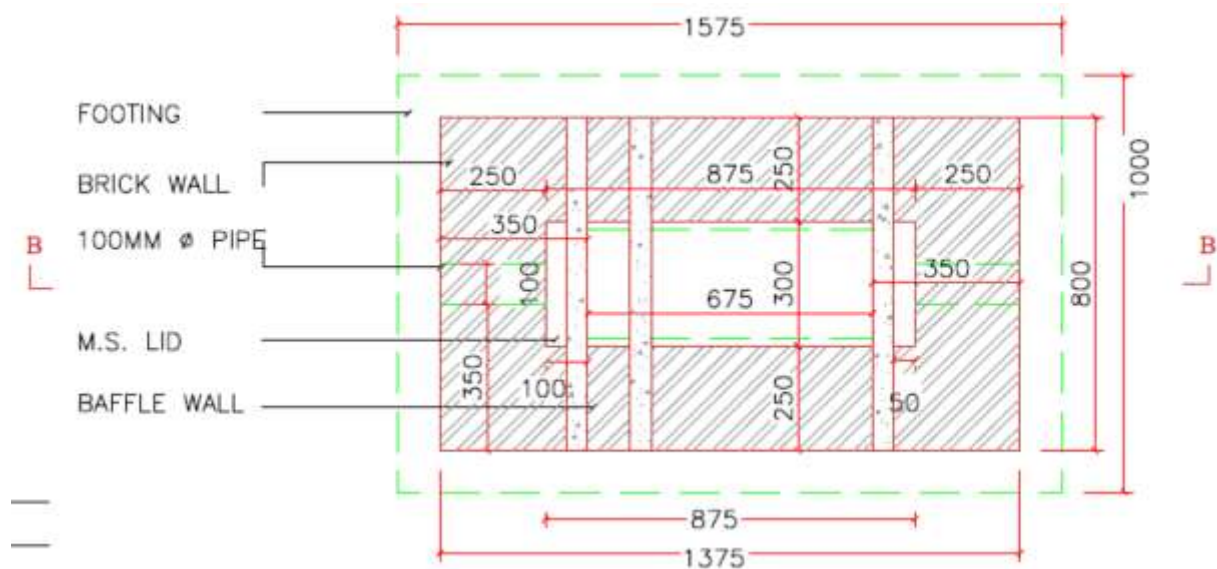


Figure 5-13: Oil Interceptor

5.4.4 WATER QUALITY DEGRADATION

Some important parameters like pH; Chlorides, alkalinity etc. were compared with the acceptable standard for drinking water. No direct impact on water quality is predicted.

5.5 LAND ENVIRONMENT

5.5.1 PHYSIOGRAPHY

The impact of road construction on physiography is a function of the terrain of the area. Since entire length of bypass passes through plain areas and the main carriageway will be raised, therefore, there will be visible and significant impact on physiography of the region.

a. Preconstruction Stage

No significant impact on topography is envisaged during the pre-construction stage.

b. Construction Stage

The impacts on the local topography will be significant. Digging for the borrow materials would bring about significant changes in the existing topography around the borrow areas. Similarly stone quarrying, fill and cuts for widening, provision for construction, yard for material handling and building of project related structures can further alter the local topography of the project direct influence area.

c. Operation Stage

No significant impact is envisaged on topography during the operation stage.

5.5.2 LOSS OF PRODUCTIVE SOIL

Loss of productive soil, although during the construction stage only, is envisaged at locations of workers camps, stockyards, storage godowns etc. if these are located on cultivated areas. Provision has been made in EMP to ensure that no productive areas are used for these purposes. In any case, though it would be a direct impact, it would be reversible and low in nature.

Land Use

The land use in the entire alignment will be converted into pavement permanently due to construction of the road. Thus fertile agriculture land coming within the RoW will be lost permanently. During the construction period there will be temporary land acquisition for access road for construction site,, location of crushers, hot mix plants and workers camp for the project road.

Soil Erosion

Loss of productive soil due to road construction is direct, adverse and long term. It is therefore necessary to ensure that this top soil is replaced or rehabilitated for plantations or agriculture after

construction. The loss of productive soil especially in irrigated areas can be considered a long-term residual impact. As the project involves the acquisition of some productive agricultural lands, the impact will be mitigated with the help of appropriate measures.

Contamination of Soil

a. Pre-construction Stage

The loss of topsoil and the contamination of the soil will be negligible in the pre-construction stage, as the site clearances activities do not involve stripping the site. However, the movements of heavy clearing machines will result in temporary compaction of the soil.

b. Construction Stage

During Construction Stage, the soil is likely to be impacted due to various construction activities. Spilling of Construction materials and the residual waste will result in soil pollution. The topsoil is rich in nutrient value and supports rich bio-diversity. Location with this thin soil and soils already under erosion are susceptible to high impacts even with slight modifications in the area. Intense construction activities in these areas lead to erosion and loss of productivity. Impact will be more pronounced in this areas due to lower permeability of the black cotton soil and hence higher retention time of the runoff from construction activities as well as the residential wastes.

Road construction activity will involve stripping all the top soil, however that is restricted within the direct influence zone i.e., RoW itself. The locations identified as borrow areas will experience the loss of productive soil cover. The EMP thereby ensures proper utilisation of this soil into landscaping activity and adequate trimming and dressing of the borrow areas. Spillage, leakage and disposal of construction materials, setting up of the construction camps and improper waste disposal will lead to short term contamination of the soil.

c. Operation Stage

No loss of topsoil is envisaged during the operation stage of the road. However, the commuters along the road envisage contamination of the soil due to accidental leaks, spills and waste disposal during the operation stage. These impacts are reversible and short term.

Table 5-18: The Type and Scale of Soil Impact

Location	Type of Impact	Scale of	Mitigation measures
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	Loss of productive soil	Erosion/ Contamination	Impact	suggested
Road side open stretches	No Loss; Beneficial	Very less	May be negative impact during construction	More trees plantation to enhance environment and for soil conservation.
Market and congested areas	No Loss; Beneficial	No	May be negative impact during construction	Not needed
Borrow pit area	No Loss of productive soil; Beneficial	No	-	Can be developed into pond for fisheries
Near Bridges	No significant Loss of productive soil	Soil erosion due to high embankment	-	By turfing, slope should be gradual

5.6 IMPACT ON FLORA, FAUNA AND ECOSYSTEM

5.6.1 FOREST AREA

Need for diversion of forest land has been envisaged for this project. Hence Forest Clearance under the purview of Forest (Conservation) Act, 1980 is applicable. About. 35.546061 Hectares of forest area is proposed to be diverted for the proposed project. The application for the same has already been done to the forest department.

National Park/ Ecological Sensitive Areas

The 10-km buffer zone of the project area is not having any

- National Park
- Biosphere Reserve
- Tiger/ Elephant Reserve

However the proposed project passes through ecosensitive zone Protected Forest of Kaimur wildlife sanctuary.

There is a scope of slight impact to local domestic animals, which graze in the area especially after the road is constructed. Increased vehicle movement in the area might lead to accidents involving animals. Apart from this, micro-ecosystems developed on the roadside with the birds, animals and insects using the plantation over the years would be lost due to loss of their habitat.

5.6.2 REMOVAL OF TREES

Approximately 2357 no. of trees recorded in proposed RoW. The impacts of tree cutting on the environmental quality will be as follows.

- The loss of trees will lead to higher degree of soil erosion. This has to be compensated by re-plantation of trees in the first priority, at the pre-construction stage.
- The loss of trees will reduce the ambient air quality since trees act as adsorbent of air pollutants thereby improving the air quality.

The reduction in number of trees, especially in or near congested market places will enhance the raising of noise level.

- The other benefits of such trees such as shade, availability of fruits etc. will be worst affected till the new trees grow up and compensate.

However, a careful and proper planning of re-plantation of trees right at the commencement of construction and the phase wise removal of existing trees will mitigate the negative impacts.

Conservation and Mitigation Measures

Assessment of habitat quality, extent and analysis of usage and problems are essential prerequisite for Environmental Management Plan. Predicting barriers caused by local and state activities is critical. The following measures could be essentially practiced for the environmental and biodiversity conservation in the project area:

1. Management of Activities: A collaborative management approach involving the Forest department, Wildlife wing, Park personnel, local people and knowledge partners, such as, academia and research, and interface institutions like non-profit organizations and trusts would be appropriate for this purpose: for maintenance of wildlife habitat, habitat improvement and awareness generation. The establishment of industry must be discouraged in those areas nearby to Park and Eco sensitive zone.

2. Awareness Generation: It is, therefore, suggested that the information in regard to species of plants and animals existing in the project site, importance of these species for human beings and

conservation of food chain organisms and ecological processes essential for ecological balance at the site, threats for their survival and suitable package of practices for conservation of biodiversity need be made available to the local people and other stakeholders through print and electronic media, street plays (nukkar natak) and exhibitions. Local festivals and fairs (mela) can be better opportunities for awareness generation.

3. Promotion of Eco development and Ecotourism: In order to reduce the dependency of local people on the forest, savannah, grassland and natural biodiversity for different socio-economic needs, such as, fire-wood, small timber, leaf fodder and medicinal species, etc., the eco-development programme focusing on the cultural and socioeconomic and environmental dimensions specific to the project site need be encouraged utilizing local knowledge and practices. The existing Wildlife Sanctuaries (Kaimur wildlife sanctuary, Chandraprabha wildlife sanctuary) and development of the proposed highway will further promote tourism activities in the area, therefore, the local people centric-ecotourism focusing on savannah, grasslands, wetland and organic-agriculture (agro-tourism), and rural life-style (rural-tourism) need be strengthened and popularized in order to promote availability of natural resources indigenously, employment opportunities and income of the local inhabitants at their own location. Such an activity will also promote respect for local culture among the tourists and park visitors, besides supporting conservation through measures like zero-waste activities, organic farming, sustainable-harvest, green sanitation and green economy.

4. Control of Population Influx around the Highway: The construction of proposed Highway will lead to increase in human population from outside the project area also. This will adversely affect the carrying capacity of the project site (at least temporarily) as far as the space and livelihood needs are concerned. This needs to be regulated through development of well managed habitation and growth centers accordingly.

5. Promotion of Farm Forestry, Agro-Forestry and Silvo-Pasture: The multi-species land uses, such as, agro-forestry and farm forestry in the farm land, horti-pastoral and silvo-pastoral practices on the barren lands and wasteland need be given priority to achieve soil conservation and to obtain economic goods, such as, fire-wood, small timber, fodder and fruits simultaneously. For this purpose, locally-preferred species should be considered on priority.

6. Habitat Management for Wildlife: The landscape approach following decentralized collaborative management need be adapted for this purpose. The habitat management practices such as, road-side plantation, rain water harvesting, fencing along road-side habitats specially near the Wildlife Sanctuary, eradication of invasive species regulated grazing by domesticated livestock at selected site (away from wild animal foraging and nesting grounds) and making roads less attractive to birds can be adopted.

For good governance in the interest of wildlife conservation and sustainable economic development, the following regulatory measures need be practiced equitably in case of common citizens, authorities and very important persons:

- Wildlife (Protection) Act 1972 and amendments
- The Forest Conservation Act 1980
- The (Prevention and Control of Air Pollution) Act 1981
- The (Prevention and Control of Water Pollution) Act 1974
- The Environment (Protection) Act 1986
- The Biodiversity Act, 2002
- Discharge of effluents as per EPA, 1986
- Noise Pollution and Control Rules, 2000
- Construction and Demolition of Waste Management Rules, 2016
- Solid Waste Management Rules, 2016
- Plastic Waste Management Following Plastic Waste Management Rules, 2016.

7. Measures Taken For Pedestrian Safety

The Provision 02 Major Bridge, 01 Major Bridge cum Under Passes, 17 Minor Bridge, 26 Minor Bridge cum Under Passes 06 VUP, 21 LVUP, 04 flyovers, 136 Box culverts has been provided in proposed project for safety of pedestrian and as well as animals.

5.6.3 PLANTATION

a. Pre-construction Stage

This is a Greenfield project so no question of damage of the road side plantation.

b. Construction Stage

2357 trees are planned to be felled for which the compensatory afforestation and avenue plantation would be taken.

The detailed avenue plantation has been discussed in Chapter-9

c. Operation Stage

There would be positive impact on this front as new trees would come up.

5.7 SOCIAL ENVIRONMENT

5.7.1 LAND ACQUISITION

• Preconstruction Stage

As the proposed 4/6 laning is to acquire the land, Most of the land acquired will be agricultural land.

The preliminary baseline socio-economic survey identified that some structures are likely to be affected due to the project. The remaining included private and government structures that will be affected due to the proposed project. Most of the structures affected are of permanent nature.

The pre-construction stage demands the clearing of the site, which would result in disruption of a few community facilities. The facilities affected may be the following:

- Institutions, Bus–stops
- Electric lines and poles
- Telephone Lines and Poles
- Hand pumps, wells, tube wells.

Community Facilities

The Community Facilities like public utilities and amenities get significantly disrupted during the construction activities. All community facilities and public utilities that are to be impacted due to the project will be relocated prior to the commencement of the project construction.

A total of 164 structures are likely to be affected excluding the government and common properties resources. Most of the structures are likely to be affected belong to permanent category. **(Refer Annexure-XII).**

• Construction Stage

The visual quality of the construction site and temporary detours may affect the local community.

During the construction stage of the project, scattering of construction debris also presents an ugly

look to the corridor. These effects will be minimized to the extent possible with pre-designated transit routes for the construction vehicles.

• **Operation Stage**

Damage by vehicular collision if located nearer to the corridor. Overuse of the property-increased traffic will lead to commercialization of the abutting land, better communication along the corridor would also attract more visitors to these sites as rest areas, thus destroying their ambience.

5.7.2 MONUMENTS/HISTORICAL AREAS & ARCHAEOLOGICAL SITES

There is no important Archaeological resources, or sites of cultural interest within the study area that are of state or national level interest.

5.7.3 HUMAN HEALTH

a.Construction Stage

Human health is an issue of concern, especially in the construction camps. These camps if not adequately equipped for habitation will experience the outbreak of diseases. These camps are anticipated to house upto 1000 people for the period of 2 years. Given this concentration of people, the potential for disease and illness transmission will increase. However, the guidelines laid by the MOEF&CC, if appropriately, deployed, helps maintain the health standards.

Mitigation measures

Construction workers will be fully trained and will be provided adequate safety measures such as safety helmets, safety boots, earplugs and gloves. During construction regular training will be given to construction workers in respect of safety measures as well as environmental protection measures. Construction workers will also be provided ready access to on-or-off site health care facilities to reduce the transmission of infectious diseases, and provide first aid for minor injuries.

5.7.4 ROAD SAFETY

Since there is a Greenfield road development so there is no significant impact during construction period. The activity related to operation will increase the incidence of accidents. However, the situation will be improved during the operation stage due to the improved design and providing safety signages adequately.

The Operation Stage envisages the design speed of 100 km/ hr, there is pedestrian and cattle movement. These section become sensitive and are prone to accidents. However, due care has been taken during the design-stage to overcome such related hazards.

However, such incidents would be minimized with the help of appropriate **mitigation measures**.

The chances of accidents could be minimized by (1) strengthening the pavements, (2) improving upon the curves in road geometrics, (3) fly-over and grade separators (4) proposing the service lanes in market places and near schools, etc (5) providing proper median, (6) improving upon road crossings (7) putting right signals and signboards, (8) new under passes. The human diseases caused by the contamination of water, increase in air pollutants and noise may go up by 5-10% but proper mitigation can take care of the situation.

Table 5-19: Traffic Sinage Detail

Sl. No.	Type of Sign	Nos.
1	One Way Object Hazard Marker (OHM)	20
2	Two Way Object Hazard Marker (OHM)	22
3	Height restriction (Regulatory Sign)	45
4	Speed Limit Signs (Regulatory Sign)	10
5	Merging Traffic Ahead (Cautionary Sign)	10
6	Compulsory Keep Left Sign (Regulatory Sign)	12
7	Compulsory Ahead Sign (Regulatory Sign)	15
8	U-Turn Prohibited Sign (Regulatory Sign)	12
9	Give way sign (Regulatory Sign)	16
10	Chevron Marker (At Curves)	180
11	Triple Chevron Marker (At roundabout)	110
12	Reassurance Sign (Direction & Place Identification Sign)	26
13	Roundabout Sign (Cautionary Sign)	06
14	Left/ Right Hand Curve (Cautionary Sign)	12
15	Expressway Route Marker Sign	10
16	Entry/ Exit Expressway Sign (Information Sign)	14
17	End of Expressway Sign	02
18	Map type Advance Direction Sign	04
19	Flag type Advance Direction Sign	06
20	Advance Directional Sign (Overhead Cantilever/ Gantry)	12
21	Rest Area Information Sign (Overhead Cantilever/ Gantry)	0
22	Slogan Gantry	12

5.8 SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT

The summary of Environmental Impact Assessment along with the mitigation Measures are presented in **Table 5.20**.

Table 5-20: Summary of Environmental Impact Assessment and its Mitigation Measures

Particulars	Stages	Potential Impacts	Mitigation Measures
Physiographic Environment			
Topography	Preconstruction & Construction	Changes are expected due to proposed project Impacts are marginal, but permanent.	Proper planning to keep the land reformation up to bare minimum
Geology	Preconstruction & Construction	Impacts are moderate because of extraction of sand	If quarry opening is required then Prior Environmental Clearance shall be obtained from SEIAA / MoEF&CC (if applicable) and Quarry Development Plan will be enforced.
Climate			
Temperature / Rainfall / Humidity	Preconstruction & Construction	Tree felling will have an impact of micro-climate of the area Heat island effect due to increase in paved roads.	Compensatory afforestation of the trees to be cut as per Forest Dept. guidelines. With the proposed avenueplantationscheme, the micro climateof the project.
Land			
Loss of Forest	Design, Pre-construction & Construction	Diversion of forest	Compensatory afforestation Payment of NPV

Particulars	Stages	Potential Impacts	Mitigation Measures
Induced Development	Preconstruction & Construction	Change in the land use pattern	Civil authorities to plan and guide any induced development using the prevailing regulatory framework.
Soil			
Soil Erosion	Preconstruction, Construction & Operation	In Road slopes and spoils Erosion in excavated areas	Embankment protection through pitching & turfing Regular water sprinkling in excavated areas
Contamination of Soil	Preconstruction, Construction & Operation	Scarified bitumen wastes Oil and diesel spills Emulsion sprayer and laying of hot mix Production of hot mix and rejected materials Residential facilities for the labor and officers	Hazardous and Other Wastes (Management & Trans-boundary Movement) Rules, 2016. Oil Interceptor will be provided in storage areas for accidental spill of oil and diesel. Rejected material to be laid as directed by monitoring consultant. Septic tank to be constructed for waste disposal.
Water			
Impact on Water Resource	Design, Preconstruction, Construction & Operation	Physical Impact / Partial loss of Water Bodies Depletion of ground water recharge	Wise design; compensatory digging. Provision of Storage / harvesting structure of water, wherever feasible
		Contamination of surface water system due to run-	Oil Interceptor, sedimentation chambers, oils and grease separators

Particulars	Stages	Potential Impacts	Mitigation Measures
		off from road construction area	and Septic tank in construction camp to be provided. Enforcement of Hazardous and Other Wastes (Management & Trans-boundary Movement) Rules, 2016. Both side drain facility to suitably divert the run-off from roads.
Air			
Dust generation	Preconstruction & Construction	Shifting of utilities, removal of trees & vegetation, transportation of material	Regular Sprinkling of Water Fine materials to be completely covered, during transport and stocking. Hot mix plant to be installed in down wind direction with at least 500m distance from nearby settlement. Regular monitoring of particulate matter in Ambient Air
Gaseous pollutants	Preconstruction, Construction & Operation	Operation of Hot mix plant and vehicle operation for material transportation.	Air pollution Norms will be enforced. Only PUC certified vehicles and machineries shall be deployed.
			Laborers will be provided with mask. Regular gaseous pollution monitoring in ambient air.
Ambient air quality	Operation	Generation of Dust Air pollution from traffic	Paving of shoulders Compliance with statutory regulatory requirements.

Particulars	Stages	Potential Impacts	Mitigation Measures
Noise			
Pre-Construction Activity	Pre-Construction	Man, material and machinery movements. Establishment of labour camps, onsite offices, stock yards and construction plants.	No Horn Zone sign, Speed Barriers near sensitive receptors Camps will be setup more than 500m away from settlements.
Construction Activity	Construction	Operation of high noise equipment like hot mix plant, diesel generators etc. Community residing near to the work zones.	Camp will be setup more than 500m away from the settlements, in down wind direction. Noise pollution regulation to be monitored and enforced. Provision of Noise barriers etc.
Operation Stage	Operation	Indiscriminate blowing of horn near sensitive area	Restriction on use of horns No Horn Zone sign.
Ecology			
Flora	Preconstruction, Construction	Loss of vegetation cover. Felling of trees.	Felling of only unavoidable trees Compensatory Afforestation as per Forest Dept. guidelines Plantation of trees along the project road, median and in areas realigned and maintaining the same for a fixed period.

Particulars	Stages	Potential Impacts	Mitigation Measures
Fauna	Preconstruction Construction & Operation	Loss of insect, avian and small mammalian species due to felling of trees Accidental run over	Compensatory Afforestation Speed breaker and limit in sensitive areas Wise selection of alignment
Social			
Socio Environment	Design, Preconstruction & Construction	Loss of livelihood Loss of CPRs, Religious Structures.	Rehabilitation Action Plan Relocation of CPRs, Religious Structures to suitable place.
Public Health and Road Safety	Preconstruction, Construction & Operation	Psychological impacts on project affected people. Migration of worker may lead to sanitation problem creating congenial condition for disease vectors. Discomfort arising of air and noise pollution. Hazards of accident.	Continued consultation with PAPs and the competent authority for speedier settlements of appropriate compensation package and resettlement.Ensuring sanitary measures at construction camp to prevent water borne disease and vector borne disease. Provision for appropriate personal protective equipment like earplugs, gloves gumboot, and mask to the work force.Safe traffic management at construction area. Drive slow sign and speed barriers near community facilities like school, hospital, etc.

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAMME

6.1 ENVIRONMENT MONITORING PROGRAMME

The Environmental Monitoring Programme provides such information on which management decisions may be taken during construction and operational phase. It provides basis for evaluating the efficiency of mitigation and enhancement measures, and suggested actions that need to be taken to achieve the desired effect. The monitoring includes:

- i. Visual observation
- ii. Selection of environmental parameters at specific locations, and
- iii. Sampling and regular testing of these parameters.

The objectives are:

- Evaluation of the efficiency of mitigation and enhancement measures
- Updating of the actions and impacts of baseline data
- Adoption of additional mitigation measures if the present measures are insufficient
- Generating the data which may be incorporated in the environmental management plan in future projects

6.1.1 AMBIENT AIR QUALITY (AAQ) MONITORING

The air quality is recommended for monitoring through an approved agency in the process of Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar. Proposed Length – 58.155 Km. The monitoring of air sampling should be conducted at the location of Crusher plant, HMP, Stockyards Batching plant, Haul roads. In addition to these, air quality should also be monitored near the storage sites having aggregates, sands etc.

The parameters recommended for monitoring during construction are:

- PM10, PM2.5
- Sulphur Dioxide
- Oxides of Nitrogen, and
- Carbon Monoxide
- Other parameters as included in the CPCB AAQ monitoring parameters.

6.1.2 WATER QUALITY

Water quality and public health parameters should be monitored till the end of project and two years after the completion. Monitoring should be carried-out at quarterly basis, to cover seasonal variations, by any recognized agency (NABL Accredited laboratory). Water quality shall be analyzed by applying the standard technique.

6.1.3 AMBIENT NOISE MONITORING

The monitoring of noise sampling should be conducted at the location of plant sites i.e. crusher plant, HMP and construction sites etc. In addition to these, noise quality should also be monitored near the school, hospital, other sensitive sites and residential areas exist along the 40 meter to 50 meter distance of project road or at the designated locations fixed –up by the environmental expert

The procedural details of monitoring of various components have been presented in **Table 6.1**.

Table 6-1: Environmental Monitoring Plan

Environmental Components	Monitoring			Location	Frequency	Institutional Responsibility	
	Parameters	Special Guidance	Standards			Implementation	Supervision
Air Quality	PM2.5, PM10, SO2, NOX, CO	As per CPCB guidelines	The Air (Prevention and Control of Pollution) Rules, CPCB, 1982	At sites where hot mix plant /batching plant is located	Twice in a month till the end of the construction	Contractor through approved monitoring agency	IC, NHAI-PIU
Ground and Surface Water Quality	pH, temperature, BOD, Total Hardness, COD, TDS, TSS, DO, Total coliform, Conductivity, Oil & Grease	Grab priority collected from source and analyze as per standard methods for examination of water and wastewater	Water quality standards by CPCB	River tributaries, roadside ponds and ground water at construction camp sites	Once in a season till end of construction	Contractor through approved monitoring agency	IC, NHAI-PIU

Noise Levels	Noise level for day and night on dB(A) scale	In free field at 1m distance from the equipment to be monitored	Noise standard by CPCB	At equipment yards, camp and villages along the alignment.	Once in a season till end of construction	Contractor through approved Monitoring agency	IC, NHAI-PIU
Soil quality	Monitoring of NPK & heavy metals and grease		As per IRC code of practice	Ad-hoc if accident /spill locations involving bulk transport of carrying hazardous material		PIU through an approved agency	IC, NHAI-PIU
Road side plantation	Monitoring of felling of trees Survival rate of trees, success of re-vegetation	It should be ensured that only marked trees are felled. The number of trees surviving during	As given in the Detailed Design for the project. The survival rate should be atleast	All along the corridor At locations of compensatory afforestation	During the felling of trees Every year for 3 Years	Forest depart Competent Agency PIU	Developer to assist in coordination with NHAI

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

Chapter 6- Environmental Monitoring Programme

		each visit should be compared with the number of saplings planted	75% below which replantation should be done				Developer & Forest Department
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6.2 ENVIRONMENTAL MONITORING COST

The environmental monitoring cost is estimated on the basis of the length and existing environmental scenario of the proposed project. Environmental monitoring cost of **6,64,000** /- per year has been allocated for construction and operation stages. The details have been presented in **Table 6.2**.

Table 6-2: Environment Monitoring Cost

S.No.	Parameters/Components	Particular	Guidelines	Total Cost (Rs)
1	Ambient Air Monitoring: At construction Stage: At 5 locations for three season in a year	Monitoring at Construction sites	PM2.5 and Respirable dust samplers to be used and located 50 m from the construction site	52,500
	At Operation Stage: At 5 locations for three season for a year	Ambient Air Quality Monitoring	-	52,500
2	Ground Water Monitoring: At Construction Stage: At 5 locations for three season in a year	Ground water bodies	Analyze as per the standard methods for examination of water and waste water	60,000
	At Operation Stage: At 5 locations for three season for a year	Ground water bodies	Analyze as per the standard methods for examination of water and waste water	60,000

3.	Surface Water Monitoring: At Construction Stage: At 6 locations for three season in a year	Surface water resources	Analyze as per the standard methods for examination of water and waste water	72,000
	At Operation Stage: At 6 locations for three season for a year	Surface water resources	Analyse as per the standard methods for examination of water and waste water	72,000
4.	Noise Monitoring: At Construction Stage: At 5 locations for three season in a year	At equipment yards/ construction sites identified by IC	Using an integrated noise level meter kept at a distance of 15 m from the construction site	67,500
	At Operation stage At 5 locations for three season for a year	As directed by the Engineer	-	67,500
5.	Soil Monitoring: At Construction Stage: At 5 locations for three season in a year	At productive agricultural land	-	80,000
	At Operation Stage: At 5 locations where for three season for a year	At productive agricultural land	-	80,000
	Total Monitoring Cost (A)			6,64,000

CHAPTER 7 – ADDITIONAL STUDIES

7.1 GENERAL

As per EIA Notification dated 14th September, 2006, as amended from time to time, The MoEF & CC, has suggested various Terms of Reference (ToRs) for the preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP) vide their letter no. vide letter no. 10/11/2022-IA.III dated 25.04.2022. The following Additional Studies were carried out as per Terms of Reference:

1. Public Hearing
2. Risk Assessment &
3. Disaster Management Plan

7.2 PUBLIC HEARING

Public hearing has been conducted as per EIA Notification for the proposed Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar (Package-1 Length – 58.155 Km

Table 7-1: Public hearing details (District: Rohtas)

Particular	Description
Advertisement for Public Hearing	
➤ Date of Advertisement in Newspapers	01/10/2022
➤ Name of Newspapers	The Times of India, Hindustan Times, Patna, Nav Bihar Times, Aurangabad
Date of Public Hearing	12.11.2022 at 01:30 PM
Venue	Anchal Office, Tilouthu, NH -2C, Bhadsa, Tilouthu East, District - Rohtas.
Members	Sri Chandrasekhar Prasad Singh, ADM, Rohtas Sri Anil Kumar, Regional Officer, BSPCB Patna; Shri Ehsan Ahmad, Land Acquisition officer, Rohtas



Particular	Description
	Sri Lalit Kumar, Manager (Tech.), NHAI PIU, Varanasi Sri Shashank Kumar, Site Engineer NHAI PIU, Varanasi

Table 7-2: Public hearing details (District: Aurangabad)

Particular	Description
Advertisement for Public Hearing	
➤ Date of Advertisement in Newspapers	09.12.2022
➤ Name of Newspapers	Hindustan, Aaj, Nav Bihar Times and The Time of India
Date of Public Hearing	16.01.2023 at 11:30 AM
Venue	Block office Amba, Tehsil- Kutumba, District – Aurangabad
Members	Kamlesh Singh, Additinal District Magistrate and Regional Officer, Bihar Pollution Control Board

The Environmental Consultant briefed the public about the purpose of organizing the hearing and explains the salient features of project with specific reference to the impacts on environment, its management and social welfare measures including community development activities proposed.

The public hearing proceedings & related papers are attached as ***Annexure XV***.

Chapter 7- Additional Details

Figure 7-1: Notice for public hearing (Rohtas District)

Figure 7-2: Notice for public hearing (Aurangabad District)



Figure 7-3: Public hearing photographs (Rohtas)



Figure 7-4: Public hearing photographs (Aurangabad)

7.2.1 ISSUES RAISED DURING PUBLIC HEARING AND COMMITMENT

Action plan to address the issues raised during public hearing is discussed in **Table 7.3 & 7.4**.

7.2.2 CONCLUSION ON PUBLIC HEARING

After the questions raised by the public present during the public hearing, were suitably replied to their satisfaction and no further questions were coming, the Regional Officer, PCB of both the district summed up the Proceedings of the Public hearing and declared the Public Hearing as over. The details of persons attended and representations received in writing during the public hearing are enclosed along with the minutes of the public hearing.

**Table 7-3 : Details of action plan for the issues raised during the public hearing
(District: Rohtas)**

S. No.	Applicant's Name	Issued raised by the applicant	Answers given by management
1.	Sri Din Dayal Yadav, Village – Kaithi Block - Tilouthu District- Rohtas.	Asked about benefit for us from the project.	Environmental consultant replied that this project will improve connectivity with each other for the states of Bihar, UP, Jharkhand & West Bengal, and will enhance business opportunity in the region. The compensation of the acquired land will be given to the respective farmer/owner as per norms.
2.	Sri Anil Kumar Dubey, Village - Bhandokhra, Anchal - Tilouthu, Dist.- Rohtas.	Asked that what will be the rate of compensation of our land which are being acquired for the project.	Replied that the compensation of the acquired land and its attached property will be given to the respective farmer/owner as per norms.
3.	Sri Jawahar Yadav, Village - Tilouthu, District – Rohtas.	Asked about the doubt on water logging and pollution issues from the proposed project road. Further, asked what will be the compensation of the land as per its nature.	A number of 56 cross drainage structures are proposed to be constructed in the project road to maintain natural flow of water and to avoid water logging situation due to the project road. All possible efforts shall be made to protect the environment like CTE & CTO shall have to obtain for establishment of construction camp/Plants and their operations



			<p>will be started after getting consent from State Pollution Control Board as per rules. Vehicles having PUC will be allowed in the construction works.</p> <p>Further, compensatory plantation will be done as per norms. Alongside, avenue plantation and median plantation shall be done on the available ROW as per IRC SP:21-2009.</p> <p>The compensation of the acquired land shall be provided as per norms.</p>
4.	<p>Sri Dharmendra Singh, Village-Kaithi, Anchal – Tilouthu, Dist-Rohtas.</p>	<p>Asked that, is there provision of link road in the Project road.</p> <p>Further, he raised that the project road is crossing their land, how will cross the road from one side to another side.</p>	<p>As per IRC Guidelines "IRC-SP-99" (Manual of specifications and standards for Expressway)</p> <p>Clause - 3.3.5 "spacing between interchanges, 20-30 Km is desirable distance. In Rohtas district, connectivity at Amra village, Circle – Tilouthu with the project road is proposed to be provided.</p> <p>To provide facility of crossing the project road, number of 09 - Minor bridge, 01 - Major bridge cum underpass, 08 - Minor bridge cum underpass, 03 - VUP, 03- LVUP, 03 - flyovers, 38 – Box Culverts are proposed to be constructed in</p>



			the Rohtas district.
5.	Sri Deepak Kumar, Village-hadsa, Anchal-Tilouthu, District- Rohtas.	Stated that rate of commercial land is much more than agriculture land but our land being acquired for the project is agriculture. Land as per land record. Please provide compensation of the land as much as possible.	The compensation of the acquired land shall be provided as per norms. In case of any apprehension/ complaint/query related to acquired land /compensation, Competent Authority for Land Acquisition (CALA)/ D.C.L.R, Rohtas may be approached for resolving the issue.
6.	Sri Chandrashekhar Singh Kushwaha, Village - Amra, Dist- Rohtas.	Asked that most of the land is being acquired from our village as per comparison of other single village. What will be compensation of the land? Govt. Should provide bonus also.	The compensation of the acquired land shall be provided as per norms.
7.	Sri Awadhesh Chaoudhary, Kaushalabad Saraiya Anchal-Tilouthu, District-Rohtas.	Suggested that one losing land for the project should get the smart compensation and job form the Government as our precious land is being acquired for the project.	The compensation of the acquired land shall be provided as per norms. There is no policy of NHAI to provide the job to land losers.
8.	Sri Bharat Singh, Village-Amra,	Stated that Rakwa is very small and poor & small	There is no policy of NHAI to provide employment/job to land



	Anchal-Tilouthu, District -Rohtas.	farmers are dependent on this small rakwa. Therefore, provision of employment must be provided for such land losers.	losers.
9.	Sri Vijay Singh, Village-Amra, Anchal -Tilouthu, District-Rohtas.	Stated that our village is agriculture oriented surrounded by hills. Agriculture is not only a source of livelihood, therefore, Govt. should consider job opportunities to our children/land losers.	There is no policy of NHAI to provide employment/ job to land losers.
10.	Sri Jitendra Kumar Singh, Village-Kaithi , Anchal - Tilouthu, District - Rohtas.	Suggested to provide maximum compensation of the land to farmers.	The compensation of the acquired land shall be provided as per norms.
11.	Sri Nagendra Singh, Anchal -Tilouthu, District- Rohtas.	Stated that physical survey should be carried out and compensation should be given as per type of land.	Joint measure survey (JMS) of the acquired land is carried out, and compensation to farmers/land owners is provided based on type of land as per norms.
12.	Sri Raj Kumar Singh, Village - Amra, Dist-Rohtas.	Stated that market cost of land has increased six fold but compensation will be given as per NH Act, 1956.	The land for national highway/ Expressway project is carried out under the provision of NH Act, 1956 but compensation of the land and its attached property is



		Further, he suggested providing loan of 10-10 lakhs on zero percent interest rate to land losers for business purpose.	calculated and given as per THE RIGHT TO FAIR COMPENSATION AND TRANSPARENCY IN LAND ACQUISITION, REHABILITATION AND RESETTLEMENT ACT, 2013. There is no Policy of NHAI to Provide any type of loan to land losers.
13.	Sri Sushil Kumar, Village - Tilouthu, District - Rohtas.	Raised matter of compensation saying we will not accept compensation according to 2013, compensation of land should be given as per norms of Year 2022.	The compensation of the acquired land shall be provided as per prevailing norms.

**Table 7-4 : Details of action plan for the issues raised during the public hearing
(District: Aurangabad)**

S. No.	Applicant's Name	Issues raised by the applicant	Answers given by management
1.	Mr. Chhote Lal Pandey, father - Late. Ramanandan Pandey, Village - Berwa, Amba, Kutumba, District - Aurangabad	Raised the issue that due to this project, the plantations done by the villager's years ago will be cut, for this what measures will be taken by the government?	Ten saplings against each tree to be cut would be planted.
2.	Mr. Pramod Kumar Singh S/o Mr.	Informed that there will be a lot of water flow due to	It was replied that waste water generated from the construction



	Indradev Singh, Village - Singhna, Block - Amba, Circle- Kutumba, District- Aurangabad	the proposed construction work. Where there is a densely populated village, what measures will be taken for this?	camps/ labour camps will be drain out after proper treatment.
3.	Mr. Devendra Kumar Pandey S/o Mr. Ashok Kumar Pandey, Village - Dhanibagh, Block - Amba, Anchal-Kutumba, District - Aurangabad	Told that many things are told before starting the scheme, in which regular sprinkling of water does not happen. In the process of construction, the bad effect of dusting falls on the health of the villagers and their crops.	It was clarified that adequate water sprinkling through tankers will be done to mitigate impact of dust at local level.
4.	Shri Madhusudan Pandey, Village- Edka, Block- Amba, Circle - Kutumba, Dist. Aurangabad	Raised the issue of not to get proper compensation of acquired land and non-issuance of receipt.	It was informed that the process of land acquisition is under process at the district level and proper solution of the matter will be done on the basis of the policy decision taken by the Government.
5.	Shri Dharmendra Sharma, Block - Amba, Circle - Kutumba, District- Aurangabad.		The Chairman (Additional Collector-cum-District Public Grievance Redressal Officer, Aurangabad) informed that for the construction of 4/6 lane road of Varanasi-Kolkata section under Bharatmala project, The land is being acquired from 52 mojas/ villages belonging three circles Nabinagar, Kutumba & Dev of
6.	Shri Kumar Lal Singh, Gram - Sanda Panchayat, Block- Amba, Circle - Kutumba, District- Aurangabad.		



7.	Shri Harilal Das, Gram - Dumra Panchayat, Panchayat Prakhand - Amba, Anchal - Kutumba, District - Aurangabad		Aurangabad district. Gazette has been published under Section 3A of the NH Act 1956 of the acquired land. 3D publishing is in progress. Action is taken to pay compensation to the interested persons.
8.	Mr. Naresh Pandey, Village - Edka, Panchayat Block- Amba, Achal- Kutumba, District- Aurangabad		It was told by the Chairman that your point will be taken care of. There is a need to take the local people into confidence during the project. There should be such an effort that the pollution should be minimum, the local people should get employment.
9.	Mr. Vashit Prasad Singh, Village - Edka Panchayat Block- Amba, Achal- Kutumba, District - Aurangabad.		

7.3 RISK ASSESSMENT

Risk assessment is fundamentally a management activity supported by persons familiar with risk management activities. A comprehensive risk assessment combines both qualitative and quantitative assessments. The qualitative assessment is useful for screening and prioritizing risks and for developing appropriate risk mitigation and allocation strategies. The quantitative assessment is best for estimating the numerical and statistical nature of the project's risk exposure.

Construction of highways involves various risk factors from designing and planning stages to completion of project. So risk assessment consisting of risk identification, risk classification and risk analysis or evaluation is necessary for maintaining cost and quality of the project and for scheduled completion of the project.

7.3.1 RISK CONTROL MEASURES

- General precautions to be maintained by the Contractor:



- Maintenance of safe systems and without risks to health
- Safe use, handling, storage and transportation
- Information, instruction, training and supervision for health and safety
- Maintenance of means of safe access and egress
- Safe working environment
- Provision of Safe articles for use and without risks to workers
- Necessary tests and examination for the use of articles before works
- Adequate information for the use of articles in factory
- Elimination/minimization of risks to health and safety wherever necessary
- Application of suitable methods for prevention and accumulation of dust and fumes
- Exhaust system for extracting toxic fumes and dust
- Fencing system for every dangerous and moving part; all moving parts shall be enclosed
- Striking gear and devices for cutting off power in an emergency.

7.3.2 HAZARD IDENTIFICATION RISK ASSESSMENT

- Hazard Identification Risk Assessment is a process of defining and describing hazards by characterizing their probability, frequency, and severity and evaluating adverse consequences, including potential losses and injuries
- Emergency Response Plan
- The overall objective of an ERP is to make use of the combined resources on-site and outside services to achieve the following:
 - To localize the emergency and, if possible, eliminate it
 - To minimize the effects of the accident on the people and property on-site
 - Effect the rescue and medical treatment of casualties.
 - Safeguard other people
 - Evacuate people to safe areas/assembly points
 - Informing and collaborating with statutory authorities to tackle the emergency
 - Initially contain and ultimately bring the incident under control
 - Preserve relevant records and equipment for subsequent enquiry into the cause and circumstances of the emergency, and
 - Investing and taking steps to prevent recurrence.

7.3.3 TRAFFIC MANAGEMENT

7.3.3.1 HAZARDS DUE TO EXTERNAL TRAFFIC

Hazards occur due to external traffic are as follows:

- External vehicle with other stationery objects in the side of the road
- Due to fall in excavated trenches, Construction workers hit by external vehicles while working, Collision between external vehicle and construction equipment /vehicle.
- Collision due to improper traffic management.
- Hit by construction equipment / vehicle.
- Use of carriageway due to blockage / absence of footpath, Injury to Pedestrians

7.3.3.2 ROAD SAFETY

Crash Barriers: Metal Beam Crash Barriers is proposed at high embankment locations and at major bridge approaches. The barrier would be of “Thrie” beam type consisting of steel posts and a 3mm thick “Thrie” beam rail. There would be a steel spacer block between the post and the beam to prevent the vehicle from snagging on the post. The steel posts and the blocking out spacer would be channel section of 75mm x 150mm size and 5mm thick. The posts are spaced 2m centre to centre. All members of the system would be hot dipped galvanized. Crash barrier system absorbs impact of vehicle and laterally restrains a vehicle from veering off. This would ensure minimum damage to the vehicle and passengers.



Figure 7-5: Crash Barriers

7.3.3.3 TRAFFIC CONTROL DEVICES

Traffic control devices used to regulate the traffic in Road Construction Zones include,

- 1.Road Signs
- 2.Delineators
- 3.Barricades
- 4.Cones
- 5.Pylons
- 6.Pavement markings
- 7.Flashings lights

Table 7-5: Road Signs

Average Speed (Km/h)	Distance of first sign in advance of the first channelizing device (m)	Size of Warning Sign (mm)	Minimum no of signs in advance of the hazard
Under 50	100	600	3
51 – 60	100 – 300	750	3
61 – 80	120 – 300	900	3 or 4
81 – 100	300 – 500	1200	4
Over 100	1000	1200 to 1500	4

Cautionary / Warning Signs

In case of divided carriageways, the signs should be provided both adjacent to the shoulder and on the central median so as to be visible from all lanes.

Delineators

Delineators are devices or treatment which outlines the roadway or portion thereof. They include Safety Cones, Traffic Cylinders, Tapes, Drums, Painted lines, Raised Pavement Markers, Guide Posts, and Post-mounted Reflectors etc. They are used in or adjacent to the roadway to control the flow of traffic. Delineators are basically driving aids and should not be regarded as a substitute for warning signs or barriers for out-of-control vehicles.



Figure 7-6: Delineators

Guide Post

They are intended to delineate the edges of the midway so as to guide driven about the alignment ahead, particularly where it might be confusing. Guideposts can be of metal, concrete, cut stone, amber or plastic. The posts can be made of Circular, Rectangular or Triangular Cross-section but the side facing traffic should be at least 10 cm wide.

Drums

Drums of height 800 mm to 1000 mm high and 300 mm in diameter can be used as either channelizing or warning devices. Both plastic and metallic drums (e.g. Bitumen drums) can be used for this purpose. Drums need to be filled up with earth or sand to increase its stability. Drums should be reflective and painted as shown in the **Figure 7-7**.

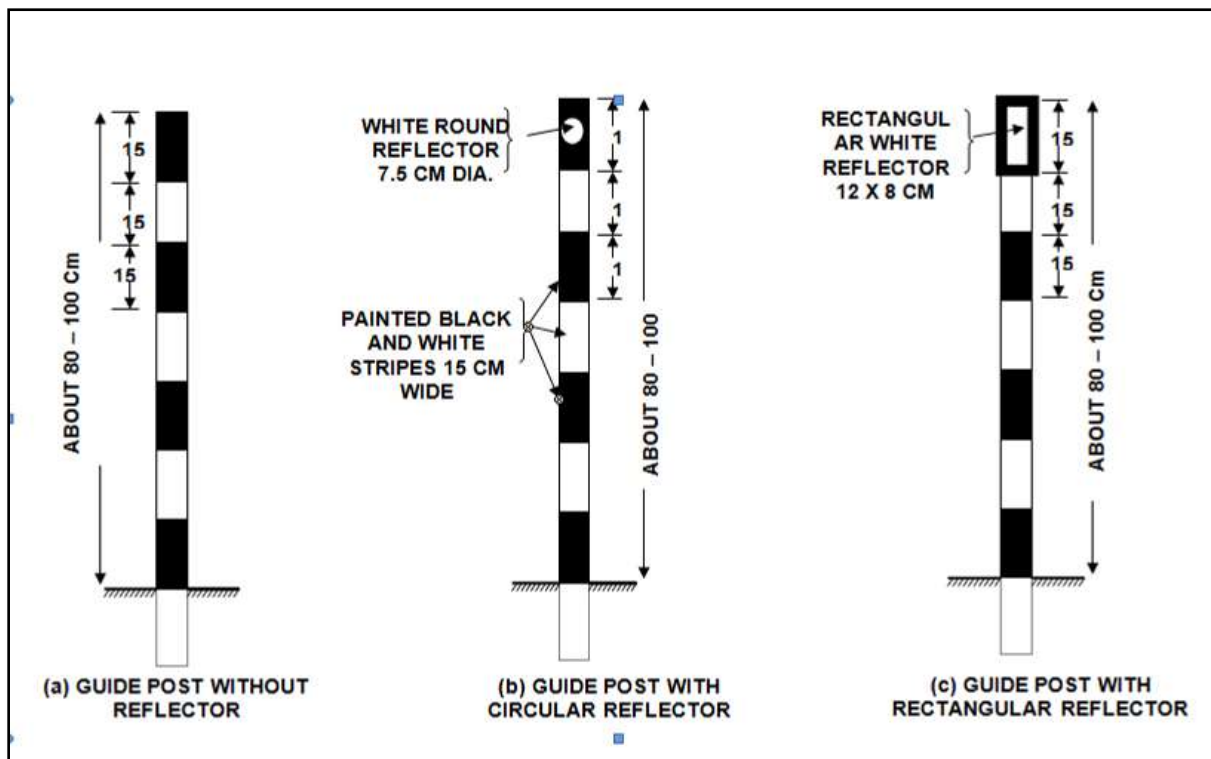


Figure 7-7: Drum Reflection

Safety Cones

Safety cones are 500 mm, 750 mm and 1000 mm high and 300 mm to 500 mm in diameter. They are usually made of plastic, rubber, HDPE, PVC and have retro reflectories red and white bands. Safety cones would be displaced or blown unless their bases are anchored or loaded with ballast. This can be avoided by, using sand bag rings to provide increased stability. Using heavier weighted cones. Using cones with special weighted bases. Doubling the cones to provide added weight.

Barricades

CMRL prescribed standard barricades are used.

Flagmen

- An authorised personnel at least average intelligence, be mentally alert and good in physical condition be selected, since flagmen are responsible for public and workmen safety.
- Flagmen should be equipped with yellow helmet with green reflective sticker fixed around and reflective jacket along with hand signalling devices such as flags and sign paddles. The typical specification are given below.

- Flagmen need to maintain the flow of traffic continuous past a work zone at relatively reduced speeds by suitably regulating the traffic. He shall stop the traffic for a short while whenever required (e.g. for entry and exit of construction equipment in to work zone).
- Flagman should be positioned in a place where he is clearly visible to approaching traffic and at a sufficient distance to enable the drivers to respond for his flagging instructions. A flagman never leaves his post until properly relieved,
- The standard distance shall be maintained at 60 – 100 m but can be altered depending upon the approach speed and site conditions. In urban areas this distance shall be taken as 20 m to 50 m.

7.3.3.4 TRAFFIC MANAGEMENT PRACTICES

Definitions

Road traffic control involves directing vehicular and pedestrian traffic around a construction zone, accident or other road disruption, thus ensuring the safety of emergency response teams, construction workers and the general public.

Working zone:

The Plant Site, construction zone of road *etc.* at which workmen will be working.

Working space:

The space around the works area that will require storing tools, excavated material and other equipment. It is also the space to allow workmen, movement and operation of plant, (e.g. swing of jibs, excavator arms) to move around to do the job. Materials and equipment must not be placed in the zone either. Workmen will only need to enter the zone to maintain cones and other road sign.

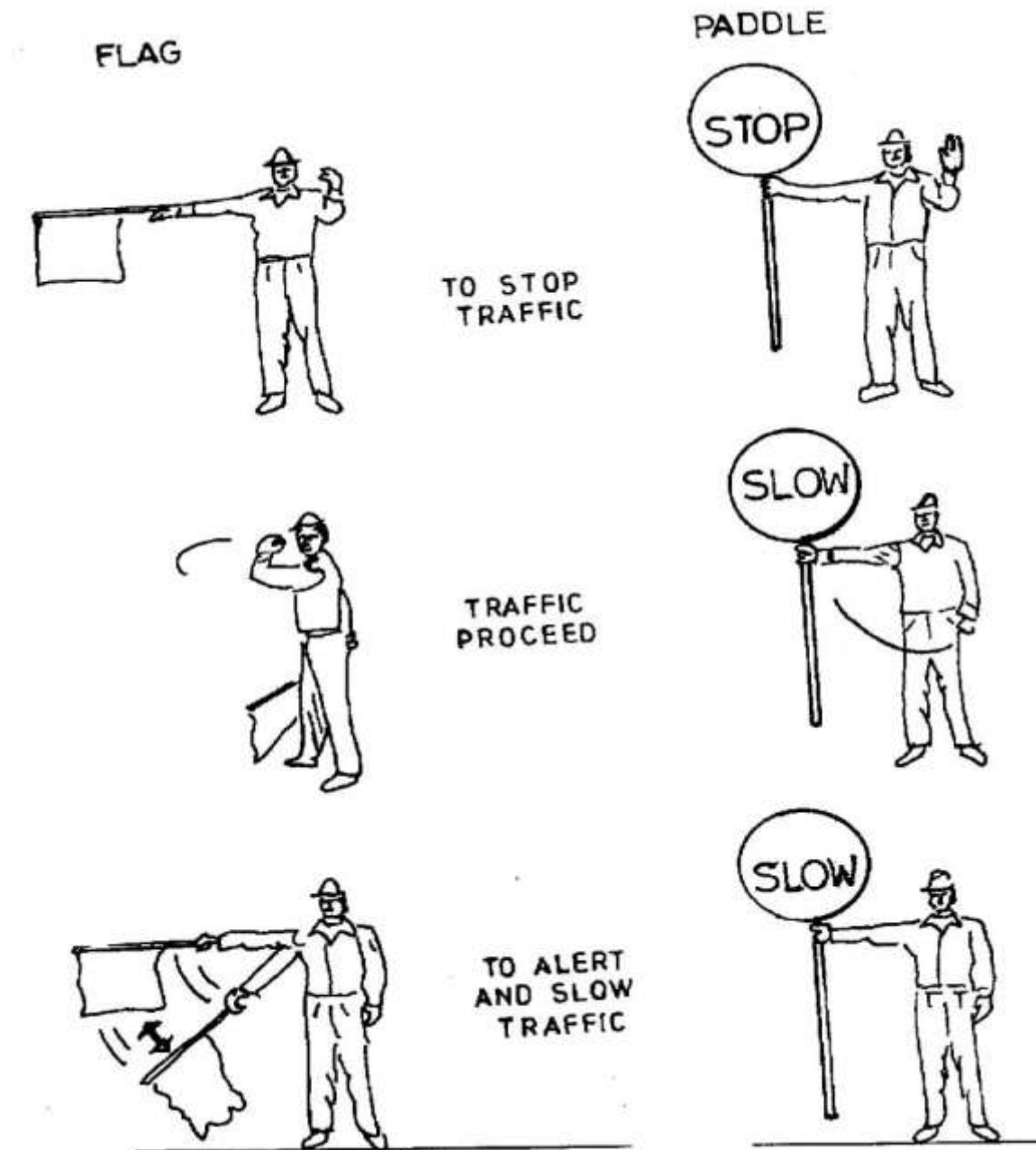


Figure 7-8: Road Signals Traffic Signals

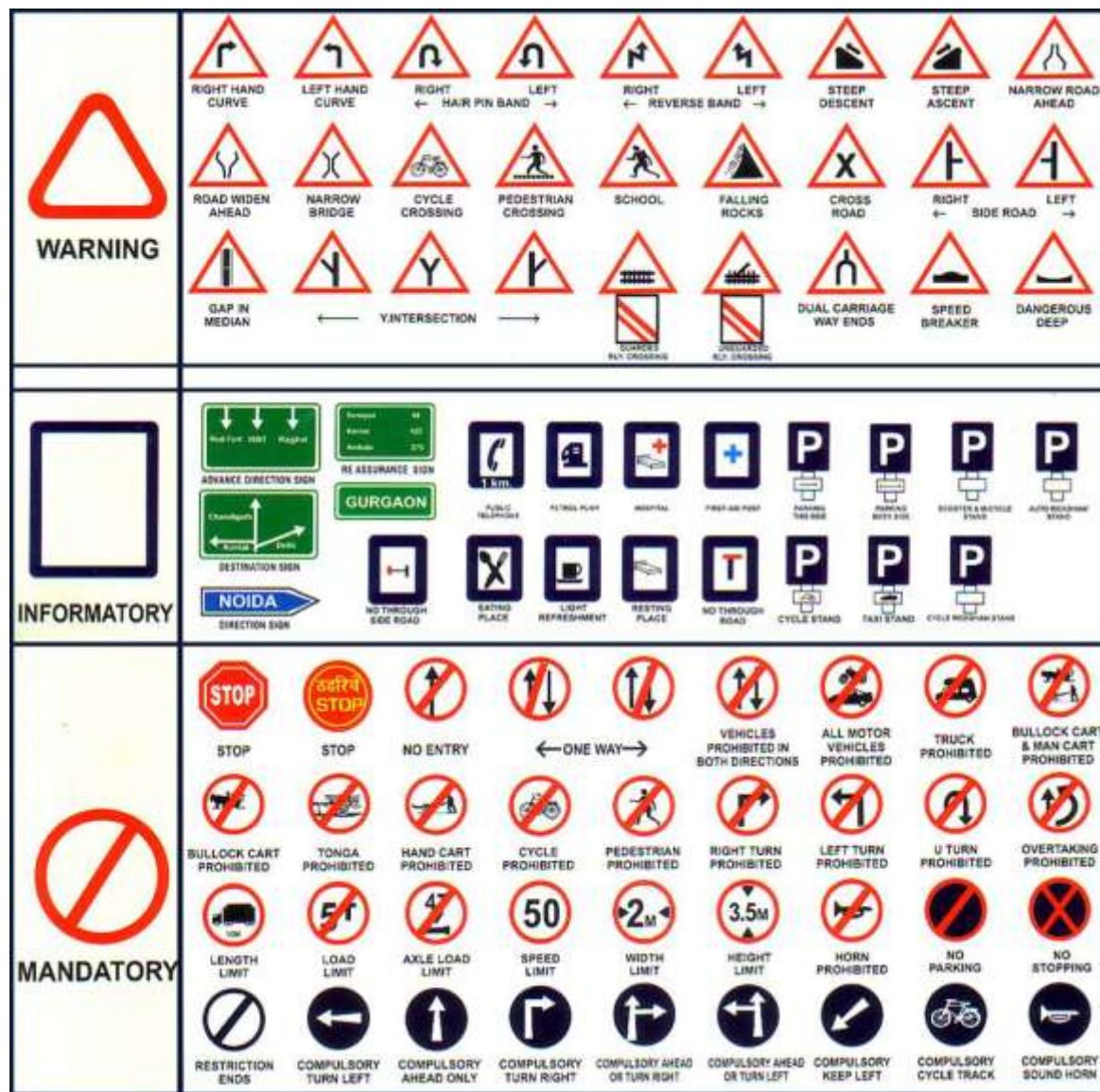


Figure 7-9: Traffic Signals

Safety zone:

The zone that is provided to protect workmen from the traffic and to protect from them.

Approach Transition zone:

This will vary with the speed limit and the width of the works as given in (diag: Traffic Control zone)

Longitudinal buffer zone:

This is the length between the end of the lead-in taper of cones (T) and the working space. It will vary with the speed limit as given in table (Traffic Control zone).

Lateral buffer zone:

This is the width between the working space and moving traffic. It will vary with the speed as given in table (Traffic Control zone). The lateral buffer zone safety clearance is measured from the outside edge of the working space to the bottom of conical sections of the cones on the side nearest to the traffic.

Traffic Management on Road Junction

Construction traffic meets live traffic from quarry/plant/borrow pit

- Where vehicles are more to the approach junction from the side road, permission shall be seek for providing speed breaker at junction from local traffic police and road-authority.
- The layout for signs and traffic control devices.
- Flag man shall be kept in the peak time provided with the traffic circle painted with red and white at the corner at a height of 500 mm, clearly visible to approaching traffic for a distance provided with while gloves and STOP, GO Paddle. And night time flagman should use LED Batons.
- All vehicles from approaching road should be STOP, LOOK and GO.
- Spillage of earth / Gravel / Aggregates / Bituminous mix from the tipper shall be cleaned on regular basis, if required 2 coolies permanently posted for booming.
- All Construction vehicles must follow lane discipline and road signs.

Activities inside Median / Island

- The traffic would discontinue from plying temporarily on the carriageway; for 2 min for reversing & dumping earth / stones / etc., , by the direction of helper and the flagman controls the traffic as shown in Picture- 01 and made continue the traffic and for the next trip repeating the same.
- The construction zone shall be barricaded with standard CMRL barricade.
- One Flagman (refer flag man clause) shall be appointed at traffic coming side of the transition zone.
- No personnel are allowed to come out of the safety zone, unless flagman guidance

CHAPTER 8: PROJECT BENEFITS

8.1 INTRODUCTION

The proposed highway starts from Km 73.800 (near Rampur village) 24°56'25.80"N, 83°47'22.32"E and ends at to Km 131.955 (near Tetaraha village) (previously Km 73.800 to Km 114.000) 24°45'30.75"N, 84° 7'8.37"E in Bihar passing through districts Rohtas & Aurangabad in the state of Bihar.

This is a green field alignment, and is proposed for 4/6-Lane .The proposed length of Project Highway is about 58.155 kms passing through districts Rohats & Auranagabad in the state of Bihar.

The road passes through the districts of Rohats and Auranagabad through important talukas like Shesagar, Sasaram, Tilouthu, Nabinagar and Aurangabad.

Existing carriage away and pavement detail

This is a Greenfield alignment where there is no existing road.This road is proposed to connect from Rampur, Rohtas, to Tetaraha, Aurangabad in Bihar which will be a part of Bharatmala Pariyojana to improve the efficiency of the Freight movement in India. The whole section is proposed to be of Flexible Pavement type confirming to IRC: 37:2018. Rigid pavement shall be constructed in the section(s) for Toll Plaza only. The configuration of the carriageway shall conform to IRC: SP: 84:2014 and the Structures shall be constructed as 4/6 lane configurations. The Proposed ROW of this road is taken as 70 m in non-forest Area and 60 m in Forest areas in which all the configurations shall be fitted with. The proposed access controlled project with new alignment has been envisaged through an area which shall have the advantage of simultaneous development as well as shall result in a shorter distance to travel. The junctions with existing road will be planned in the form of interchanges and flyover to ensure uninterrupted flow of traffic.

The proposed road would act as the prime artery for the economic flow to this region. It will enhance economic development, provide employment opportunities to locals, strengthen tourist development, ensure road safety, and provide better transportation facilities and other facilities such as way side amenities. Vehicle operating cost will also be reduced due to improved connectivity. The compensatory plantation and road side plantation shall further improve the air quality of the region

The Project will further have following benefits at national and regional level:



- **High-speed connectivity and access:** The projected corridor is a proposed economic corridor. This will avoid traffic congestion and speed-up the freight movement.
- **Aiding economic growth:** The seamless connectivity will provide better access to vehicles. The Project will reduce travel time and provide boost to trade and commerce linked to the regions connected through this economic corridor.
- **Growth of backward areas:** The biggest strength of the alignment is that it plans to cover backward districts of Bihar. As a result of connectivity and access to other parts of the country, these backward areas will be aided to integrate with rest of the world. Further, freight and passenger traffic on the economic corridor will help promoting ancillary economy of these regions.
- **Decongestion of existing Highways:** The proposed corridor will take away traffic pressures from existing highways passing through various cities. Also, long-distance traffic will shift to the proposed corridor, thereby leaving the existing NH 19 for regional and local usage.
- **Usage shift:** Long-distance traffic will shift from NH 19 to the proposed Economic Corridor, resulting in lesser congestion on these highways.
- **Improved safety:** Due to access control, the roadway & travel safety of the traffic connecting the cities will be enhanced as there will be minimum distractions & conflict zones.
- **Support to industry:** Different types of industries like Manufacturing, Tourism etc. along the proposed corridor will be facilitated in their business operation and reachability.

8.2 ENVIRONMENTAL BENEFITS FROM THE PROJECT

The environmental benefits from the proposed project have been described below:

- Better level of service in terms of improved riding quality and smooth traffic flow.
- Faster transportation will ultimately lead to massive savings in the form of reduced wear and tear of vehicles, reduced vehicle operating costs and total reduction in transportation costs etc.
- With the improvement in the traffic congestion due to obstructed movement of vehicles will be minimized on the NH 19 and thus wastage of fuel emissions from the vehicles will be reduced.
- Increased road landscaping and safety features.
- Plantation of tree all along the proposed highway will improve the tree density along the RoW which will improve aesthetics as well as trees will act as a pollution absorber.
- The compensatory plantation and road side plantation shall further improve the air quality of the region.
- Overall Environment improvement of the region.



8.3 SOCIO-ECONOMIC BENEFIT OF THE PROJECT

- The proposed project shall generate an employment opportunity to about 1000 persons during construction phase. During operation phase about 100 persons will be employed through the concerned contractor. It shall also generate additional employment opportunities in form of transportation of construction materials, greenbelt development and implementation of EMP.
- During operations phase, the Project will largely have indirect employment benefits in form of highway amenities and through economic & social hubs developed around the Economic Corridor.
- Efficient reach and connectivity to distant markets will further enhance economy of the districts and create employment opportunities.
- Enhanced connectivity between rural & urban population which will benefit all sections of the society like general population, small-medium-large scale industries, farmers, businessmen etc.
- Faster transportation will strengthen tourism opportunity in the area.
- Improved access to higher education facilities & modern health facilities.
- The project will enhance economic development in the area through industrial areas (Aurangabad, Sasaram)
- The project also connects major other city like Aurangabad, Sasaram, Dehri in Bihar state.

8.4 ROAD SAFETY

Indian Road Congress (IRC) codes will be followed in proposing and designing road safety features. Pavement markings will be done for traffic lane line, edge lines and hatching. The marking will be with hot applied thermoplastics materials. The pavement markings will be reinforced with raised RR pavement markers and will be provided for median and shoulder edge longitudinal lines and hatch markings. Highway lightings including high masts will be provided at intersections in order to improve the night time visibility. All the urban locations as well grade separated structure locations will be provided lighting arrangements. The construction of green alignment of New Four/Six Lane national Highway from Rampur village to Tetaraha village Rampur will ensure smooth flow of the traffic. Installation of proper road safety.

8.5 REDUCTION IN VEHICLE OPERATING COST

Vehicle Operating Cost (VOC) will be reduced when the highway is constructed. Fuel consumption, wear and tear of tyres, suspension will be benefited when a geometric of the road is improved. VOC consist of the following components.



- Fuel consumption
- Lubricating oil consumption
- Spare part consumption
- Tyre consumption
- Vehicle depreciation

CHAPTER 9: ENVIRONMENTAL MANAGEMENT PLAN

9.1 INTRODUCTION

The Environmental management Plan (EMP) consists of set of mitigation, monitoring and institutional measures to be taken during the design, construction and operation stages of the project to eliminate adverse environmental impacts, to offset them, or to reduce them to acceptable levels. The plan also includes the action needed for the implementation of these measures. The summary of all activities are provided in **Table 9.1**.

The major components of the Environmental Management plan are:

- Mitigation of potentially adverse impacts;
- Monitoring during project implementation and operation;
- Institutional capacity building and training;
- Implementation schedule and Environmental cost estimates; and
- Integration of EMP with Project planning, design, construction and operation.

9.2 OBJECTIVES OF THE EMP

The main aim of the Environmental Management Plan is to ensure that the various adverse impacts are mitigated and the positive impacts are enhanced. The objectives of the EMP at various stages of the project planning and implementation are as follows:

Design Stage

- To have minimum impact on road side tree, forestation and ground cover;
- To keep land acquisition and building demolition at a minimum;
- To provide maximum safety to the road users and road side communities;
- To develop a design that incorporates environmental safeguards; and
- To provide mitigation measures to all expected environmental degradation due to the project activity.

Constructions Stage

- To prevent and reduce the adverse environmental impacts of the project by implementing mitigation measures; and

- To ensure that the provisions of the EMP are strictly followed and implemented by strengthening implementation arrangements.

Operation Stage

- To prevent deterioration of environment components of air, water, soil, noise etc.
- To improve the safety of the road users and road side communities.

Table 9-1: Environmental Management Plan for Rampur to village Tetarahar

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
PRE CONSTRUCTION AND CONSTRUCTION STAGE				
Land Acquisition, R&R (Throughout the Project Corridor)	The acquisition of land and private properties will be carried out in accordance with the RAP and entitlement Framework for the project. It will be ensured that all R&R activities are to be completed before the construction activity starts, on any section of project area.	District Magistrate	Project Execution Agency	NHAI
Clearance of Encroachment/ Squatters	Advance notice, as per RAP shall be given to the encroachers and squatters which need relocation. All R & R activities will be undertaken. Entitlements as per state govt’s entitlement framework for this project will be completed before construction starts.	Revenue Authorities	Project Execution Agency	NHAI
Tree Cutting (Throughout the Project Corridor)	2357 no of trees have been identified to be removed. If necessary, the trees will be cut as per guidelines of MoEF&CC and forest dept.	Forest Dept.	Project Execution Agency	National Highway Division
Relocation of	All such Community utilities, if required will be relocated	District 41976	Project	National

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Community utilities (Throughout the Project Area)	as per Govt of Bihar rules.	administration	Execution Agency	Highway Division
Relocation of Cultural Property Resources (Throughout the Project Area)	No relocation suggested in the planning stage.	District administration	Project Execution Agency	National Highway Division
Crushers, Hot-mix Plants & Batching Plants	Specifications of crushers, hot mix plants and batching plants will comply with the requirements of the relevant current emission control legislations.	State PCB	Contractor	National Highway Division
Other Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery to be procured for construction will confirm to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 will be strictly adhered to. Noise limits for construction equipments to be procured such as compactors, rollers, front loaders concrete mixers, cranes (moveable), vibrators and saws will not exceed 75 dB (A), measured at one meter	RTO and State PCB	Contractor	National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	from the edge of the equipment in free field, as specified in the Environment (Protection) Rules, 1986.			
Identification and Selection of Material Sources				
Construction Materials	The Contractor will not start borrowing earth from any borrow area until the formal agreement is signed between landowner and Contractor.	Mining Department and State Pollution Control Board.	Contractor	National Highway Division
Stone chips	The Contractor will obtain necessary permission for procurement of materials from Mining Department and State Pollution Control Board. Contractor will also work out haul road network and report to Environmental Expert who will inspect and in turn report to National Highway Division, before approval.	Mining Department and State Pollution Control Board.	Contractor	National Highway Division
Arrangement for Construction Water	The Contractor will source the requirement of water essentially from water supplied by Municipal bodies and cannot use the ponds, which are in use by community. The Contractor will not be allowed to pump from the surface water bodies used by community. In that case,	CGWB, Contractor, and water supplying agency of the area.	Contractor	Environmental Expert of National Highway Division,

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	<p>before using any pond water Contractor will inform the owner. To avoid disruption / disturbance to other water users, the Contractor will extract water from fixed locations and consult the Environmental Expert before finalizing the locations.</p> <p>The Contractor will need to comply with the requirements of the state Ground Water Department and seek their approval for doing so, if inevitable.</p>			
Labour Requirements	The Contractor will use unskilled labour drawn from local communities to avoid any additional stress on the existing facilities (medical services, power, water supply, etc.)	-	Contractor	Environmental Expert and National Highway Division.
Construction Camp Locations- Selection, Design & Layout	<p>Siting of the construction camps to be as per the guidelines presented below</p> <p>Construction camps will not be proposed within 1000 m from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community.</p>	-	Contractor	Environmental Expert of National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	The waste disposal and sewage system for the camp will be designed, built and operated such that no odour is generated.			
	Unless otherwise arranged by the local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Environmental Expert of National Highway Division, will need to be provided by the Contractor.			
Hot Mix Plants and Batching Plant Locations	Hot mix plants and batching plants will be sited sufficiently away from settlements and agricultural operations or any commercial establishments. Such plants will be located at least 1000 m away from the nearest village settlements preferably in the downwind direction.	State Pollution Control Board.	Contractor	Environmental Expert of National Highway Division
Arrangements for Temporary Land Requirement	The Contractor as per prevalent rules will carry out negotiations with the landowners for obtaining their consent for temporary use of lands for construction sites/hot mix		Contractor	National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	plants/traffic detours/ borrow areas etc. The Environmental Expert of National Highway Division, Bihar will be required to ensure that the clearing up of the site prior to handing over to the owner (after construction or completion of the activity) is included in the Concession Agreement.			
Site Clearance				
Construction Wastes Disposal including Fly Ash	The pre-identified dump locations will be a part of comprehensive solid waste management plan to be prepared by the Contractor in consultation with Environmental Expert of National Highway Division.		Contractor	Environmental Expert National Highway Division.
	Location of disposal sites will be finalized prior to completion of the work on any particular section of the project area. The Environmental Expert of National Highway Division will approve these disposal sites. Contractor will ensure that any spoils of material unsuitable will not be disposed off near any water course, agricultural land, and natural habitat like grass lands or pastures. Such			

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	<p>spoils from excavation can be used to reclaim borrow pits and quarries, low-lying area in barren lands along the project corridors.</p> <p>No fly ash will be disposed in any disposal site. Contractor will take care if any residual fly ash (if used) is remain after construction work either this will be returned to the source or used in construction. National Highway Division will keep strict vigil on this aspect.</p> <p>All waste materials will be completely disposed and the site will be fully cleaned before handing over.</p> <p>The Environmental Expert of National Highway Division will certify the site after approval.</p> <p>The Contractor at its cost shall resolve any claim, arising out of waste disposal.</p>			
Stripping, Stocking and Preservation of Top Soils	The topsoil from all areas of cutting and all areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. At least 10% of the temporarily acquired area will be earmarked for storing		Contractor	Environmental Expert of National Highway

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	topsoil and following precautionary measures will be taken to preserve them till they are used: Stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and height of the pile is restricted to 2 m.			Division.
	<p>Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be covered with gunny bags or tarpaulin sheets.</p> <p>It will be ensured by the Contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles.</p> <p>Such stockpiled topsoil will be utilized for covering all disturbed areas including borrow areas, top dressing of the project area embankments and fill slopes filling up of tree pits, in the median, and in the agricultural fields of farmers, acquired temporarily.</p> <p>The management of topsoil shall be reported regularly to the Environmental Expert of National Highway Division.</p>			

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Accessibility	<p>The Contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the project area.</p> <p>The Contractor will also ensure that the existing accesses will not be undertaken without providing adequate provisions to the prior satisfaction of the Environmental Expert of National Highway Division.</p> <p>The Contractor will take care that the cross project areas are constructed in such a sequence that construction work over the adjacent cross project areas are taken up one after one so that traffic movement in any given area not get affected much.</p>	RTO, Traffic dept.	Contractor	Environmental Expert of National Highway Division.
Raw Materials	The Contractor shall obtain materials only from the approved sources after consent of the department of Mining.	Department of Mining,.	Contractor	Environmental Expert of National Highway Division.

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Transporting Construction Materials and Haul Road Management	Contractor will maintain all project areas (existing or built for the project), which are used for transporting construction materials, equipment and machineries. All vehicles delivering materials to the site will be covered to avoid spillage of materials. All existing highways and roads used by vehicles of the Contractor, or any of his sub-Contractor or suppliers of materials and similarly roads, which of all dust/mud dropped by such Vehicles.		Contractor	Environmental Expert of National Highway Division.
	Contractor will arrange for regular water sprinkling at least thrice a day (i.e., morning, noon and evening) for dust suppression of such project areas particularly the earthen project areas. The unloading of materials at construction sites close to settlements will be restricted to daytime only.			
Water				
Construction Water	Contractor will arrange adequate supply and storage of water for the whole construction period at his own costs. Contractor will not open new bore well or	Ground Water Board.	Contractor	Environmental Expert of National

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	extract groundwater without permission from the Ground Water Board.			Highway Division.
	<p>The Contractor will take all precaution to minimize the wastage of water in the construction process/ operation.</p> <p>Contractor will not take water from any irrigation canal or any other surface water bodies without written permission by the competent authority.</p> <p>If Contractor uses any existing source of water, (subject to the provision that any claim arising out of conflicts with other users of the said water body shall be dealt with entirely by the Contractor) (s) he will seek permission from the owner and Environmental Expert of National Highway Division. National Highway Division will ensure that such activity will not deprive the original user of the concern water source (s). Environmental Expert of National Highway Division will also keep a strict vigil on this aspect and it will be reflected in compliance report to MoEF&CC.</p>			
Drainage and Flood	Contractor will ensure that no construction materials like	District	Contractor	Environmental

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Control	<p>earth, stone, ash or appendage disposed off so as not to block the flow of water of any water course, and cross drainage channels.</p> <p>Contractor will take all necessary measures to prevent the blockage of water flow.</p> <p>In addition to the design requirements, the Contractor will take all required measures as directed by the Environmental Expert of National Highway Division to prevent temporary or permanent flooding of the site or any adjacent area.</p>	Administration		Expert of National Highway Division.
Water Pollution from Construction Wastewater	<p>The Contractor will take all precautionary measures to prevent the wastewater during construction from entering directly into streams, water bodies or the irrigation system.</p> <p>The Contractor will strictly follow the discharge standards promulgated under the Environmental Protection Act, 1986.</p> <p>All waste arising from the project is to be disposed off in the manner that is acceptable to the State Pollution Control Board (State PCB).</p> <p>Environmental Expert of National Highway Division, will</p>	State PCB	Contractor	Environmental Expert of National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	certify that all liquid wastes disposed off from the sites meet the discharge standards.			
Siltation of Water Bodies and Degradation of Water Quality	<p>The Contractor will not excavate beds of any stream/ canals/ any other water body.</p> <p>Contractor will construct silt fencing at the base of the embankment construction for the entire perimeter of any water body (including wells) adjacent to the RoW and around the stockpiles at the construction sites close to water bodies. The fencing will be provided prior to commencement of earthworks and continue till the stabilization of the embankment slopes, on the particular sub-section of the road.</p> <p>The Contractor will also put up sedimentation cum grease traps at the outer mouth of the drains located in truck lay bays and bus bays which are ultimately entering into any surface water bodies / water channels with a fall exceeding 1.5 m.</p> <p>Contractor will ensure that construction materials</p>	Dept of Irrigation, Govt.	Environmental Expert of National Highway Division.	National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	containing fine particles stored in an enclosure such that sediment-laden water does not drain into nearby watercourse.			
Slope Protection and Control of Soil Erosion	The Concessionaire will take slope protection measures as per design, or as directed by the Environmental Expert to control soil erosion, sedimentation through use of dykes, sedimentation chambers, basins, fibber mats, mulches, grasses, slope, drains and other devices. All temporary sedimentation, pollution control works and maintenance thereof will be deemed as incidental to the earthwork or other items of work and as no	Dept of Irrigation	Contractor	National Highway Division
	Separate payment will be made for them. Concessionaire will ensure the following aspects: During construction activities on road embankment, the side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub as per design specifications. Turving works will be taken up as soon as possible provided			

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	<p>the season is favorable for the establishment of grass sods. Other measures of slope stabilization will include mulching netting and seeding of batters and drains immediately on completion of earthworks.</p> <p>In borrow pits, the depth of the pits shall be so regulated that the sides of the excavation will have a slope not steeper than 1 vertical to 2 horizontal, from the edge of the final section of the bank.</p> <p>Along sections abutting water bodies, stone pitching as per design specification will protect slopes.</p>			
Water Pollution from Fuel and Lubricants	<p>The Contractor will ensure that all construction vehicleparking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 1000 m from rivers and irrigation canal/ponds or as directed by the Environmental Expert of National Highway Division,.</p> <p>Contractor will ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be</p>	Bihar PCB	Contractor	Environmental Expert of National Highway Division.

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	carried out in such a fashion that spillage of fuels and lubricants will be minimized and does not contaminate the ground. Oil interceptor will be provided for vehicle parking.			
	Contractor will arrange for collection, storing and disposal of oily wastes to the approved disposal sites. All spills and collected petroleum products will be disposed off in accordance with MoEF&CC and State PCB guidelines.			
Air				
Dust Pollution from Batching Plants	All the plants will be sited at least 1 km in the downwind direction from the nearest human settlement Clearance for siting shall be obtained from the State PCB. Alternatively, only approved plants licensed by the State PCB shall be used. Regular water sprinkling should be provided to ensure the dust suppression. The PM10 value at a distance of 50m from a unit located in a cluster should be less than 100 µg/m ³ . The monitoring is to be conducted as per the monitoring plan.	State PCB	Contractor	Environmental Expert of National Highway Division.
Emission from	Contractor will ensure that all vehicles, equipment and	State PCB	Contractor	Environmental

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Construction Vehicles, Equipment and Machineries	machinery used for construction are regularly maintained and confirm that pollution emission levels comply with the relevant requirements of State PCB. The Environmental Expert of National Highway Division, will be required to inspect regularly to ensure the compliance of EMP.			Expert of National Highway Division
Noise				
Noise from Vehicles, Plants and Equipments	<p>The Contractor will confirm the following:</p> <p>All plants and equipment used in construction shall strictly conform to the MoEF&CC/CPCB noise standards. All vehicles and equipment used in construction will be with exhaust silencers. Servicing of all construction vehicles and Machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.</p> <p>Limits for construction equipment used in the project such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB (A) (measured at one meter from the edge of equipment</p>	State PCB	Contractor	Environmental Expert of National Highway Division.

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	<p>in the free field), as specified in the Environment (Protection) rules, 1986.</p> <p>At the construction sites within 150 m of the nearest habitation, noisy construction work such as, concrete mixing, batching will be stopped during the night times between 10.00 pm to 6.00 am.</p> <p>Contractor will provide appropriate noise barriers to their premises. Noise barrier may be of 2 to 3 m high wall separating the sensitive building from noise or it may a green barrier of vegetation having density of minimum 5 m between sensitive location and the highway monitoring shall be carried out near construction site as per monitoring schedule.</p> <p>Environmental Expert of National Highway Division will be required to inspect regularly to ensure the compliance of EMP.</p>			
Safety				
Personal Safety	Contractor will provide:	Office of the	Contractor	Environmental

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Measures for Labours	Protective footwear and protective goggles to all workers employed on mixing asphalt materials, cement, lime mortars, concrete etc. Protective goggles and clothing to workers engaged in stone breaking activities and workers	Factory Inspector		Expert of National Highway Division.
	<p>Will be seated at sufficiently safe intervals.</p> <p>Earplugs to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation.</p> <p>The Contractor will not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.</p> <p>The Contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint.</p> <p>Contractor will provide facemasks for use to the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.</p>	Office of the Labour Commissioner		

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Traffic and Safety	The Contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking, flags, lights and flagmen as may be required by the Environmental Expert of National Highway Division for the information and protection of traffic approaching or passing through the section of any existing cross roads. Any such activity should be reported to traffic police and a prior consent is taken.		Contractor	Environmental Expert of National Highway Division.
Precautionary/Safety Measures during Construction	The Contractor will make sure that during the construction work: All relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 will be adhered to.	Building and other Construction Workers	Contractor	Environmental Expert of National Highway Division
	The Contractor will comply with all the precautions as required for the safety of the workmen as per the International Labor Organization. The Contractor will comply with all regulations regarding	(regulation of Employment and Conditions of Services) Act,		

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.	1996		
Risk from Electrical Equipment (s)	The Contractor will take adequate precautions to prevent danger from electrical equipment i.e. no material will be so stacked or placed as to cause danger or inconvenience to any person or the public.			
	All necessary fencing and lights will be provided to protect the public. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision.	Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996	Contractor	Environmental Expert of National Highway Division.
Risk Force Measure	The Contractor will take all reasonable precaution to prevent danger of the workers and public from fire, flood,	Building and other	Contractor	Environmental Expert of

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	etc.The Contractor will keep emergency arrangement so that incaseofanymishapallnecessarysteps canbetaken for prompt first aid treatment.	Construction Workers		National Highway Division.
First Aid	The Contractor will arrange for a readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules of Bihar at every workplace. Suitable transport to take injured or sick person(s) to the nearest hospital. Equipment and trained nursing staff at every workplace and construction premise.	Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996	Contractor	Environmental Expert of National Highway Division.
Heritage protection and care				
Project area Plantation	The Contractor will do the plantation in their premises as per requirement of the NBCC and Industrial plant's code.	Forest Dept, MoEF&CC	Contractor	Environmental Expert of National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Flora/ Fauna	<p>The Contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal.</p> <p>If any wild animal is found near the construction site at any point of time, the Contractor will immediately upon discovery thereof acquaint the Environmental Expert of National Highway Division and report to the nearby forest office (forest range office or divisional forest office) and will take appropriate steps/ measures, if required in consultation with the forest officials.</p>	Forest Dept, MoEF&CC	Contractor	Environmental Expert of National Highway Division
Archaeological Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government, and shall be dealt with as per provisions of the relevant legislation The Ancient Monuments and Archaeological Sites and Remains Act, 1958.	Archaeological survey of India	Contractor	Environmental Expert of National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Additional Occupational Facility				
Provision of Potable Water	The Contractor will provide, erect and maintain necessary (temporary) livingaccommodationand ancillary facilitiesfor labour up to standards and scales approved by the National Highway Division at the location identified for such facilities in pre-construction phase. The Contractor will provide these facilities within the precincts of every	Building and other Construction Workers	Contractor	Environmental Expert of National Highway Division
	Workplace, latrines and urinals in an accessible place, and the accommodation, as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. The Contractor will construct and maintain all temporary accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. The Contractor will also guarantee the followings: Supply of sufficient quantity of potable water (as per IS 10500) in every workplace/labour campsite at suitable and easily accessible places and regular maintenance of such	(Regulation of Employment and Conditions of Services) Act, 1996	-	-

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	<p>facilities.</p> <p>If any water storage tank is provided that will be kept at a distance of not less than 15 m. from any latrine, drain or other source of pollution.</p> <p>If water is drawn from any existing well, which is within close proximity of any latrine, drain or other source of pollution, the well will be disinfected before water is used for drinking.</p> <p>All such wells will be entirely covered and provided with a trap door, which will be dust proof and waterproof.</p> <p>A reliable pump will be fitted to each covered well. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month.</p> <p>Testing of water will be done every month as per parameters prescribed in IS 10500:1991.</p>			
Sanitation and Sewage System	The Contractor will ensure that the sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the	Building and other Construction	Contactor	Environmental Expert of

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	air, ground water or adjacent water courses take place.	Workers		
	<p>Separate latrine and urinals, screened from those from men (and marked in the vernacular) are provided for women</p> <p>Adequate water supply is there to all latrines and urinals</p> <p>All latrines in workplaces are with dry-earth system (receptacles) which are cleaned at least four times daily and at least twice during working hours and kept in a strict sanitary condition</p> <p>Night soil is disposed off by putting layer of it at the bottom of a permanent tank prepared for the purpose and covering it with 15 cm. layer of waste or refuse and then covering it with a layer of earth for a fortnight.</p>	(regulation of Employment and Conditions of Services) Act, 1996		National Highway Division.
Waste Disposal	<p>The Contractor will provide garbage bins in the premises and regularly emptied and disposed off in a hygienic manner as per the comprehensive Solid Waste Management plan for the labour/ Contractor's premise approved by the Environmental Expert of National Highway Division.</p> <p>Contractor will follow all relevant provisions of the</p>	<p>Building and other Construction Workers (regulation of Employment and</p>	Contractor	Environmental Expert of National Highway Division.

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	<p>Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp.</p> <p>The Contractor will make arrangement for disposal of night soil by composting at the workplace unless otherwise arranged by the local sanitary authority. The composting of night soil will be done as per direction of Environmental Expert of National Highway Division.</p> <p>The Contractor will also ensure that on completion of the work, all temporary structures are cleared, all rubbish are burnt, night soil or other disposal pits or trenches filled in and effectively sealed off.</p> <p>The site will be left clean and tidy, at the Contractor's expense, to the entire satisfaction to the Environmental Expert of National Highway Division.</p>	Conditions of Services) Act, 1996		
Monitoring and Community Participation				
Monitoring of	The Contractor will undertake seasonal monitoring of air,	MoEF&CC	Contractor	Environmental

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Environmental Conditions	water, noise, and soil quality through MoEF&CC approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the monitoring plan Presented in the next section.			Expert of National Highway Division,.
Continuous Community Participation	The Environmental Expert of National Highway Division, Bihar will have continuous interactions with local people around the project area to ensure that the construction activities are not causing undue inconvenience to the locals residing in the vicinity of project site under construction due to noise, dust or disposal of debris etc.	National Highway Division	Environmental Expert of National Highway Division	Environmental Expert of National Highway Division
Cleaning of Construction Premises and Restoration	The Contractor will clear all temporary structures, remove or burn all rubbish, and night soils. All disposal pits or trenches will be filled in and effectively sealed off. Residual topsoil, if any will be distributed on adjoining/ proximate barren land or areas identified by Environmental Expert of National Highway Division in a layer of thickness of 75 mm-150 mm.	Dept of Labour, Govt of Bihar.	Contractor	Environmental Expert of National Highway Division, Bihar.

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Plantation	Avenue plantation (wherever space is available) will be implemented by Contractor. The plantation will be done as per the plantation scheme prepared for this project. The plantation will be carried by Contractor.	Forest Dept,	Contractor	National Highway Division, Bihar.
OPERATION PHASE				
Monitoring Operation Performance	The National Highway Division, Bihar will monitor the operational performance of the various mitigation / enhancement measures carried out as a part of this project. The indicators selected for monitoring include the survival rate of trees, utility of enhancement provision for relocated temples and other important structures, status of rehabilitation of borrow areas and utility of double glazing for noise sensitive receptors.	National Highway Division	Contractor	Environmental Expert of National Highway Division
Environmental Compliance Monitoring				

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
Pollution Monitoring	The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/ contamination in the select location as suggested in pollution monitoring plan in EMP will be responsibility of National Highway Division. National Highway Division will appoint CPCB/MoEF&CC approved pollution monitoring agency for this purpose.	State PCB	Contractor/ National Highway Division	National Highway Division
Atmospheric Pollution	Ambient Air concentrations of various pollutants shall be monitored as envisaged in the pollution-monitoring plan.	State PCB	Contractor	National Highway Division
Ground and Surface Water Analysis	Ground and Surface water has to be analysed as per IS 10500.	State PCB	Contractor	National Highway Division
Noise Pollution	Noise pollution will be monitored as per monitoring plan at sensitive locations. Noise control programs to be enforced strictly. Monitoring of the effectiveness of the pollution attenuation barriers, if there is any will be taken up thrice in the	Bihar State PCB	Contractor	National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	operation period.			
Waste water management	Provision of Soak pit	State PCB	Contractor	National Highway Division
Municipal Solid waste management	Proper disposal	State PCB	Contractor	National Highway Division
Hazardous waste management	Proper disposal	State PCB	Contractor	National Highway Division
Changes in Land Use Pattern	National Highway Division, shall take initiative and act as facilitator to prepare an action plan for balanced regional development in consultation with Local Development Authority and State Government to control the ribbon development along the project area including new bypasses. A land use regulation control, if applicable need to be adopted. A separate governing body may be formed with the	District Administration	National Highway Division, & Local Authorities (Revenue Department and Local Civic	National Highway Division

Environmental Issue	Mitigation Measures	Reference and Authority		
			Implementation	Responsibility
	representation of National Highway Division, Revenue Department and Local Civic Body (Municipal Corporation/ Gram Panchayat) with the power of taking necessary action, if required to remove un-authorized development along the project area. This special body will meet periodically and monitor the development along the project area.		Bodies)	
Orientation of Implementing Agency and Contractors	The National Highway Division, shall organize orientation sessions during all stages of the project. The orientation session shall involve all staff of Environmental Cell, field level implementation staff of National Highway Division, Environmental Expert and Contractor.		Contractor	National Highway Division

9.3 GREEN BELT DEVELOPMENT PLAN

Green belt development plan is formulated as a part of new road construction project. As a part of greenbelt development, plantation shall be carried out in entire open space on the both side of the road and median to enhance floral cover and scenic beauty as well as sink of air pollution and act as noise barrier. Plantation will be carried out as per Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy-2015 and IRC: SP: 21:2009 guidelines.

The species recommended for greenbelt development are given in **Table 9-2**.

Table 9-2: Species recommended for Avenue Plantation

S.NO.	Botanical name/Scientific Name	Local/Kannada name	Location
1	Syzgium cumini	Jamoon	Median Plantation
2	Terminalia belerica	Bahera	Median Plantation
3	Ficus Sp	Peepal, Bagad, Pakud,	Median Plantation
4	Cassia siamea	Saimese Cassia	Median Plantation
5	Acacia auriculiformis	Vilayati babool	Ist RoW
6	Bauhinia sps.	Kachnar	Ist RoW
7	Cassia fistula	Amaltas	Ist RoW
8	Cassia nodosa	Cassia	Ist RoW
9	Delonix regia	Gulmohar	Ist RoW
10	Jacaranda minosaefolia	Jacranda	Ist RoW
11	Peltophorum ferrugineum	Peltophorum	Ist RoW
12	Albizzia lebbek	Kala siris	2nd RoW
13	Dalbergia sissoo	Shisham	2nd RoW
14	Gravillea robusta	Slver Oak	2nd RoW
15	Malia azadiracta	Bakain	2nd RoW
16	Pongamia pinnata	Kanji	2nd RoW
17	Terminalia arjuna	Arjuna	2nd RoW

9.4 EMP Budget

Table 9-3: EMP Budget

Item	Details	No/unit	Rate (Rs)	Total (Rs)
Planning and Construction				
Land Acquisition	Land and Properties	Covered in RAP Cost		
RAP Implementation		Covered in RAP Cost		
Forest Land Diversion		35.546061 ha	6,260,00	2,22,51,834
Horticulture	Compensatory Afforestation to offset the loss of trees due to the project corridor in accordance to the relevant forest laws (Minimum of 2 trees planted for every tree cut) including plantation and maintenance at locations & as per directions of the forest department or administrative department	3.66 Ha (for 3660 trees)	5,00,000	18,30,000
	Half brick circular tree guard as per design provided by the engineer and complete in all respect as per MoRT&H Standard Data book for analysis of rates.	19938	2300	4,58,57,400

Item	Details	No/unit	Rate (Rs)	Total (Rs)
	Avenue plantation on both sides of the highway.	22853	400	91,41,200
Soil	Providing Oil Interceptors as per design and drawing at vehicle parking areas and as per directions of the Environmental Specialist / Environmental Engineer of the Engineer.	1	30,000	30,000
Air	Dust Management with sprinkling of water, covers for vehicles transporting construction material	58.155	30,000	12,06,000
Ground Water Recharge	Rainwater Harvesting Structures complete in all respect and confirming to the relevant specifications as directed by the Engineer and as per drawing approved by Engineer.	112	40,000	44,80,000
Solid Waste Disposal	Disposal of Sewage and other wastes in the construction yard and labour camps as per directions of the Environmental Specialist / Environmental	24	15000	3,60,000

EIA for the Development of 4/6 lane (green field) access control expressway from Varanasi to Kolkata Package-II from Km 73.800 (near Rampur village) to Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) in the state of Bihar under Bharatmala Pariyojana Phase-II (lot-9 package-3). Proposed Length – 58.155 Km

Chapter 9- Environmental Management Plan

Item	Details	No/unit	Rate (Rs)	Total (Rs)
	Engineer of the Engineer.			
Environmental Monitoring	Details provided in EIA report	-	-	3,32,000
	Total (A)			8,54,88,434
Operation				
Environmental Monitoring	Details provided in EIA report	-	-	3,32,000
	Maintenance of plantation			20,00,000
	Watch and ward			5,40,000
	Total (B)			28,72,000
Training				2,50,000
	Total (C)			2,50,000
Contingency		@6%		53,01,626
	Total (D)			53,01,626
	Total A+B+C+D			9,36,62,060

CHAPTER 10: SUMMARY AND CONCLUSION

10.1 INTRODUCTION

The Ministry of Road Transport and Highways (MORTH), Government of India has proposed “Bharatmala Pariyojana” an Umbrella scheme of road development project through National Highways Authority of India (NHAI), National Highway, Industrial Development Corporation Ltd (NHIDCL) and State Public Works Departments (PWD) at an estimated cost of INR 5,35,000 crores. This is the second largest highways construction project in the country after NHDP, where in almost 50,000 km of roads are targeted across the country.

10.2 DESCRIPTION OF THE PROJECT

The Proposed highway starts at village from Km 73.800 (near Rampur village) 24°56'25.80"N, 83°47'22.32"E and ends at Km 131.955 (near Tetarahar village) (previously Km 73.800 to Km 114.000) 24°45'30.75"N, 84° 7'8.37"E in Bihar passing through districts Rohtas & Aurangabad in the state of Bihar.

Scope of present report is confined to the (Ch.73+800 to Ch. 114+000).

The Proposed Right of Way is 70 m in non-forest Area and 60 m in which all the configurations shall be fitted with. This is a green field alignment, and is proposed for 4/6-Lane. The proposed length of Project Highway is about 58.155 kms.

The road passes through the districts of Rohtas & Aurangabad through important towns Chenari, Shesagar, Sasaram, Tilouthu and Nabinagar in the state of Bihar.

Table 10-1: Salient features of the project:

S.no.	Parameters/Issues	Description
1.	Length (km)	58.155
2.	Total land acquired (ha)	407.085
3.	Govt. land (ha)	36.450
4.	Pvt. Land (ha)	361.135
5.	Forest land (ha)	9.6
6.	Area under protected/ important or sensitive species of flora or	NA.

	fauna/Wildlife Sanctuary	
7.	No. of trees	2357
8.	No. of structure to be impacted due to proposed alignment	164
9.	No. of families	85
10.	No. of structure to be constructed	2 Major Bridge, 01 Major Bridge cum Under Passes, 17 Minor Bridge, 26 Minor Bridge cum Under Passes 06 VUP, 21 LVUP, 5 flyovers, 136 Box culverts..
11.	Total water requirement	1250 KL/day. Water will be extracted from surface sources. The ground water will be abstracted for campsite after obtaining the permission from competent authority.
12.	RoW	70 m in genral and 90 m in Hill cutting section as per the requirement keeping in view the fully access controlled Highway with 4/6-lane dual carriageway configuration.
13.	Construction material	Cement (MT)- 44500 Coarse Sand (cum)- 430 Coarse Agg. (cum)- 244250 Fine Agg. (cum)- 488500 Steel (ton)- 1450 Bitumen (ton)- 1845000 Bitumen Emulsion (ton)- 489800 Borrow Earth/Fly Ash (cum)- 2298800

		Steel and Cement would be sourced from Authorized Vendor. Soil, Sand and Aggregate will be procured from operational licensed borrow areas and quarries located around nearby areas. Fly Ash from nearest Thermal Power Stations. However, Steel and Cement would be sourced from Authorized Vendor. Soil, Sand and Aggregate will be procured from operational licensed borrow areas and quarries located around nearby areas. If any new borrow area or quarry site require to be opened, requisite permission will be obtained from concerned department before extraction of materials.
14.	Connectivity	The proposed alignment will be part of Varanasi- Kolkata 4/6 lane expressway will connect cities like Varanasi to Chatra, Hazaribagh, Ramgarh, Ranchi, Bokaro, to the other connected City like Bhabhua, Sasaram, Aurangabad, Gaya Purliya, Bankura, Jamshedpur, Kharagpur, Kolkata e.tc.
15.	Project cost (cr.)	2500 Cr

10.3 DESCRIPTION OF THE ENVIRONMENT

The baseline data was generated during pre-monsoon season of 2022 i.e. March to May 2022. The baseline data has been provided in chapter 3 of this report which shows the values of almost all of the parameters are well within the prescribed limits.

10.4 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

- Slight change in the micro-climate of the area is expected due to Heat Island Effect.
- There will be a marginal rise in PM levels during the construction activities, which shall again be within prescribed limit after the construction activities are over.
- The area is likely to experience a marginal increase in noise level due to increase in vehicle density after construction of the road.
- Contamination to water bodies may result due to spilling of construction materials, oil, grease, fuel and paint etc. This will be more prominent in case of locations where the project road crosses rivers, canals, nallahs, etc. Mitigation measures have been planned to avoid contamination of these water bodies.
- Diversion of forest land has been envisaged for this project. Hence, Forest Clearance under the purview of Forest (Conservation) Act, 1980 is required. The application of forest clearance is under process. Adequate compensatory afforestation has been planned as a mitigation measure. Since the project road is a green field project, acquisition of land shall be required.
- During the construction of the proposed project, the topography may change marginally due to cuts & fills for project road and construction of project related structures etc.
- Provision of construction yard for material handling will also alter the existing topography.

10.5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

Detailed analyses of the alternatives have been conducted taking into account both with and without project. Comparative analysis of all the alternatives has also been conducted. The proposed development of the road is likely to have a positive impact on the economic value of the region. However, there are certain environment and social issues that need to be mitigated for sustainable development.

Three alternatives were studied and the first one was found out to be most suitable.

10.6 ENVIRONMENTAL MONITORING PROGRAM

Regular monitoring of important and crucial environmental parameters is of immense importance to assess the status of environment during operation of the proposed project.

With the knowledge of baseline conditions, the monitoring program can serve as an indicator for any deterioration in environmental conditions due to operation of the project and suitable mitigating steps could be taken in time to safeguard the environment. Monitoring is as important as that of control of pollution since the efficacy of control measures can only be determined by monitoring.

10.7 ADDITIONAL STUDIES

The various additional studies have been undertaken for the project including Public Consultation, Risk assessment and Social Impact Assessment/ R&R Action Plans. Public consultation is a continuous process and has been carried out at all stages throughout the project road. To ascertain the views of the affected families to be recorded and has been included in the Social Impact Assessment report.

10.8 BENEFITS OF THE PROJECT

The benefits of the Project are multi-fold. It will substantially reduce the distance and travel time from SH-67 to NH-119 and Aurangabad to Rohtas and to give connectivity to remote areas and major cities. The project lays emphasis on development of these areas and makes them available with the resources. and the other remote areas falling on the alignment. In addition to the improved connectivity, it will also provide a boost to the economic status of the villages / towns falling in the dedicated Project area.

10.9 ENVIRONMENT MANAGEMENT PLAN

Project specific environmental management plan have been prepared for ensuring the implementation of the proposed measures during construction phase of the project, implementation and supervision responsibilities. The cost for environmental management during construction has been indicated in EMP. The project impacts and management plan suggested thereof are summarized in the chapter.

The Environmental Management Plan (EMP) has been designed within the framework of various regulatory requirements on environmental and Socio-economic aspects aiming at the following:

- Minimize disturbance to native flora and fauna, if any.
- Prevent and to attenuate air, water, soil and noise pollution, if any.
- Encourage the socio-economic development.

The environmental management plan (EMP) would, therefore, consists of following main components:

To integrate potential impacts (positive or negative), environmental mitigation measures, implementation schedule, and monitoring plans.

- To describe the potential environmental impacts and proposed management associated with each stage of the project development.
- To control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the construction and subsequent operational phases of the project.

10.10 CONCLUSION

Based on the EIA study and surveys conducted for the Project, it can be safely concluded that associated potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the measures as stated in the EIA Report. Adequate provisions shall be made in the Project to cover the environmental mitigation and monitoring requirements, and their associated costs as suggested in environmental budget. The proposed project shall improve Road efficiency and bring economic growth. In terms of air and noise quality, the project shall bring considerable improvement to possible exposure levels to population.

CHAPTER 11: DISCLOSURE OF CONSULTANT

Table 11-1: Contact Details

Name of the Consultant	PandM Solution
Address	C-88, Sector 65, Noida-201301 – U.P
Mobile No.	91-9555548342
Name of Laboratories	Noida Testing Laboratory
Address	GT-20, Sector 117 Noida


Quality Council of India
 National Accreditation Board for
 Education & Training
 

CERTIFICATE OF ACCREDITATION

P and M Solution
 First Floor, C-88, Sector-65, Noida, Uttar Pradesh- 201301

Accredited as **Category -A** organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA/EMP reports in the following sectors:

Sl. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals including opencast / underground mining	1	1 (a) (i)	A
2.	River Valley projects	3	1 (c)	B
3.	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	B
4.	Highways,	34	7 (f)	A
5.	Building and construction projects	38	8 (a)	B
6.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in IA AC Minutes dated December 20, 2019 on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/20/1223 dated February 3, 2020. The accreditation needs to be renewed before the expiry date by P and M Solution, Noida following due process of assessment.


Sr. Director, NABET
 Dated: February 3, 2020

Certificate No.
 NABET/EIA/1922/IA0053

Valid till
 Dec 10, 2022

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

Figure 11-1: Accreditation Certificate of EIA Consultant



Figure 11-2: Extension of QCI Accreditation certificate of consultant

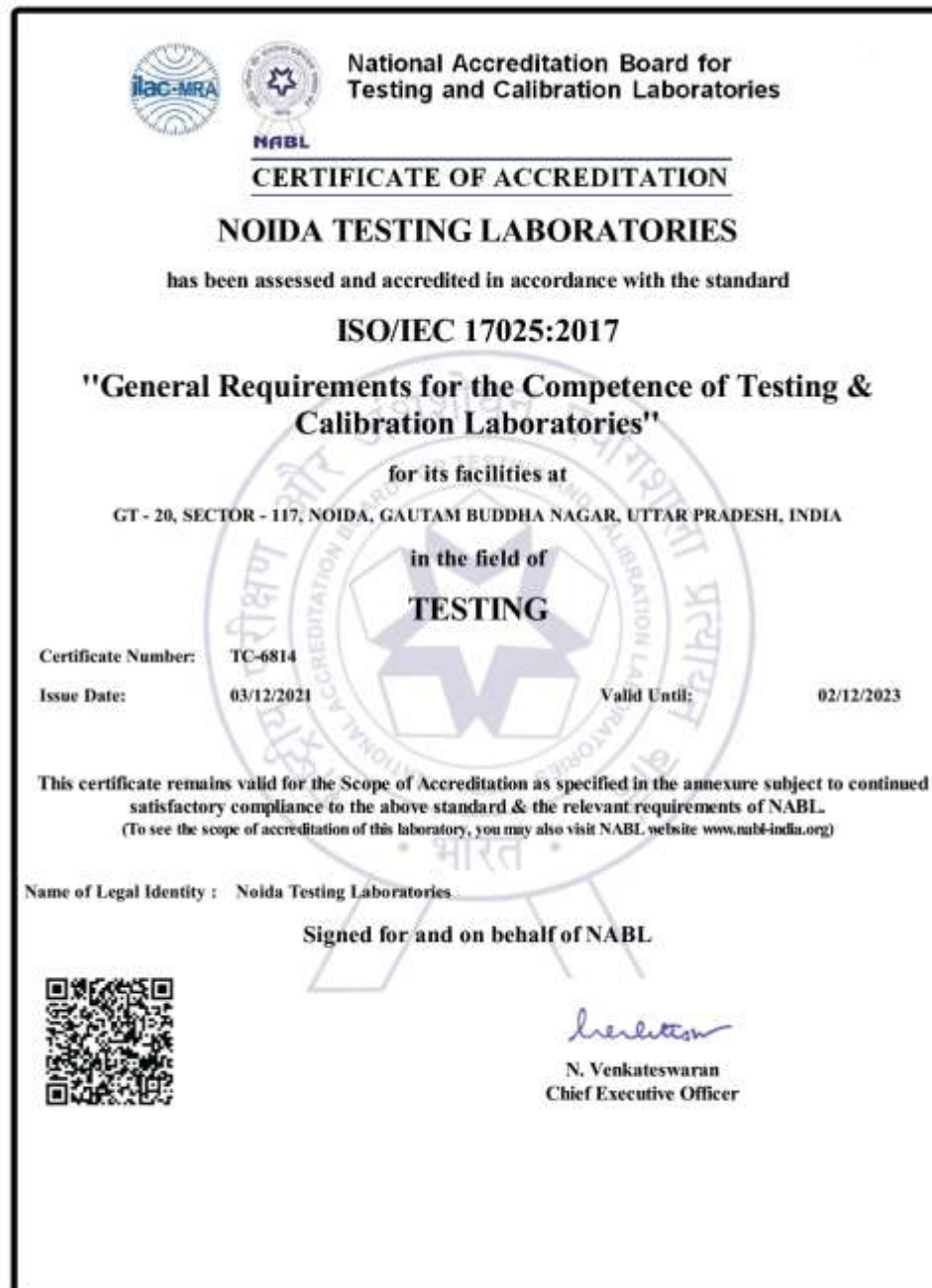


Figure 11-3: Accreditation Certificate of LAB