ORISSA STATE ROAD PROJECT
ENVIRONMENT SCREENING REPORT

EXECUTIVE SUMMARY [+]

1.0 Background

The Government of Orissa (GoO) plans to improve the state road network under Orissa State Road Project (OSRP) with the help of World Bank funding. This project comprises of two components namely upgradation and major maintenance. Under upgradation following project routes are being planned to be improved:

Table – 1: Project Corridors Selected for Improvement

Name of the Corridor	Length (km)	Road Identification
Jagatpur--Kendrapara--	99	SH 9A
Chandabali—Bhadrak--	53	SH 9
Bhadrak--Anandpur--	122	SH 53
Karanjia--Jashipur	15	SH 49
Khariar—Bhawanipatna	70	SH 16
Bhawanipatna— Muniguda	68	SH 6
Muniguda—Rayagada	50	SH 5
Rayagada—Kerada	25	MDR-48B
Berahampur--JK Pore (Rayagada)	50	SH 17
	51	SH 4
Banarpal—Daspalla	89	MDR 18 & 19
Dasapalla—Bhanjanagar *	61	SH 37
Aska--Bhanjanagar	38	SH7

* *Recently Included*

At present all project routes are single to intermediate lane. The planned improvement includes two lane carriageways with hard shoulders. The improvements have been planned by carrying out economic viability of each project route. The OSRP project will provide faster traffic movement and project benefits in terms of reduction in vehicle operation costs (VOC) and travel time. The planned up-gradation may result into some adverse environmental impacts.

2.0 Scope and Purpose *of Environmental Screening*

In the present case work defined under the ToR of project has been considered. The environmental screening is taken up to make a preliminary assessment /

[+] The environmental screening has been prepared as a stand-alone document for disclosure. Specific data / details can be referred in the main report with the Chief Engineer, Project Implementation Unit, World Bank Projects, Nirman Soudha, Keshari Nagar, Bhubaneswar-5.

review of environmental issues that are relevant to OSRP and to make project environmentally sound and sustainable. The screening has also done scooping of Environmental Assessment, which is a subsequent activity in the project. The recommendations of environmental screening will help design team and OSRP in assessing technical, economic and financial feasibility of project. The aspects of environmental screening have also recommended possible modifications in preliminary project Design.

3.0 Environmental Screening Methodology

The environmental screening has been completed in the following steps:

- *Through study of background information on OSRP project and related policy and legal issues;*
- *Through collection of data from secondary sources;*
- *Through reconnaissance survey of all project routes and project influence area;*
- *Through collection of data for environmental screening and preparation of strip maps;*
- *Through analysis of environmental screening data;*
- *Through preparation of screening matrix;*
- *Through ranking project corridors from environmental considerations; and*
- *Scoping for EA and recommendations for preliminary project design.*

The above steps have been completed through identification of relevant sub parameters in Natural, ecological and physical components of environment. These identified sub parameters have been assigned scores and each project corridor has been assessed based on evaluation criteria evolved on the basis of available baseline data. The sub parameters identified and total score assigned have been given below in **Table – 2**.

Table - 2: Environmental Parameters - Weightage Assigned

Sl. No.	***Parameters***	***Weightage Assigned***
1	***Natural Environment***	***34***
	(i) Material Sources	
	(ii) Soil Erosion	*08*
	(iii) Drainage and Water Logging	*08*
	(iv) Noise	*08*
	(v) Water bodies (River / Canals / Ponds)	*03*
	(vi) Air Quality	*04*
		03

2	***Ecological Environment***	***50***
	(i) Wild Life	*12*
	(ii) Forest (RF/PF)	*12*
	(iii) Number of Trees in RoW	*08*
	(iv) Green Tunnels and Giant Trees	*08*
	(v) National Park and Wild Life Sanctuaries	*10*
3	***Physical Environment***	***16***
	(i) School / Hospital / College	*04*
	(ii) Common Property Resources (Religious Structures and water sources)	*04*
	(iii) Residential Properties	*04*
	(iv) Commercial Structures	*04*

Based on evaluation criteria evolved a comparative score has been obtained for each sub environmental parameters and overall score for each project corridor has been obtained. This has helped in ranking all corridors from environmental considerations.

4.0 Valued Environmental Components (VECs) in Context of OSRP

The valued environmental component is defined as social a biophysical component of an environment, which is of value (for any reason) in a project influence area (PIA). Based on analysis of screening data and reconnaissance survey following VECs have been identified for OSRP.

a) Natural Environment

- *(i) Material Source*
- *(ii) Soil Erosion*
- *(iii) Drainage and Water Logging*
- *(iv) Noise*
- *(v) Water bodies (River / Canal / Pond)*
- *(vi) Air Quality*

b) Ecological Environment

- *(i) Wild Life in Project Influence Area (PIA)*
- *(ii) Reserved / Protected Forest along project road*
- *(iii) Plantation in RoW*
- *(iv) Green Tunnels and Giant Trees*
- ***(v)*** *National Park / Wild Life Sanctuaries*

c) Physical Environment

(i) Common Property Resources (School / Hospital / College)
(ii) Religious Structures (Temple / Mosque / Mazars / Chabutra) and Water sources (well, hand pumps, tube wells)
(iii) Residential Structures
(iv) Commercial Structures

5.0 Policy, Legal and Administrative Frame Work

5.1 World Bank Requirements

The project has been categorized as category 'A' project as per World Bank classification. Due to this, a full environmental assessment has been initiated. Subsequently there will be independent environmental review through an independent reviewer.

5.2 Statutory Requirements

The applicability of environmental and other relevant rules and acts has been assessed. Based on detailed assessment in the environmental screening, it has been concluded that OSRP will require following clearances:

Table – 3: Summary of Clearance Requirements

Sl. No.	*Type of Clearance*	*Project Stage*	*Responsible Agency for Obtaining Clearance*	*Time Required*
1	*NOC from OSPCB*	*Pre Construction*	*Orissa Works Department*	*2-3 Months*
2	*Environmental Clearance from MoEF*	*Pre Construction*	*Orissa Works Department*	*3-4 Months*
3	*Forest Clearance*	*Pre Construction*	*Orissa Works Department*	*6-8 Months*
4	*NOC and consents under Air and Water Act stage (Prior to initiation of any work) for establishment of construction camp*	*Construction stage (Prior to initiation of any work)*	*Respective contractors of Project roads*	*2-3 Months*
5	*Explosive License for storing fuel oil, lubricants, diesel, etc. at construction camp from Chief Controller of Explosives, Nagpur*	*Constrcution stage (Prior to initiation of any work)*	*Respective contractors of project roads*	*2-3 Months*

6.0 Baseline Environmental Scenario

*The consultants have collected baseline data during reconnaissance visit, survey for strip maps, discussion with PWD and locals. This data along with likely impacts has been presented in **Tables - 4** and **5**.*

The construction material sources have been identified close to respective project corridors. The materials will be transported using haul roads. The distance of quarries from project corridors varies from 0.10 – 15.0km.

Table –4: Route Specific Environmental Impacts

Sl. No.	Corridor Name	Environmental Impacts					
		Wild life	Soil Erosion	Drainage & Water Logging	Water bodies	Trees	Forest
1.	Jagarpur – Kendrapara – Chandbali	Yes, Bhitar kanika crocodile sanctuaries within 8.0km	Yes, on Approaches of bridges at Baitarani, Kharasota and Brahamini	None	Yes impact on two rivers Baitarani, Kharasota & Brahmani	No Significant Trees to be cut. Total trees 7888	No Presence of forest along project route
2.	Chandbali - Bhadrak	No	Yes 2.8km length prone to erosion	Between motto and Tihidi (500m)	None	Some significant trees to be cut. Total trees 5268	No presence of forest along project route
3.	Bhadrak - Karanjia	Yes Simbipal Tigar Reserve at about 10km	No impact	None	Yes	No Significant Trees to be cut. Total trees 14168	Yes impact on forest in 32km length
4.	Karanjia - Jashipur	No	No impact	None	None	Not significant. cutting of trees Total trees 2141	No impact
5.	Rayagada - Bhawanipatna	Yes Karlapat Wild Life Park at about 20km	14km length prone to soil erosion Animal crossing - one	Yes 400m	None	Maximum number of trees present in RoW. Total trees 23811	Yes Impact on 13km forest length
6.	Bhawanitpatna - Khariar	Yes Karlapat Wild Life Park at about 20km	No impact	Yes In about 500m length water logging problem	Yes Impact on Tel Nadi	Old trees of Tamarind and ficus. One side cutting proposed. Total trees 5199	No impact on forest
7.	Rayagada - Kereda	No impact	None	Yes about 2.0km length prone to water	Yes Langulia river	Total trees to be cut 3490	No impact on forest

				logging			
8.	Berahampur - Rayagada	Yes Lakhari Valley Sanctuary at 5km. Animal crossing at 2 locations.	33km prone to soil erosion	Yes about 1.2km length	Yes Basudhra river and two reservoirs	Giant trees and green tunnel in 18.0km Total trees 20277	Yes impaction 120km forest length
9.	Aska – Bhanj Nagar	None	No impact	None	Yes impact on Rishikulia River	Impact on 8km green Tunnel Total trees 2962	No forest
10.	Banarpal - Daspalla	Yes, Gharial Sanctuary at 40km. No significant impact Animal crossing - one	6km length prone to flooding.	About 4.0km length prone to flooding	Yes impact on Mahanadi River	Green tunnel in 5.5km Total trees 8149	Yes impact on 3.5km of project length

Table – 5: Route Specific Environmental Impacts (Contd.)

Sl. No.	Name of Corridor	Water Resources	Religious Structures	Residential Structures	Commercial Structures	Hospitals / Nursing Home
1.	Jagarpur – Kendrapara – Chandbali	Yes, impact on 04 water resources	47 structures likely to be impacted	321 Structures likely to be impacted	1945 Structures likely to be impacted	Yes 02 hospitals likely to be impacted
2.	Chandbali - Bhadrak	Yes, impact on 02 water resources	43 structures likely to be impacted			Yes 02 hospitals likely to be impacted

3.	Bhadrak - Karanjia	Yes, impact on 03 water resources	25 structures likely to be impacted	160 Structures likely to be impacted	962 Structures likely to be impacted	Yes 02 hospitals likely to be impacted
4.	Karanjia – Jashipur-Tangabilla	Yes, impact on 02 water resources	One structures likely to impacted			No hospitals likely to be impacted
5.	Rayagada - Bhawanipatna	Yes, impact on 03water resources	19 structures likely to impacted	377 Structures likely to be impacted	508 Structures likely to be impacted	Yes 06 hospitals likely to be impacted
6.	Bhawanitpatna - Khariar	No Impact	125 structures likely to impacted			Yes 02 hospitals likely to be impacted
7.	Rayagada - Kereda	Yes, impact on 01water resource	05 structures likely to impacted			Yes 01 hospital in COI
8.	Berahampur - Rayagada	Yes, impact on 03water resources	48 structures likely to impacted	1047 Structures likely to be impacted	233 Structures likely to be impacted	Yes 04 hospitals in COI
9.	Aska – Bhanj Nagar	Yes, 05 water resources likely to be impacted	178 structures likely to impacted	949 Structures likely to be impacted	488 Structures likely to be impacted	Yes 06 hospitals in COI
10.	Banarpal - Daspalla	Yes, 03 water resources likely to be impacted	22 structures likely to impacted			Yes 01 hospital in COI

Note: Water Resources means Hand Pumps / Wells and Tube Wells in COI.

Orissa State is rich in biodiversity; a number of wild life parks and sanctuaries are located close to project routes. The details of these have been given in ***Table – 6****.*

Table - 6: Wild Life Sanctuaries Close to Project Routes

Project Corridor	***Districts***	***Places***	***Importance***	***Nearest Distance from project corridor Kms***
Jagatpur-Kendrapada - Chandbali	*Kendrapada*	*Bhitarkanika sanctuary*	*Located in the second largest mangrove forest in the east coast, the sanctuary has protected estuarine crocodiles since 1975. Located slightly further away is the coastal area of Gahirmatha marine sanctuary , where the olive ridley sea turtles, traveling annually from as far away India Ocean nest in the lakh.*	*7 to 8 km*
	Cuttack	*Nandankanan*	*A zoo famous for white tigers*	*20 (Jagatpur)*
Anandapur-Karanjia	*Mayurbhanj*	*Similpal Tiger Reserve*	*It is a 2750 Kms. park especially chosen by for conserving the country's deteriorating tiger population. One of India's tiger reserves Similpal has over more than 95 tigers within the lavish bounds of the sanctuary. leopards, elephants, mugger crocodiles and numerous reptiles abound here and over 231 species of birds. Simipal is also a part of elephant reserve.*	*10*
Khariar-Bhawanipatna-Bhawanipatna-Rayagada	*Kalahandi*	*Karlapat*	*About 20 Kms from Bhawanipatna, the district headquarters of Kalahandi, on Bhawanipatna Thuamula Rampur route, Karlapat is famous for wildlife. Tigers, Leopards, Elephants, Gaur and Samabar Chitals have rich presence in these forest tracts.*	*20*
Berahampur-Taptapani-Rayagada	*Gajapati*	*Lakhari Valley Sanctuary*	*Located in Gajapati, it has a huge concentration of elephants and other wildlife animals.*	*Adjacent 4 -5*
Banarpal-Daspalla	*Angul*	*Gharial Sanctuary*	*The Gharial sanctuary at Tikarapara is a must see for wildlife fans. Located at about 211 Kms from BBSR and 58 Kms from Angul*	*40*

Some of the project routes pass through reserved forests and some are close to reserved forests. The details of reserved forests along project routes has been summarized below:

Table -7: Reserve and Protected Forest Along Project Routes

Sl. No.	***Project Routes***	***Protected Forest***	***Reserve Forest (Nos.)***	***PIA of project routes through Forest area (Km)***	***Percentage to Road Length***
1	*Jagatpur-Kendrapada* *Kendrapada-Chandbali* *Chandbali- Bhadrak*	*NIL* *NIL* *NIL*	*NIL* *NIL* *NIL*	—	*0*
2	*Bhadrak-Anandapur* *Anandapur-Karanjia*	*NIL*	*02*	***Approx. 28 kms***	*22.53*
	Karanjia-Jashipur	*NIL*	*02*	***Approx. 4 kms***	
3	*Khariar Bhawanipatna* *Bhawanipatna-Rayagada* *Rayagada-Kerada*	*NIL* *NIL* *NIL*	*NIL* *02* *NIL*	***Approx. 13kms***	*6.08*
4	***Berahampur-Rayagada***	*NIL*	*02*	***Approx. 120Kms***	*58.54*
5	*Aska- Bhanjanagar* *Banarpal -Daspalla*	*NIL* *NIL*	*NIL* *01*	***Approx. 3.5 Kms***	*2.76*

The dominant species of trees available in PIA are Neem, Charanji, Palas, Shishum, Mahua, Imli, Sal, Jamun, Bahera and Arjun. Routewise estimations have been done for number of trees in RoW. These estimated number of trees are given in ***Table – 8*** *below.*

Table - 8: No of Trees with in RoW

Sl. No.	*Project Route*	*Length*	*No. of Trees*	*Trees per Km.*	** Rank*
1	*Jagatpur-Kendrapada-Chandbali*	*99*	*7888*	*78.8*	***3***
2	*Chandbali-Bhadrak*	*53*	*5268*	*99.39*	***6***
3	*Bhadrak-Anandpur-Karanjia*	*111*	*14168*	*129.11*	***7***
4	*Karanjia-Jashipur*	*15*	*2141*	*142.73*	***9***
5	*Khariar-Bhawanipatna*	*70*	*5199*	*74.27*	***1***
6	*Bhawanipatna-Muniguda-Rayagada*	*119*	*23811*	*200.55*	***10***
7	*Rayagada-Kerada*	*25*	*3490*	*139.6*	***8***
8	*Berahampur-Rayagada*	*205*	*20277*	*98.91*	***5***
9	*Aska-Bhanjanagar*	*38*	*2962*	*77.94*	***2***
10	*Banarpal-Daspalla*	*89*	*8149*	*91.56*	***4***

**** Higher tree density – Higher Rank – More Sensitivity***

Locations of green tunnels and availability of giant trees has been found in about 13.0km length on Bhawanipatna – Rayagada, 15.0km on Berahampur –Rayagada, 8km on Aska – Bhanjnagar and 5.50km on Banarpal –Daspalla project routes. Medicinal plants have been found to exist along Bhawanipatna – Rayagada and Berahampur – Rayagada corridors.

In the physical resources schools, colleges, hospitals and religions structures details have been covered in corridor of impact (COI). The summary of these structures is given in ***Table – 9*** *below:*

Table -9: Schools, Colleges, Hospitals & Religious Structures

Sl. No.	*Project Route*	*Kms*	*Environmental Features*				
			Religious Structures	*Avg/Km*	*School / College*	*Avg/ Km*	*Hospitals*
1	*Jagatpur – Kendrapada - Chandbali*	*99*	*47*	*0.48*	*30*	*0.30*	*02*
2	*Chandbali - Bhadrak*	*53*	*43*	*0.81*	*21*	*0.40*	*02*
3	*Bhadrak – Anandapur - Karanjia*	*127*	*25*	*0.20*	*36*	*0.28*	*02*
4.	*Karanjia - Jashipur*	*15*	*1*	*0.07*	*0*	*0*	
5	*Rayagada -*	*119*	*19*	*0.16*	*21*	*0.18*	*06*

	Bhawanipatna						
6	*Bhawanipatna - Khariar*	*70*	*12*	*0.17*	*23*	*0.33*	
7	*Rayagada - Kerada*	*25*	*05*	*0.2*	*04*	*0.16*	*01*
8	*Berhampur - Rayagada*	*205*	*48*	*0.23*	*44*	*0.21*	*04*
9	*Aska- Bhanjanagar*	*38*	*17*	*0.45*	*24*	*0.63*	*06*
10	*Banarpal - Daspalla*	*89*	*22*	*0.25*	*28*	*0.31*	*01*

The residential, commercial, residential plus commercial structures in corridor of impact have been identified by the social team. The details of these are given in ***Table –10*** *below:*

Table -10: Residential / Commercial Structures

Sl. No.	***Project Route***	***Length Km.***	***Environmental Features***					
			Kiosks	***Residential (R)***	***Commercial (C)***	***R & C***	***Commercial per km***	***Residential + R & C per km***
1	*Jagatpur – Kendrapada - Chandbali*	*152*	*1414*	*321*	*1768*	*177*	*11.63*	*3.27*
2	*Chandbali - Bhadrak*							
3	*Bhadrak – Anandapur - Karanjia*	*142*	*599*	*160*	*876*	*86*	*6.16*	*1.73*
4	*Karanjia - Jashipur*							
5	*Rayagada - Bhawanipatna*	*213*	*257*	*377*	*296*	*212*	*1.38*	*2.76*
6	*Bhawanipatna - Khariar*							
7	*Rayagada - Kerada*							
8	*Berahampur - Rayagada*	*201*	*477*	*1047*	*233*	*1159*	*1.16*	*10.98*
9	*Aska- Bhanjanagar*	*133*	*493*	*949*	*488*	*389*	*3.66*	*10.10*
10	*Banarpal - Daspalla*							

Total land acquisition has been estimated as 181 Hectares. Out of this land about 72% is agriculture, 16Ha is forest and balance land is in miscellaneous uses.

The ground water table depth is 5 to 8m. The water aquifer is unconfined and is in crack form. The water is sweet.

The climate of Orissa is characterized by a very hot and dry summer and well-distributed rains during monsoon season followed by distinct cold season. It is characterized by three major seasons namely winter, summer and monsoon. The extreme temperatures in winter and summer months are 6 and 46.0deg.C respectively. The project routes areas receive an annual rainfall of over 1000mm.

7.0 Environmental Evaluation of Project Corridors

Based on baseline data collected, evaluation criteria established and environmental attributes selected a comparative evaluation has been done for all project corridors. The scores obtained by each project route have been given in Environmental Screening matrix given in ***Table – 11*** *below:*

Table – 11: Environmental Screening Matrix /Results

Sl. No.	Environmental Attribute	Total Score	Score Allocated to Project Route *									
			1	2	3	4	5	6	7	8	9	10
1	**Ecological Resources**											
	i. Wild Life	12	-	-	12	3	10	-	-	6	2	8
	ii. Reserve / P.F.	12	-	-	10	6	8	-	-	9	6	3
	iii. Sanctuaries	10	4	-	8	4	2	-	-	4	-	3
	iv. No. of Trees	8	2	4	6	7	8	1	6	4	2	3
	v. Green Tunnels	8	6	6	2	-	2	7	3	4	3	-
	Sub Total	**50**	**12**	**10**	**38**	**20**	**30**	**8**	**9**	**27**	**13**	**17**
2	**Natural Resources**											
	i. Cons. Materials	8	2	2	2	-	7	3	3	6	4	6
	ii. Soil Erosion	8	4	2	2	-	4	-	5	3	-	3
	iii. Water logging	8	-	3	-	-	3	3	3	6	-	6

	iv. Rivers/Canals X	*4*	*3*	*3*	*-*	*-*	*2*	*2*	*3*	*2*	*3*	*2*
	v. Air Quality	*3*	*1*	*1*	*2*	*2*	*2*	*2*	*1*	*2*	*1*	*2*
	vi. Noise Level	*3*	*1*	*1*	*3*	*2*	*2*	*2*	*1*	*2*	*2*	*2*
	Sub Total	***34***	***11***	***12***	***9***	***4***	***20***	***12***	***16***	***21***	***10***	***21***
3	***Physical Resources***											
	i. Colleges, Hospitals	*4*	*2*	*2*	*2*	*-*	*1*	*2*	*1*	*1*	*3*	*3*
	ii. Religious Stru.	*4*	*1*	*1*	*-*	*1*	*1*	*2*	*1*	*1*	*3*	*3*
	iii. Water outlets	*4*	*1*	*1*	*1*	*2*	*1*	*1*	*1*	*1*	*2*	*2*
	iv. Resi/Comm./Stru.	*4*	*4*	*4*	*2*	*2*	*1*	*1*	*1*	*2*	*2*	*2*
	v. Sub Total	***16***	***8***	***8***	***5***	***5***	***4***	***6***	***4***	***5***	***10***	***10***
	Overall Score	***100***	***31***	***30***	***52***	***29***	***54***	***26***	***29***	***53***	***33***	***48***

**** Project Routes***

1. *Jagatpur – Kendrapara – Chandbali*
2. *Chandbali – Bhadrak*
3. *Bhadrak-Karanjia*
4. *Karanjia – Jashipur*
5. *Rayagada – Bhawanipatna*
6. *Bhawanipatna – Khariar*
7. *Rayagada – Kereda*
8. *Berahampur – Rayagada*
9. *Aska – Bhanj Nagar*
10. *Banarpal – Daspalla*

Based on above scores ranking of project routes and priority from environmental angle has been given in ***Table – 12*** *below:*

Table – 12: Ranking of project Routes From Environmental Considerations and Priority

Sl. No.	*Project Route*	*Score*	*Rank*	*Priority from Environmental Angle*
1.	*Jagatpur – Kendrapara - Chandbali*	*31*	*4*	*06*
2.	*Chandbali - Bhadrak*	*30*	*3*	*07*
3.	*Bhadrak - Karanjia*	*52*	*7*	*03*
4.	*Karanjia - Jashipur*	*29*	*2*	*08*
5.	*Rayagada – Bhwanipatna*	*54*	*9*	*01*
6.	*Bhwanipatna - Khariar*	*26*	*1*	*09*
7.	*Rayagada - Kareda*	*29*	*2*	*08*
8.	*Berahampur - Rayagada*	*53*	*8*	*2*
9.	*Aska – BhanjNagar*	*33*	*5*	*05*
10.	*Banarpal - Daspalla*	*48*	*6*	*04*

8.0 *Environmental Impacts*

The adverse environmental impacts will be on account of following:

- *Land acquisition for widening and impacts on common property resources.*
- *Tree cutting for required widening;*
- *Disturbance to fauna due to cutting of trees and increased traffic;*
- *Increased air and noise pollution during construction; and*
- *Disturbance to water resources and change in drainage pattern.*

Based on score obtained by various environmental attributes the impacts have been categorized in to the following categories. The criteria of categorization has been explained below:

Sl. No.	*Impact Category*	*Score Limit*
1.	*Low*	*<30%*
2.	*Medium*	*30-50%*
3.	*High*	*50-80%*
4.	*Very High*	*>80%*

*Based on overall scores indicated in **section 6.5** the ranking of project routes has been done from environmental point of view. This has been presented below:*

*The impacts based on above criteria have been summarized in **Table –13** given below:*

Table –13: Qualitative Impacts on Various Environmental Attributes

Sl. No.	Environmental Attribute	Total Score	Impacts Project Route *									
			1	2	3	4	5	6	7	8	9	10
1	**Ecological Resources**											
	(i.) Wild Life		L	L	VH	L	H	L	L	M	L	H
	(ii.) Reserve / P.F.		L	L	H	M	H	L	L	H	M	L
	(iii.) Sanctuaries		M	L	H	M	L	L	L	M	L	L
	(iv.) No. of Trees		L	M	H	H	VH	L	H	M	L	L
	(v.) Green Tunnels		H	H	L	L	L	VH	M	M	M	L
2	**Natural Resources**											
	(i.) Cons. Materials		L	L	L	L	H	M	M	H	M	H
	(ii.) Soil Erosion		M	L	L	L	M	L	H	M	L	M
	(iii.) Water logging		L	M	L	L	M	M	M	H	L	H
	(iv.) Rivers/Canals X		H	H	L	L	M	M	H	M	H	M
	(v.) Air Quality		M	M	H	H	H	H	M	H	M	H
	(vi.) Noise Level		M	M	VH	H	M	H	M	H	H	H
3	**Physical Resources**											
	(i.) Colleges, Hospitals		M	M	M	L	L	M	L	L	H	H
	(ii.) Religious Stru.		L	L	L	L	L	M	L	L	H	H
	(iii.) Water outlets		L	L	L	M	L	L	L	L	M	M
	(iv.) Resi/Comm./Stru.		VH	VH	M	M	L	L	L	M	M	M
	Overall Score											

**** Project routes, VH – Very High, H – High, M – Medium, L - Low***

**** Project Routes***

1. *Jagatpur – Kendrapara – Chandbali*
2. *Chandbali – Bhadrak*
3. *Bhadrak-Karanjia*
4. *Karanjia – Jashipur*
5. *Rayagada – Bhawanipatna*
6. *Bhawanipatna – Khariar*
7. *Rayagada – Kereda*
8. *Berahampur – Rayagada*
9. *Aska – Bhanj Nagar*
10. *Banarpal – Daspalla*

It is clear from the above table that ecological impacts are high or very high on Bhadrak - Karanjia and Bhawanipatna – Rayagada routes. This is because of presence of dense forests and proximity to wild life parks / sanctuaries. Very high impacts on residential, commercial structures have been found on Jagatpur – Chandbali and Chandbali – Bhadrak routes because of presence of dense habitations. High and very high impacts on natural environmental attributes are anticipated on Beharampur – Rayagada and Banarpal – Daspalla routes.

Rayagada – Bhawanipatna project route has been identified as the most environmentally sensitive project route followed by Berahampur – Rayagada. This is due to the fact that there is presence of reserve / protected forest and wild life crossings on both the project routes. Bhawanipatna – Khariar has scored least amongst all the project routes followed by Karnjia – Jashipur & Rayagada - Kerada, therefore these project routes have least environmental problems.

8.1 Impact management Matrix

The impact management matrix has been formulated for all the identified impacts. This has been given in ***Table – 14*** *below:*

Table -14: Impact Management Matrix

Sl.No.	*Environmental Attribute*	*Mitigation Measure*
1	***Ecological Environmental***	
The emphasis will be minimize impacts on ecological features. This needs to be taken care of during planning & design stage. Adequate mitigation measures will be required to compensate for any adverse impact.		
	(a) Wild Life	*(a) Adequate measures to be incorporated in high way design at locations of wild life crossings on Berahampur – Rayagada, Bhawanipatna – Rayagada, Chandbali – Karanjia and Banarpal – Daspalla routes.*
	(b) Reserve / Protected Forest	*(b) Compensatory plantations needed as per Forest Act.*
	(c) Sanctuaries	*(c) The mitigatory measures needed to minimize wild life crossings at sanctuaries close to project routes. The details shall be covered in EA.*
	(d) Number of Trees	*(d) Number of trees should be saved by adjusting alignment and through compensatory plantation.*
	(e) Giant Trees and Green Tunnels	*(e) Green tunnels and giant trees exist on Berahampur – Rayagada, Aska – BhanjNagar, and Banarpal – Daspalla project routes. The alignment should be finalized in such a way that one side trees can be saved.*
2	***Natural Environment***	
Most of the adverse impacts on natural environment can be managed / mitigation through good construction management, for which suitable measures need to be built into the EMP.		
	(a) Material Source	*(a) All haul roads should be properly maintained. The vehicle carrying construction material should be covered.*
	(b) Soil Erosion	*(b) Design need to consider soil erosion protection measures. The details will be covered in EA.*
	(c) Drainage and Water	*(c) Highway design needs to take into*

	Logging	*consideration for provision of drains, raising of roads, etc.*
	(d) Noise Levels	*(d) No construction work during night time at habitations, reserved forest and near wild life crossings. All construction machinery should be maintained. Workers working in high noise zones should be provided protective measures. Noise mitigatory measures need to be provided at noise sensitive receptors.*
	(e) Water Bodies	*(e) Mitigatory measures to avoid spillage into water bodies of construction materials needs to be elaborated in EMP. Similarly measures to be indicated in EMP to avoid disposal of construction waste into water bodies.*
	(f) Air Quality	*(f) During construction regular control on dust generation needed. All construction machinery should conform to emission norm. During operation adequate compensation needed in RoW.*
3	***Physical Environment***	
Most of the likely impacts on physical environment need to be managed through proper design, relocation plans and public consultation		
	(a) School / Hospital / Colleges	*(a) School, hospital and colleges in COI may be impacted. High way design should explore possibility to save as far as possible. In case these to be demolished they need to be relocated prior to demolition. Also, measures to prevent noise pollution and enhanced safety need to be looked into.*
	(b) Common Property Resources (CPRs)	*(b) Same as explained in (a) above.*
	(c) Residential and Commercial Properties	*(c) Same as explained in (a) above.*

9.0 Findings and Recommendations of Environmental Screening.

9.1 Findings

The findings of screening have been summarized below:

- *The wildlife and reserve forest issues are more involved in Berahampur – Rayagada, Rayagada – Bhawanipatna, Chandbali – Anandpur – Karanjia and Banarpal – Daspalla project routes.*
- *The project requires environmental clearance from Ministry of Environment and Forests, New Delhi.*
- *OSRP is a category 'A' project and will require independent environmental review from an independent reviewer as per World Bank operative Directive 4.01.*
- *Forest clearance is needed for Conversion of forestland into road use. The project routes requiring forestland are Berahampur –Rayagada, Rayagada – Bhawanipatna, Banarpal –Daspalla and Chandbali – Anandpur – Karanjia. Wild life issues are also involved in these routes.*
- *High impact on ecological resources has been identified on Bhawanipatna – Muniguda – Rayagada, Rayagada – Berahampur and Bhadrak – Karanjia routes.*
- *Maximum impact on natural resources has been identified on Berahampur – and Rayagada – Bhawanipatna project routes. It is concluded that both these routes will have maximum environmental impacts.*

9.2 Public Consultation Findings

The locals during public consultation have given following suggestions:

- *Construction of drains as part of project design;*
- *Restoration of water supply sources and common property resources before demolition;*
- *Provision of Public Toilets in habitations;*
- *Creation of over bridge at village to facilitate crossing; and*
- *Plantation of trees along project roads to compensate trees cutting.*
- *This is the first of public consultation, more detailed & project design specific issue will be carried out during EA / SA*

9.3 Recommendations

9.3.1 General

- *Concentric widening should be adopted as far as possible. This will help to save trees and will give equal and fair treatment to the public living along roadside.*
- *The environmental assessment has to be conformed to the World Bank requirements, Ministry of Environment and Forests requirements and Government of Orissa requirements.*
- *Mathematical Modelling to assess post project ambient air and noise levels along project routes should be carried out as this exercise will help to plan and built mitigatory measures in project design.*
- *Adequate budget provisions have to be made in respective EMPs of construction packages for identification and re-location of common property resources being impacted due to widening.*
- *The EMP should incorporate necessary mitigatory measures in project design at surface water sources abutting or crossing project routes.*
- *Proper addressal of drainage and water logging problem through highway design needs to be done at identified locations along each project route.*
- *Necessary environmental monitoring and surveys should be initiated as part of EA to establish baseline scenario.*
- *The environmental assessment of project should cover assessment of capacity of OWD from environmental angle and should make recommendations for capacity building of OWD.*
- *Design of training modules for OWD for capacity building in environment area should be part of environmental assessment.*
- *The EMP should provide proper monitoring system to make project environmentally sustainable.*
- *During EA possibility should be explored to enhance few water bodies and religious structures (temples / shrines / chabutras) in use of public along each route. The selection should be done through consultation process. The enhancement measures should also be designed in consultations with locals.*
- *Highway design should consider suggestions of local level consultations summarized in section 7.1.2 and **Chapter 5**.*

*All statutory clearances as explained in **Chapter 3** should be in place before start of construction activity.*

9.3.2 Route Specific

- *Rayagada – Kereda project route has maximum sharp curves, therefore geometric improvements are necessary. The design should take care of this issue.*
- *Possibility should be explored to provide bypasses / realignments at Rayagada on Rayagada – Kereda project route as safety is a major issue at two consequent major bridges in project road beginning. Similarly bypass / realignment is recommended at Muniguda from safety and congestion point of view. There are couple of rail crossings that project road is crossing.*
- *Realignment at Chatikona should be looked into avoid railway crossing on Rayagada – Bhawanipatna project route.*
- *On Jagatpur –Kendrapara - Chandbali project route Pattamundai (Chainage 68.00 to 73.00 of SH – 9 A) and Aul village (Chainage 83/500 to 86/100 of 9A) are congested. The project road also takes sharp turn at Pattamundai. It is therefore, recommended to provide bypass / realignments at both the locations.*
- *On Banarpal – Daspalla project route on Narsinghpur to Hindol section of project route (MDR – 18A) the road passes through hilly section from chainage 8/200 to 11/400. In this section gradients are very steep even of order of 1:7 to 1:9. The geometric improvements will not be possible and hill ecology will be disturbed incase geometric improvements are taken up. It is therefore, recommended that this hill section may be bypassed and a suitable realignment may be planned in plain areas on right.*
- *Rayagada – Berahampur project route has ghat portion from km 41.0 to 60.0 on SH-17 and km 141.0 to 127.0 of SH-4. In above-mentioned stretches widening should be restricted to available width except at locations of geometric improvements. This will help in ecological impact minimization. Similarly Rayagada – Bhawanipatna has ghat portion from km 21 to 38. The same philosophy should be adopted for widening of this stretch also.*

10.0 Scoping

Scoping has been done for EA as a part of environmental assessment. The scooping covers for following types of improvements planned:

- *Upgradation involving land acquisition; and*
- *Upgradation without land acquisition. In the scooping requirements of data, EIA / EMP preparation and clearance requirements have been indicated.*