

Orissa State Road Project

Executive Summary of Environment Management Plan of Bhawanipatana-Khariar Road

The corridor SH-16 forms a part of the corridor connectivity with SH-6, SH-5 (Part), SH-4 and SH-17 to inter connect places like Khariar, Nawapara, Chhatisgarh with Bhawanipatna, Muniguda, Bisam Cuttack, JKPur, Rayagada and from Bisam Cuttack to Kolnara, Gumuda, Raipanka, Mohana, Taptapani, Berhampur NH-5.

This is a major line to cater to the need of developmental activities and industrial infrastructure in Nawapara, Kalahandi, Rayagada, Ganjam and Koraput districts. The industries like proposed Alumina plants of Utkal & Vedanta, existing industries like Theruvali Ferroalloys, Damanjodi Alumina, HAL mig aeroplane factory at Sunabeda, paper manufacturing in JKPur and open up a sea port for the Chhatisgarh on road at Gopalpur on sea.

This will also open up the tourism activity in Kalahandi, Nawapara, Bolangir, Rayagada, Koraput, Gajapati & Ganjam districts. The corridor starts from 2km on Bhawanipatna and covers three districts Kalahandi, Bolangir and Nuapara to reach Khariar town limits.

1. Major environment sensitive structures along the route are River Tel, Sunder and their numerous Tributaries, streams and nala that will be impacted.
2. More than a century old giant trees will be cut and removed for expansion of RoW and therefore there will be loss of habitat & food source of several wildlife.
3. There are number of schools, temples, hospitals, passenger sheds, market yards, burial ground, agricultural land and other structures which will be impacted as reported on the table no.30 of EIA report.

Out of 18 water bodies and ponds there are 5 large water bodies and 13 small water bodies or ponds along the corridor. 11 such are on right and 7 are on the left, which are going to be affected by road widening and geometric correction. Out of 7 open well 6 are fully affected and 1 partially affected. But the entire 7 wells will be replaced for sinking of new tube wells away from the RoW to facilitate drinking water supply. Similarly there are only 3 pipe water supply **stand post** requiring replacement and relocation away from the proposed RoW after the Rural Water Supply organization and PHD organization of Govt. of Orissa relocate them suitably. Out of 55 bore wells /hand pumps getting fully affected it has been proposed to sink 62 bore wells after inclusion of the seven open wells mentioned above subject to the condition that these locations shall be finalized in consultation with the ground water survey data, water quality data of the govt. of India and the spot test reports of the sunk bore wells to be free from Arsenic, Iron and Fluoride concentration hazardous for human and livestock consumption. All bore wells to be abandoned will also have to be lifted and disposed for sale for public auction so as to deduct the sale proceeds from the total cost of such equipments. The new bore holes as well as the dismantled bore wells shall not be left open to act as a death trap for human being and livestock together with wildlife which may accidentally fall into such openings. Therefore a mandatory provision to seal all the abandoned bore wells by filling up with epidorite material, coarse sand, pables topped with cement concrete PCC M-15 has been

inserted in the guidelines which are to be followed to protect the underground water and aquifers from getting polluted.

There is an underground pipe line for water supply to Khariar town from Sunder river which runs parallel to the Tarmac and will require relocation before road construction activity starts between Tukla to Khariar i.e. 60.5km to 75.0km. All the new tube wells after boring is completed shall be subjected to water quality test and shall be require to provide plugging till such time when the tube well shall be fitted after ensuring the water quality to the fit for human consumption. Any accidents on account of the carelessness of the contractor as well as the executing department for non compliance of the guideline shall be view as anti environment activity.

All total 4 giant trees with mandap fully affected out of 8 mandaps. Out of 12 religious structures only provision for erecting improved boundary wall for noise and dust mitigation has been suggested along with tree planting. Out of 14 schools only 3 in the right and 4 schools in the left require a specific measure such as preconstruction of the school (fully affected) shall be duly compensated and the parent department shall have to come up with their required designs and specifications for these the watch and word staff. One out of 3ANM centres and 1 out of 3 Hospitals are partially affected. Out of 19 passenger shades at Bus stops 14 are fully affected. Two play grounds are partially affected. One burial ground out of 3 is fully affected which has to be avoid for the sake of religious sentiments.

Out of 1929 trees on left and 1835 on the right earlier proposed to be removed from the RoW has been reduced to 1274 in the left and 1016 trees on the right side through judicious designing of the RoW for protection of environment. Thus there was a saving of 655 trees on the left and 819 on the right summing up to 1474 trees on this track which is a water scarcity and high temperature zone.

There are two major rivers Tel and Sunder and the bridges in Tel basin are going to be improved, raised to desired level and a new bridge constructed for improving the road geometry to facilitate the desired traffic speed.

All total 120 number of culverts 20 number of bridges are to be constructed afresh with equal number of diversions and major curve corrections at chainage 57.786 to 58.900, to left, 54.700 – 55.010km to the left, 37.500 to 37.827km to the right by way of new alignment for preventing the black spots (accident sites).

There are number of market yards on either side of the corridor (weekly) and agro marketing mandi (Krishak bazaar) which are directly impacted by way of acquisition and formation of embankments at these places.

Specific provisions for noise and dust mitigation has been made at these locations with tree planting within the market yard for providing shade, shelter and ambient temperature at these places of congregation.

The zone is a traditional dry zone with high fluoride and arsenic content in the ground water sources. Therefore before sinking of new bore wells the water quality data on existing bore wells has to be ascertained through laboratory tests and then the tube wells are to be sunk at desired locations avoiding the areas where toxicity on account of presence of Fluoride or Arsenic has been suspected. However the water quality of the new bore well has to be tasted for ensuring the its fitness for human and live stock consumption. Should there be any toxicity such bore wells should not be provided with casings and hand pumps to prevent its misuse.

No bore well should be left open at any point of time during the course of jacketing (lowering of PVC pipes) to prevent accidental fall of wildlife, domestic animal and human being into these bore holes which have earned a bad name at “death traps”. A mandatory provision has been inserted in the contract document for ensuring proper sealing /plugging of the abandoned bore holes and new borings respectively.

The setting up of several water harvesting structure for irrigation purposes has been there out of which 3 are getting partially affected. Measures for preventing siltation of these vital resources is of paramount importance with Toe wall and silt fencing. Similarly the pond which is fully affected owing to the road improvement requires to be relocated at certain place subject to release of land by revenue authority. However for the present only compensation for the acquired land in this case shall be considered pending any other decision that may be taken up by the regional compensation assessment committee that will be set up by govt. Digging of the ponds and water body will be carried out by the PIU (Project Implementing Unit) to compensate the area of water spread that is lost on account of land acquisition.

There are 6 number of under passes provided for allowing the wildlife movement across the road without many special provision for under pass road using the now construction of culverts to act as under pass at desired locations with site enhancement planting either side of the opening for corridor development. Since this is s corridor with low rainfall and high temperature the planting of shade bearing plants like samania, siris, tamarind, mango, arjun, fasi and babul will be more beneficial.

Site enhancement measures to improve the vegetative cover of the corridor has been proposed by saving the young avenues through relocation of trees below 30cm girth at new locations in rainy season along the water bodies, river bankes and nala banks, schools, hospitals, market places, religious sites and temple premises, burial grounds, road junctions etc. These will act as moderators to reduce the heat and exposure of the road users to scorching heat and radiation.

All affected tube wells, water taps, wells shall be demolished as per the standard practice prescribed in the guide line before start of road construction by relocating the said units to avoid distress and no new water supply pipe line should be laid within the RoW or under the carriageway by the concerned agency entrusted with the work. All such supply lines for water, gases, sewerage must be located beyond the line drain in separate enclosures to prevent ingress and egress of contaminants into drinking water supply and open water bodies. To the extent possible the rural water supply and urban supply pipe lines shall be relocated on either side of the RoW beyond the OWD land in two separate lines, so that frequent road cutting and disfiguring It has been suggested in the report to ensure two pipe lines on either side of the road for avoiding unnecessary digging up of the carriage way and shoulders every now and then for piped water supply.

A detailed work schedule has been prescribed for the culverts, bridges and diversions, new alignments so as to avoid distress to the commuters, vehicles, livestock etc. in using the road. A brief tabular statement is furnished below showing the work schedule which may be followed subject to prevailing conditions at the time of execution of the contract package and continuation on the ongoing activity.

All works should be taken up over a stretch of 5kms at a stretch to concentrate the activity leaving a gap of 2 to 5 kms except at river and wider submergence zones where the work will begin early at the end of monsoon for the entire stretch of submergence, so that the period of working may not be shorter and the work schedule is not hampered.

All utilities are to be shifted first of all before tree cutting starts to facilitate easy and early clearance simultaneously by formation of a state committee of all the stake holders in consultation activity ahead of the actual road construction.

It has been further proposed not to take up under H.T lines/ domestic transmission lines / overhead cable lines. Dwarf shrubs and bushes of Muraya coingi, Muraya exotica, Nectanthes arbortristic, Embelia ribes, Mimosops elengi, Buchnanian larjan, Pongamia pinnata, Sapindus muckrosi, Tabernamontana coronaria, Gardenia gummifera, G.tergida etc. have been suggested for planting along the avenue under transmission lines in place of tall trees. The tall trees shall be planted on the other side away from the transmission line and there shall be intermittent planting of Palmyra palm seedling on the periphery of RoW at 10mtr interval from plant to plant on either side so that the boundary of the RoW remains well identified and demarcated even after 50 years.

There are quarries located within 1.5 to 3km away from the road side. Locations are at km18 (Adhamunda), (stone quarry) km15, Pastipada (GSB quarry), km31 stone aggregate quarry with crusher, BM and HM plant, km64, stone aggregate and GSB quarry, Risigaon, 70km Singhbahali pahada approved quarry for metal and GSB.

The sand shall be quarried from Tel and Sunder river bed at km28 and km59 along with borrow areas from dried out ponds and water bodies nearer to the corridor on either side for increasing the storage capacity and reducing the cost of transport and procurement of GSB materials.

No borrow areas from any agricultural fields has to be undertaken as this is a dry zone with less fertile soil depth.

A special provision is being suggested to develop all the borrow areas and abandoned quarry sites as water harvesting structures and use the top soil from all these sites to develop the rocky region of the RoW for raising plantations. These water harvesting structures will be used for additional revenue earning by panchayats through pisciculture as well as picnic spot and contrivances for water sports, angling and ambient water quality through recharge of the aquifers.

A special action plan for road side avenue planting with earthen pitchers has been provided with estimated cost to ensure cent percent survival of the trees, shrubs and bushes and the spacing has been reduced to 2.5mtrs from plant to plant in place of 5X5 mtr spacing for other roads.

The site enhancement of abandoned road portions shall be made by digging up the old road after the new alignment work is complete and opened up for the traffic. There is a proposal to hand this reclaimed land of OWD to the PAPS who have become virtual landless persons to cultivate medicinal plants underneath the tall trees by way of under planting to provide them sustainable employment and regular earning capability. The species to be planted on this zone shall be "Ainla", Harida, Bahada, Mahula, Chara, Barakoli, Tentuli, Amba, Ritha, Anato, Bidanga, Gila, Sunamukhi, Satabari etc.

Alternately area will be planted up and managed as a recreation centre for the communities along the corridor besides enhancing the environmental features in this tree less zone. The chief species in this case shall be Palash, Samania saman, Mango, Fasi, Dhaura, Sidha, Patuli, Tentuli etc.

The detail area statement with plantation cost for such strips including the cost of site improvement such as scarification, removal debris, leveling loosening of soil etc. is provided separately as an annexure to this report.

The introduction of species suitable for black cotton soil is most important as vast stretches of such soil are rich in calcium nodules or gravel found along the corridor.

Tree species like Samania, Albizia, Soyimida, Terminalia alata, Arjun, Annogeisus acuminata, Sapindus muckrosi, Diospirus, Ingadulsis, Tamarind, Mango, Babul, Safed kikad (Gohira), Palmyra palms, Dhatki, Amla, Char, Mahul, Neem, Karanj along nala and river banks are recommended specifically.

Specific care has been taken to go for planting of weeds in place of grass on the road slopes to stabilize the soil and prevent erosion besides providing employment to the local people for collection of NTFP that will be available all these plants.

The species chosen are golden grass or Vetiver, Bridha daraka, Ipomia biloba, Vitex negundo or Begonia, Androgruphis paniculata or Bhuineem, Cassia aungostifolia or Sunamukhi cassia tora or Tarwar, Barleria crista or Bajradanti, Tribulus terrestris or Gokshura and such other seeds in \ine óiving across the slope during pòl monsoon with watering till monsoon breaks up. Jatropha gossypifolia, Solanum xanthocarpum, Solanum verbacifoliam, S.torvum, S.trilobatum are the other species for planting /showing as an admixture.

The road covers mostly baròdn dry la^d on either side which is open or óqarsely vegetated with scrub /thorn forest of very low density and no canopy cover.

Forest and non forest land (in ha.)

District	SH No.	Private Land	Govt. land	Total
Kalahandi	SH-16	34.97	8.16	43.13
Bolangir	SH-16	29.34	10.24	39.58
Nuapada	SH-16	7.81	1.35	9.16

Out of the Govt. land going to be acquired for the road improvement and geometric correction the component of forest land proposed to be as under.

Forest land

District	Village	Plot No.	Kisam	Land to be Acquired in ha.
Bolangir	Gandharala	911	Gram Jungle	0.06
	Gandharala	915	Gram Jungle	0.01
	Gandharala	1568	Gram Jungle	0.10
	Gandharala	1569	Gram Jungle	0.04
	Gandharala	1265	Village Forest	0.093
	Chandtora	178	Gram Jungle	0.07
	Chandtora	134	Gram Jungle	0.02
	Nirmula	1269	Gram Jungle	0.01
	Gourtula	911	Village Forest	0.048
Gourtula	915	Village Forest	0.036	
Kalahandi	Karlapada	104	Village Forest	0.008

	Karlapada	130	Village Forest	0.016
	Borda	291	Gram Jungle	0.03
	Borda	292	Gram Jungle	0.02
	Borda	310	Gram Jungle	0.012
	Borda	311	Gram Jungle	0.036
Nuapada	Badadohel	27	Gram Jungle	0.01
	Badadohel	28	Gram Jungle	0.01
	Badadohel	48	Gram Jungle	0.01
	Badadohel	50	Gram Jungle	0.02
	Badadohel	258	Gram Jungle	0.04
	Ranipur	97	Gram Jungle	0.03
	Ranipur	101	Gram Jungle	0.01
	Ranipur	102	Gram Jungle	0.03
	Ranipur	104	Gram Jungle	0.03
	Ranipur	105	Gram Jungle	0.02
Ranipur	76	Gram Jungle	0.01	
Bhawanipatna	Maningpadar	1150	P.B	0.00084
	Borbhata	221	P.B	0.00072
	Borbhata	2287	Village Forest	0.032
	Borbhata	87	P.B	0.036
	Tureikela	409	Village Forest	0.020
Total				0.92ha.

Above table indicates attempt to minimize the impact on the forest land, so that this drought prone area will have the forest land intact in spite of the road development proposed.

Movement of wildlife in this corridor is few and far between as there is no tree cover to camouflage the wild animals during movement and lack of adequate hunting and predating ground for carnivores besides scarcity of water. The common animals found in localities are Hyaena hyaena, Jackal (*Canis aureus*), Squirrel (*Funambulus penanti*) Nilgai (*Boselaphus tragocamelus*), Pangoline (*Manis crassicaudata*), Mongoose (*Herpestes javanicus*), Rattle (*Mellivora capensis*), Sloth bear (*Melursus ursinus*) and snakes like Python, Cobra, Rat snake, Water snake and reticulate python. Provision for wildlife underpass has been proposed at chainage 18.85km, 22.15km, 54.35km, 64.9km and 67.85km to facilitate the movement of wildlife during the day and night taking the help of camouflage cover plantation proposed to be raised at either end of these underpasses up to a length of 50mtrs and width of 25mtrs.

Last but not the least a statutory decision to avoid the affected burial ground at 67.220km and avoid all religious trees coming along the corridor as public sentiment has to be respected for smooth execution of the improvement activity has been proposed. The Toll plaza that has been proposed at 32.200km to 32.540km is also proposed to be the location of Forest Check Gate on this road so as to avoid additional land acquisition and development of infrastructure at another place as an avoidance, mitigation and minimization attempt for environmental, physical and socio cultural stability. 39 Bus Bay with passenger shade have been proposed at different location as against the pre-existing 19 bus stops with passenger shade to facilitate the movement of local inhabitant in this hot and dry zone with bags and baggage's in the absence of pre existing giant trees those will be removed during improvement activity keeping in view the future development that may induced more and more passengers and bus services catering to the economic development.

The total requirement of construction materials such as stone, sand, course aggregates, fine aggregates, GSB, bitumen, petrol oil and lubricant, steels, cement etc. has been estimated to be as follows for this proposed development activity on an approximate assessment which is subject to change as per the existing field conditions at the time actual execution of works.

Approximate quantity of road construction materials.

Item	Quantity
Earth Work from Borrow pits	316880 cum
Sand/Crusher dust	277848 cum
GSB & Morrum	204000 cum
Course Aggregate	277848 cum

Water 1,580 KL,

Filter Material 114258 MT,

Cement 210 MT

It has been suggested to develop the camping sites of the contractor on Govt. land as future monitoring and maintenance staff establishments along this corridor by retaining the construction activity in case of demolition after the project work is over.

The borrow areas, quarry sites, shall be developed into water harvesting structures after the project work is completed in place of land fill as this is a water scarcity zone and the Gram panchayat shall be involved to maintain these units as a source of irrigation ponds, ground water recharge facilities and fish farming sites.

Provision for site enhancement along all water bodies affected by land acquisition shall be carried out with silt fencing of embankment and preservation of top soil at diversion localities along the RoW so that the fertility of the land can be restored once the road construction activities are completed. Steps have been provided to ensure road safety and traffic regulation signage, dust, noise and water pollution preventive measures for minimizing the hazard of living along SH.
