JSW Utkal Steel Limited

No. JSW/U/O/2021/106 Date: 2nd June, 2021

To

The Member Secretary (Infra-1)
Ministry of Environment Forest and Climate Change
Indira Paryavaran Bhavan,
Jor Bagh Road,
NEW DELHI. 110003

Subject: **Environmental & CRZ Clearances** for the proposed "Development of All-weather, Multi cargo, Greenfield, Captive Jetty(ies) for handling capacity 52 MTPA at Jatadhari Muhan River, District Jagatsinghpur, Odisha by M/s JSW Utkal Steel Limited."
[Proposal No. IA/OR/MIS/74417/2018; F. No. 10-68/2018-IA.III]

Ref.: 256th & 260th Minutes of the meeting of Expert Appraisal Committee (EAC), Infra - 1.

Dear Sir,

This is with reference to the proposed project, you may kindly be aware that the proposal has been appraised by the esteemed Expert Appraisal Committee (EAC), and the committee suggested us to submit additional study reports for further appraisal for its Environmental and CRZ clearance (EC).

In this regard, we are herewith submitting the requisite addendum study reports for your kind perusal and further action.

We trust you will find the submissions in order and provide an early opportunity to make a presentation before the esteemed EAC on the salient features of the project for the grant of Environmental & CRZ Clearances.

Thanking you.

Yours Faithfully,
For JSW Utkal Steel Limited.

[Ranjan Nayak]
DIRECTOR

Registered Office:
JSW Centre
BandraKurla Complex,
Bandra (East), Mumbai 400 051
CIN. : U27209MH2017PLC301887
T +91 22 4286 1000
F +91 22 4286 3000
www.jsw.in

Plot No-3, Forest Park, Shishubhawan Square
Bhubaneshwar 751009, Odisha
T +91 674 2596117

OP Jindal Group

Development of All Weather, Multi-cargo, Greenfield, Captive Jetty(ies) for handling capacity 52 MTPA in Jatadhari Muhan River, Dist. Jagatsinghpur, Odisha

ADDENDUM EIA REPORT

UTKAL STEEL LIMITED

WAPCOS LIMITED

(A Government of India Undertaking)

NABET Accredited Consultant Certificate No.

NABET/EIA/1619/ RA 0106

MAY, 2021

Development of All Weather, Multi-cargo, Greenfield, Captive Jetty(ies) for handling capacity 52 MTPA at Jatadhari Muhan River, Dist. Jagatsinghpur, Odisha

Prepared For

UTKAL STEEL LIMITED

Prepared By

WAPCOS LIMITED

(A Government of India Undertaking)

76 C, Sector 18, Gurgaon - 122015, Haryana, INDIA

Tel. +91-124-2397396

Email: environment@wapcos.gov.in

NABET Accredited Consultant Certificate No.

NABET/EIA/1619/ RA 0106

MAY, 2021

PROJECT: Development of All-weather, Multi cargo, Greenfield, Captive Jetty(ies) for handling capacity 52 MTPA at Jatadhari Muhan River, Dist. Jagatsinghpur, Odisha by M/s JSW Utkal Steel Limited.
[Proposal No. IA/OR/MIS/74417/2018; F. No. 10-68/2018-IA.III]

JSW Utkal Steel Limited (JUSL) has proposed to develop the captive jetty(ies) facility for handling capacity of 52 MTPA for the 13.2 MTPA integrated steel plant (ISP) near the mouth of the Jatadhari River.

The proposal has been appraised by the EAC during 256th meeting held on 3rd March, 2021 and 260th meeting held on 5th April, 2021 and sought additional study reports/documents for further appraisal by the committee for its environmental and CRZ clearance. The requisite addendum study reports prepared are summarized and submitted in the following section.

S. No.	Observation by EAC	Our Submissions
1	Study on impact of Coal and its movement/ storage shall be submitted. Details on whether the coal is shared with other units of JSW in India shall be submitted.	Coal movement and receipt at the captive jetty facility is only through ship, and there is no rail/road movement is envisaged. The coal requirement for steel plant is to be imported from countries like Australia, Canada, Russia, South Africa, Columbia and Indonesia through sea route. The coal handling at the jetty facility is under controlled conditions to contain the fugitive emissions by implementing a series of pollution control measures through highly mechanization, including its storage in the longitudinal cover shed to further arrest air pollution. The coal handled at the jetty facility is mainly for captive use at the proposed ISP, and shall not be transported to other JSW facilities in the hinterland. The detailed movement of coal, likely impact and mitigation measures are summarized and given as **ANNEXURE I**.
2	Dredging work in creeks, its	Dredging in the creek area and inner channel is likely to

S. No.	Observation by EAC	Our Submissions
	usage and disposal patterns need to be elaborated. The impact of disposal in sea to the nearby ports shall be evaluated and submitted.	generate about 20 - 25 Million Cubic Meter of dredged spoil, and the dredged material can be used as a resource. The borehole data indicates that the dredged material can be used for reclamation of the port and ISP area. Dredging material from the outer channel which can't be used for reclamation would be disposed at the designated area in sea determined through model study. The dredging disposal report is given as **ANNEXURE II.** The dredging disposal in sea and its impact to the nearby Ports has been evaluated through model study. The detailed model report is given later as **ANNEXURE IV**.
3	Clarity on transfer of FC of POSCO to JUSL is required. A number of new items of work are included in project. Clarification is required whether new item of works were considered and approved at the time of transfer of FC to new PP.	Govt. of Odisha (GoO) requested MoEFCC for transfer of final forest clearance in favor of M/s JSW Utkal Steel Ltd., which was granted to POSCO-India Pvt. Ltd. for establishment of Integrated Steel Plant and Captive Port. A comparative statement of land use of the components which were allowed for POSCO-India Pvt. Ltd. and those proposed for M/s JSW Utkal Steel Ltd. were submitted to the Ministry, and having satisfied with the submissions, the esteemed FAC has recommended the proposal for transfer of final forest clearance (FC). The details are given as **ANNEXURE III.**
4	Details of identification of dumping and reclamation sites during Construction and Operation Phase be submitted.	Model report has been re-validated for identification of the dumping locations and impact of disposal to the nearby Port. The detailed model study report is given as **ANNEXURE IV.**
5	The master plan of Paradip port shouldn't overlap with activities of proposed port and hence, an	Letter of Undertaking by JUSL has been submitted to MoEFCC as **ANNEXURE V**.

S. No.	Observation by EAC	Our Submissions
	undertaking in this regard may be submitted to the Ministry.	
6	Re-assess the marine ecology study performed by CSIR-NIO Mumbai for its completeness, and resubmit detailed base line data and impact mitigation plan.	Marine ecology report has been re-assessed and submitted. The brief summary of the baseline environment and mitigation plan along with financial allocation is given in the CSIR-NIO ADDENDUM report as **ANNEXURE VI.**
7	Detailed Environmental Base line study and Mitigation plan along with the financial allocation be submitted.	
8	The PH issues and the commitment and mitigation measures/plans along with the budgetary provisions be submitted in a tabular form. EMP shall be revised by making financial allocations for activities for fulfilling these commitments.	Issues raised during the public hearing (PH) and the mitigation plans along with CER commitment has been prepared. EMP has been revised in accordance to the CER commitment and the revised marine biodiversity monitoring and management plan. The detailed study report is given as **Annexure VII.**

ANNEXURE I

Study on impact of Coal and its movement/storage shall be submitted. Details on whether the coal is shared with other units of JSW in India shall be submitted.

1.0 Import Coal Movement

JSW Utkal Steel Limited (JUSL), proposes to develop an All-weather Multi-cargo, Greenfield Captive Jetty(ies) for handling capacity of 52 MTPA cargo for its proposed 13.2 MTPA Integrated Steel Plant (ISP) along with 900 MW Captive Power Plant (CPP), 10 MTPA Cement Plant.

The raw material requirement for the ISP i.e., coal, limestone and other fluxes would be brought in by sea, and iron ore concentrate/pallets steel products and cement would be sent out by sea to various consumption centers along the east and west coastlines of India and abroad. The export/import cargo of the ISP shall be transported through the captive jetty(ies) facility.

The ISP would require about 25 MTPA of raw material including 16.5 MTPA of Coal Bearing Raw Material (CBRM), 3.7 MTPA of Fluxes (limestone, quartzite) and 5.3 MTPA of clinker, etc. The CBRM requirement of about 16.5 MTPA would include various types of coal such as, Coking coal, Anthracite, PCI coal and Thermal Coal. The coal cargo would be imported and brought to the captive jetty(ies) via ship, since it would be mostly imported with their countries of origin is as follows;

Import coal movements by Ship.

A) Coking Coals:

PDN Coal / Kestrel Coal / Gregory Coal / Maules Creek Coal – Australia

Teck Grey Coal / Teck Venture Coal - Canada

B) PCI Coals:

BHP PCI Coal / Lake Vermont PCI Coals - Australia

C) Anthracite Coal - Russia

D) Thermal Coal:

Thermal coals - Australia, South Africa, Columbia, Indonesia.

2.0 Coal Handling, Storage and Conveyance

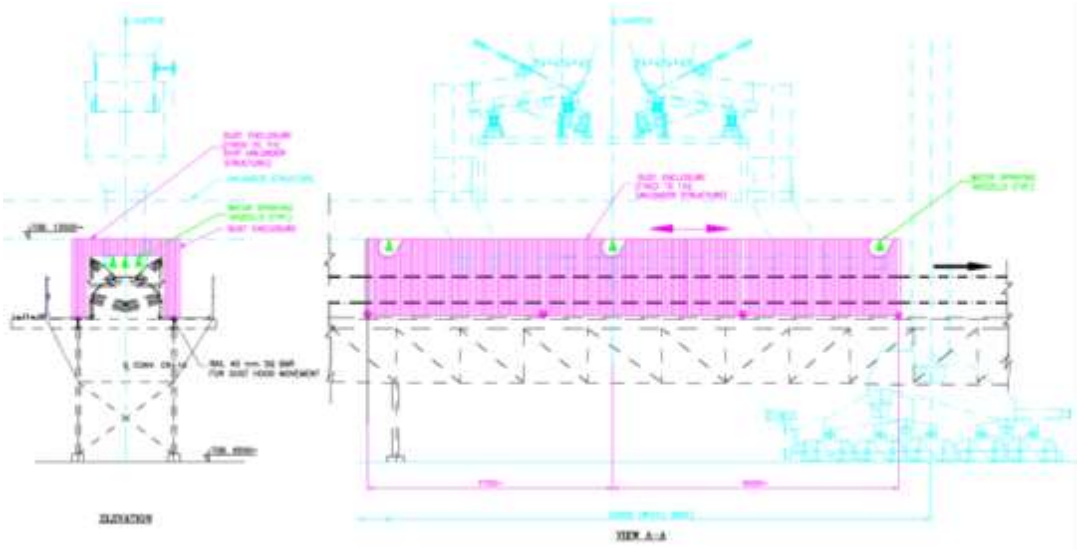
The jetty facility would be well equipped with state-of-the-art equipment, which would take care of the coal unloading requirements. The equipment would be fully mechanized, so that the fugitive emissions

are controlled and the points of probable dust emissions would be equipped with water mist system for containing the dust emissions, if any. Hence, the hoppers and the transfer points of the reclaimer would be provided with water fogging system to control the emissions (Refer Figure 1).

Figure 1: Water fogging system at work at the unloading hopper

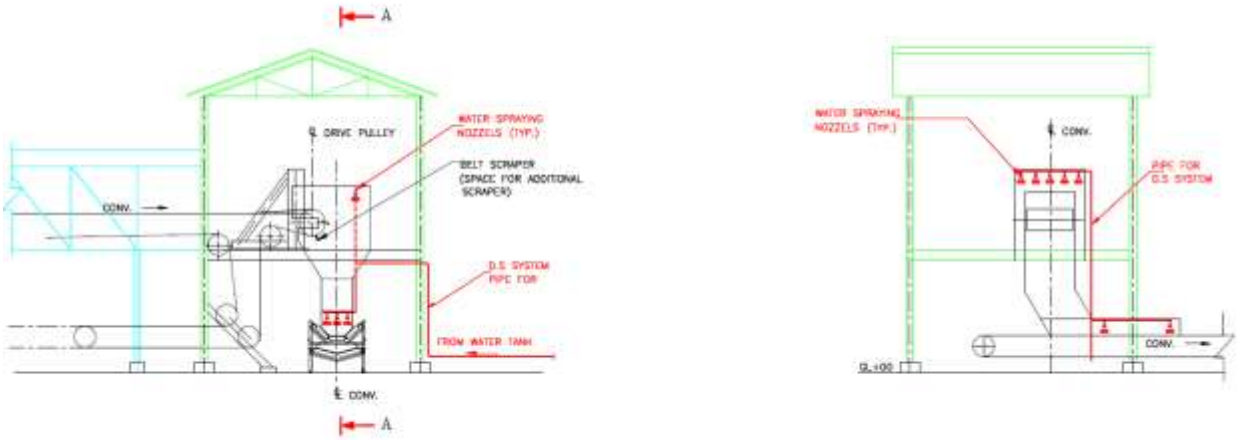
On the Jetty/Wharf the conveyor carrying the unloaded coal cargo would be transferred to the covered conveyors at the end of the Wharf through a transfer tower. The jetty conveyor would be provided with a moving hood equipped with water fogging system as shown in Figure 2. The moving hood would move along the conveyors and keep the coal damp preventing any fugitive emissions.

Figure 2: Movable hood on the Jetty conveyor with water fogging system



Coal cargo would be sent to the stockyard through the covered conveyors and transfer towers, both of which are provided with adequate water fogging system as shown in Figure 3 below.

Figure 3: Water fogging system in the transfer towers



Once the cargo reaches the stackyard, the stacking of the materials would be carried out through stackers under continuous water sprinkling/fogging/mist for preventing dust emission under covered storages.

The covered storages would be provided with adequate dust suppression system for enabling an emission free environment even inside the covered storage.

The philosophy of coal handling at the jetty facility its storage and conveyance to the ISP is given in the following paragraph.

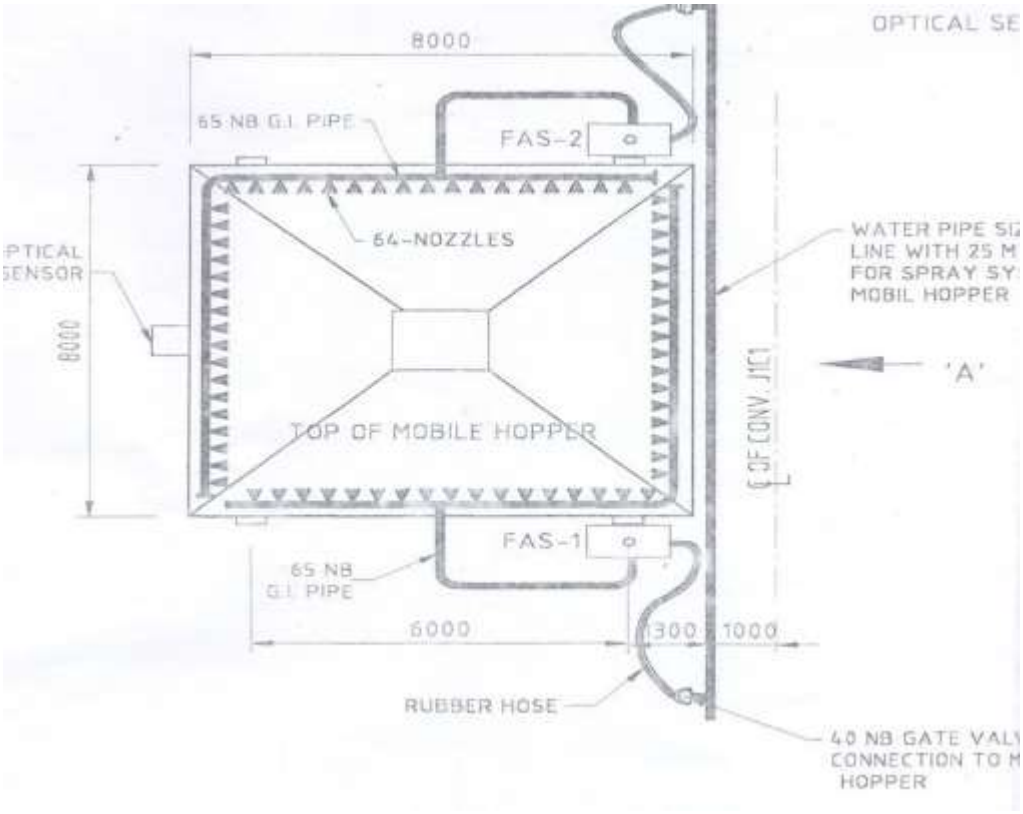
2.1 Coal Unloading

Coal cargo would be discharged from vessel by using Grab Ship Unloaders which is a special purpose quay unloader equipped with locking grab buckets into the Hopper and GSU Chutes.

Cargo is moistened at this point with plenum water fogging ring so that the fugitive emissions are well controlled at the handling stage at the jetty facility.

Figure 4 shows the arrangement of the fogging system on the Hopper, which is shown under working condition in earlier Figure 1.

Figure 4: Water fogging system in the unloading hopper (also refer Figure 1)



2.2 Covered Conveyance

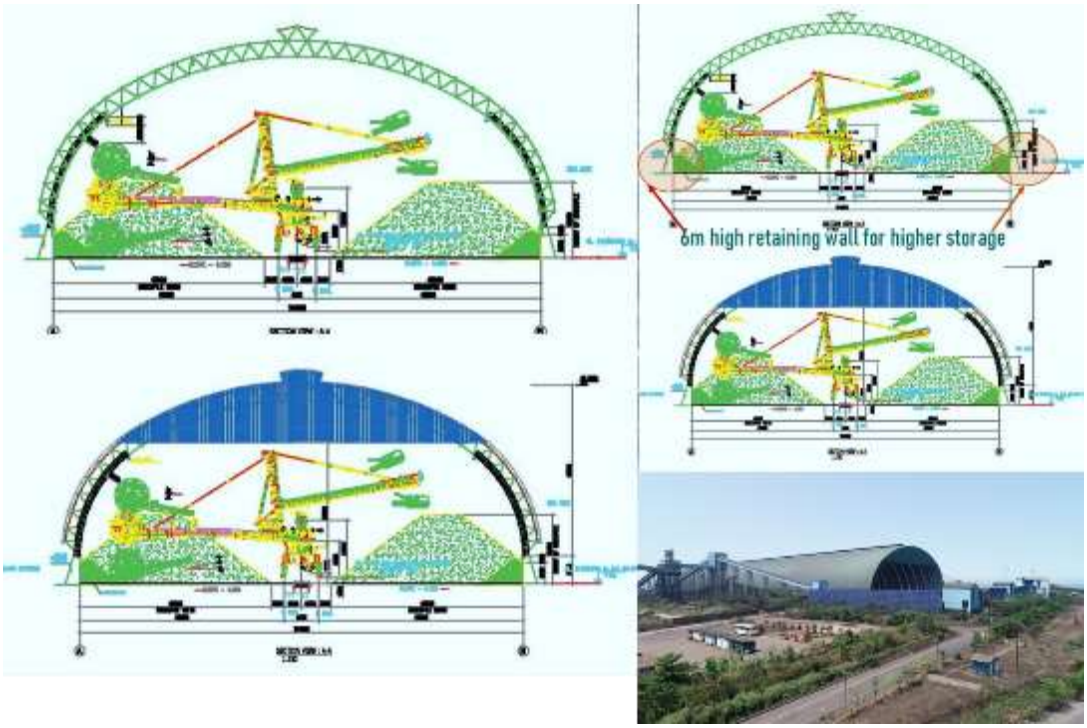
The unloaded moistened coal cargo then would be transferred to the stackyard the covered conveyors as shown in Figure 5. The covered conveyors having transfer towers at the frequent intervals are provided with water fogging system which will further moisten the coal and prevent fugitive emissions during its conveyance.

Figure 5: Covered conveyors conveying the material in to the covered storage

2.3 Covered Storage

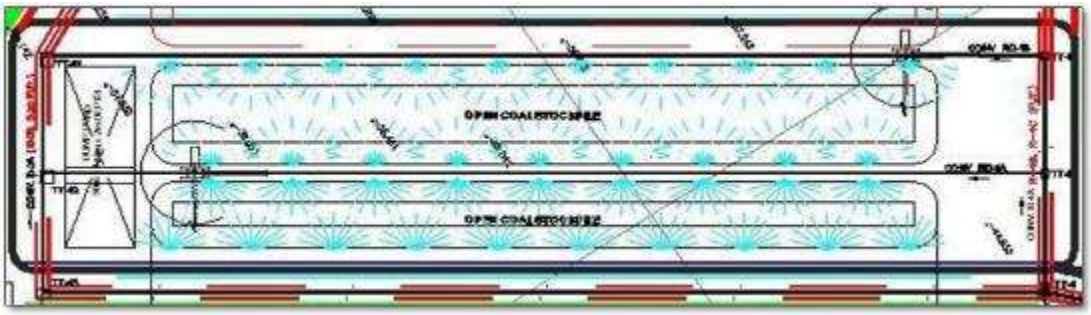
Once the cargo reaches the stackyard, the stacking of the materials would be carried out through stackers under continuous water sprinkling for preventing fugitive emission. The stackyard would be provided with longitudinal cover shed for storage of coal cargo as shown in Figure 6, to further reduce the emissions. The facility would be provided with multi nozzle water spray system on the sides with water pumps of adequate capacity for sprinkling water for the emission control as shown in Figure 7. Suitable drainage arrangements with traps and de-silting facilities would be provided in the covered storage.

Figure 6: Covered storage with all equipment for cargo storage to limit fugitive emission



For transferring to the ISP, the Stacker-cum-Reclaimer will reclaim the cargo and feed to the reclaiming stream conveyors and sent to the steel plant storage yard through covered conveyor belts under continuous water fogging. At each stage of conveyance coal is moistened so that the fugitive emissions are controlled.

Figure 7: Fogging/water sprinkler at the storage



3.0 Impact due to Coal Handling

In general, during coal handling, conveyance, and its storage it could lead to fugitive emissions due various sources/activities which are as follows.

i. Emissions caused by displacement of air.

ii. Emissions blown out by wind.

However, as in the present context, as the coal cargo is proposed to be handled through highly mechanized way during unloading, closed conveyance, and storage in closed covered shed and moistened at every stage through water sprinkling/fogging mechanism, the impact due to wind and displacement of air is insignificant and near negligible. The mitigations measure to handle coal cargo at the jetty facility is given in the following paragraph.

4.0 Mitigation Measures

Coal handling at the jetty could lead to dust emission and contribute to the fugitive emissions. The impacts due to dust emissions could be substantially managed by containment and reduction of emissions. The reduction in the emissions is achieved by continuous spraying of water so that the surface remains moist and the dust gets suppressed. The emissions are contained by deploying highly mechanized systems equipped with air pollution control measures (APCMs).

As part of the project development, it is proposed to install mechanized handling system and other associated equipment such as hoppers, closed conveyors, stacker cum reclaimers equipped with integrated dust suppression systems.

The detail plan of mechanization and deployment of series of air pollution control measures proposed at the captive jetty(ies) facility are as follows:

- ✓ Imported coal from Indonesia, Australia and Africa are generally having high moisture contents, often times exceeding 20%, Thus, handling of such coal at the jetty(ies) would result in lesser dust emission.
- ✓ Dust suppression systems will be provided at the hopper and at the point of discharge on the berth conveyor as well as the feeder underneath hopper at the ship unloader (Refer Figure 1 and 4 above). Mist and Fog sprayers will be used for this purpose.
- ✓ Dust suppression systems will be provided at all transfer points in the conveying and transfer systems to limit residual dust in the discharge area (Figure 2 and 3). Nozzles with capacity to

atomize 2 - 6 rpm of water at 4 - 8 kg/cm^2 pressure has been envisaged for this purpose. With all the above-mentioned measures, no emission is anticipated from the main length of the conveyors.

- ✓ Stack yard will be provided with water spraying system (Figure 6 and 7). The sprinkler system would consist of pressurized high through sprinklers jets of capacity 4 – 5 rpm at pressure up to 12 kg/cm^2, which will operate at an inclination of 30 – 40 degree with respect to the horizontal. Each sprinkler will have a throw range of 25 m and will be installed at 40 m intervals all along the stockpiles.
- ✓ For wind generated dust generation, a windshield with a wire mesh fencing with fast growing creepers up to a height of 12 - 14 m around the coal/other bulk stack yard has been proposed (Figure 8).

Figure 8: Windshield around the port as a second line of defense against dust emission

- ✓ All the dusty cargos, mostly coal cargo would be stored under longitudinal cover shed (Figure 9) so that the fugitive emissions near zero and completely arrested. Photographs of the longitudinal cover shed showing pollution control water sprinkling systems of the functional JSW Jaigarh Port is shown in Figure 9.

Figure 9: Longitudinal Cover shed with DSS

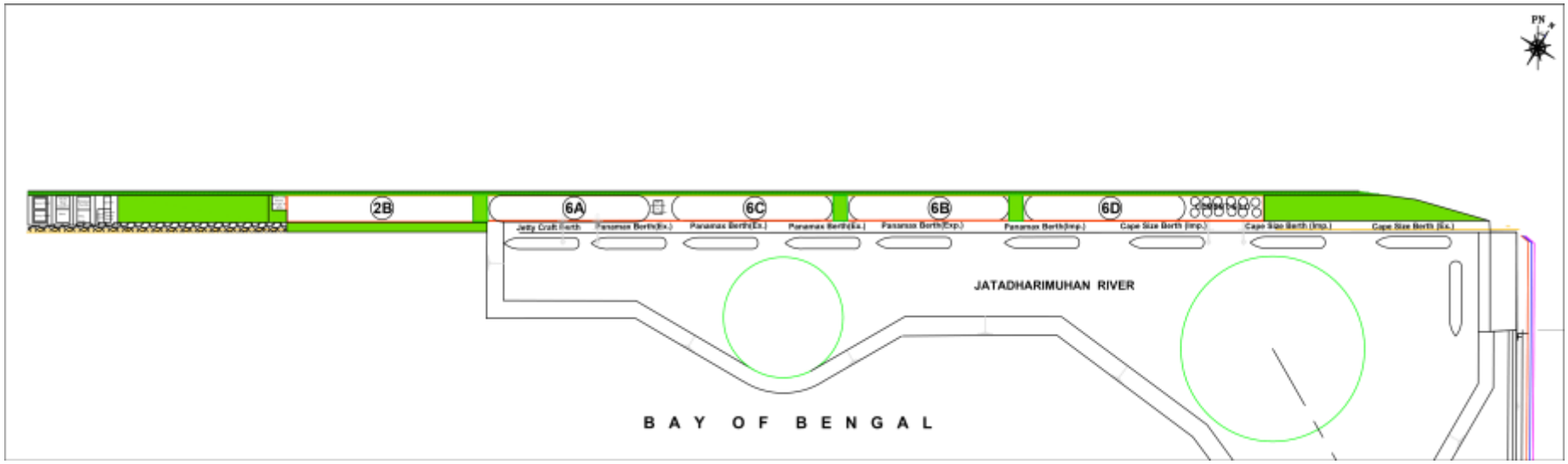
- ✓ In addition to the above measures, 15 m wide greenbelts (Figure 10) would be developed around the periphery of the jetty(ies) facility to arrest the fugitive emissions.

5.0 Coal transportation with other JSW Units

The project does not propose to transport of coal to other units of JSW facility existing at the hinterlands. Coal handled at the jetty facility shall be utilized for captive purpose only, and only for the proposed integrated steel plant (ISP).

The import of coal movement at the jetty facility shall be only through ship. No road/rail movement of coal cargo is envisaged as part of the proposed project.

Figure 10: Proposed Green Belt around the Facility as third line for protection



ANNEXURE II

Dredging work in creeks, its usage and disposal patterns need to be elaborated. The impact of disposal in sea to the nearby ports shall be evaluated and submitted.

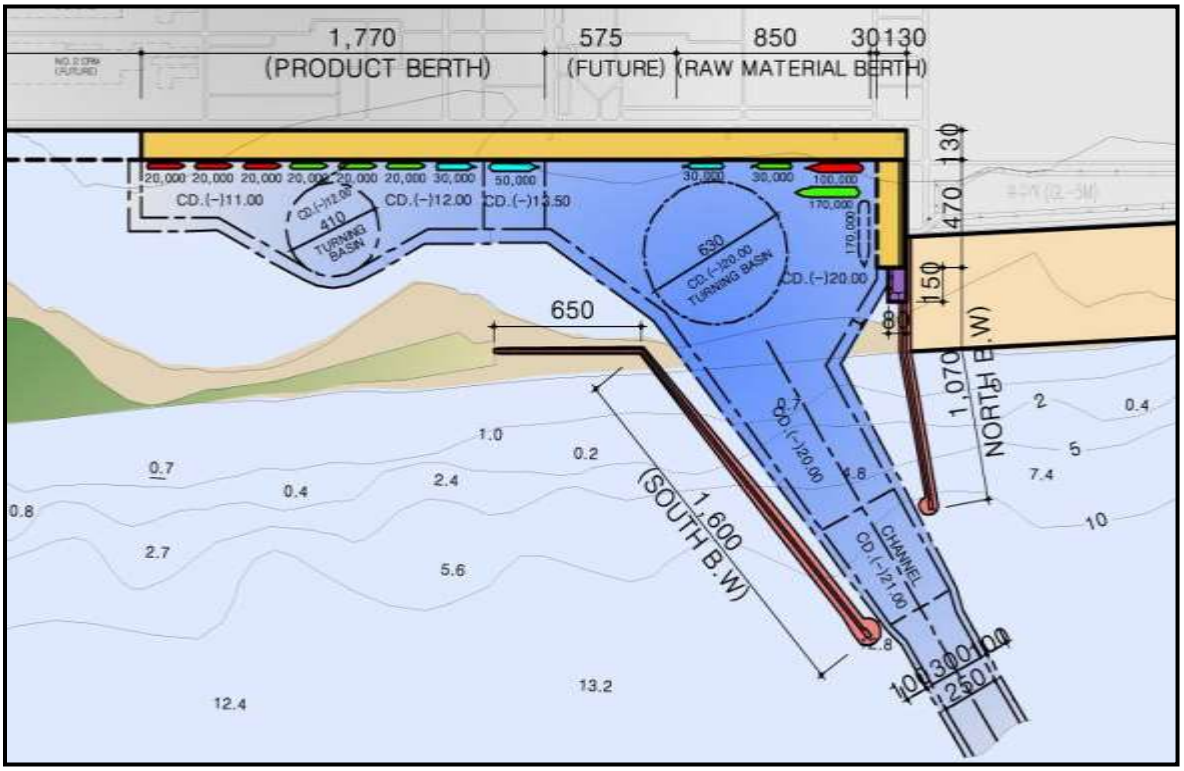
1.0 Dredging Works in Creeks, its usage and Disposal Patterns

1.1 Requirement of Dredging and possible usage

The Captive Jetty is located on the left bank of the Jatadhar River. The layout of the port highlighting the dredging area and the corresponding dredged depths inside the creek and the inner channel is shown in the Figure 1.

Recent bathymetry surveys indicate that the depths inside the creek varies between 1 and 4 m, hence required to be dredged to make it navigable the Cape size vessels.

Figure 1: Layout of the Captive Jetty showing the dredged areas (The dimensions are indicative only)



Hence, as per computations, the inner channel and the creek area (as per the Figure 1) is likely to generate about 20 - 25 Million Cubic Meter of dredged spoils.

Most dredged material can be used as a resource, providing significant environmental and financial benefits and contributing to worldwide sustainability.

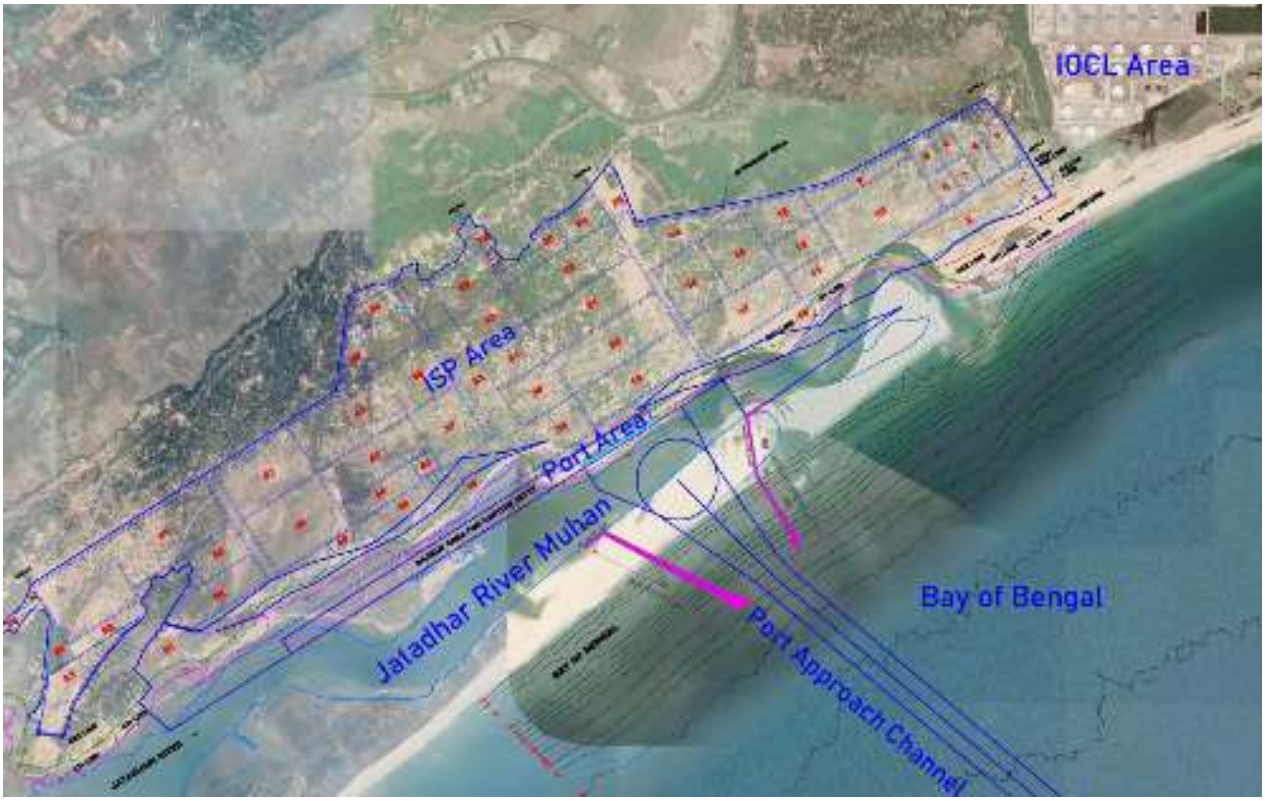
Not all dredged material is suitable as a resource, but more often the old adage 'seek and ye shall find' applies. In some countries, like Japan, more than 90 percent of dredged material is ultimately put to good use. This may require treatment of the sediments, but generally speaking, dredged material such as rock, gravel and sand, consolidated clay, silt or soft clay and a mixture of rock, can to varying degrees be used as a resource.

A variety of uses of dredged material:

- Rock may range from soft marl like sandstone and coral to hard rock like granite and basalt. Depending on size and quantity, rock can be a valuable construction material.
- Gravel and sand are perhaps the most valuable resource and are routinely used for beach nourishment, wetland restoration and coastal protection.
- Consolidated clay, if the water content is low, can be used for engineering purposes.
- Silt and soft clay usually come from maintenance dredging, are rich in nutrients and thus are good for agricultural purposes such as topsoil and for wildlife habitat development.
- Mixed materials are somewhat more restricted in use options but may still be used for fill, land improvement and topsoil.

It is therefore imminent that the dredged spoil must be used for environmental upgradation, rather than degradation. In the marine environment, the spoils in recent times based on the quality is used either for reclamation, shore nourishment or simply dumped in to the sea in an identified area deep enough to have any effect on the sea biological activity or the shore line. Often times the location of the Captive Jetty or Port also matters. Figure 2 shows the development along with the surroundings.

Figure 2: Location of the JSWUSL vis-à-vis the IOCL Plant



It could be seen from the Figure 2, on northern periphery of the proposed steel plant area, the Indian Oil Refinery of IOCL is located and further north out of the Figure about 12 km away, the Paradip Port is located. It is understood that the material from the same creek was used for grade development of this refinery.

1.2 The Dredged material

The usage of the dredged material for a particular purpose is dependent on the quality of material. The quality of the material in the Creek and the channel was examined by geotechnical studies described below. The boreholes are enclosed as Annexure I for reference. The dredged material is devoid of any toxicity.

The borehole indicates the material is generally constituting good quality sand and/or sometimes sand mixed with silt, hence could be used for reclamation of the port as well as the plant area.

Average top level of the existing leased land leased for the Plant and Port development is about +1.0 to +2.0 m with respect to the Chart Datum (CD). However, the finished estate level of the plant area is computed as +6.50 m CD based on the prevailing the cyclonic surge and wave studies, requiring about 4.5

to 5.0 m of land fill. Though the top 0.5 m would be finished with selected and graded fill material, dredged material could be used up to +6.0 m CD level.

1.3 Dredging Equipment

Considering the quality of the bed material to be dredged and the use, the dredging would be carried out using cutter suction dredger as shown in Figure 3 shows the components of the Dutter Suction dredger and the Figure 4 shows the working and floating cutter section dredger.

Figure 3: Illustrative Cutter –suction dredger to be deployed for dredging the creek

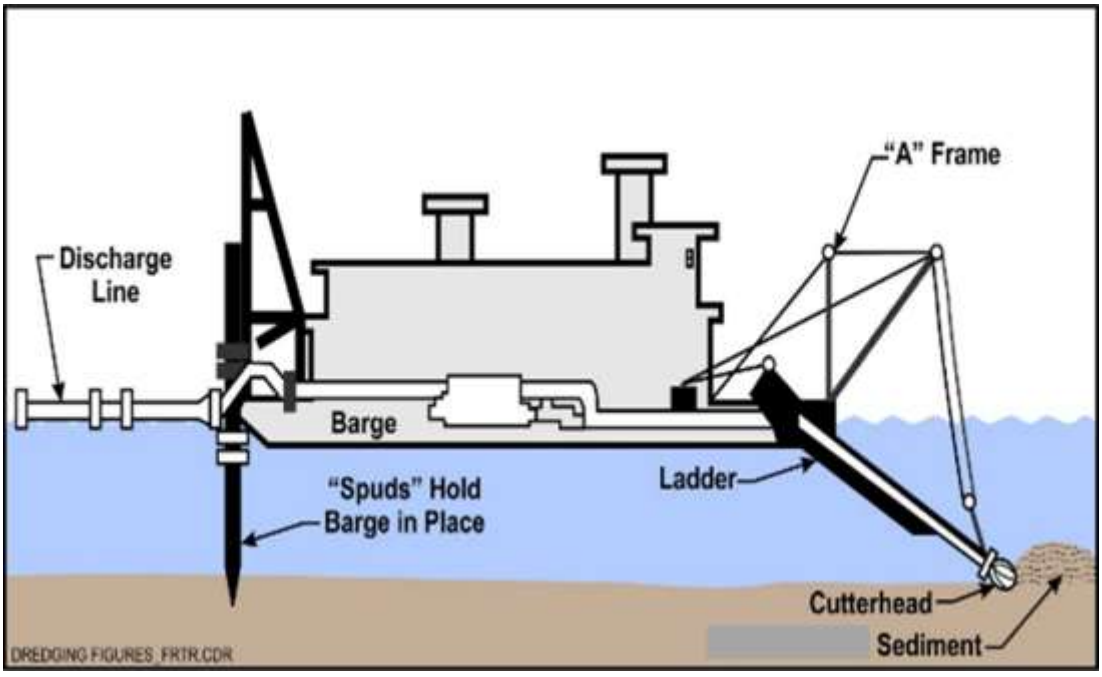


Figure 4: Cutter –suction dredger – Dredging (Top) and being floated to located (bottom)

The dredged spoil from the dredger will pass through the discharge line shown in the Figure 3, and pumped to the shore. The discharge pipe line would be either taken on water by using floaters or laid on ground as shown in Figure 5.

Figure 5: Dredge line on water (floating) and on land (Right)

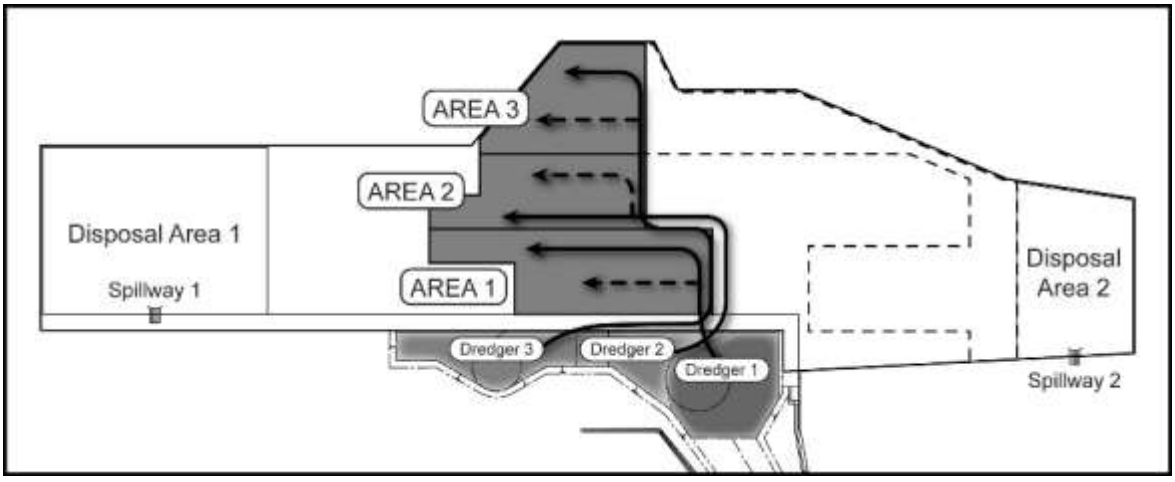
Prior to dredging the shore protection works would be carried out to make the shoreline along the port and the steel plant stable as can be seen in the Figure 6. A stable shoreline up to the finished level of +6.5 m CD would be the first requirement for reclamation work to proceed.

1.4 Reclamation of the Port & Plant Area

Dredging of the creek would be carried out using Cutter Suction dredger and the material would be pumped ashore, from the creek area, which is alongside the reclamation area. The area intended to be reclaimed would be lined with geo-fabric or thick polythene sheets capable of taking normal wear and tear. The dykes would be constructed around the reclaimed area inside which smaller dykes would be constructed as shown in figure 2. The reclaimed area thus would be divided in to various small areas divided with smaller height dykes with top level of +6.0 m CD. The peripheral dyke would have a top level of +7.0 m CD so no water escapes the desired area lined with plastic fabric.

The reclamation area is shown in Figure 6 below along with the shore protection work

Figure 6: Reclamation and the bank line area

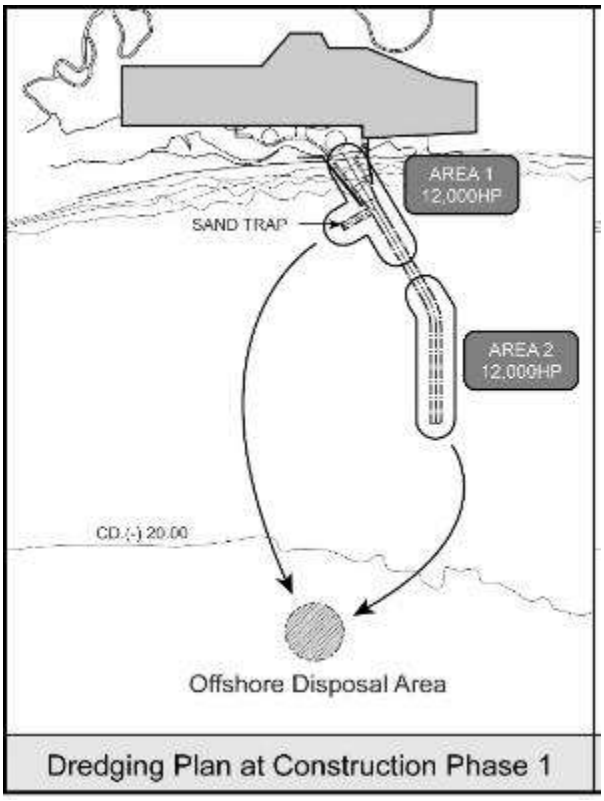


The water from the smaller compartments would be collected on the lower end of the disposal area and would be decanted through a rubble spillway. This way relatively clean water would be decanted in to the creek/sea. Since it is low in sediments, would have negligible impact on the environment.

The material from outer channel would be dumped in the sea (Refer Figure 7) and the effect of the same was studied in a mathematical model, which shows no impact on the sea bed on the nearest channel of the Paradip Port trust.

Figure 7 shows the excess material from the Area 1 and the material from Area 2 would be disposed in the sea at a designated location earmarked through model studies.

Figure 7: Reclamation of the excess material at Sea



1.4 Concluding Remarks

Dredging of the port area and the approach channel would generate about 30 Million Cubic Meter of sand/Silt etc. About 27 Million Cubic Meter would be used for reclamation in a manner so as not to contaminate the surface as well as the creek water. The balance material would be pumped back to the sea and disposed at the designated area determined through a model study.

There would be no environmental impact and the dredged product would be used for grade elevation of the plant and port area.

2.0 Impact of Dredging Disposal in Sea to the nearby Ports

The disposal of excess material at deep waters in the sea and its impact to the nearby Ports has been re-evaluated through the model study. The detailed model report is given as **Annexure IV** to this submission.

ANNEXURE III

Clarity on transfer of FC of POSCO to JUSL is required. A number of new items of work are included in project. Clarification is required whether new item of works were considered and approved at the time of transfer of FC to new PP.

1.0 Clarity on transfer of FC of POSCO to JSUL

Ministry of Environment and Forests (F.C. Division) *vide* its letter dated 04.05.2011 granted final/Stage-II approval in accordance with the Forest (Conservation) Act, 1980 for diversion of 1253.225 ha forest land for establishment of the Integrated Steel Plant and Captive Port by POSCO-India Pvt. Ltd., Jagatsinghpur District of Odisha (***Annex I***).

The State Government of Odisha stated that the erstwhile project proponent, M/s POSCO India Pvt. Ltd. could not utilize the land so allotted for establishment of Integrated Steel Plant even though they had possession of the land for a long period of four years. Further M/s POSCO could not pay the ground RENT and CESS of the allotted land to the Government of Odisha, represented by the Industrial Development Corporation of Odisha (IDCO) as per demand and unwillingness of the Company to utilize the land for the purpose of its allotment, Government of Odisha decided to cancel the allotment of land earlier made in favour of M/s POSCO India Pvt. Ltd.

Meantime, Govt. of Odisha received the proposal of M/s JSW Utkal Steel Limited for establishment of Integrated Steel Plant with Captive Power Plant at the villages of Gadakujanga, Nuagaon and Dhinkia area of Jagatsinghpur District. The proposal was approved by the State Government, following clearance in the 17th Meeting of High-Level Clearance Authority headed by the Hon'ble Chief Minister of Odisha. Hence, based on the decision of the State Government of Odisha, land earlier allotted to the M/s POSCO India Pvt. Ltd in Jagatsinghpur District was allotted in favour of M/s JSW Utkal Steel Limited for development of similar types of projects, consisting of an Integrated Steel Plant, Power Plant with Captive Jetty.

Govt. of Odisha (GoO) in the year 2018 requested for transfer of final forest clearance in favour of M/s JSW Utkal Steel Ltd., which was granted *vide* the Ministry's letter of even number dated 04.05.2011 for diversion of 1253.225 ha forest land for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur district of Odisha by POSCO-India Pvt. Ltd. The proposal was examined by the Forest Advisory Committee (FAC) in accordance with the Forest (Conservation) Act, 1980. The esteemed FAC in connection with the instant matter analyzed the guideline and opines that based on the provisions of comprehensive guidelines the approval granted under the provisions of Forest (Conservation) Act 1980 to one user agency for particular land use can be transferred to other user agency for the same land use, on

the recommendation of state government, with the conditions specified in para 5.1 of comprehensive guidelines.

2.0 Comparative Land use Plan

In compliance to the FAC observations, the State Government submitted a comparative statement of the components which were allowed for POSCO-India Pvt. Ltd. and those proposed for M/s JSW Utkal Steel Ltd., as it can be seen in the FAC minutes of the meeting (Please refer to Page No. 13, attached as ***Annex II***).

As the present proposal is concerned, the captive jetty involves only 14.400 ha of diverted forest land, lesser land area, as compared to the 17.032 ha land proposed by POSCO for captive port. The present JSW captive jetty proposal has been proposed without any change in the land use pattern and without addition of any new items into it as compared to the POSCO captive port (please refer to the comparative land use plan statement at item no. 11).

The main raw material for steel plant is iron ore, which shall be sourced in the form of slurry, received at a designated area inside the steel plant, de-moisturised, and stored in steel plant area under covered shed as cakes of Iron Ore concentrate. For exports to other JSW Plant locations, the Iron ore concentrate is received from Plant covered storage, or as manufactured pallets. Hence, since the storage is completely shifted to the steel plant area, storage area in the captive Jetty area is proportionately reduced and would be used only for the imported cargo such as Coal and Fluxes. Therefore, the forest land area requirement for the JSW captive jetty has been consequently reduced and approved accordingly.

Having satisfied with the above submissions of the State Govt., the esteemed FAC has recommended the proposal for the transfer of forest clearance (FC). The Ministry *vide* its letter dated 16.09.2019 granted transfer of final forest clearance for 1083.69 ha forest land (out of 1253.225 ha) in favour of M/s JSW Utkal Steel Ltd., *vide* Ministry's letter dated 04.05.2011 for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur District of Odisha by POSCO-India Pvt. Ltd. (***Annex III***). The balance forest land shall be adequately afforested with native forestry native species and protected.

In conclusion, it could be indicated that no new items are added in the forest clearance as is evident from the comparison statement submitted by the Government of Odisha, (*Annex II*), as far as the Captive Jetty is concerned.

In conclusion it could be seen that no new item as ordained in the POSCO clearance has been added in the new clearance and therefore the land use is not at all changing. Hence, the same may be favorably considered by the honorable committee.

Speed Post

F. No. 8-63/2007-FC
Government of India
Ministry of Environment and Forests
(F.C. Division)

Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi - 110510.
Dated: 4th May, 2011

PRINCIPAL SECRETARY TO GOVT. 09 MAY 2011 FOREST & ENV. DEPARTMENT

To

The Principal Secretary (Forests),
Government of Orissa,
Bhubaneshwar.

Sub: Diversion of **1253.225 ha** of forest land for establishment of an Integrated Steel Plant and Captive Port by M/s. POSCO-India Pvt. Ltd. in Jagatsinghpur district of Orissa.

Sir,

I am directed to refer to State Government's letter No. 10F (Cons)-54/20076-10240/F&E dated 26.06.2007 on the above-mentioned subject wherein prior approval of the Central Government for diversion of **1253.225 ha** of forest land for establishment of an Integrated Steel Plant and Captive Port by M/s. POSCO-India Pvt. Ltd. in Jagatsinghpur district of Orissa, was sought, in accordance with Section-2 of the Forest (Conservation) Act, 1980, and say as below:

(i) After careful consideration of the proposal by the Forest Advisory Committee (FAC) constituted by the Central Government under Section-3 of the said Act, this Ministry vide its letter of even number dated 19th September, 2008 accorded in-principle/stage-I approval under the Forest (Conservation) Act, 1980 for diversion of the said forest land, subject to fulfillment of conditions stipulated therein.

(ii) On the basis of the compliance report furnished by the State Government vide letter No. 10F(Cons)-54/2007-20393/F&E dated 03.12.2009, this Ministry vide its letter of even number dated 29.12.2009 accorded final/stage-II approval under Section-2 of the Forest (Conservation) Act, 1980, for diversion of the said forest land subject to the fulfillment of conditions stipulated therein.

(iii) This Ministry vide its letter of even number dated 08.01.2010 however, clarified that the forest clearance issued vide its letter of even number dated 29.12.2009 is conditional on settlement of rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. No forest land shall be handed over to the User Agency before settlement of rights under the above mentioned Act.

(iv) Later on, on receipt of complaints on violation of the Scheduled Tribes and Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Rehabilitations and Resettlement provisions in respect of the said forest land, this Ministry vide its letter of even number dated 28.07.2010 constituted a four member committee to (i) investigate and ascertain the status of the implementation of the Scheduled Tribes and Other

04/05/2011

JSW UTKAL STEEL LIMITED MUMBAI

Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Rehabilitations and Resettlement provisions; (ii) look into Environmental, Coastal Regulation Zone (ERZ) & other clearances granted; and (iii) review compliance with legislative and other obligations imposed by the Ministry of Environment & Forests in respect of the said project.

(v) Meanwhile, this Ministry vide its letter of even number dated 05.08.2010 requested the State Government of Orissa to stop the work (including handing over of the forest and non-forest land), if any, being undertaken for establishment of the said project.

(vi) After examination of the report of the said four member committee and the recommendations of the FAC thereon, the competent authority in the Central Government decided that before a final decision can be taken on diversion of forest land, since that state government has the primary responsibility for ensuring and guaranteeing compliance with the Forest Rights Act, 2006, he would like the State Government of Orissa to give a categorical assurance that at least one of the three conditions to be fulfilled by a person before his claims as other Traditional Forest Dweller (OTFD) under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 are recognized, are not fulfilled in the case of those claiming to be depending on or cultivating land in the POSCO project area.

(vii) This Ministry vide its letter of even number dated 10.02.2011 requested the State Government of Orissa to submit the said categorical assurance.

(viii) The State Government of Orissa vide their letter No. 10F (Cons)/-561/2011 (pt.) 6356/ F & E dated 08.04.2011 communicated said assurance to this Ministry. On April 14th, 2011 however, because of two supposed Palli Sabha Resolutions received from the POSCO Partirodha Sangram Samiti, the matter was referred back to the State Government of Orissa.

(ix) The State Government of Orissa vide their letter No. 10F (Cons.)-561/2011 (pt) -7651/ F & E dated 29.04.2011 furnished their comments/views on the said Palli Sabha resolutions received from the POSCO Partirodha Sangram Samiti.

(x) After careful examination of the State Government of Orissa's said letter dated 29.04.2011 and its enclosures, the Competent Authority in the Central Government accorded approval to grant final/stage-II approval for diversion of **1253.225 ha.** of forest land for establishment of an Integrated Steel Plant and Captive Port by POSCO-India Pvt. Ltd., Jagatsinghpur district of Orissa, subject to the condition that in addition to the conditions already imposed, the POSCO would bear the cost of regeneration of an equivalent amount of open, degraded forest land in a district to be determined and indicated by the state government. **(copy of speaking order of competent authority dated 02.05.2011 enclosed).**

Accordingly, I am directed to say that the Central Government hereby accords final/stage-II approval, in accordance with Section-2 of the Forest (Conservation) Act, 1980 for diversion of 1253.225 ha of forest land for establishment of an Integrated Steel Plant and Captive Port by

04/05/2011

JSW UTKAL STEEL LIMITED MUMBAI

M/s. POSCO-India Pvt. Ltd. in Jagatsinghpur district of Orissa, subject to the fulfillment of the conditions stipulated by this Ministry vide its letter of even number dated 29.12.2009 and the **additional condition** that the user agency would bear the cost of regeneration of an equivalent amount of open, degraded forest land in a district to be determined and indicated by the State Government of Orissa.

The conditions stipulated in this Ministry's said letter of even number dated 29.12.2009 are reproduced as below:

(i) Legal status of forest land shall remain unchanged.

(ii) Wherever possible and technically feasible, the User Agency *i.e.* M/s. POSCO-India Pvt. Ltd., shall undertake afforestation measures in the blanks within the proposal area (if the density is less than 0.4 area shall be afforested) as well as along the roads in consultation with the State Forest Department at the project cost.

(iii) The forest land shall not be used for any purpose other than that specified in the proposal.

(iv) The approval under the Forest (Conservation) Act, 1980 is subject to the clearance under the Environmental Protection Act, 1986 and all other Acts, Rules/ Regulations applicable to such project. .

(v) No labour camp are set up inside the forest area.

(vi) M/s POSCO-India Pvt. Ltd. will make arrangement for free supply of coal/alternate fuel to laborers and stop working on the project site so as to avoid any pressure on the adjacent forest areas.

(vii) Demarcation of lease area will be done on the ground at project cost using four feet high reinforced cement concrete pillars with serial numbers, forward and back bearings and distance from pillar to pillar at every 20 meters.

(viii) **M/s POSCO-India Pvt. Ltd. shall take up Afforestation inside the forest area in 100 radius from the permitted lease area in consultation with the Forest Department.**

(ix) No damage to the flora and fauna of the area shall be caused.

(x) The recommendations of the Committee constituted by the Hon'ble Supreme Court to examine imitative measures to be taken to protect this area from cyclone and other natural calamities shall be implemented as and when available at the user agency's cost.

(xi) The period of approval under the provisions of the Forest (Conservation) Act, 1980 shall be 30 years subject to subject to possession of valid lease by M/s POSCO-India Pvt. Ltd.

(xii) The fishing community of Nolia Sahi will be given financial aid and access to the sea by M/s. POSCO-India Pvt. Ltd.

(xiii) The Resettlement and Rehabilitation for the project affected families will be as per R&R Policy, 2006 of the Government of Orissa and as per the orders of the Hon'ble Supreme Court in W.P. (Civil) No. 202 of 1995.The affected families to be suitably compensated.

(xiv) The rights of the tribal people will be settled as per the provisions of the scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, before implementation of the project.

24/5/2011

JSW UTKAL STEEL LIMITED JSW KUMEDA

771

(xv) Any other condition that the Chief Conservator of Forests (Central), Regional Office, Bhubaneswar may impose from time to time for protection and improvement of flora and fauna in the forest area, shall also be applicable.

Yours faithfully,

Encl.: As above

04/07/11

(H.C. Chaudhary)
Assistant Inspector General of Forests

Copy to:

1. The PCCF, Government of Orissa, Bhubaneswar.
2. The Nodal Officer, O/o PCCF, Bhubaneswar.
3. The Chief Conservator of Forests (Central), Regional Office, Bhubaneswar.
4. The User Agency.
5. The Monitoring Cell, FC Division, MoEF, New Delhi.
6. Guard File.

Sd/-

(H.C. Chaudhary)
Assistant Inspector General of Forests

JSW UTKAL STEEL LTD MUMBAI

F. No 8-63/2007-FC

Sub: Proposal for transfer of final forest clearance in favour of M/s JSW Utkal Steel Ltd., which was granted vide this Ministry's letter dated 04.05.2011 for diversion of 1253.225 ha forest land for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur district of Odisha by POSCO-India Pvt. Ltd

1. The Government of Orissa vide their letter dated 26.06.2007 had submitted the proposal for diversion of 1253.225 ha forest land for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur district of Odisha by POSCO-India Pvt. Ltd. for seeking prior approval of the Central Government under Section-2 of the Forest (Conservation) Act, 1980. The integrated steel plant was proposed to be located in Kujang Tehsil of Jagatsinghpur district, Orissa, about 12 km from Para deep. The proposed project requires 4,004 acres of land of which 437.68 acres is private land, and 3566.342 acres is Government land (2958.79 acres forest land and 607.53 acres non-forest government land). The land for proposed project lies in 8 villages of three Gram Panchayats. Of the eight villages, two falls fully within the project area and the families in these villages would need to be resettled and rehabilitated in other areas. According to reports, **a total of 471 families would be displaced by the project.**
2. In-principle/Stage-I approval for diversion of the said forest land was granted by this Ministry on **19.09.2008** (**Pg.3196-3197/c)** subject to certain conditions prescribed therein. After receipt of compliance report on the conditions stipulated in the Stage-I approval dated 19.09.2008 from the State Government of Orissa, F**inal approval/Stage-II Forest Clearance** for diversion of the said forest land in favour of POSCO-India Pvt. Ltd was accorded on **29.12.2009 (Pg.3198-3199/c).** However, this Ministry vide its letter dated 8th January, 2010**(Pg.3200/c)** informed the State Government of Orissa that the stage-II approval is subject to settlement of rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and no forest land shall be handed over to the User Agency before settlement of the rights under the FRA.
3. Ministry vide its letter dated **04.05.2011 (Pg.3201-3205/c)** granted final/Stage-II approval in accordance with Section-2 of the Forest (Conservation) Act, 1980 for diversion of 1253.225 ha forest land for establishment of the said Integrated Steel Plant and Captive Port by POSCO-India Pvt. Ltd., Jagatsinghpur district of Orissa subject to the fulfilment of the conditions stipulated by this Ministry vide its letter dated 29.12.2009 **and additional condition** that the user agency would bear the cost of regeneration of an equivalent amount of open degraded forest and in a district to be determined and indicated by the State Government of Orissa.
4. The Govt. of Odisha vide their letter No**.** 10F (Cons)-164/2018/25069/F&E dated 19.11.2018 requested for transfer of final forest clearance in favour of M/s JSW Utkal Steel Ltd., which was granted vide this Ministry's letter of even number dated 04.05.2011 for diversion of 1253.225 ha forest land for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur district of Odisha by POSCO-India Pvt. Ltd. The said request was considered by the **Forest Advisory Committee in its meeting held on 21.02.2019.** FAC after through deliberation and discussion observed that,

   (i) MoEF&CC had accorded final approval (Stage-II approval) on 29.12.2009 in favour of POSCO-India Pvt. Ltd for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur district of Odisha.

   (ii) However, MoEF&CC vide its letter dated 8th January, 2010 informed the State Government of Orissa that the Stage-II approval is subject to settlement of rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and no forest land shall be handed over to the User Agency before settlement of the rights under the FRA.

   (iii)FAC took a note of the fact that its recommendation in its meeting dated 9.8.2007 was placed before CEC for its examination and appropriate recommendation to Hon'ble Supreme Court.

   (iv) The CEC examined the proposal and observed that the diversion proposal covers forest land required for the integrated steel plant and captive port and the proposal for requirement of forest land for other linkages such as mines, railways, road, corridor, etc. are yet to be finalized. The CEC further observed that instead of piecemeal diversion of forest land for the project, it would be appropriate to assess the total forest land requirement for the project including for the mining and that the decision for diversion of forest land is taken after considering the ecological importance of the area, number of trees required to be felled, adequacy and effectiveness of the Rehabilitation and Resettlement (R & R) Plan for the project affected

persons and benefits accruing to the State. Finally, the CEC recommended that the proposed diversion of forest land for M/s POSCO India Private Limited may be permitted subject to the compliance of the above observations.

(v) In consideration of the said report of the CEC, the Hon'ble Supreme Court in its order dated 08.08.2008 in IA. No. 2166 in 1413 in Writ Petition (Civil) No. 202 of 1995 directed that "**M/s POSCO, a Company registered in the Republic of Korea, proposes to start an integrated steel plant in the State of Orissa. The C.E.C. has examined the project and has recommended for diversion of 1253.225 ha of forest land. It is stated that about 2.8 lacs trees are to be cut and removed from this area. The Forest Advisory Committee (FAC) has also examined the project and has given its report. The MoEF may take an appropriate decision in this regard and subject to the decision of the MoEF, this project is cleared. As regards mining operations, the matter is pending with the Orissa State Authorities and we are told that the matter has already heard by the appropriate authority. The decision may be taken within a period of four weeks**. As there is involvement of cutting of a large number of trees, especially from the coastal side, examination of mitigating measures to be taken to protect this area from cyclone and other natural calamities is necessary. We appoint a Committee consisting of Shri S.K. Patnaik, presently acting as a Member of C.E.C., as Chairman. The Tribal Welfare department of the State of Orissa will nominate a Member and also the MoEF will nominate another Member to this Committee. The Forest and Environment Department of State of Orissa may also nominate another Member to this Committee. The Committee shall examine the steps to be taken as mitigating measures. It may be noted that this part of the order is as an interim measure",

(vi) Based on above stated FAC recommendations, CEC and Hon'ble Apex court decision, MoEF&CC accorded In-principle/Stage-I approval on 19.09.2008 subject to certain conditions prescribed therein.

(vii) On compliance of the conditions imposed in Stage I approval, MoEF&CC issued Stage II approval. MoEF&CC received many complaints regarding violations of FRA and Resettlement & Rehabilitations(R&R) provisions. The complaints were verified through different committees constituted by MoEF&CC and MoTA.

(viii) In a written communication to the state government, dated 5.08.2010, Ministry informed the state government of Odisha that work, if any, being undertaken on the said land for the said project, including handing over of the forest and non-forest land, shall be stopped and report on the same be submitted to this Ministry.

(ix) The report of Ms. Meena Gupta Committee and observations of N.C Saxena Committee were placed before FAC in its meeting on 25.10.2010.FAC after detailed deliberations, recommended as below:

a) As there is no agreement on the adequacy of the FRA process at the project site, it is essential to examine the issue in its entirety.

b) The Ministry of Tribal Affairs (MoTA) is the nodal Ministry to ensure implementation of the FRA and may examine the larger question of whether the implementation of the FRA has been adequate. At the same time, the FAC is required to examine the prima facie allegations of noncompliance with the said Act. This is to ensure the Committee does not condone any illegality and to ensure that it always acts in full conformity with Acts of Parliament. This is done in following paragraphs.

c) The MoEF's order dated 5 August 2010, asking that all works on the project site be halted, is still in force. This is to remain till it is ensured that all acts of the State Government of Orissa were in accordance with the FRA.

d) The MoEF circular dated August 3, 2009, states that forest clearance under the Forest Conservation Act is conditional upon obtaining "a letter each from the concerned Gram Sabhas, indicating that all formalities/processes under the FRA have been carried out, and that they have given their consent to the proposed diversion and the compensatory and ameliorative measures if any, having understood the purposes and details of proposed diversion." No such resolutions meeting the required specifications have been forwarded by the State Government.

e) The issue of compliance with FRA is especially relevant in this case because the forest clearance dated 29.12.2009 clearly stipulates that rights as per the provisions of the FRA shall be settled before implementation of the project. This was further reiterated in the MOEF letter dated 8 January 2010 which stipulated that, "the forest clearance issued is conditional on settlement of rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. No

forest/ land shall be handed over to the User Agency before settlement of rights under the above mentioned Act". This condition has not been met by the State Government. The majority and minority reports of the Meena Gupta Committee concur on this issue. The evidence clearly indicates that the conditions upon which final clearance was granted have been violated.

f) Further, the regional representative of the MoEF had noted as early as 24.07.2007 that the No Objection Certificate from the gram panchayats, as required under para 2.1.4 of the FCA Handbook, had not been obtained.

g) The Committee is of the opinion that this is a clear case for temporary withdrawal of permission. The Ministry may give adequate opportunity to the State Government to respond and adequately demonstrate its compliance with the above stipulations.

(x) The FAC finally recommended that in the opinion of the FAC, the Meena Gupta Committee report clearly indicates a lack of diligence in settlement of forest rights and unless the State Government provides evidence of their serious intent for following observance of due process of law, it appears to the FAC that this is a breach of law. Based on the above analysis, the FAC finds that **this is a fit case for applying the precautionary principle to obviate irreparable damage to the affected people**, and recommends temporary withdrawal of the final/stage-II approval already accorded.

(xi) The FAC recommendation was placed before competent authority. After detail analysis of the recommendation, the competent authority placed a detail speaking order dated 31.1.2011 as under:

Subject: POSCO

I. <u>Background</u>

(a) The Government of Orissa and Pohang Steel Company (POSCO) signed a MoU on June 22, 2005 for setting up an integrated steel plant with the total capacity of 12 million tonnes per annum (with 4 million tonnes in the first phase) at Paradip in Jagatsinghpur district. The integrated steel plant includes a captive power plant and a captive minor port. The entire project complex requires about 1621 hectares of land of which about 1253 hectares in forest land.

(b) The application for environmental clearance for the captive minor port was received in the MoE&F on September 14th, 2006. The environmental clearance was granted by the MoE&F on May 15th, 2007.

(c) The application for environmental clearance for the captive power-cum-steel plant was received in the MoE&F on April 27th, 2007. The environmental clearance for the captive power-cum-steel plant was granted by the MoE&F on July 19th, 2007.

(d) On June 26th, 2007, Government of Orissa sought approval from the MoE&F for diversion of about 1253 hectares of forest land. On September 28th, 2008, Stage-I clearance for diversion of forest land was granted by the MoE&F. Final clearance for diversion of forest land was granted by the MoE&F on December 29th, 2009.

(e) On January 8th, 2010, MoE&F clarified to the Government of Orissa that the final approval of diversion of forest land in favour of POSCO is conditional on the Settlement of rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 also known as Forest Rights Act (FRA, 2006.

(f) On March 16th, 2010, the Forest and Environment Department of Government of Orissa wrote to the MoE&F conveying that there are no tribal people or traditional forest dwellers residing in the forest area being acquired by POSCO.

(g) On June 29th, 2010, the Forest & Environment Department of Government of Orissa sent copies of translated versions of entire proceedings of the settlement of Rights under the Forest Rights Act, 2006 as requested by the MoE&F in the its letter of April 15th, 2010.

(h) On April 13th, 2010 the MoE&F and Ministry of Tribal Affaris jointly constituted a Committee under the Chairmanship of Dr. N.C. Saxena and Dr. Devendra Pandey to study the implantation of the Forest Rights Act, 2006, particularly from the point of view of sustainable forest management. On August 4th, 2010 a report was received in the MoE&F submitted by a sub-

committee of this joint committee which said that there was non-compliance of the required processes under the Forest Rights Act, 2006.

(i) On August 5h, 2010 MoE&F based on sub-committee's report asked the Government of Orissa to stop transferring forest land till all the processes under the FRA 2006 has been satisfactorily completed.

(j) Meanwhile, on July 25th, 2010 a four-member committee had been constituted by the MoE&F based on a recommendation made by the Forest Advisory Committee (FAC) to examine all issues relating to diversion of forest land for the POSCO Project. This was done considering the substantial amount of forest land being diverted and in view of the representations that the FAC has received.

(k) The report of the four-member Committee was submitted on October 18th, 2010. The Committee was not unanimous in its recommendations, with one member submitting one set of findings and recommendations and three others taking a different view both in terms of findings and recommendations.

(l) The report of this four-member committee were considered by three statutory bodies of the MoE&F- (i) The Forest Advisory Committee (for diversion of forest land); (ii) the Expert Appraisal Committee for Industry (for the captive power-cum-steel plant); and (iii) the Expert Appraisal Committee for Infrastructure (for the captive minor port).

(m) I have (i) carefully considered the recommendations of these three committees; (ii) carefully considered the representation made by the state government to the FAC; and (iii) had detailed discussions with the state government, Union Ministry of Tribal Affairs and various other stakeholders. The following are my decisions.

II. Environment Clearance for Steel-cum-Captive Power Plant

(a) Environmental clearance for the Steel-cum-captive power plant is being accorded with 28 additional conditions over and above that stipulated in the original environmental clearance of July 19th, 2007. Of these the most significant are the following:

- The National Ambient Air Quality Standards issued by the MoE&F on November 16th, 2009 will be followed.
- Sustainability study of water requirement (for the ultimate steel production capacity of 12 million tonnes per year) will be carried out by an institute of repute, Should there be a shortfall of water at the Jobra Barrage for irrigation purposes, the company will voluntarily sacrifice water intake for facilitating irrigation.
- The total green area within the plant will be 25% of its area as per the guidelines of the Central Pollution Control Board (CPCB).
- In addition to fulfilling the R&R obligations mandated by the state government's package and while also implementing CSR-related programmes in the construction phase, 2% of net annual profit should be devoted to corporate social responsibility in the region where the project is located*.

  (* This is in keeping with the "Guidelines on corporate social responsibility for Central Public Sector Enterprises" brought out by the Department of Public Enterprises, Govt. of India, March 2010.)

III. Environmental Clearance for Captive Minor Port

(a) Over the last few weeks, the MoE&F has received the results of the shoreline study being carried out in different states by the Institute of Ocean Management, Anna University, Chennai. This study is based on satellite imagery for 1972, 1990, 2000 and 2010. **The study**

for Orissa and more particularly for that 3.48 km stretch of the Orissa coast from Gopalpur to Paradip where POSCO's captive port is proposed reveals the following:

Erosion Characteristics	Distance (m)
High erosion	200
Medium erosion	2000
Low erosion	940
Stable coast	340
Low accretion	Nil
Medium accretion	Nil
High accretion	Nil
Total	**3480**

(b) In view of this finding and also keeping in mind concerns raised on impacts on the marine environment raised by many civil society groups, **the environmental clearance for the captive minor port is being accorded with 32 additional conditions over and above stipulated in the original environmental clearance of May 15th, 2007.** The most significant of these are:

- No construction shall be undertaken in the "high erosion" zone identified by the Institute of Ocean management.
- Shoreline protection measures to counter erosion on the norther side of north breakwater shall be undertaken.
- The shoreline shall be protected to ensure that no further erosion occurs on the northern side of the Northern Breakwater up to Paradip port.
- A MOU shall be signed between NIO and POSCO which will includes works relating to monitoring of the shoreline, sand bypass system, beach nourishment and any other activity that has an impact along the coast/coastal waters. The Institute for Ocean Management will monitor the progress periodically on behalf of the MoE&F.
- POSCO shall ensure that no industrial activity shall be carried out within CRZ area other than those permissible under the Notification.
- POSCO shall submit detailed Marine Environment Conservation Plan (including mangrove regeneration and conservation of turtles and horse shoe crabs). The implementation of conservation plan should start before commencing of construction of port.
- The location and size of the fishing jetty intended to compensate the loss of fishing activity arising out of development of the port at JMC shall be carried by POSCO in consultation with the local people to their satisfaction and requirement. Separate clearance under Coastal Regulation zone Notification, 2011 for the proposed fishing jetty shall be obtained.
- POSCO shall made a detailed assessment of the impacts on fishing communities and resultant economic losses converged in R&R package- along with requirement of fishing jetty and identified beneficiaries' location identified for the jetty (and alternative options considered).

IV. Forest Clearance for Project Complex

(a) In a communication to the Ministry of Tribal Affairs, Government of India dated August 24th, 2010, the SC&ST Development Department of the Government of Orissa stated that:

"There are no tribals in occupation nor residing within the POSCO project area and no traditional forest dwellers are also there in occupation more than 75 years".

In this communication the state government has also stated that some claims submitted by the POSCO PrathirodhasangramSamiti on June 1st, 2010 were, upon enquiry, found to be forged.

(b) A communication from the Forest and Environment Department of the Government of Orissa to the MoE&F dated October 21st, 2010 stated that:

"….. no claims were received were received from any of the villages (Dhinkia, Gobindpur, Nuagaon, Polanga, NoliaSahi and Bhuyanpal) …..nor has a single person claimed redressal under the definition of "other traditional forest dwellers".

(c) It is clear that the POSCO project site is not a part of a Fifth Schedule Area and is, in fact, far away from the nearest Fifth Schedule Area. However, according to the Forest Rights Act, 2006 non-tribals have to fulfill three conditions before their claims as other traditional forest dwellers (OTFDs) for rights under FRA, 2006 can be recognized. These are:

- They should have primarily resided in the forest for 75 years prior to the 13th day of December, 2005. (Section 2(o))
- They should be, at present, dependent on the forest or forest land for bona fide livelihood needs. (Section 2(o))
- They should have been in occupation of the forest land before the 13th day of December, 2005. (Section 4(3))

(d) Non-tribals who meet the above three conditions constitute OTFDs regardless of whether they file any individual claim for land or not. All these three conditions have to be fulfilled for the recognition and vesting of forest rights for the OTFDs. Even if one of them is not fulfilled, then the applicants will be eligible as OTFDs (individually or as a community) for the recognition and vesting of forest rights under the FRA, 2006.

(e) Furthermore, regarding what constitutes "primarily residing in", the Union Ministry of Tribal Affairs in its circular of June 9th, 2008 has clarified that the interpretation of the phrase "primarily resided in and who depend on" includes person "who are not necessarily residing in the forest but are depending on the forest for their bona fide livelihood needs" or "who are working on such patches of land in such areas irrespective of whether their dwelling houses are outside the forest or forest land".

(f) As regards the phrase "bona fide livelihood needs", Rule 2(b) of the Rules made under FRA, 2006 implies that a person either living in or cultivating parcel of forest land or a person collecting firewood, fodder, non-timber forest produce, fish, etc. from forest lands qualifies as bona fide user.

(g) Against this background and in view of the observation of the FAC and of the four-member committee (paras 11 and 12), **before a final decision can be taken on diversion of forest land, since the state government has the primary responsibility for ensuring and guaranteeing compliance with the Forest Rights Act, 2006, I would like the Orissa government to**

- **Give a categorical assurance to the MoE&F that at least one of the above three conditions is not fulfilled in the case of those claiming to be dependent on or cultivating land in the POSCO project area.**
- **Final approval for diversion of 1253 hectares of forest land for the POSCO project would be granted as soon as this assurance of the state government is received by the MoE&F.**

V. A Final Word

(a) Undoubtedly, project such as that of POSCO have considerable economic, technological and strategic significance for the country. At the same time, laws on environment and forests must be implemented seriously. Every such case presents its own unique set of circumstances and requires a distinctive solution. **In this case,**

(i) the 28 additional conditions imposed as part of the environmental clearance for the steel-cum-captive power plant;

(ii) **The 32 additional conditions imposed as a part of the environmental clearance for the captive minor port; and**

(iii) **The pointed assurance sought from the state government in keeping with its obligations under the Forest Rights Act, 2006**

Do provide a comprehensive package of measures to ensure that this project will not be detrimental from an ecological and local livelihood perspective. In any case, the conditions imposed are going to be closely monitored.

(b) Projects like POSCO also raise broader issues of our capacity to conduct comprehensive, coordinated and combined environmental and forestry -related impact assessments and appraisals for mega projects and for projects that cut across a number of sectors, traditionally defined. The MoE&F has taken up this issue for review and improvement.

(c) Finally, in keeping with the MoE&F's steadfast commitment to transparency and accountability, all documents referred to in this note and not already in the public domain are being made available on www.moef.nic.in.

(xii) The decision of the Ministry was communicated to the state vide its letter dated 10.02.2011 with request from the State Government to submit the categorical assurance to MoEF&CC.

(xiii) Government of Odisha vide their letter no. 10F (Cons) 561/2011(pt.)/6356 dated 08.04.2011 submitted its reply and informed as below:

(a) Subsequent to the afore-mentioned letter orders indicated in the Hon'ble Union Minister for Environment & Forests vide his letter dated 22.2.2011 had also drawn the attention of the Hon'ble Chief Minister, Orissa regarding violation of Forest Rights Act in the POSCO project area as alleged by Sri Prasant Paikray.

(b) Since the issues raised above are about ensuring implementation of forest Rights Act and alleged violation of the said Act in the POSCO Project area, the ST & SC Development Department; which is the Nodal department for implementation of the Forest Right Act in the State and the Collector, Jagatsinghpur, who is the Chairperson of the District Level Committee constituted under the provision of the Forest Rights Act, were asked to look into the matter and submit compliance.

(c) After necessary examination of the matter, the Commissioner-cum Secretary to Government, ST&SC Development Department in his letter No. 9770 dated 7.3.2011, based on the report of Collector, Jagatsinghpur, has confirmed that on one satisfies the conditions laid down under Section 2 (0) of the Scheduled Tribes & Other Traditional Forest Dwellers (Recognition of Forest Rights Act, 2006 to be treated as other traditional forest dwellers in the forest land involved in the POSCO project area, who has for at least three generations prior to 13^{tb} day of December, 2005 primarily resided in and who depend on the forest land for bonafide livelihood needs. This observation of the Nodal department of the State Government clarifies that at least one of the three stipulations prescribed in para 19 of the order of Hon'ble Union Minister for Environment & Forests regarding eligibility of an applicant to be regarded as Other Traditional Forest Dwellers for settlement of Individual community forest rights as per provision of the Forest Rights Act is not fulfilled in respect of any person in the POSCO project area.

(d) Further the Hon'ble Minister, Environment & Forests in the letter dated 12.3.2011 had drawn the attention of Hon'ble Chief Minister, Orissa to the resolutions passed by Dhinkia and Gobindpur villages of Dhinkia GP appended with another representation of Sri Prasanta Paikra, indicating their opposition to setting up of Steel Plant Project by POSCO India Pvt. Ltd. in their area along with their eligibility to be created as Other Traditional Forest Dwellers under the provisions of Forest Rights Act. The matter has been thoroughly enquired examined by the Collector, Jagatsinghpur district (Chairperson of the District level Committee constituted under the Forest Right Act) and the ST & SC development Department (Nodal department for implementation of the Forest Rights Act in the State).

Further, the Commissioner -cum-Secretary, ST & SC Development Department vide his letter No.11807 dated 31.3.201, based on the latest report of the Collector, Jagatsinghpur, has again reiterated the earlier position that no one satisfies he conditions to be treated as "other traditional forest dwellers" in the forest land involved in the POSCO protect area.

(xiv) The reply of Government of Odisha was analyzed in MoEF&CC and competent authority in MoEF&CC issued a speaking order dated 2.5.2011, which is placed as below

Subject: POSCO

I

1. On January 31st, 2011 I had announced that final forest clearance for the POSCO project in Orissa would be given after the receipt of certain categorical assurances from the state government. This is at Annexure-I.

2. On April 13th, 2011 the state government communicated these assurances to MoE&F. On April 14th, 2011 because of two supposed Palli Sabha Resolutions I received from the POSCO PratirodhaSangramsamiti, I referred the matter back to the state government. This is at Annexure-II.

3. On April 29th, 2011, the state government responded to my letter of April 14th, 2011. This latest reply is at Annexure-III.

II

4. The government of Orissa in its latest reply dated April 29th 2011 has stated the following:

(a) The two Pallisabha Resolutions-of Dhinkia dated February 21st, 2011 and of Gobindpur dated Feb. 23rd, 2011—are not valid documents in terms of mandatory provisions of law under the Orissa Grama Panchayat Act, 1964 and forest Rights Act, 2006. Such resolutions can neither be relied on nor be acted upon.

(b) Out of a total of 3445 voters of Dhinkia, only 69 persons have allegedly signed the so-called Pallisabha Resolution of Feb.21st, 2011, and of 1907voters of Gobindpur, only 64 persons have allegedly signed the Pallisabha Resolution of Feb.23rd, 2011. This clearly shows that the "resolutions" are invalid.

(c) The two "resolutions" purported to have been passed by the Palli Sabha are **not** available in the book (recorded by the gram panchayat secretary and signed by the sarpanch) and are therefore fake ones.

(d) Stringent action for violation of provisions of Orissa Grama Panchayat Act, 1964 will be taken against ShriSisirMohapatra, SarpanchDhinkia who has over-stepped the jurisdiction vested in him and mis-utilised his official position to serve the interest of POSCO PratirodhaSangramSamitee (PPSS) of which he is the Secretary.

III

5. I have gone through various provisions of the Orissa Grama Panchayat Act, 1964, Forest Rights Act, 2006 and Forest Rights Rules, 2007. The main issue here is whether the two supposed Pallisabha Resolutions that I received from the POSCO PratirodhaSangramSamiti, and that were sent on April 14th to the Orissa government for disposal according to law, are legally valid documents or not.

6. According to Rule 4(2) of the Forest Rights Rules, 2007, the quorum of the Gram Sabha[1] meeting shall not be less than two thirds of all members of such Gram Sabha. As per the report of the Orissa government (see ii. In Para 4 above) the number of members was far less than the prescribed quorum.

7. Further, according to Rule 3(1) of the Forest Rights Rules, 2007, the Gram Sabhas should be convened by the Gram Panchayat, where as in this case these seem to have been convened by the Sarpanch without the authority of the Gram Panchayat. Rule 20(a) of the Orissa Grama Panchayat Rules 1968 has also authorized only the Gram Panchayat to convene the pallisabha.

8. Lastly, as per the requirements of Rule 26 of the Orissa Grama Panchayat Rules, the proceedings of the pallisabha should be recorded in a book specially maintained for this purpose. In the instant case, as per the report of the district Collector, the resolutions under questions are not available in that book.

9. For these reasons, and based on the information provided by the state government, I have no option but to come to the conclusion that there has been no legally valid resolution of the Gram sabha claiming recognition of forest rights as required under section 6(1) of the Forest Rights Act, 2006.

10. I now have three options available to me.

- Seek further legal opinion on what the state government has stated.
- Institute an independent inquiry into the claims and counter-claims being made by the state government and the PPSS.
- Repose trust in what the state government has so categorically asserted.

11. I have already examined the legal issues in section III, and therefore there is nothing to be gained by seeking further legal opinion. Similarly the facts of the case, in particular the lack of signatures of two-thirds of the village adult population on the resolution passed by the Sarpanch, are too obvious to require any further enquiry or verification.

12. I have therefore decided to follow the thid route because the primary responsibility for implementing the Forest Rights Act, 2006 is that of the state government through the institutions of the Gram Sabha, SDO, and the District Collector.; I must respect the reports from the SDO and the Collector. Their views and also of the state government must prevail unless there is overwhelming and clinching evidence to the contrary[2]. Therefore I hold that there has been no valid claim for recognition of forest rights in Dhinkia and Gobindpur as required under the Forest Rights act, 2006.

13. **Faith and trust in what the state government says is an essential pillar of cooperative federalism which is why I rejected the second option.** Beyond a point, the bona fides of a democratically elected state government cannot always be questioned by the Centre.

14. I am conscious of the fact that the MOU between the state government and POSCO expired last year and has yet to be renewed. This MOU had provisions for the export of iron ore which made me deeply uncomfortable with this project. **I would expect that the revised MOU between the state and**

POSCO would be negotiated in such a manner that exports of raw material are completely avoided. In addition, the appeal of the state government against the decision of the Orissa High Court striking down the allocation of the Khandadhar iron ore mines to POSCO is still pending in the Supreme Court. I could well have waited for the MOU to be renewed and for a final decision of the Supreme Court. But that would have smacked of filibustering. I would now hope that the new MOU would be negotiated by the state government in such a way that exports of iron ore are completely avoided.

15. **Therefore, in view of the state government's latest communication of April 29th, 2011, final approval is accorded to the state government for diversion of 1253 hectares of forest land in favour of POSCO. This approval would, however, be subject to the condition that, in addition to the conditions already imposed on compensatory afforestation, payment of NPV etc, POSCO would also bear the cost of regeneration of an equivalent amount of open, degraded forest land in a district to be determined and indicated by the state government.**

16. **I also expect that the state government would immediately pursue action, under the Orissa Grama Panchayat Act, 1964, against the Sarpanch, Dhinkia for what it has categorically said are "fraudulent" acts.** If no action is taken forthwith, I believe that the state government's arguments will be called into serious question.

V

17. I want to address the question of whether my decision will weaken the implementation of the Forest Rights Act, 2006. To these critics I would answer that it was at my personal insistence that in August 2009, the Ministry of Environment and Forests made adherence to the forest Rights Act, 2006 an essential pre-requisite for allowing diversion of forest land for non-forestry purposes under the forest Conservation Act, 1980. I was under no obligation or pressure to do so except my own commitment to FRA, 2006. The implementation of both the FRA, 2006 and the August 2009 guideline is alearning and an evolving process since we are still in largely uncharted territory. The Ministry of Environment and Forests will continue to upgrade and improve the process to ensure compliance with the law in letter and in spirit.

18. The environment and forest clearance process for the POSCO project has generated huge interest both in India and abroad. As I had pointed out in my decision of January 31st, 2011, the POSCO project itself has considerable economic, technological and strategic significance for both the state and the country. At the same time, laws on the environment and forests must be implemented seriously. **In this case, the 60 conditions imposed as part of my decision of January 31st, 2011 provide a package of measures to ensure that the project will not be detrimental from an ecological and local livelihoods point of view. I would expect both the state and POSCO to be extra-sensitive on this score.**

19. This has not been an easy decision to take and it will, I know, be both welcomed and criticised[3]**.** That is perhaps inevitable given the complex nature of the issues involved. But what I want to be clearly appreciated is that all along I have tried to uphold the principle of due process. **I believe as Minister my responsibility is not just to do the right thing, but do the thing right.**

(xv) Ministry vide its letter dated **04.05.2011** granted final/Stage-II approval in accordance with Section-2 of the Forest (Conservation) Act, 1980 for diversion of 1253.225 ha forest land for establishment of the said Integrated Steel Plant and Captive Port by POSCO-India Pvt. Ltd., Jagatsinghpur district of Orissa subject to the fulfilment of the conditions stipulated by this Ministry vide its letter dated 29.12.2009 **and additional**

condition that the user agency would bear the cost of regeneration of an equivalent amount of open degraded forest and in a district to be determined and indicated by the State Government of Odisha.

(xvi) It was reported by the state government that the project proponent i.e. M/s POSCO India Pvt. Ltd. could not utilize the land so allotted for establishment of Integrated Steel Plant even though they had possession of the land for a long period of four years. Further owing to non-payment of ground rent and cess of the allotted land by the M/s POSCO India Pvt. Ltd as per demand of IDCO and unwillingness of the Company to utilize the land for the purpose of allotment, Government of Odisha decided to cancel the allotment of land earlier made in favour of M/s POSCO India Pvt. Ltd and to keep the said land under Land Bank of IDCO as the ownership of the land is with IDCO.

(xvii) It is further reported by the Govt. of Odisha that it revealed from the letters of CMD, IDCO that the proposal of M/s JSW Utkal Steel Limited for establishment of 12 MTPA Integrated Steel Plant with Captive Power Plant at Gadakujanga, Nuagaon and Dhinkia area of Jagatsinghpur district with an investment of Rs.50,000 crores has been approved by the State Government following clearance of the above proposal of the Company in the 17 Meeting of High Level Clearance Authority headed by the Hon'ble Chief Minister, Odisha held on 2.6.2017. The land earlier allotted in favour of M/s POSCO India Pvt. Ltd in Jagatsinghpur district has now been decided by the State Government to be allotted in favour of M/s JSW Utkal Steel Limited for similar types of projects, i.e. Integrated Steel Plant with captive Jetty.

(xviii) The Industrial Promotion & Investment Corporation of Odisha Limited (IPICOL) have appraised the extent of land requirement for the new project proponent i.e. M/s JSW Utkal Steel Limited for setting up,12 MTPA Integrated Steel Plant & CPP and Captive jetty. As per its appraisal, the Integrated Steel Plant with CPP would require **2,980 acres (1,205.99 ha.) of land**, while the proposed Captive Jetty for this project needs **180 acres (72.85 ha) of land**. Thus total land required for the Integrated Steel Plant with CPP and Captive Jetty is assessed to be **3,160.00 acres (1,278.834 ha.)** as against earlier land requirement of **1620.496 ha. including 1253.225 ha. of forest land** for the same projects by the earlier project proponent i.e M/s POSCO India Pvt. Ltd. However, the requirement of land mentioned under Project Details furnished by the new project proponent indicates that the total land of **2950.31 acres (1193.974 ha.) is required** for the proposed Green Field Integrated Steel Plant of 12 MTPA along with a Captive Power Plant of 900 MW capacity and a dedicated Captive Jetty along the JatadharMuhan in Jagatsinghpur district, Odisha.

(xix) Less requirement of land for the project is owing to due diligence and engineering innovations leading to requirement of reduced extent of forest as well as non- forest land for the project. Total land of **1193.974 ha. required now for the project** includes 2677.80 acres (1083.69l ha.) of forest land and 272.51 acres (110.283 ha.) of non-forest land spread over **six villages** of Dhinkia, Gobindapur, Nuagaon, Bayanalakandha, Polanga and Jatadhara under ErasamaTahasil of Jagatsinghpur district as against earlier project area of 1620.496 ha. pertaining to POSCO project spread over **8 villages**.

(xx) The forest land includes 170.45 acres (68.98 ha.) of RF land, 2441.17 acres (987.928 ha.) of PF-1, 8.44 acres (3.4l6 ha.) of PF-2 and 57.74 acres (23.367 ha.) of Revenue forest land which are all part of earlier diverted forest land of 1253.225 ha allotted in favour of M/s POSCO India Pvt. Ltd. The comparative statement showing land requirement for the project of the new proponent i.e. M/s JSW Utkal Steel Limited vis-à-vis the land requirement shown by M/s POSCO India Pvt. Ltd. for developing similar projects in the project area earlier which could not come up, is indicated in detail agenda of FAC as submitted by the applicant.

(xxi) In this backdrop, Keeping the legal requirement as well as decision of State Government for development of projects of same nature at the earlier site in Jagatsinghpur district in view, the new project proponent i.e. M/s JSW Utkal Steel Limited has requested MoEF&CC to transfer FC approval granted to M/s POSCO India Pvt. Ltd to M/s JSW Utkal Steel Limited for the purpose of establishing Integrated Steel Plant with CPP and Captive Jetty at the same project site in Jagatsinghpur district of Odisha as per provision of para 2.8 of F.C. Act guidelines.

5. Decision of FAC on 21.02.2019: FAC after detail deliberation and discussion observed that the POSCO India Ltd was granted approval by MoEF&CC in 2009 for diversion of 1253.225 ha of forest land for establishment of Integrated Steel Plant, captive power plant and captive Port and the approval was revalidated on 04.05.2011.From perusal of documents and time line followed in approval of the project it is learnt that a detail deliberation for almost 4 years since 2007 till 2011 had taken place before according final go ahead for the diversion of forest land for establishment of the proposed project. It is also observed that after prior approval for diversion of forest land under FCA 1980, the forestland was in possession of the user agency for

four years but due to certain administrative hurdle the user agency i.e. POSCO India Pvt. Ltd.could not start the work and the MoU was also got cancelled.

The condition no. (xi) mentioned in the Stage II approval dated 4.05.2011 was perused. It reads as: The period of approval under the provisions of Forest (Conservation) Act 1980 shall be 30 years subject to possession of valid lease by POSCO -India Pvt. ltd.

It is clear that MoEF&CC in the year 2011, had granted the approval for POSCO India Pvt. Ltd for 30 years. It is also reported that the new user agency is also going to establish the integrated steel plant, captive power plant and captive jetty at the same area which had been diverted to POSCO -India Pvt. ltd. From the analysis of the land use plan submitted by the new user agency it is seen that, barring few, most of the works proposed over the forest land are similar in nature. More over forest area demanded by new user agency is less i.e. 1083.691 ha as compared to earlier diversion of 1253.224 ha. In this backdrop it was felt that it will be prudent to analyze and compare the detail land use plan in order to ascertain how the new plan is more ecofriendly due to usage of new technology. Further it is also understood that the state government had submitted a proposal for transfer to Forest clearance under the provisions of FCA guideline 2.8, which actually deals with "lease transfer", whereas the instant proposal is for the "transfer of FC approval" from one user agency to another user agency. The issue needs legal interpretation. Accordingly, **FAC observed that following documents shall be submitted to FAC for further analysis**:

(i) MoEF&CC shall seek legal opinion on the issue of transfer of FC approval from one user agency to other and the relevance of its guideline 2.8 which deals with transfer of lease.
(ii) State government shall submit the shape file of the area diverted to POSCO -India Pvt. ltd and area requested by M/S JSW Utkal steel limited.
(iii) State government shall submit a comparative statement of the components which were allowed for POSCO-India Pvt. ltd and those proposed for M/S JSW Utkal steel limited. The difference in land use shall be highlighted clearly. DGPS map depicting different components of the proposed project may also be submitted.
(iv) Shape file of CA land and present status shall be confirmed by state government.

6. Based on the recommendation of FAC on 21.02.2019 as mentioned at para 5(i) above, the matter was referred (**Pg.105-107/n**) to MoLJ for advice in which the issue pertaining to guideline and apprehension of Ministry that case to be treated as transfer of lease or transfer of approval of forest conservation was highlighted. The comments also received from MoLJ and placed in file at **Pg.108/n**.

In the meantime, the comprehensive guidelines (under FC Act, 1980) has been approved by the Competent Authority in the Ministry and issued vide this Ministry's letter dated 28.03.2019.The same has been placed in the Ministry's website.

7. Further, the **FAC in its meeting held on 22.05.2019** in connection with the instant matter analysed the guideline and opines that based on the provisions of comprehensive guidelines it is clear that the approval granted under the provisions of Forest (Conservation) Act 1980 to one user agency for particular land use can be transferred to other user agency for the same land use, on the recommendation of state government, with the conditions specified in para 5.1 of comprehensive guidelines.In this backdrop **FAC decided that** its earlier recommendation i.e

"MoEF&CC shall seek legal opinion on the issue of transfer of FC approval from one user agency to other and the relevance of its guideline 2.8 which deals with transfer of lease"

shall be deleted. The remaining information sought by FAC will be submitted by the State Government.

8. Ministry vide its letter dated 15.04.2019 **(Pg.3214: F/X)** requested to State Govt. of Odisha to furnish the certain information as sought on the recommendation of FAC:
9. Now the State Govt. of Odisha vide their letter no 13252/9F dated 26.07.2019 **(Pg.3235-3240/c)** furnished

point wise information as below:

Observation of FAC –Para 5(ii) above	**State Government shall submit the shape file of the area diverted to POSCO India Pvt. Ltd. and area requested by M/s JSW Utkal Steel Ltd.**
Response of State Govt.	In compliance to above, the DFO Mangrove (WL) Division Rajnagar has furnished the CD containing the shape files as submitted by User Agency is enclosed as **Annexure-I**. Further, the DFO Mangrove (WL) Division Rajnagar has furnished the DGPS map and map showing area diverted to POSCO India Ltd. and area requested by M/s JSW Utkal Steel Ltd. duly authenticated by him which are submitted by User Agency are enclosed as **Annexure-I A and Annexure-I B** respectively.
Observation of FAC -2 Para 5(iii) above	**State Government shall submit a comparative statement of the components which were allowed for POSCO- India Pvt. Ltd. and those proposed for M/s JSW Utkal Steel Ltd. The difference in land use shall be highlighted clearly. DGPS map depicting different components of the proposed project may also be submitted**

Response of State Govt.

In compliance to above, the DFO Mangrove (WL) Division Rajnagar has furnished a comparative statement of the component-wise land use relating to both the projects highlighting the difference in land use(**Annexure-II),** as below:

POSCO					**M/s JSW Utkal Ltd.**			
S. N.	**Items/ Units**	**Forest land**	**Non-Forest land**	**Total land**	**Items/Units**	**Forest land**	**Non-Forest land**	**Total land**
1	Raw Material Storage & Landing Yard	198.816	038.235	237.051	Raw material storage & Landing yard for Ore & Flux, **Iron ore slurry, Thermal coal yard**	52.630	-	52.630

2	Raw Material Processing	034.270	0.009	034.279	Raw material storage & landing yard for imported coal, PCI, Lime stone and Pellet	22.790	20.073	42.863	
3	Iron Making Plant	178.124	002.952	181.076	Iron making plant	178.310	2.780	181.090	
4	Steel Making Plant	273.382	054.012	327.395	Steel making Plant	73.305	-	73.305	
5	Rolling Mill	153.720	034.200	187.920	Rolling Mill	183.447	-	183.447	
6	Captive Power Plant	031.403	013.208	044.611	Captive Power Plant	51.330	-	51.330	
7	Disposal Area	140.911	028.016	168.927	Disposal Area + **Cement Plant**	20.740+ 33.500	-	54.240	
8	Water Treatment Plant & Treated Waste Water Holding Pond	29.695	032.316	62.011	Water / waste water treatment plants, Treated Waste water holding pond	60.240	-	60.240	
9	Main Office / Security Control & Waiting Hall	005.671	000.431	006.102	Main Admin office and common facilities	7.680	-	7.680	

10	Rail Siding	001.988	039.230	041.218	Railway siding /Truck Handling & Raw material unloading	30.820	-	30.820
11	Port	017.032	023.367	040.399	Captive Jetty	14.400	54.177	68.577
12	Supporting Auxiliary	053.766	000.002	053.788	Supporting Auxiliaries Comprising of MRSS, Stores & repair shop, Compressed air section, loco Repair shop, Medical Centre,	40.630	0.493	41.123
13	Arterials & Peripheral Road	035.159	029.261	064.421	Roads, Parking & drains	43.894	3.970	47.864
14	Green Belt	099.289	072.012	171.301	Green Belt	239.720	13.030	252.750
15	---	---	---	---	Water reservoir	30.255	115.760	46.015
Total		**1253.225**	**367.271**	**1620.496**		**1083.691**	**110.283**	**1193.974**

Further, the DFO Mangrove (WL) Division Rajnagar has furnished the comparative account of village wise forest land required by both the project as well as comparative account of type wise forest land required by both the projects are furnished (**Annexure-II A** as below:

Name of village	**Forest Land as proposed by old Project Proponent (POSCO Project)**							**Forest Land proposed by new Project Proponent (JSW Project)**						
	RF	**PF1**	**PF 2**	**Rev.**	**Total Forest**	**Non-Forest**	**Total**	**RF**	**PF1**	**PF2**	**Rev. Forest**	**Total Forest**	**Non-Forest**	**Total**

				Forest	**Land**	**Land**						**land**	**land**	
Dhinkia		340.835	-	1.339	342.174	151.351	493.525	-	302.885	-	-	302.885	-	302.885
Gobindapur	-	364.141	-	2.034	366.175	25.254	391.429	-	321.554	-	-	321.554	-	321.554
Nuagan	-	271.135	-	-	271.135	28.149	299.284	-	269.745	-	-	269.745	-	269.745
Nolia Sahi	-	-	**14.642**	**4.212**	**18.854**	**9.645**	**28.499**	**Not Included**						
Bayanalakandha	-	21.904	-	0.092	21.996	0.036	22.032	-	21.020	-	-	21.020	-	21.020
Polang	-	100.116	7.431	36.404	143.951	10.748	154.699	-	70.724	3.416	23.367	97.507	-	97.507
Bhuyanpal	-	**6.746**	-	**5.607**	**12.353**	**8.521**	**20.874**	**Not Included**						
Jatadhara	68.980	2.00	5.607	-	76.587	133.567	210.154	68.980	2.000	-	-	70.980	110.283	181.263
Total	**68.980**	**1106.877**	**27.680**	**49.688**	**1253.225**	**367.271**	**1620.496**	**68.980**	**987.928**	**3.416**	**23.367**	**1083.691**	**110.283**	**1193.974**

The DFO Mangrove (WL) Division Rajnagar has furnished the DGPS map depicting different components of the proposed project duly authenticated by him which is submitted by User Agency is enclosed as **Annexure-III.**

Observation of FAC - Para 5(iv) above	**Shape file of CA land and present status shall be confirmed by State Government**
Response of State Govt.	In compliance to above, the DFO Mangrove (WL) Division Rajnagar has furnished the shape file of CA land in CD form relating to Mangrove (WL) Division Rajnagar which is enclosed as **Annexure-IV.** Further, the DGPS map of the CA lands relating to Mangrove

	(WL) Division Rajnagar duly authenticated by him is enclosed as **Annexure- IV A.** Further, the DFO Cuttack Forest Division has furnished the shape file of CA land in CD form relating to Cuttack Forest Division is enclosed as **Annexure-IV B** and the DGPS map of the CA lands relating to Cuttack Forest Division has been duly authenticated by DFO Cuttack Division is enclosed as **Annexure- IV C.** The Compensatory Afforestation land over 1110.782 ha of Revenue Forest land has been identified in Cuttack Forest Division and 46.4 ha of Revenue Forest land and 128.90 ha of non-forest land has been identified in Mangrove (WL) Division Rajnagar for Compensatory Afforestation. Thus the total Compensatory Afforestation area comes to 1286.082 ha which has been mutated in favour of the State Forest Department as reported by DFO Mangrove (WL) Division Rajnagar and DFO Cuttack Forest Division vide their Memo No.5241 dated 25.07.2019 and Memo No.5764 dated 25.07.2019 respectively. DFO Cuttack Forest Division has reported that out of 1110.782 ha of Revenue Forest land identified for Compensatory Afforestation under Cuttack Forest Division, the plantation has already been done over 745.0 ha of CA land. Further, the DFO Mangrove (WL) Division Rajnagar has reported that out of 175.30 ha of CA land comprising of 46.40 ha of Revenue Forest land and 128.900 ha non-forest land identified for Compensatory Afforestation under Mangrove (WL) Division Rajnagar, the plantation has already been done over 81.94 ha of CA land.

10. A note on contribution **of modern technology and eco-friendly nature of the project of the New Project Proponent (JSW Utkal Steel Ltd**) duly signed by DFO, Mangrove Forest Division is given as reproduced:

The **main reason for such requirement of lesser land** in the JSW Project is due to adopting Modern Energy Efficient and Eco-friendly Steel Making technologies which consume:

(i) Less resources
(ii) less energy and
(iii) reduce waste generation. These cleaner and greener technologies are much compact, thus requiring lesser land to establish

A. Main raw material for steel plant is iron ore. In the new project it has been planned not to stack raw material within the steel complex. In order to be land efficient and eco-friendly, the iron ore is to be stacked and processed away near to the source of iron ore. This has significantly reduced the land requirement for establishing steel plant complex.

Therefore, JSW Project has proposed only 73 ha of forest land (and no non-forest land) for the Steel Making Plant in contract to 273 ha of Forest Land and 327 ha of total land proposed by POSCO.

B. In JSW Project most of the wastes will be recycled and reused which is a key Eco-friendly feature

(i) All the ferrous containing waste like mill scale etc. will be reused back into steel making.
(ii) waste such as Blast Furnace Slag and Fly Ash will be reused for cement making

- The new project proponent proposes to set up a Cement plant of 10 MTPA capacity to ensure 100% utilization of Blast Furnace Slag and Fly Ash generated from captive power plant.

- Thus due to continuous reuse of these wastes for cement making, the land requirement for storage/disposal of these wastes will be significantly reduced.

C. Pipe line Mode of Transportation:

- This has been recognized as Green Industrial Operation by Environmental Bodies and regarded as the most Eco-friendly mode of transportation, since it
  (i) Avoids traffic issues;
  (ii) Ensures consistent supply of material and
  (iii) keeps the environment clean by eliminating hazardous exhaust emissions

- JSW proposes to use Slurry Pipeline for transportation of Iron ore rather than relying on the conventional method of transportation through road.

D. Adopting Dry Gas Cleaning System instead of Wet Gas Cleaning System:

- Wet Gas Cleaning System generates huge amount of Effluent which requires Effluent Treatment Plant (ETP) and hence more space.
- JSW has opted for Dry Gas Cleaning System which doesn't involve water & requires no Extra land for setting up ETPs in SMS (Steel Melting Shop).
- The same method has also been adopted for cleaning the waste gases generated from Blast Furnaces.
- This arrangement will conserve water and reduce waste water generation and reduce land component in totality.

E. Important Technical features of the proposed SMS (Steel Melting Shops) will be:

- High capacities BOF (Basic Oxygen Furnaces) which enhances productivity per unit of land
- Twin caster based continuous caster which requires less space

F. The Blast furnace and SMS have been designed/ located in such a way in proposed layout that travel length of torpedo carrying hot metal is minimum to make system efficient as well as land efficient.

G. Adopting MEROS System (Maximized Emission Reduction of Sintering) in the sinter plant:

- This is much more superior technology than the present system of Emission control.
- In this system in a series of successive treatment steps the dust and harmful metallic and organic components present in the sinter off gas are removed to levels previously unattained with conventional gas treatment techniques.

H. TRT (Top Pressure Recovery Turbines) will be installed in Blast Furnace: As an Energy-saving equipment it will

(i) control the top pressure of a blast furnace, and

(ii) generate electric power by driving a Turbine using Blast Furnace Gas generated in blast furnace.

I. CDOS (Coke Dry Quenching system) to be installed in the coke oven: This will

(i) help in reducing water consumption and

(ii) at the same time, energy will be recovered from hot coke to produce power.

J. All the waste gases generated from coke oven, Blast furnace and Steel melting shops will be cleaned properly and reused for generating energy within the plant thus making it one of the most energy efficient plants

K. Provision for water reservoir inside the plant premises:

- This will meet the needs of exigencies and will be a step towards cooling the environment.

Thus the proposed Steel Plant of the new Project Proponent will be one of the most energy efficient and Eco-friendly Steel Plant in the country where

(i) Less water will be consumed
(ii) Less energy will be consumed
(iii) Less waste will be generated
(iv) Most of the waste will be reused/ recycled
(v) Will have slurry pipeline mode of transportation of basic raw material And
(vi) Is determined to develop 33% of Green area in the project

11. The shape file as received has been anlysed by DSS Cell and their report is placed in file at **F/P**. The major observation are as follows:

(I) In Case of Land proposed for Diversion:

(a) Proposed forest area for diversion falls under Jagatsinghpur district of Odisha State.
(b) The State Government of Odisha provided three shape files & their software calculated area is as follows:

1	Shape file/ KML file of Old Project Boundary of POSCO	1639.464 Ha
2	Shape file/ KML file of Forest land diverted earlier for POSCO Project	1419.900 Ha

3	Shape file/ KML file of area applied by M/s JSW in instant case (including Forest & Non-Forest area)	1214.506 Ha

(c) There is no WLS/ PA/ Tiger Reserve or Tiger Corridor is located within 10 Km radius of proposed area for diversion.

(d) In the instant case, DSS analysis has been performed on instant proposed project boundary that comprises an area of 1214.506 Ha. including Forest as well as Non-Forest area. It is also imperative to mention that the total area required in the instant project is 1193.974 Ha out of which 1083.691 ha is Forest area and 110.283 ha is Non-Forest land whereas the User agency/ State Government of Odisha has submitted shape file/ KML file of 1214.506 Ha. Moreover, the user agency/ State Government has submitted the shape file of overall project boundary without indicating the Forest land & Non-Forest areas in the shape-file. Thus, through Shape file it is not possible ascertain the Non-Forest areas as well as Forest areas, its kissam/ category i.e. RF/PF.

(e) The instant case i.e. M/s JSW POSCO project falls under Inviolate Zone as per DSS Rule-I due to existence of 1st order major River **(Mahanga Nadi) inside the project boundary. However, the instant project area falls under Not-Inviolate/ Not In High Conservation Zone Value as per DSS Rule-II because, out of total 17 Grids of 1X1Sq Km are falling on the project area, none of the Grids is having average score above 70. Thus, the final DSS result for the instant project is "Un-decided".**

(f) Forest Cover: Out of total 1214.506 Ha area of instant project, 14 ha of land is characterized with Moderately Dense Forest, 55 ha. of land as Open forest, 2 ha of land as water and 1145 ha. of land as Non-Forest in terms of forest classes (as per the ISFR 2015) based on the interpretation of satellite data period 2013-2014.

(II) In Case of Compensatory Afforestation Land:

(a) Software Calculated area through KML file/ shape files of total area proposed for CA is found 1293.578 Ha., out of which, 175.033 Ha area is proposed under Mangrove (WL) Division Rajnagar and remaining 1118.545 Ha area is proposed for CA under Cuttack Forest Division.

(b) Legal status of CA land is cannot be ascertained through DSS due to unavailability of RFA boundary over DSS portal.

(c) Out of total 1293.578 Ha or 1238 Ha **(because forest cover could not be assessed for 5 CA patches proposed under Mangrove (WL) Division Rajnagar)** proposed CA area, 10 ha. of land is characterized with Very Dense Forest, 155 ha of land is characterized with Moderately Dense Forest, 780 Ha area as Open Forest, 15 ha of land as Scrub, 45 ha of land as Water and remaining 233 ha of land as Non-Forest in terms of forest classes (as per the ISFR 2015) based on the interpretation of satellite data period 2013-2014.

(d) Patch-wise details of proposed CA patches w.r.t density classes (based on interpretation of satellite data period 2013-14) as per ISFR 2015, may kindly be seen in DSS report.

The facts related to the proposal may be placed before Forest Advisory Committee (FAC) in its meeting scheduled to be held on 16.08.2019 for their consideration and appropriate decision.

****

F. No 8-63/2007-FC
Government of India
Ministry of Environment, Forests and Climate Change
(FC Division)

Indira Paryavaran Bhawan,
Aliganj, Jor Bag Road,
New Delhi - 110003.

To,

Dated: 16th October, 2019

The Principal Secretary (Forests),
Government of Odisha,
Bhubaneswar.

Sub: Proposal for transfer of final forest clearance for 1083.69 ha forest area (out of 1253.225 ha) in favour of M/s JSW Utkal Steel Ltd., which was granted vide this Ministry's letter dated 04.05.2011 for diversion of 1253.225 ha forest land for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur District of Odisha by POSCO-India Pvt. Ltd.

Sir,

I am directed to refer to the Govt. of Odisha's letters No. 10F (Cons)-164/2018/25069/F&E dated 19.11.2018, No 13942/9F(MG)-159/06 dated 07.08.2019 and 10F (Cons)-164/2018/3785/F&E dated 20.02.2019 in connection with transfer of final forest clearance in favour of M/s JSW Utkal Steel Ltd., which was granted vide this Ministry's letter of even number dated 04.05.2011 for diversion of 1253.225 ha forest land for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur district of Odisha by POSCO-India Pvt. Ltd. The said proposal has been examined by the Forest Advisory Committee constituted by the Central Government under Section-3 of the aforesaid Act.

After careful examination of the proposal of the State Government and on the basis of the recommendations of the Forest Advisory Committee, ***approval*** of the Central Government under Forest(Conservation) Act, 1980 is hereby granted for transfer of final forest clearance for 1083.69 ha forest area (out of 1253.225 ha) in favour of M/s JSW Utkal Steel Ltd., which was granted vide this Ministry's letter dated 04.05.2011 for diversion of 1253.225 ha forest land for establishment of Integrated Steel Plant and Captive Port in Jagatsinghpur District of Odisha by POSCO-India Pvt. Ltd. subject to the following conditions:

i. Legal status of the diverted forest land shall remain unchanged;
ii. **Transfer of approval granted under the provisions of FCA 1980 shall be in accordance of provisions prescribed in para 5.1 of Chapter 5 of comprehensive guidelines.**
iii. **The new user agency shall be allowed to use the diverted forest land with same stipulation as prescribed in the approval granted to erstwhile user agency.**
iv. **New user agency shall be liable to inherit and pay all liabilities of erstwhile user agency, if any.**
v. **New user agency is bound to carry out CA as per the stipulations of Stage-II approvals.**
vi. **The approval granted under the provisions of FCA 1980 is valid for 30 years w.e.f. date on which stage II approval was granted to the erstwhile user agency.**
vii. **169.534 ha of balance forest land (1253.225ha-1083.69ha) shall be returned back to forest department. This land shall be adequately afforested with native forestry species and shall be protected at the cost of new user agency. In this regards detail plan shall be prepared.**

16.10.19

viii. Lease transfer charges @ 10% of the NPV or Rs. 1,00,000/- (1 Lakh) whichever is less will be realized from the new user agency and will be deposited in the account of CAMPA before execution/transfer of lease in favour of the new user agency.

ix. The new user agency shall pay the NPV as per the approval granted under FC Act if not paid earlier. The new user agency shall also furnish an undertaking to pay the additional NPV, if so determined by the Hon'ble Supreme Court of India.

x. The State Govt. shall ensure complete compliance of the FRA, 2006, if not already done.

xi. The new user agency shall abide by all the conditions on which the forest land was leased to the original user agency.

xii. The new user agency shall abide by any other condition that may be stipulated, with the approval of competent authority, by the Central Government/Concerned Regional Office/State Government in future in the interest of conservation, protection and development of forests & wildlife.

xiii. The User Agency shall submit the annual self - compliance report in respect of the stipulated conditions to the State Government, concerned Regional Office and to this Ministry by the end of March every year; and

xiv. The user agency shall comply all the provisions of the all Acts, Rules, Regulations, Guidelines, Hon'ble Court Order (s) and National Green Tribunal Order(s) pertaining to this project, if any, for the time being in force, as applicable to the project.

Yours faithfully,

(Sandeep Sharma)
Assistant Inspector General of Forests

Copy to:

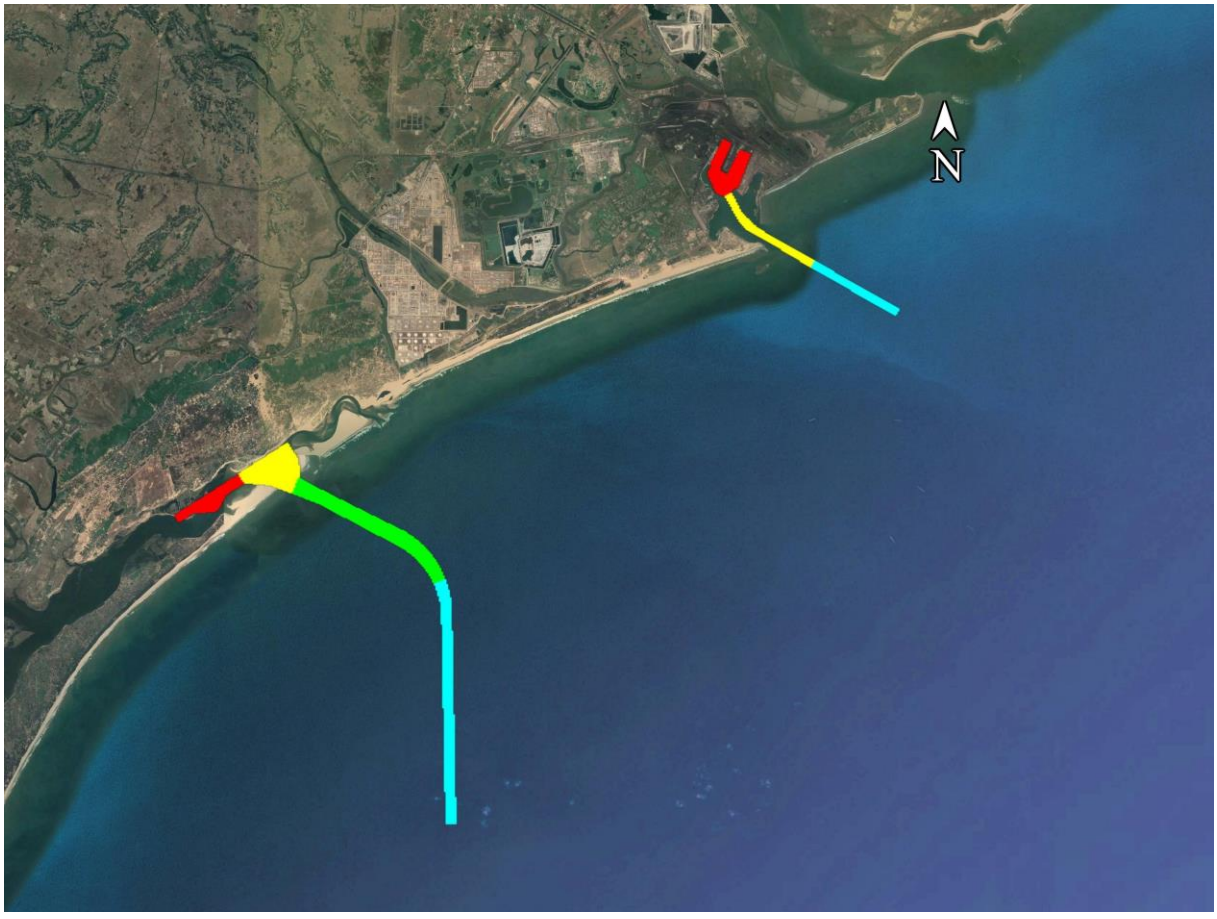
1. The Principal Chief Conservator of Forests, Government of Odisha, Bhubaneshwar.
2. The Nodal Officer, O/o the PCCF, Government of Odisha, Bhubaneshwar.
3. The Dy. Director General (Central), Regional Office, Bhubaneshwar.
4. User Agency
5. Monitoring Cell of FC Division, MoEF&CC, New Delhi.
6. Guard File

ANNEXURE IV

MATHEMATICAL MODEL STUDIES FOR PROPOSED CAPTIVE JETTY AT JATADHARIMUHAN RIVER, JAGATSINGHPUR, ODISHA

Final Report

June 2021



This report has been prepared under the DHI Business Management System certified by BVC to comply with ISO 9001 (Quality Management), ISO 14001 (Environmental Management), OHSAS 18001 (Health and Safety Management)

Approved by
Dr. Tirumaleswara Reddy Technical Director

MATHEMATICAL MODEL STUDIES FOR PROPOSED CAPTIVE JETTY AT JATADHARIMUHAN RIVER, JAGATSINGHPUR, ODISHA

Final Report

June 2021

Prepared for JSW Steel Limited

Represented by Dr. R.R.Patra, Vice-President, Environment

Report authors	Mr. Jinesh Kumar, Ms. Sree Nandhini, Ms. Sangeetha
Quality assurance	Dr. N. T. Reddy

Project number	63802408
Approval date	02nd June 2021
Revision	1
Classification	Confidential

Contents

1 INTRODUCTION 1
1.1 DHI Project 1
1.2 Background 1
1.3 Scope 1

2 Shoreline Change Prediction: LITPACK 2
2.1 Coastline and Bathymetry 2
2.2 Waves 3
2.3 Currents 4
2.4 Water levels 4
2.5 Sediment 4
2.6 Results 4
2.6.1 Littoral Drift 5
2.6.2 Coastline Evolution 6

3 Sand Transport Model 12
3.1 Bathymetry 13
3.2 Boundary conditions 13
3.3 Simulation Period 13
3.4 Modelling Results 13
3.4.1 Baseline Conditions 14
3.4.2 Layout Conditions 16
3.4.3 Comparison: Baseline vs Layout 18
3.5 Assessment of Sand Trap 19

4 Mud Transport (MT) Model 21
4.1 Model Bathymetry 21
4.2 Simulation Period 21
4.3 Model Parameters 21
4.4 Model Results. 22
4.4.1 Bed level changes: Baseline and Layout conditions 22
4.5 Maintenance Dredging 23
4.6 Effect of Capital and Maintenance Dredge Material on The Paradip Port 24
4.6.1 Effect of Capital Dredging Materials 24
4.6.2 Effect of Maintenance Dredging Material 27

5 Conclusion 29

Table of Figures

Figure 1-1 Location of the Project Site, vis-à-vis the Paradip Port Location on Indian East Coast 1
Figure 2-1 Initial coastline and Profiles considered for LITPACK study 2
Figure 2-2 Cross-sections of the three bathymetry profiles 3
Figure 2-3 Wave data extracted at 14m water depth near Profile 2; (Left) Wave height, (Right) Wave Period. 3
Figure 2-4 Littoral drift along the cross-shore profile 1 5
Figure 2-5 Littoral drift along the cross-shore profile 2 5
Figure 2-6 Littoral drift along the cross-shore profile 3 5
Figure 2-7 Shoreline derived from Satellite Image (black) and LITPACK model (red) for 2019 6

Figure 2-8 Coastline evolution result with zones selected for analysis, baseline (blue line), after 1 year -layout condition (red line) and after 5 years-layout condition (green line) in the study area. 7
Figure 2-9 Shoreline change at Zone-1. Baseline conditions after 1-year (blue colour), Layout condition after 1-year (red colour) and Layout condition after 5-years (green colour)..... 8
Figure 2-10 Shoreline change at Zone-2. Baseline conditions after 1-year (blue colour), Layout condition after 1-year (red colour) and Layout condition after 5-years (green colour)..... 9
Figure 2-11 Shoreline change at Zone-3. Baseline conditions after 1-year (blue colour), Layout condition after 1-year (red colour) and Layout condition after 5-years (green colour)..... 10
Figure 2-12 Shoreline change in meters for 5 years 11
Figure 3-1 Model domain used for the siltation studies. 13
Figure 3-2 Bed Level Change for the baseline condition (Dark Brown: Jitadhari river; Black: Paradip Port)..... 14
Figure 3-3 Zoom-in-view of model domain for baseline condition: Jatadhari River 15
Figure 3-4 Zoom-in-view of model domain for baseline condition: Paradip Port 15
Figure 3-5 Bed Level Change with Layout condition (Dark Brown: Jatadhari river; Black: Paradip Port) 16
Figure 3-6 Zoom-in-view of bed level changes with layout condition: Jatadhari River 17
Figure 3-7 Zoom-in-view of bed level changes with layout conditions: Paradip Port..... 17
Figure 3-8 Sections considered for siltation quantity..... 18
Figure 3-9 Sand trap layout on the southern side of the proposed port..... 19
Figure 3-10 Bed Level Change for the model domain for the Layout condition with sand trap 20
Figure 3-11 Zoom-in-view of model domain for layout condition with sand trap near to tip of southern breakwater..... 20
Figure 4-1 Bed level changes after 30 days with baseline condition 22
Figure 4-2 Bed level changes after 30 days with layout condition 22
Figure 4-3 Dredging layout plan cross-sections for JSW port and Paradip Port..... 23
Figure 4-4 Dumping location of dredged materials 24
Figure 4-5 Capital dredge spoil dispersion from dumping ground after 5 days..... 25
Figure 4-6 Capital dredge spoil dispersion from dumping ground after 10 days 25
Figure 4-7 Capital dredge spoil dispersion from dumping ground after 15 days 26
Figure 4-8 Capital dredge spoil dispersion from dumping ground after 20 days 26
Figure 4-9 Capital dredge spoil dispersion from dumping ground after 1-month..... 26
Figure 4-10 Maintenance dredge spoil dispersion from dumping ground after 5 days..... 27
Figure 4-11 Maintenance dredge spoil dispersion from dumping ground after 10 days 27
Figure 4-12 Maintenance dredge spoil dispersion from dumping ground after 15 days 28
Figure 4-13 Maintenance dredge spoil dispersion from dumping ground after 20 days 28
Figure 4-14 Maintenance dredge spoil dispersion from dumping ground after 1-month 28

Table of Tables

Table 2-1 Longshore sediment transport and rate for different scenarios 11
Table 3-1 Model parameters used in sand transport model set up..... 12
Table 3-2 Parameter values for generating sediment transport table..... 12
Table 3-3 Siltation quantity at Paradip Port without JSW proposed development..... 18
Table 4-1 Mud Transport model parameters..... 21
Table 4-2 Annual siltation quantity at Paradip port with baseline condition..... 23
Table 4-3 Extend of bed level change due to disposal of capital dredging quantity 25
Table 4-4 Extend of bed level change due to disposal of maintenance dredging quantity..... 27

1 INTRODUCTION

1.1 DHI Project

M/s JSW Steel Limited (JSWSL) has requested DHI to carry out additional studies to assess the effect of development at Jatadhar on the existing and operational Paradip Port, in connection with proposed All-Weather Multi Cargo Greenfield Captive Jetty(ies) for handling capacity of 52 MTPA at Jatadharimuhan River, Dist. Jagatsinghpur, Odisha

1.2 Background

JSW Steel Limited (JSWSL), one of the leading Industrial houses of India, with interests in Steel, Power, Cement, Infrastructure, Paints having a present capacity of 19 MTPA with the vision of achieving 25 MTPA capacity by 2020.

JSW Utkal Steel Ltd. (JUSL), a wholly owned subsidiary of JSW Steel Ltd., intends to set up 13.2 MTPA Integrated Steel Plant (ISP) with 10 MTPA cement plant, 900 MW captive power plant, captive jetty of 52 MTPA handling capacity in Jagatsinghpur district and 30.0 MTPA Iron Ore Grinding & Desliming Plant in Keonjhar district, Odisha with an objective to expand its operation in Odisha. Government of Odisha has given in principle approval for all these projects in Odisha. The Steel Plant, Power Plant and the Port are proposed to be located at the mouth of the Jatadharmuhan River in Jagatsinghpur District.

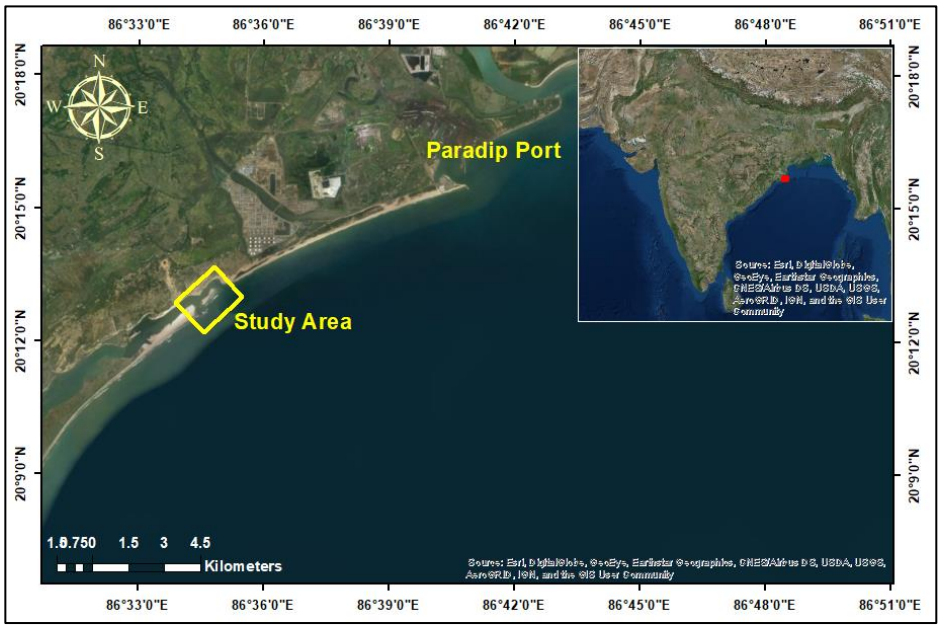


Figure 1-1 Location of the Project Site, vis-à-vis the Paradip Port Location on Indian East Coast

1.3 Scope

1. Assessment of shoreline changes between the Paradip Port and proposed JSW development
2. Assess the impact of sand trap on the south of the south breakwater of proposed JSW development
3. Details of identification of dumping disposal sites during construction and operation phase.
4. Assess the likely impact of disposal in sea to the nearby ports

2 Shoreline Change Prediction: LITPACK

In this Chapter, the shoreline change rate is predicted using numerical model techniques. Littoral processes FM is a numerical model capable of simulating littoral drift and coastline evolution in areas with non-cohesive sediment and quasi-uniform beaches in which the flow and transport can be assumed to be primarily in the longshore direction. The model has the capacity to simulate the influence of structures like groynes, breakwater, jetties etc. on shoreline evolution.

2.1 Coastline and Bathymetry

The model is simulated for the baseline conditions of the shoreline from 2018 and shoreline changes with the presence of port layout conditions. For this study, the extend which is from 5 km south of the proposed port to the north of Paradip port, is considered. The initial coastline is derived from the image of Sentinel satellite of January, 2018. The coastline orientation is considered as 240^{o} approximately. Three cross-shore profiles perpendicular to the coast were derived from the bathymetry and topography information at north of Paradip port, in between Paradip and the proposed port and to the south of proposed port. The coastline and the profiles considered is shown in Figure 2-1.

All the cross-shore profiles are drawn to same length with the same grid spacing and perpendicular to shore. Since the surf zone bathymetry data and topographic data is not available, hence, it is assumed that the dune height is of 3m and interpolated with the existing bathymetry. The 3m contour has been demarcated in the google image where there is permanent feature like vegetation or change in land use are appeared. The cross section of profiles is given Figure 2-2. Among the three profiles considered, the profile 1 is appearing to be steeper than other two profiles.

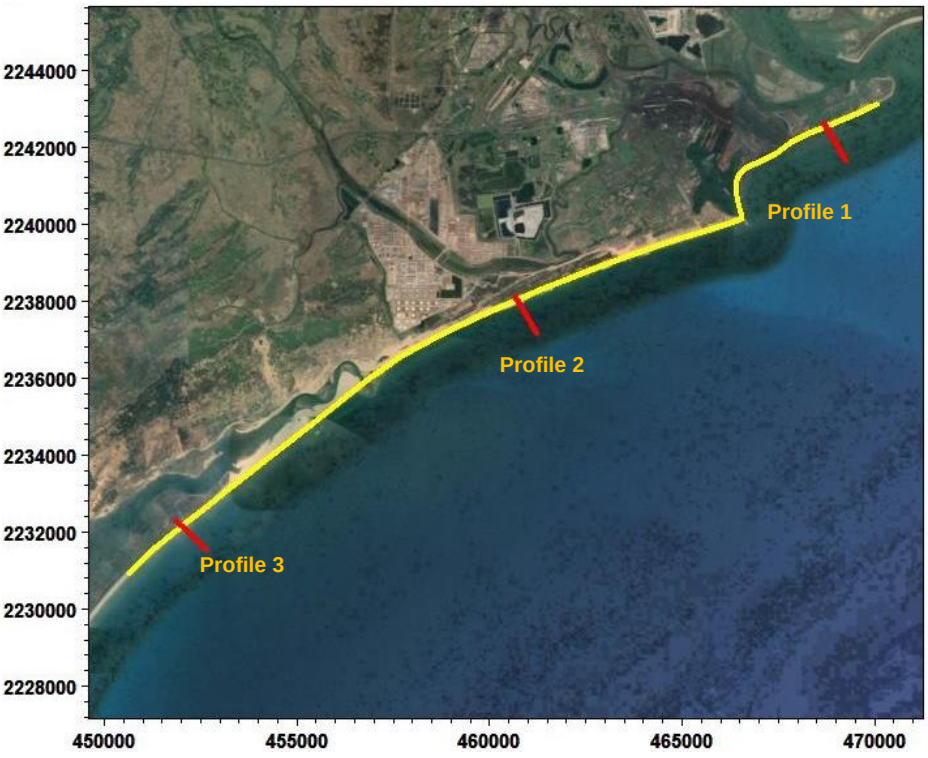


Figure 2-1 Initial coastline and Profiles considered for LITPACK study

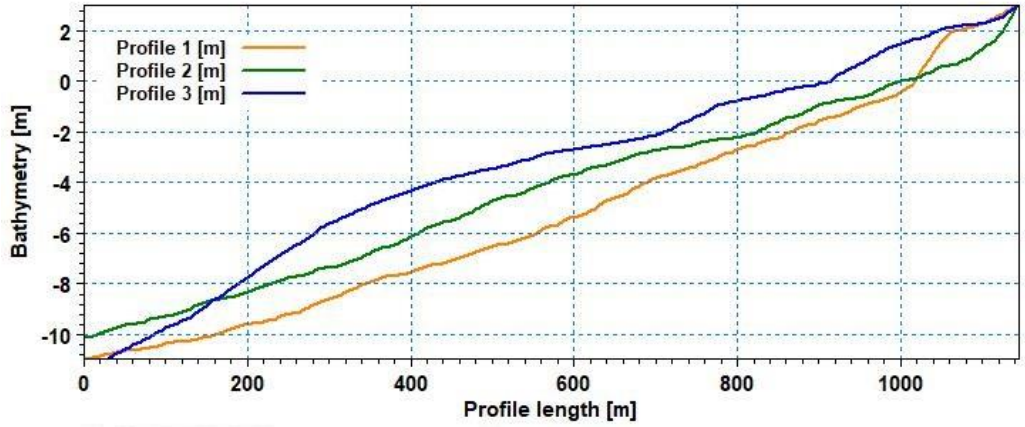


Figure 2-2 Cross-sections of the three bathymetry profiles

2.2 Waves

Waves are often the most important and decisive parameters for coastal morphology and for coastal engineering structures. The term sea state covers the wind induced sea waves (sea) and the so-called swell waves (swell). The swell waves in many cases the most important in the coastal processes during the moderate sea states because the swell height increases drastically in the nearshore zone due to shoaling which means that the swell is dominating the wave breaking process. Swell waves are often relatively long, of moderate height, regular and unidirectional. Swell waves tend to build up the coastal profile to a steep shoreface. Sea waves are referred to as short-crested. Wind waves tend to be destructive for the coastal profile because they generate an offshore movement of sediments, which results in a generally flat shoreface and a steep foreshore.

The boundary wave climate for the year 2018 is considered as variable wave climate which is obtained from the spectral wave model at 14m water depth. The reduction factor is given as 0.5. The typical wave rose plot for the year of 2018 is presented in Figure 2-3 which indicates that most of the wave occurrence is from SSE direction.

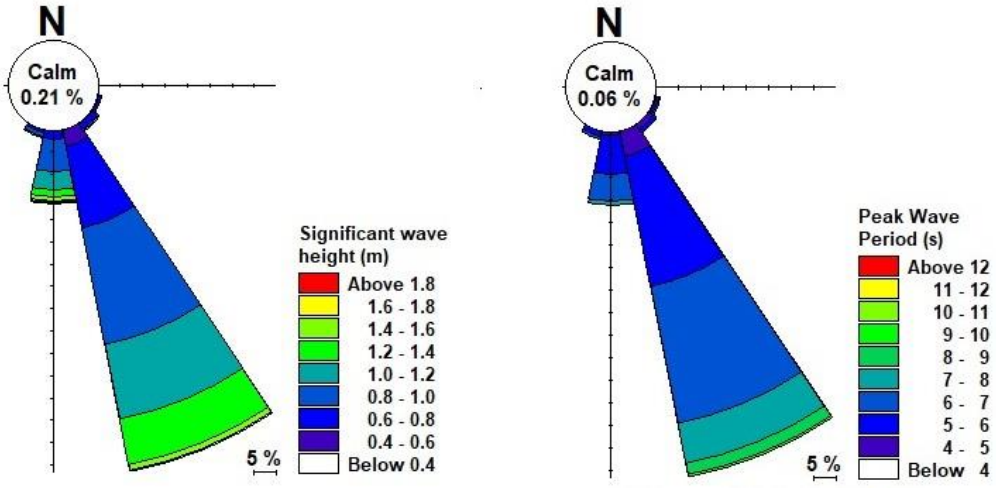


Figure 2-3 Wave data extracted at 14m water depth near Profile 2; (Left) Wave height, (Right) Wave Period.

2.3 Currents

The currents within the surf zone are driven mainly by waves, while tidal and ocean currents are dominating outside the surf zone. The wave driven currents are calculated by the model using Battjes and Janssens breaking theory, while other “external” currents must be specified as input to the model with a direction and a magnitude on a certain water depth as the main input parameters. The expected magnitude of combined tidal and ocean currents within the surf-zone is small, and experience shows that the wave driven currents completely dominate in the surf zone where they are at the maximum, while the tidal currents are stronger in deeper water where the resistance is smaller.

2.4 Water levels

The transformation of the waves to the near-shore locations (outside the surf zone) is not very sensitive to the water levels for the present case as the profile is very steep and the domain is mostly wave dominated. If waves had to pass more shallow areas like large-scale shoals, coral reef etc., the water level would have been much more critical, and a range of water levels could have been simulated. If the slope of the profile or the properties of the sediment varies in the cross-shore direction, the sediment transport may be rather sensitive to the instantaneous water level. A higher water level will move the surf zone further up on the beach, while a lower water level will widen the surf zone and move it further seaward. However, the sedimentological data material is limited and the tidal range small, and therefore water level at 0m is considered for model study.

2.5 Sediment

The main sediment properties that determine the sediment transport include mean grain size distribution and density. The mean grain size distribution is represented by the mean grain diameter, d_{50}, and the geometrical standard deviation defined as $\sigma_g = (d_{84}/d_{16})^{½}$. The beach sediments of the coast extend considered is assumed to be relatively fine but non-cohesive.

The mean grain size for the model input were considered as 0.17 mm. The uniform grain size has been used for entire domain. Since there is no grain size data available from the measurements, the data considered for the model is by referring secondary sources. The geometrical standard deviation is not known, so a constant value of 1.5 is assumed and the relative density is set to 2.65 which is corresponding to quartz sand.

The bed roughness (k_n) is one of the main calibration parameters in the LITPACK model. It represents the roughness of the bottom felt by the longshore current, and it represents the “grain roughness” as well as possible bed features. It has been set at a value of ten (10) times the local mean grain diameter.

2.6 Results

The cross-shore distribution of littoral drift and the coastline evolution of the considered coast are calculated using LITDRIFT and the COASTLINE EVOLUTION modules of the LITPACK model. The model is simulated with the shoreline of 2018 as baseline condition and under the presence of port as layout conditions. The shoreline changes were predicted for 1-year and 5 years.

2.6.1 Littoral Drift

The littoral drift along the coast of Paradip is calculated using three cross-shore profiles, a coastline of orientation 240° N represented in Figure 2-1 , the wave climate given in Figure 2-3. The cross-shore distribution of the littoral transport in the three profiles is shown in Figure 2-4 to Figure 2-6 respectively. It is clear from the figures that the net drift is northerly (negative values). Furthermore, from the analysis gross drifts and net drifts are approximately of the same magnitude implying that the littoral transport is totally dominated by northerly transport. Most of the transport happens within 5m depth.

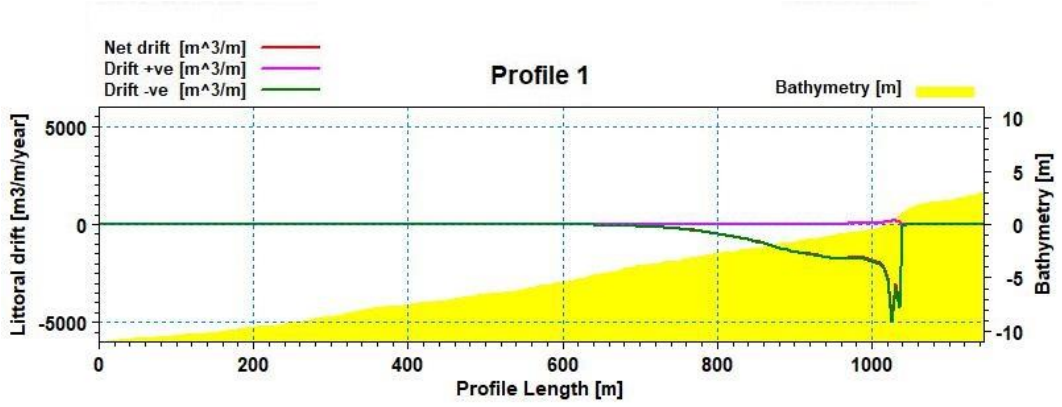


Figure 2-4 Littoral drift along the cross-shore profile 1

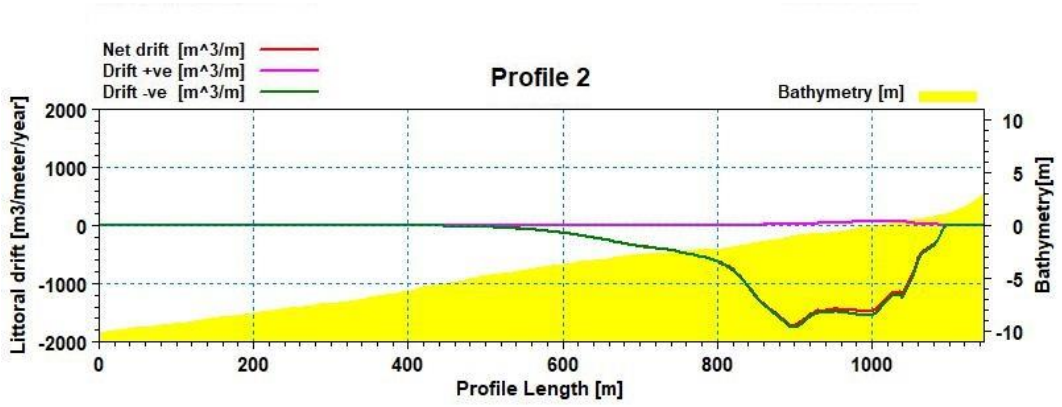


Figure 2-5 Littoral drift along the cross-shore profile 2

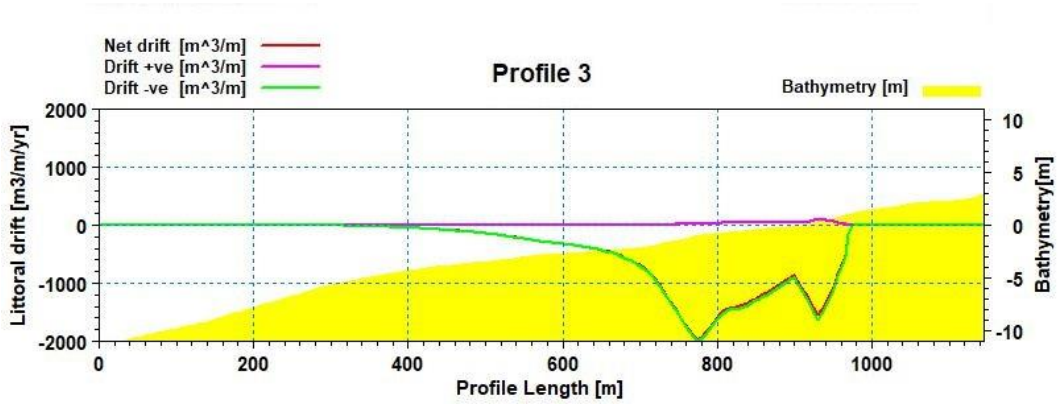


Figure 2-6 Littoral drift along the cross-shore profile 3

2.6.2 Coastline Evolution

Shoreline behaviour in the considered study area is analysed using a site-specific shoreline change model for the coastline of approximately 5 km south of the proposed port to the north of Paradip port. Southern breakwater of Paradip port and Seawalls to the north of Paradip port are considered in model simulation under baseline study. Groynes from proposed port are then considered in the study under layout conditions. The required sediment table is generated using Littoral drift table generation module in LITPACK model using all the required parameters.

Calibration

The Coastline Evolution module of LITPACK is run for one year and is calibrated with the shoreline derived from satellite image for the year 2019. The obtained coastline from LITPACK model and Satellite Images are given in Figure 2-7. It is observed that shorelines are matching well except near Jatadhari river mouth and near the Southern breakwater of Paradip port. The reason near Jatadhari river mouth can be attributed by the fact that the shoreline is considered as straight line in LITPACK study whereas in real, there are sand bars. The area near the southern breakwater of Paradip port may have artificial intervention from Paradip port.

Figure 2-7 Shoreline derived from Satellite Image (black) and LITPACK model (red) for 2019

Prediction

The coastline evolution is predicted for 1 year and 5 years under baseline and layout conditions. The coastline stretches from north of Paradip Port to south of the proposed JSW development is divided into three zones (Figure 2-8) and estimated the coastline changes.

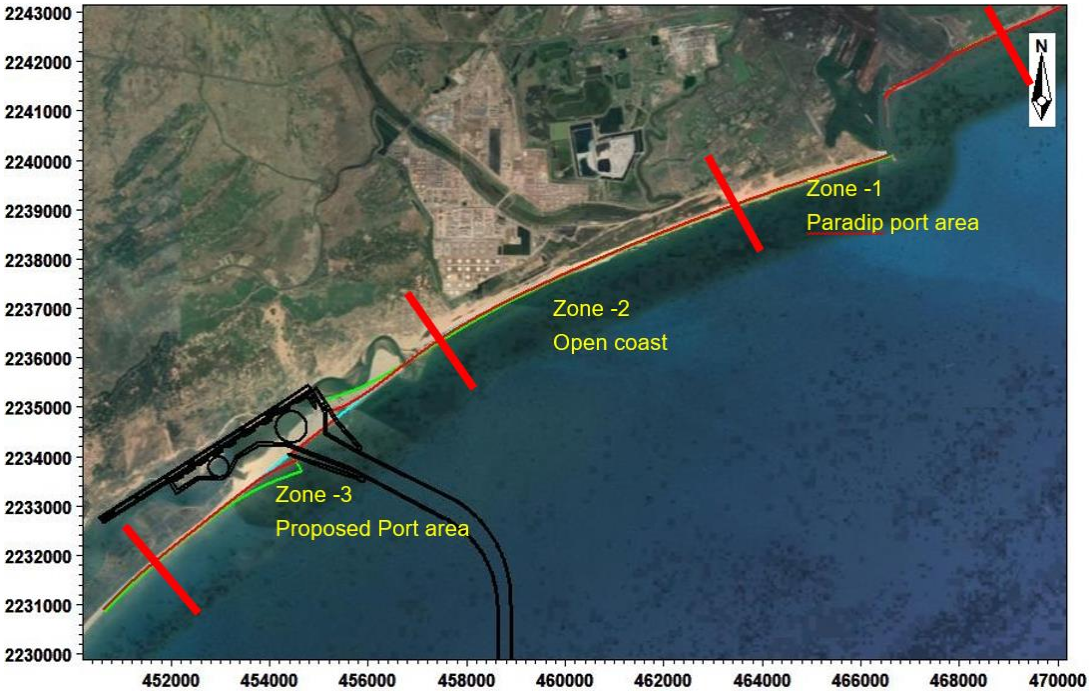


Figure 2-8 Coastline evolution result with zones selected for analysis, baseline (blue line), after 1 year -layout condition (red line) and after 5 years-layout condition (green line) in the study area.

Zone 1: Paradip Port

The one-year shoreline prediction under baseline conditions, based on the 2018 wave climate reveals that shoreline advances southern side of Paradip port. Whereas the shoreline north of Paradip port is stable because of the sea wall.

The one-year shoreline prediction with the proposed JSW development doesn't show any impact on either side of the Paradip port.

It is predicted that the shoreline is accreted approximately 56 m and 86 m on the southern side of Paradip south breakwater after 1 year and 5 years respectively (Figure 2-9).

Figure 2-9 Shoreline change at Zone-1. Baseline conditions after 1-year (blue colour), Layout condition after 1-year (red colour) and Layout condition after 5-years (green colour)

Zone 2: Open Coast:

This open coast covers the coastal stretch between south of Paradip port and Jatadhari river mouth. This stretch is stable under baseline conditions.

Under the layout conditions minor accretion takes place near Jatadhari river mouth because of the influence of proposed breakwaters with JSW development. After 5 years, most of this stretch undergoes continuous accretion (Figure 2-10).

Figure 2-10 Shoreline change at Zone-2. Baseline conditions after 1-year (blue colour), Layout condition after 1-year (red colour) and Layout condition after 5-years (green colour)

Zone 3: Proposed Port Area

The coastal stretch in this zone covers south of Jatadhari river mouth. It is stable under baseline conditions. By introducing the proposed breakwaters, the shoreline tends to accrete south of the breakwater whereas erodes at the north of the northern breakwater.

The tendency of accretion and erosion increases with the increasing number of years. The shoreline change observed near the proposed port area for 1 year and 5 years under baseline and layout conditions is represented in Figure 2-11.

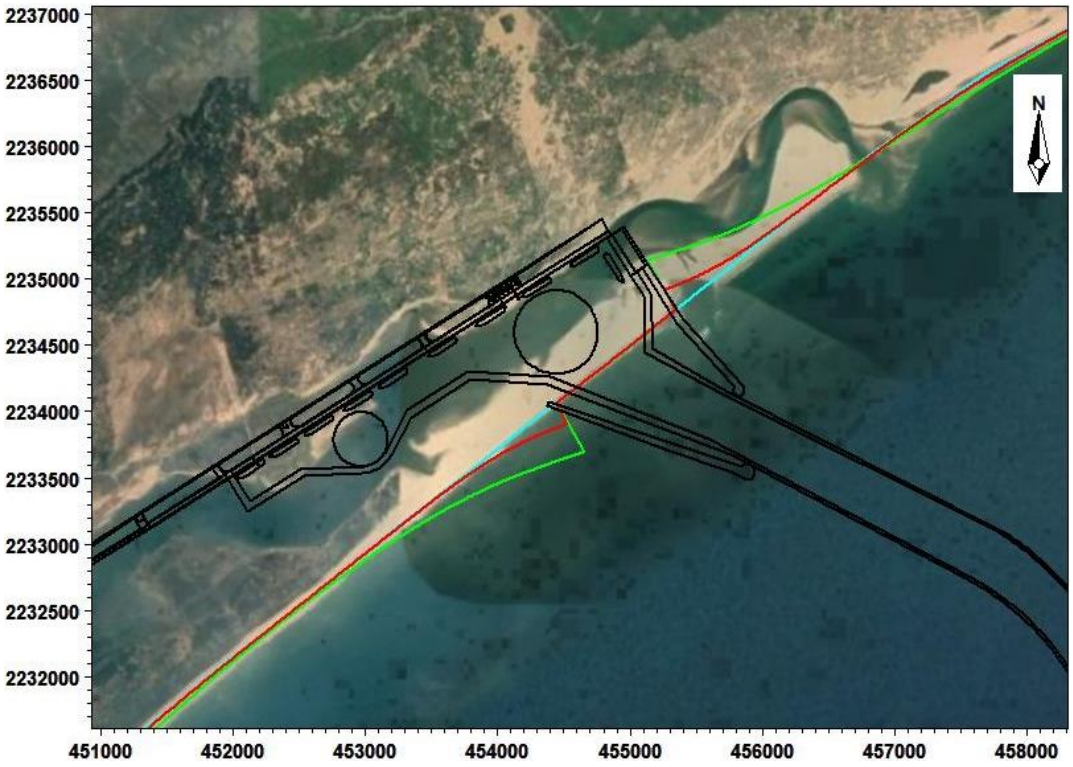


Figure 2-11 Shoreline change at Zone-3. Baseline conditions after 1-year (blue colour), Layout condition after 1-year (red colour) and Layout condition after 5-years (green colour)

The shoreline stretch of 2km from the north and south breakwaters show the trend of erosion and accretion respectively. The erosion and accretion trend decreases as moving away from the port area. In the case of the north part of the port area, nearly after 2km the trend of accretion is observed, and it continues till the southern breakwater of Paradip port. The approximate predicted length of shoreline changes for 1 year and 5 years at 500m interval distance from the groynes are given in Table 2-1. The trend of accretion and erosion increases over a coastal stretch from the increasing number of years. It is clear that the proposed port has no negative impact on the Paradip port in the considered 5 years of the study.

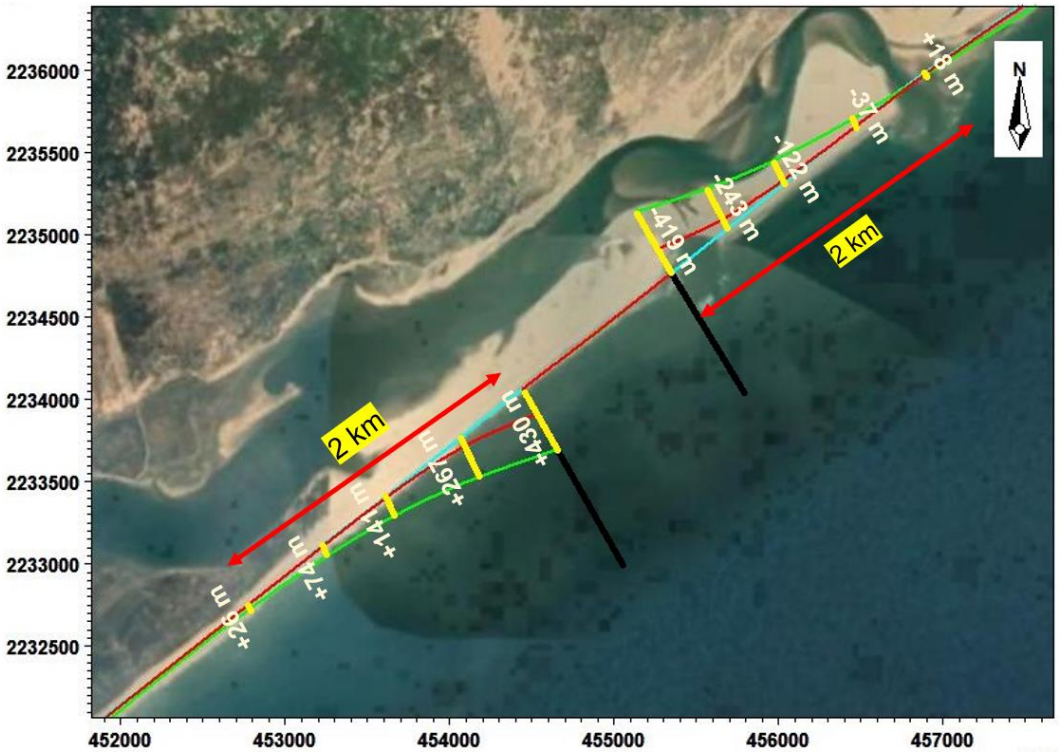


Figure 2-12 Shoreline change in meters for 5 years

Table 2-1 Longshore sediment transport and rate for different scenarios

Scenario	Structure	Longshore sediment Transport (m3)		
		Northerly Drift	Southerly Drift	Net Drift
1 year	Baseline	-900000	3000	-900000
1 year	Layout	-900000	3000	-900000
5 year	Layout	-4540000	3000	-4540000

The following results have been noticed from the shoreline change prediction:

- Northward movement of sand in the order of 900000m^3 and southward movement of sand in the order of 3000 m^3 is noticed with the baseline conditions for 1 year.
- Northward movement of sand in the order of 900000m^3 and southward movement of sand in the order of 3000 m^3 is noticed with the layout conditions for 1 year.
- Northward movement of sand in the order of 4540000m^3 and southward movement of sand in the order of 3000m^3 is noticed with the layout condition for 5 years

3 Sand Transport Model

In combination with the hydrodynamic module, the sediment transport patterns for specified configurations are also simulated for the baseline conditions and for proposed port layout conditions. For the model with combined wave and current action, the model uses precalculated sediment transport rates for a set of specified parameters. For the simulation a sediment transport table is generated beforehand using MIKE21 Q3D Sediment transport table generator. The parameters used in the generation are specified in Table 3-2. These parameters are then used in the calculations to find transport rates using linear interpolation. Currently only one fraction of sediment input is allowed in both cases. There is also a provision for including the effects of morphological changes on the hydrodynamics of the area which in turn affect the sediment transport pattern.

The model, in general, requires the following inputs: Selection of model type, Sediment properties such as D_{50}, porosity, gradation, relative density. For model simulation, the wave field is given as input as wave forcing which is obtained from results of the SW model. The sand transport calculations are carried out using a mean horizontal velocity component. The model parameters used in the sand transport model as shown in below Table 3-1.

Table 3-1 Model parameters used in sand transport model set up

Model Parameter	Value
Model definition	Model type: Combined waves and current
Sediment properties	Porosity: 0.4 Grain diameter: 0.17 mm Grading coefficient: 1.10
Wave field	From Spectral wave model
Flow field	From Hydrodynamic model
Morphology	No slope failure Boundary conditions: Zero sediment flux gradient

The ST model uses a sediment transport table to calculate the sediment transport rates for the specified current and wave conditions. This sediment transport table was generated using the parameters shown in Table 3-2.

Table 3-2 Parameter values for generating sediment transport table

Model Parameter	Value
General parameters	
Θ_c:	0.05 Critical Shields parameter)
S:	2.65 (Relative density of sediment)
N max	1000 (Max number of steps in concentration profile iteration)
N steps	140 (Number of steps during wave period)
q_tole	0.1e-3 (Tolerance for suspended sediment transport)
Wave parameters	
Wave theory	Stokes's 5th order
Wave breaking parameters	γ_1= 1 and γ_2 = 0.8
Calculation parameters	
Ripples	Included
Bed concentration formulation	Deterministic (Engelund and Fredsøe, 1976)
Boundary layer streaming	Included
Bed slope	Included
Cross current transport	Included
Centrifugal acceleration	Excluded

3.1 Bathymetry

The model domain used for this covering the region 86^{0}29'E – 20^{0}N and 86^{0}48'E – 20^{0}17'N, which includes Paradip port on the North. It features higher resolution in areas where the kinetic power density is a high, and lower resolution in areas where the currents are weaker. About 21031 elements with various mesh resolutions have been produced. The unstructured mesh triangles in coarse areas have a maximum element area of 245000m^2 and in the study areas 1558m^2. of the two numerical schemes offered by MIKE, the low order one was selected. Figure 3-1 shows the domain used for present study.

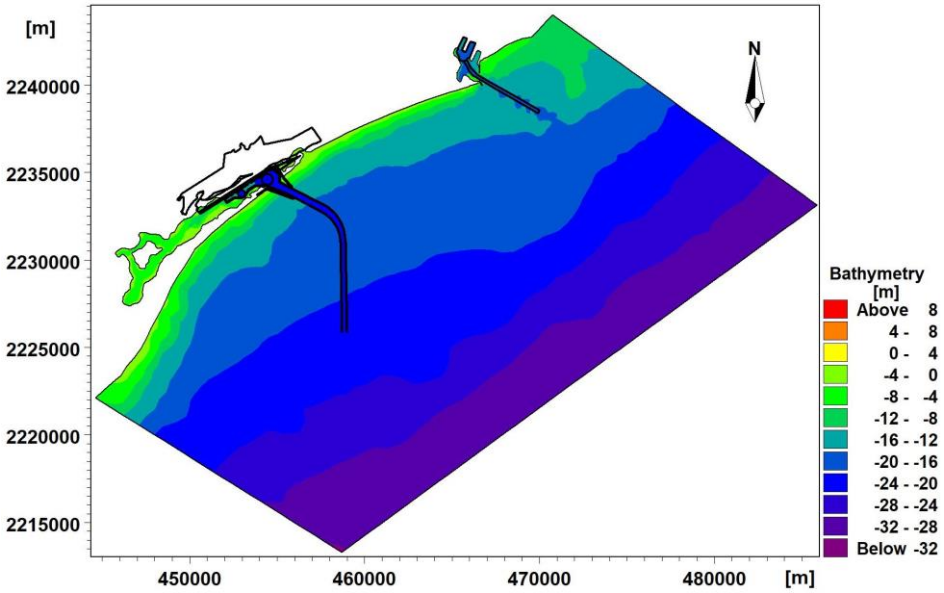


Figure 3-1 Model domain used for the siltation studies.

3.2 Boundary conditions

An important aspect in hydrodynamic modelling is the boundary conditions. For a proper simulation and reliable model outcomes it is evident to describe these boundary conditions accurately.

The boundary conditions in the HD-module were specified as constant levels based on the major diurnal (K1, O1, P1 and Q1) and semi-diurnal (M2, S2, N2 and K2) tidal constituents at a spatial resolution of 0.1250 X 0.1250.

The boundaries in the ST-module were specified as 'zero sediment flux gradient'. This way the inflow and the bottom of sediment into the model is kept at its place. This ensures a representative sediment flow into and out of the model domain.

3.3 Simulation Period

The simulation was run in coupled mode for a period of one year, from 01st January to 31st December 2008, for a typical monsoon and non-monsoon period.

3.4 Modelling Results

The numerical model MIKE 21 ST has been applied to simulate the bed level changes subjected to prevailing wave and currents for both baseline and proposed layout conditions.

3.4.1 Baseline Conditions

The bed level change after one year for the effect of wave induced currents of the study area for base conditions is discussed in the Figure 3-2. It can be observed from Figure 3-2 that the bed level changes due to tidal currents are of the order of -0.05 to 0.05 m which can be considered as negligible. The bed level changes show the erosion/deposition and the wave induced currents are dominant over the region. The predicted values are not large, and this is mainly due to the fact that the transport varies smoothly with no drastic changes. The bed level changes after one year simulation for Jatadari River mouth and Paradip port area are represented in Figure 3-3 and Figure 3-4.

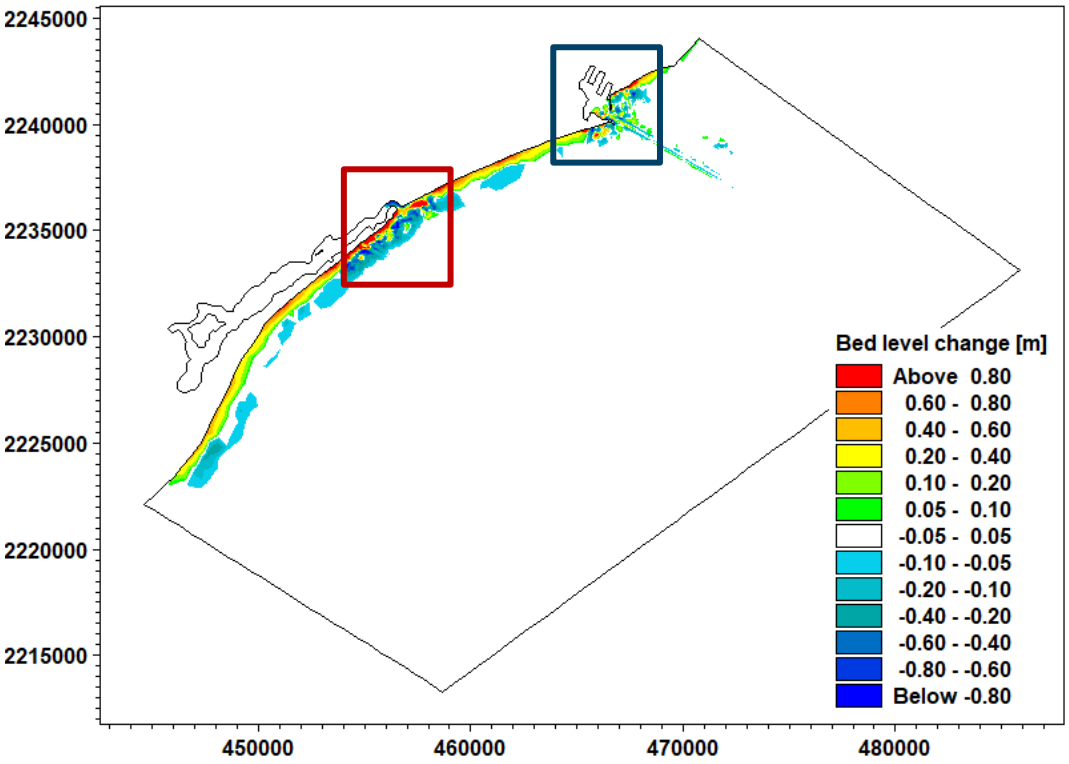


Figure 3-2 Bed Level Change for the baseline condition (Dark Brown: Jitadhari river; Black: Paradip Port)

The erosion is occurred near to the surf or wave breaking zone and sediments get deposited along the coast and there is no bed level change inside the river section due to the less wave action and the effect is felt only at the nearshore region. The deposition is more at the entrance of Jatadhari River entrance, and the erosion is noticed to occur inside the river whereas in the northern and southern Paradip port the deposition is noticed to be more compared to that of erosion.

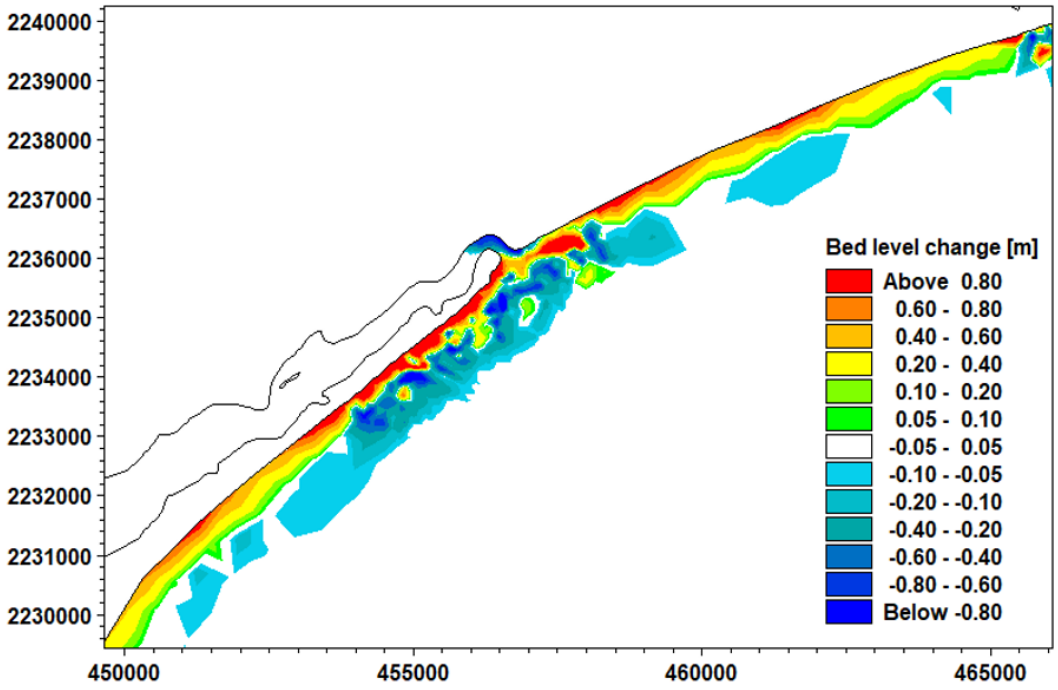


Figure 3-3 Zoom-in-view of model domain for baseline condition: Jatadhari River

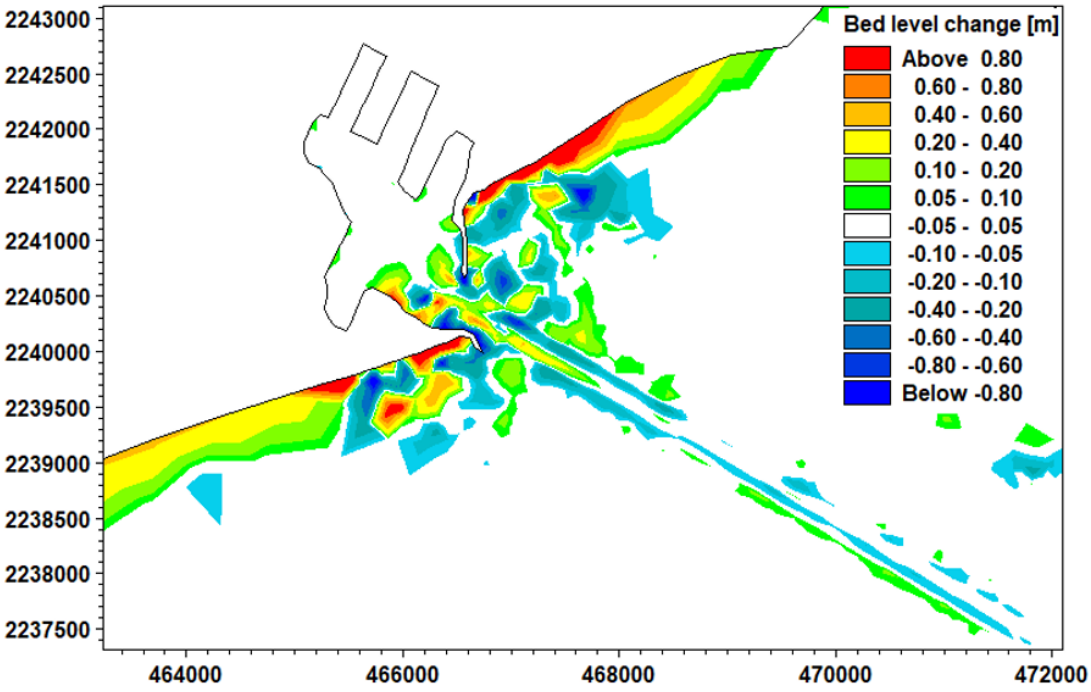


Figure 3-4 Zoom-in-view of model domain for baseline condition: Paradip Port

3.4.2 Layout Conditions

The effect of wave induced currents on morphological changes of study area for the proposed layout condition as shown in Figure 3-5. It can be observed from that the bed level changes due to tidal currents are of the order of -0.05 to 0.05 m which can be considered as negligible.

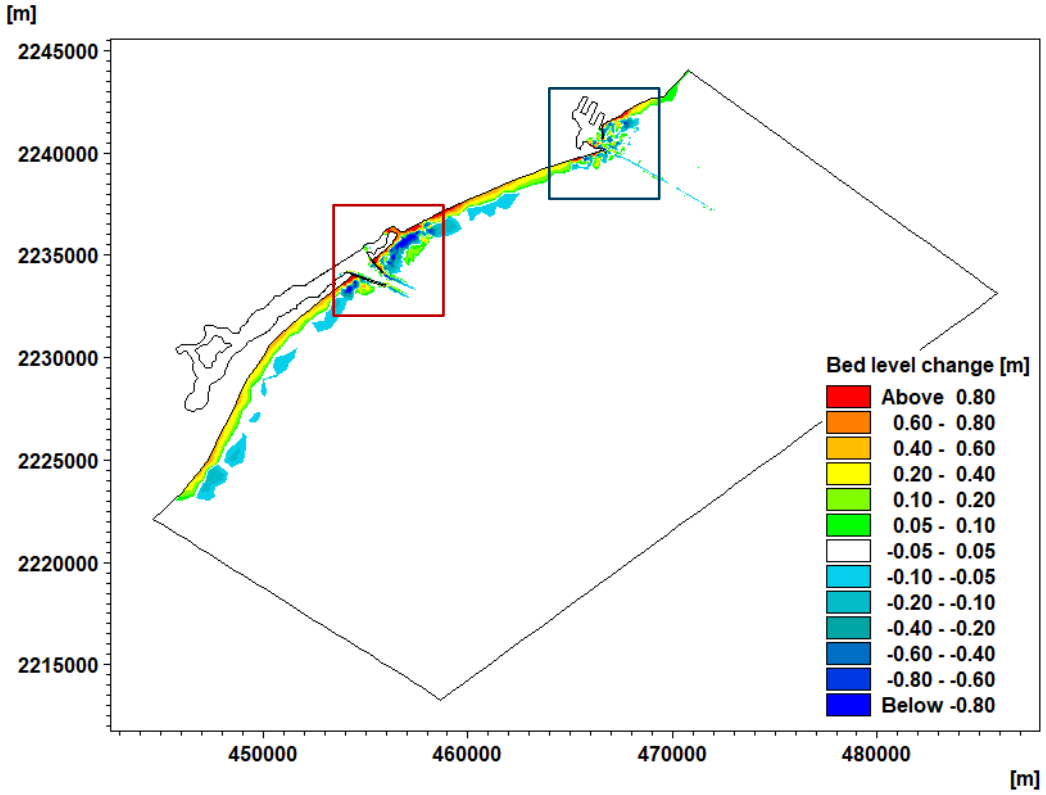


Figure 3-5 Bed Level Change with Layout condition (Dark Brown: Jatadhari river; Black: Paradip Port)

The bed level changes after one year simulation for Jatadhari River mouth and Paradip port area are represented in Figure 3-6 and Figure 3-7.

The bed level changes show the erosion/deposition and the wave induced currents are dominant over the region. The predicted values are not large, and this is mainly due to the fact that the transport varies smoothly with no drastic changes. The erosion is occurred near to the surf or wave breaking zone and sediments get deposited along the coast and there is no bed level change inside the river due to wave action and the effect is felt only at nearshore region. The deposition is seen at northern and southern breakwater for the proposed layout condition. The erosion observed to be very less at the entrance of proposed Jatadhari port layout condition.

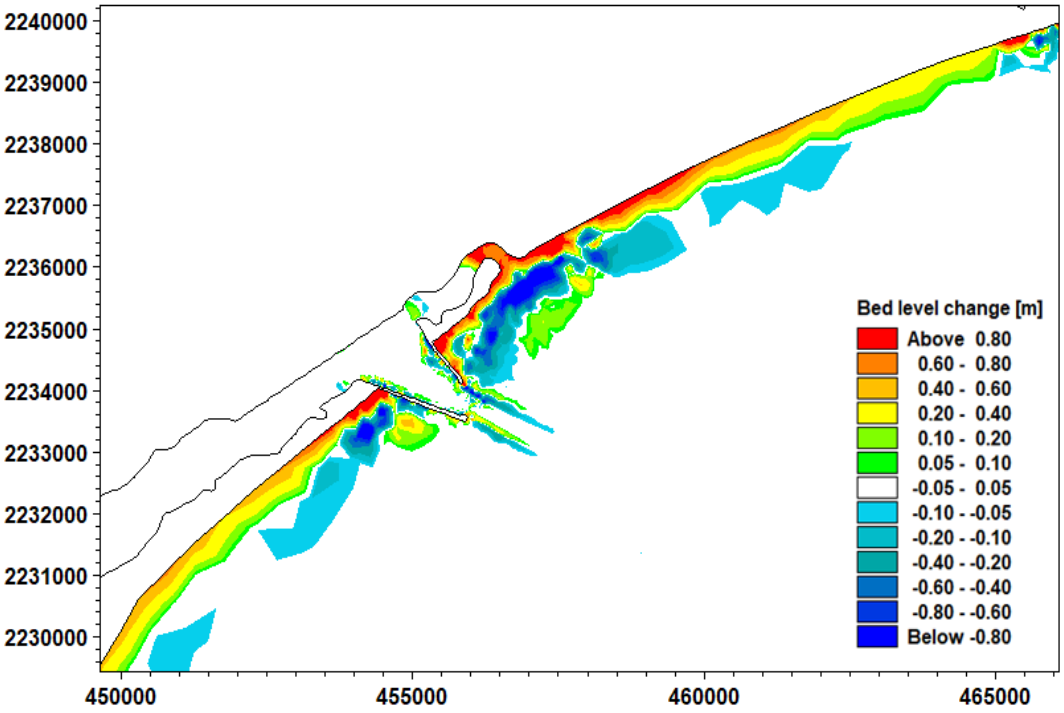


Figure 3-6 Zoom-in-view of bed level changes with layout condition: Jatadhari River

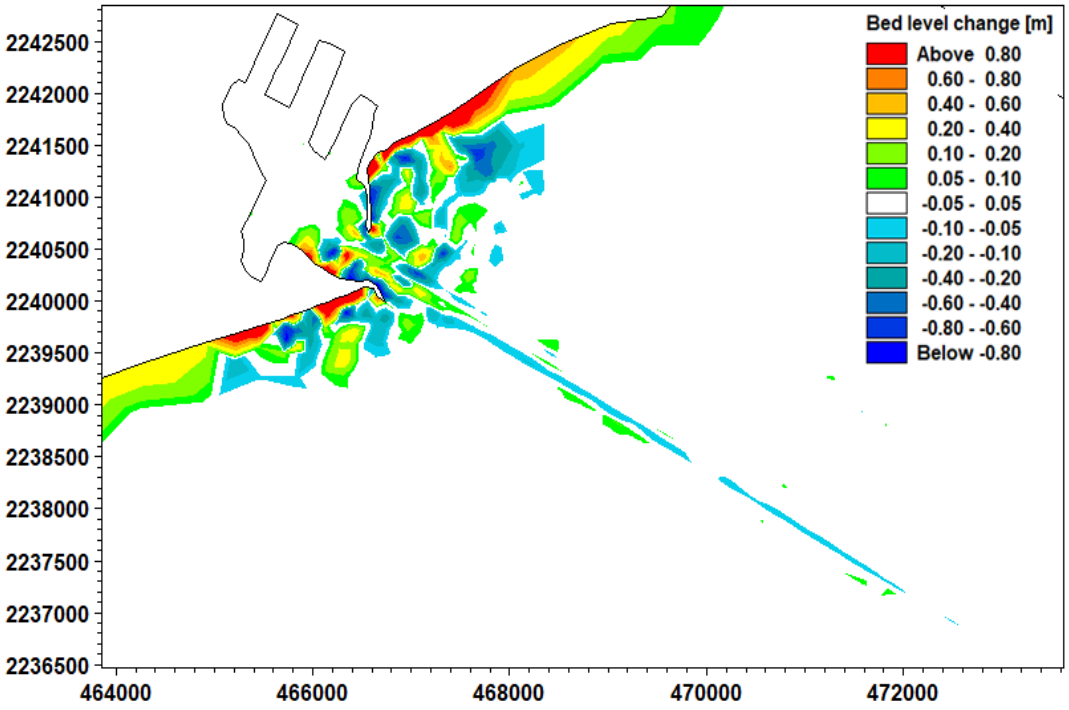


Figure 3-7 Zoom-in-view of bed level changes with layout conditions: Paradip Port

3.4.3 Comparison: Baseline vs Layout

Figure 3-8 shows the cross-sectional area considered for the calculation of siltation in Paradip port. Three sections are considered such as outer channel, inner channel and port basin. The Table 3-3 shows the siltation quantity of Paradip port with and without JSW port development.

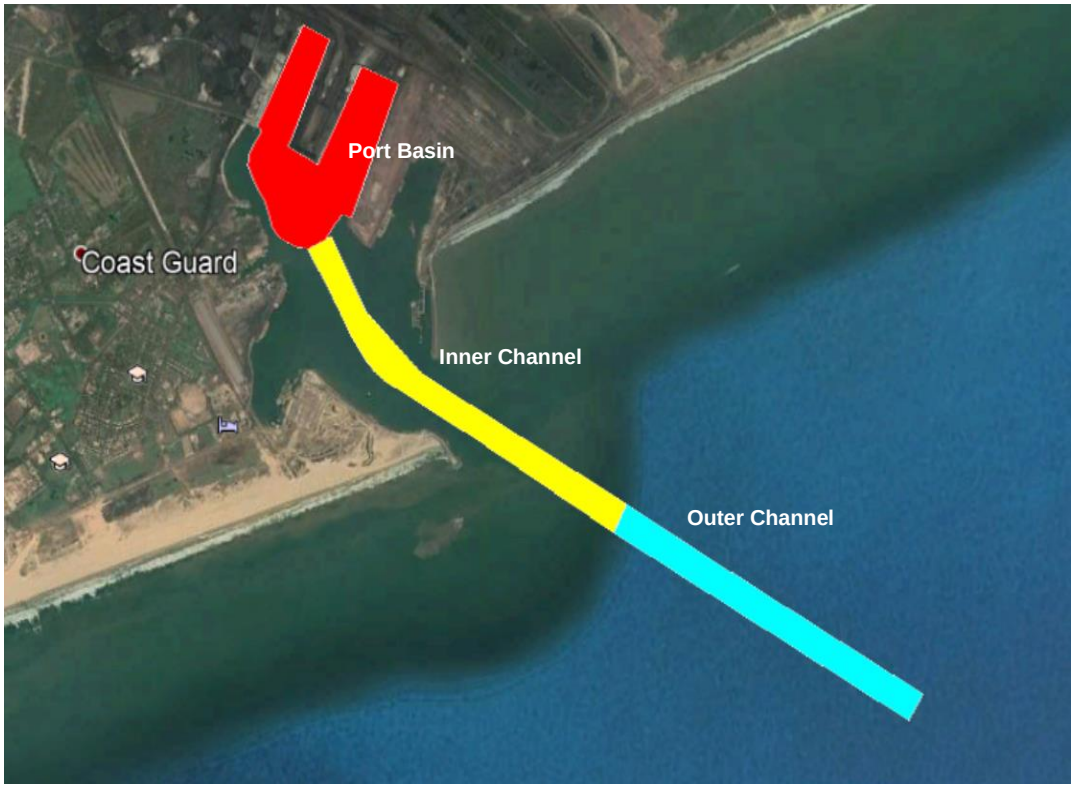


Figure 3-8 Sections considered for siltation quantity

Table 3-3 Siltation quantity at Paradip Port without JSW proposed development

Section	Area [sq.m]	Siltation quantity at Paradip Por without JSW development [m^3/year]		Siltation quantity at Paradip Por with JSW development [m^3/year]	
		Average	Maximum	Average	Maximum
Outer Channel	47600	18000	45000	25000	67000
Inner Channel	520600	87000	760000	53000	430000
Port Basin	722900	350	23000	600	8400

After considering JSW proposed development, the possible sedimentation on the southern side of Paradip port is reduced. This is due to the deficiency of the longshore transport material with the proposed breakwaters of JSW development, which arrests the sediment transport. The average and maximum quantity is approximately 79000 m^3/year, and 5,00,000 m^3/year for the layout condition

3.5 Assessment of Sand Trap

The drawing of the port layout supplied by JSW shows that the toe of the southern port breakwater is at a depth of -15m CD. Hence, the harbour will completely block the littoral drift initially. However, with time, after the updrift accretion has advanced sufficiently, part of the littoral drift will start bypassing the port. Once sand starts to bypass, the entrance will be subjected to sedimentation. This is especially the case, given the proposed layout of the port breakwaters, where the harbour mouth will be directly exposed and thus filled directly. Hence, a sand trap is considered (Figure 3-9)in the model with the dimensions of 800mx400mx5m (deeper than the actual water depth in the channel). The bathymetry is increased locally in the trap location and this will help an increase of local accumulation. The geometry of the trap is aligned to east west direction with rectangular geometry.

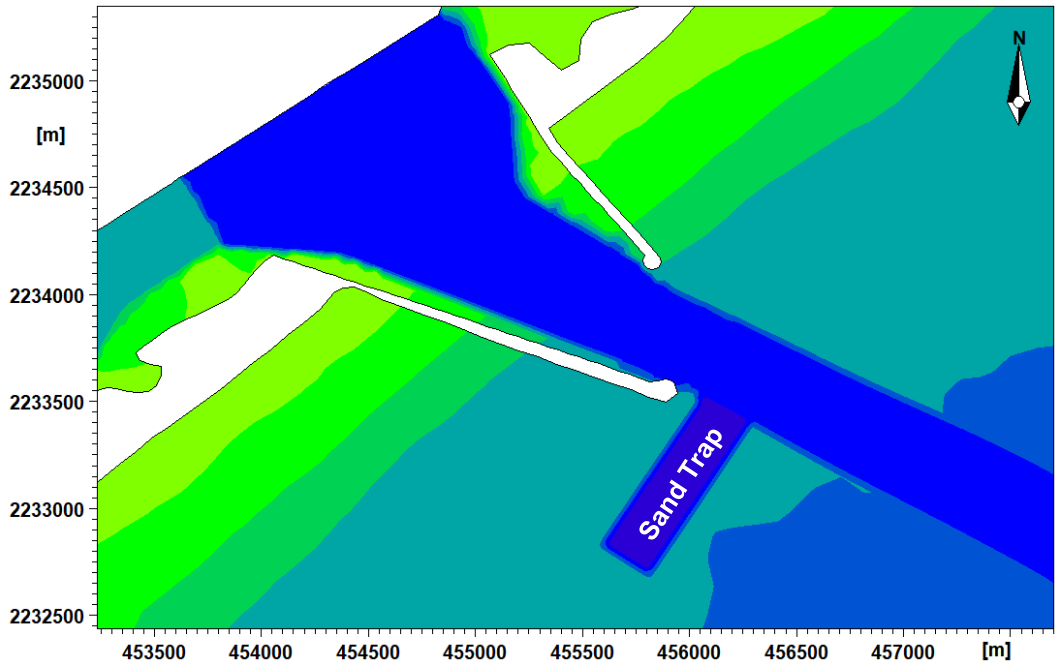


Figure 3-9 Sand trap layout on the southern side of the proposed port

Flow expansion caused by sediment trap reduces the flow velocity but increases the turbulent kinetic energy locally. A reduction of bed shear stress is observed in the trap, except near the edges where an increase is observed. The depth of the trap plays a significant role in the internal flow characteristics. Sediments which are transported in the upstream direction by the currents, are caught before they reach port channel. This way the sediment trap will help the residual transport of marine sediments towards the port basin and channel and reduce a reduction of dredging amounts and costs the proposed port location.

The morphological changes due to the effect of wave induced currents after one year is depicted in the Figure 3-10. The zoomed view of yearly bed level changes after one year for proposed Jatadari port with predefined sand trap area is represented in Figure 3-11. The functioning of the trap enables flexible and effective maintenance work. Maximum siltation is occurred in a year at the sand trap according to the maximum bed level change of 1.2 m/year equal to 0.38 Mm^3.

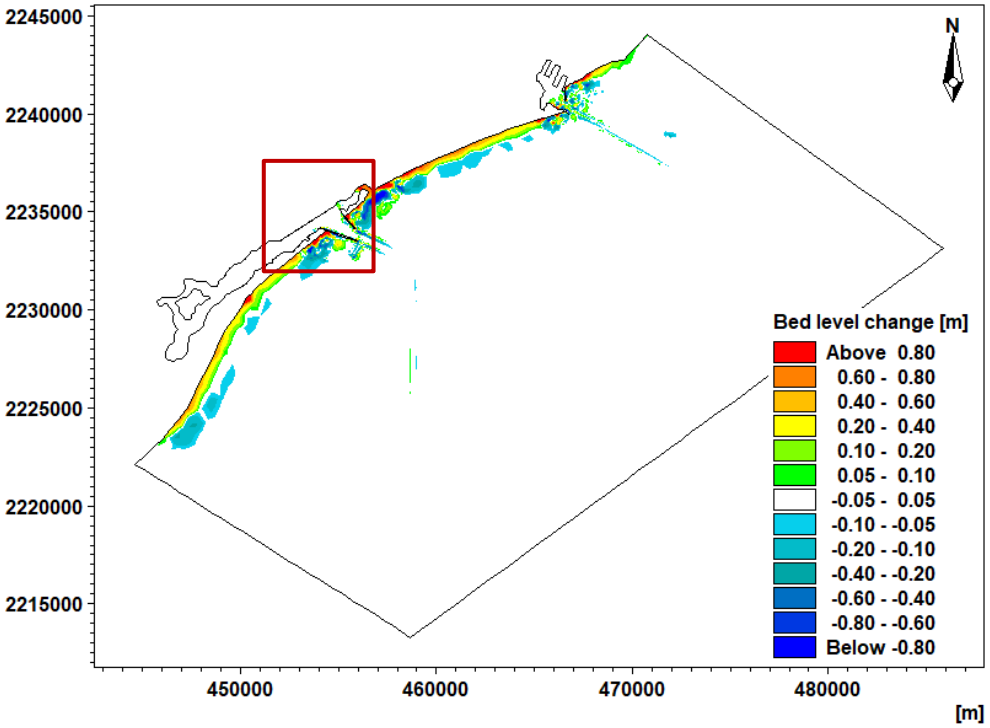


Figure 3-10 Bed Level Change for the model domain for the Layout condition with sand trap

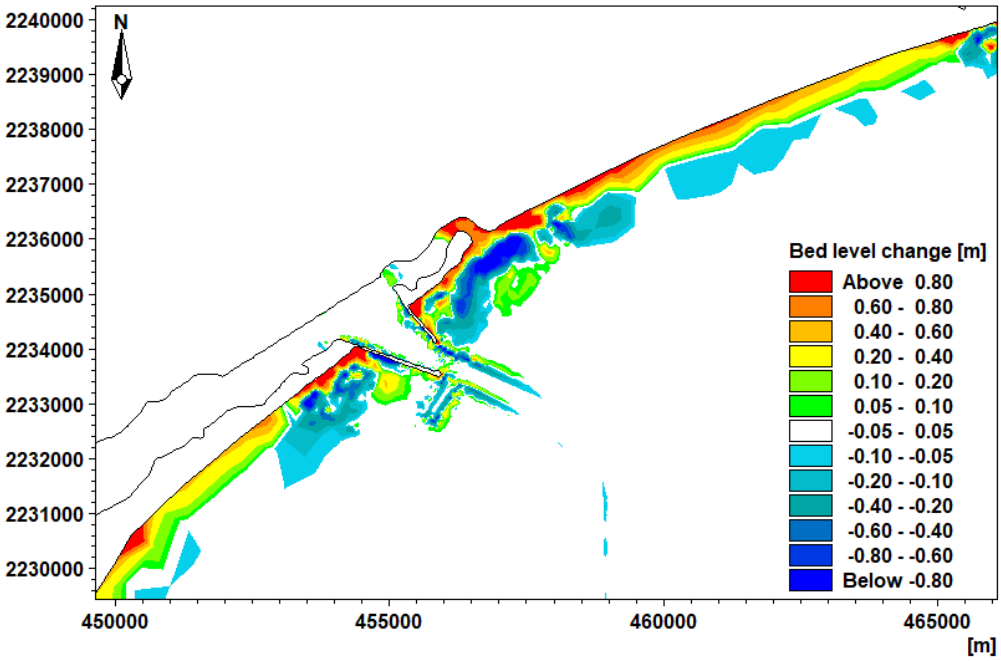


Figure 3-11 Zoom-in-view of model domain for layout condition with sand trap near to tip of southern breakwater

4 Mud Transport (MT) Model

In the MIKE 21 model complex, the transport of fine-grained material (mud) has been included in the Mud Transport (MT), linked to the Hydrodynamic module (HD) and the Advection-Dispersion (AD) module. The primary input to sediment transport modelling is in the form of characteristics of the bed material as well as material in suspension in addition to the current and wave inputs which are directly embedded from the hydrodynamic simulation results.

4.1 Model Bathymetry

The model extent and bathymetry information considered for siltation study is provided in Section 2.1 and Figure 3-1 for layout conditions (approach channel and berthing area).

4.2 Simulation Period

The simulation was carried out for a period of 30 days covering spring and neap tide during January 2008, in order to estimate the annual siltation quantity in the vicinity of the proposed development.

4.3 Model Parameters

Table 4-1 below summarizes the sediment transport parameters applied during the model calibration exercise. The parameters include number of grain size fractions, number of bed layers, water column parameters, bed material characteristics, bed roughness, initial and boundary sediment concentrations etc.

Table 4-1 Mud Transport model parameters

Parameter	Value
No. of grain size fractions	2
No. of bed layers	1
Dispersion coefficient	0.01m^2/s
Boundary concentration	Ocean=Zero gradient
Settling velocity coefficient	10 m/s
Critical shear stress for deposition	Varying [N/m^2]
Power of erosion	soft Mud=8.1 and hard mud=1
Erosion coefficient	5e-05[m^2/s]
Critical shear stress for erosion	Varying [N/m^2]
Density of bed layer	180 [kg/m^3]
Bed roughness	0.006 [m]
Initial sediment concentration	0.01 kg/m^3

4.4 Model Results.

The results of the baseline and layout conditions are representing in the following section in terms of bed level change

4.4.1 Bed level changes: Baseline and Layout conditions

From the baseline simulation, it is understood that maximum deposition of 0.008m and 0.113m and 0.039m is taking place along basin area, inner channel and outer channel respectively for Paradip port. In the proposed development from layout condition and corresponding maximum deposition of 0.005m and 0.053m, 0.014m and 0.001m is taking place along outer channel, inner channel, basin area-1 and basin area-2 respectively.

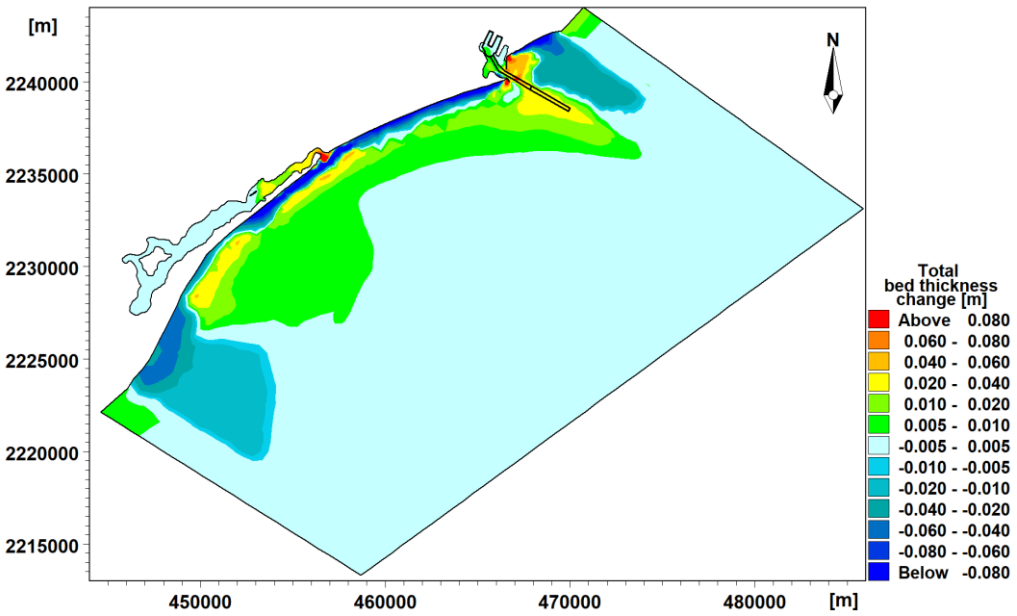


Figure 4-1 Bed level changes after 30 days with baseline condition

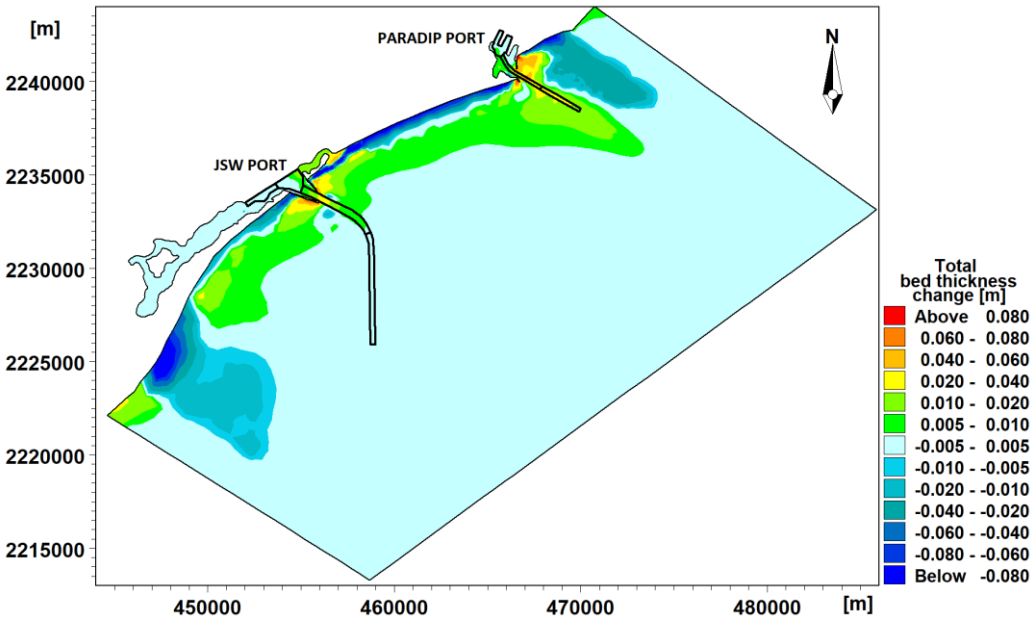


Figure 4-2 Bed level changes after 30 days with layout condition

4.5 Maintenance Dredging

Based on the siltation rate calculated using mud transport model for 30 days simulation, the annual maintenance dredging quantities are estimated at different sections of the Paradip port with and without proposed JSW development.

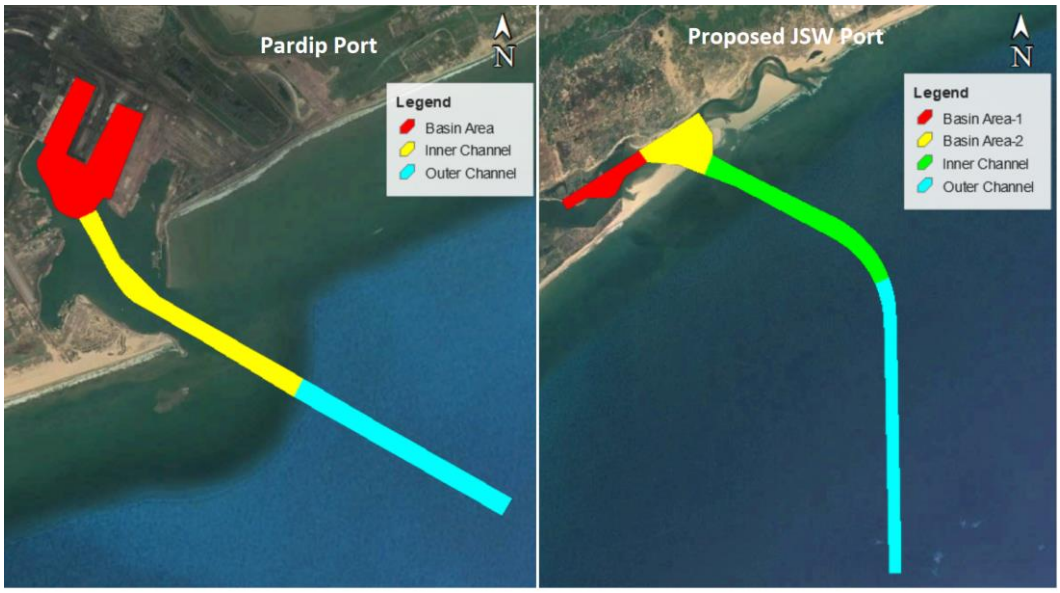


Figure 4-3 Dredging layout plan cross-sections for JSW port and Paradip Port

Table 4-2 lists the average/maximum bed level changes and siltation quantities in one-year at all three (3) sections of Paradip port for baseline and layout conditions. The comparison of both the results show that, after introducing proposed JSW port the siltation quantity of Paradip port is drastically reduced by 33.6 %.

Table 4-2 Annual siltation quantity at Paradip port with baseline condition

Section	Area (sq. m)	Annual Siltation at Paradip Port without JSW Development [m3/year]		Annual Siltation at Paradip Port with JSW development [m3/year]	
		Average	Maximum	Average	Maximum
Port Basin	722900	26000	69400	26000	52000
Inner Channel	520600	199900	706000	149900	456000
Outer Channel	476100	171400	222800	125700	154200

- The maximum maintenance dredging quantity for Paradip port area consisting of approach channel, and berthing area in baseline condition is 1 million m^3/year without the JSW development.

- The maximum maintenance dredging quantity for Paradip port area consisting of approach channel, and berthing area in layout condition is 0.6 million m^3/year, with JSW development.

4.6 Effect of Capital and Maintenance Dredge Material on The Paradip Port

Dredge disposal site should be selected on the basis of non-interference with navigation and also based on the nearshore circulation phenomena and hydrodynamic characteristics of the sea. The selection of dumping ground for both capital and maintenance dredged material should be such that the dredged material disposed at the dumping ground should not come back into the port channel. In the present study, the dumping locations are location L1: 86°34'58.09"E and 20° 5'56.26"N (water depth=22.7 m MSL) and location L2: 86°36'48.12"E and 20° 6'36.92"N (water depth=23.1 m MSL) which are approx. 14 km from the proposed port location (Figure 4-4).

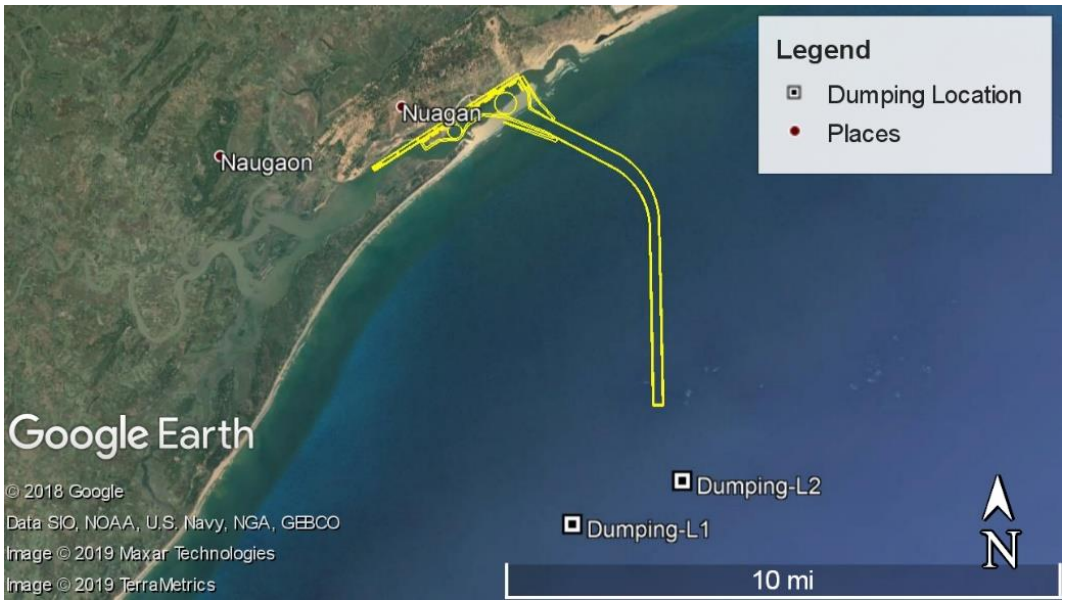


Figure 4-4 Dumping location of dredged materials

The dispersion of dredge spoil around the disposal area is simulated for 1 month during the post-monsoon (September).

A constant sediment disposal/spill rate of 1150 kg/sec (1.150 t/sec) was specified (assuming that the 3 Million Cu. metre of the Capital dredged spoil is to be disposed within this time window). At each dumping location, around 1.5 million m^3 was released.

A constant sediment disposal/spill rate of 385 kg/sec (0.38 t/sec) was specified (assuming that the 1 Million Cu. metre of the annual maintenance dredged spoil is to be disposed within this time window). At each dumping location, around 0.5 million m^3 was released.

4.6.1 Effect of Capital Dredging Materials

The model results show that the majority of material is deposited directly onto the seabed at the dredge disposal site and remains at this location after the end of the dredge campaign. The tidal current over the dredge disposal area are not sufficient (by themselves) to generate the necessary bed shear stress to initiate the transfer of sediment into the water column to be transported as suspended load. The maximum bed level change incurred due to dumping is around 0.7m at the dumping ground after 1-month simulation period.

The extend of spreading of the disposed materials from 30 days simulations with capital dredging quantity is presented in Table 4-3 . The spread of the disposed sediment on the seafloor after 5 days, 10 days, 15 days, 20 days and 30 days are shown in Figure 4-5 to Figure 4-9.

Table 4-3 Extend of bed level change due to disposal of capital dredging quantity

Si. No	Disposal location	Disposal Period	Extend of bed level change in KM
1	L1 & L2	After 5 days	1.8
2		After 10 days	2.8
3		After 15 days	7.7
4		After 20 days	18.4
5		After 30 days	20.9

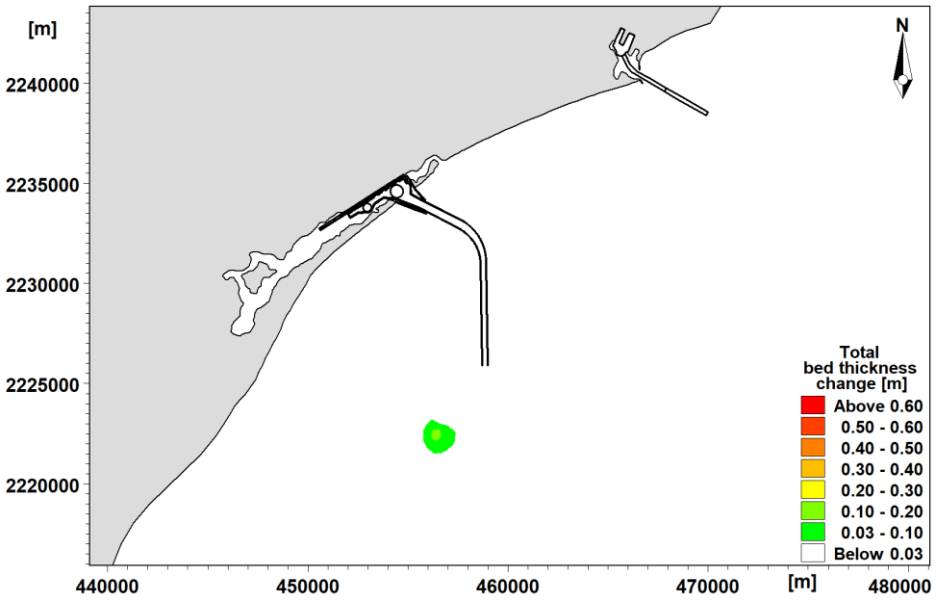


Figure 4-5 Capital dredge spoil dispersion from dumping ground after 5 days

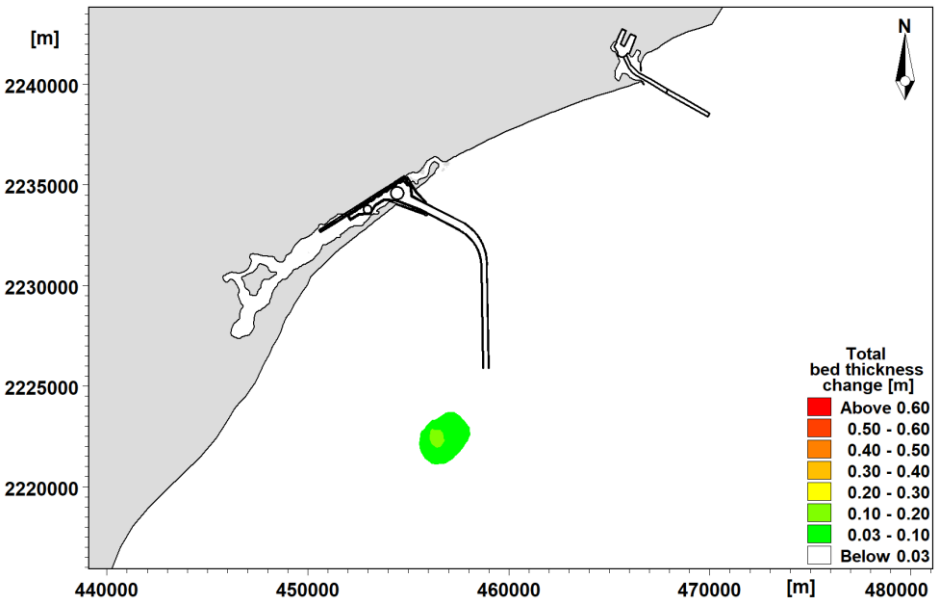


Figure 4-6 Capital dredge spoil dispersion from dumping ground after 10 days

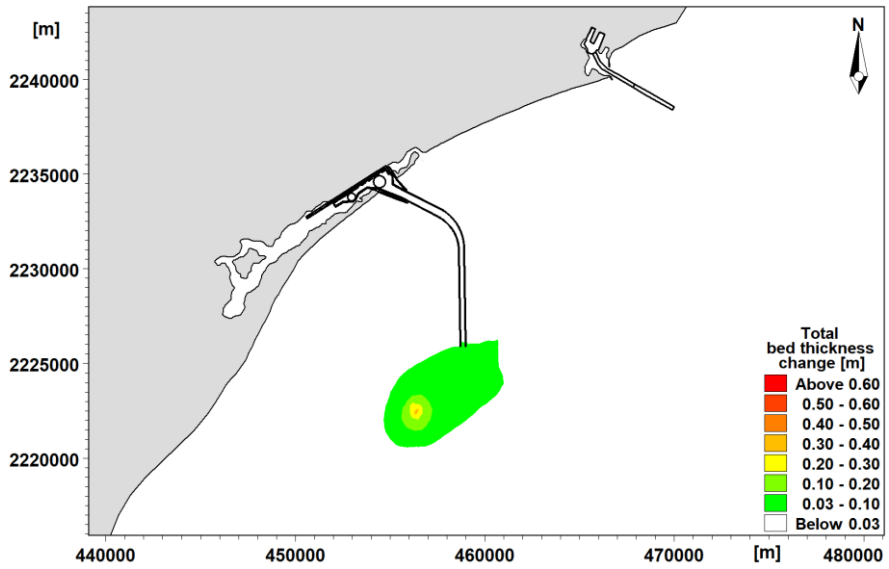


Figure 4-7 Capital dredge spoil dispersion from dumping ground after 15 days

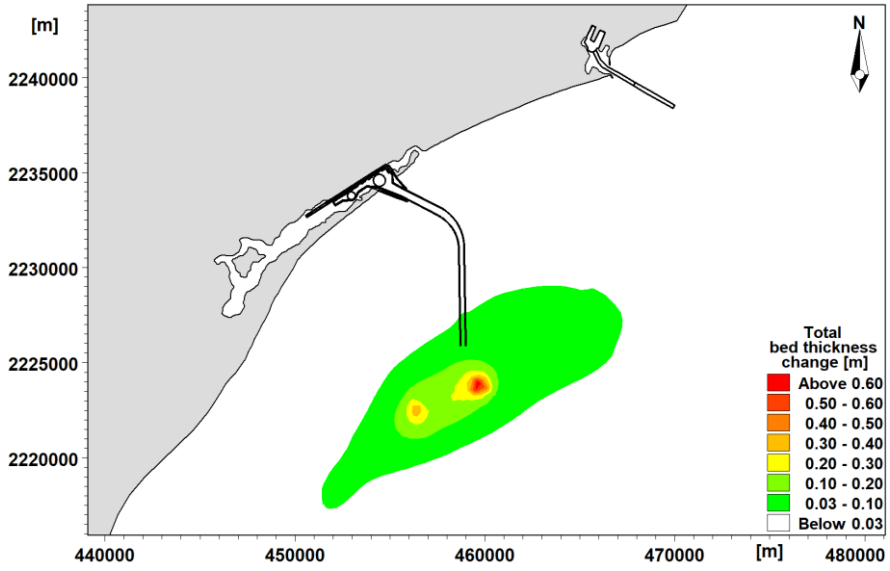


Figure 4-8 Capital dredge spoil dispersion from dumping ground after 20 days

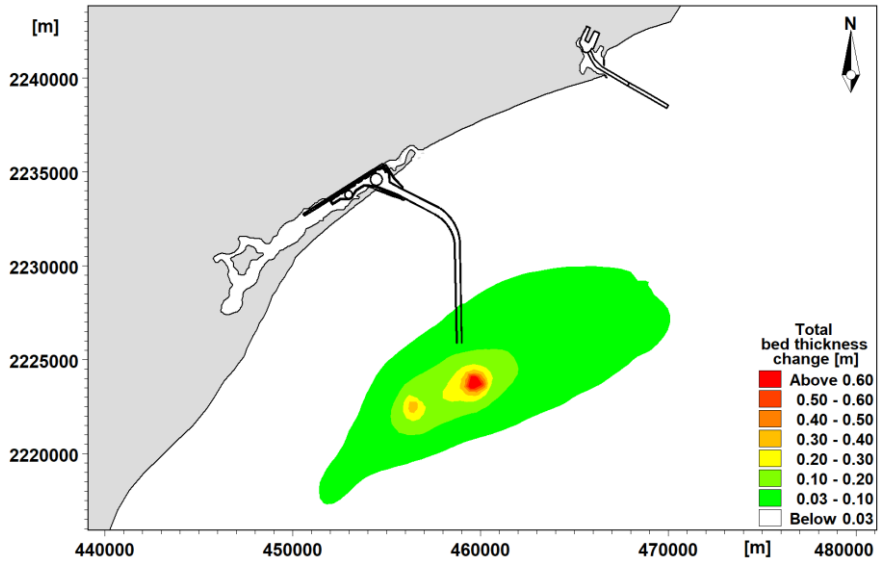


Figure 4-9 Capital dredge spoil dispersion from dumping ground after 1-month

4.6.2 Effect of Maintenance Dredging Material

The model results show that the majority of material is deposited directly onto the seabed at the dredge disposal site and remains at this location after the end of the dredge campaign. The maximum bed level change incurred due to dumping is around 0.2m at the dumping ground after 1-month simulation period.

The extend of spreading of the disposed materials from 30 days simulations with maintenance dredging quantity is presented in Table 4-4. The spread of the disposed sediment on the seafloor after 5 days, 10 days, 15 days, 20 days and 30 days are shown in Figure 4-10 to Figure 4-14.

Table 4-4 Extend of bed level change due to disposal of maintenance dredging quantity

Si. No	Disposal location	Disposal Period	Extent of bed level change in KM
1	L1 & L2	After 5 days	1.0
2		After 10 days	1.5
3		After 15 days	5.5
4		After 20 days	7.2
5		After 30 days	11.4

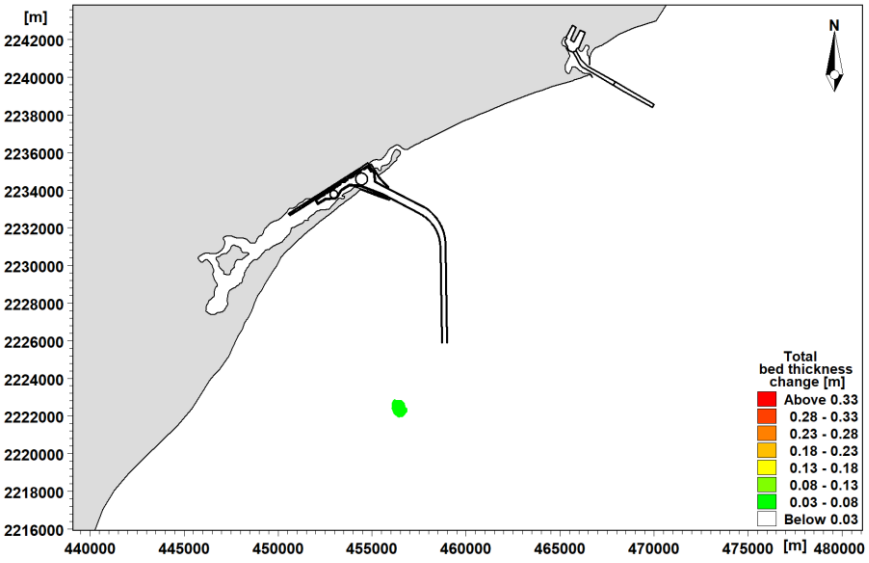


Figure 4-10 Maintenance dredge spoil dispersion from dumping ground after 5 days

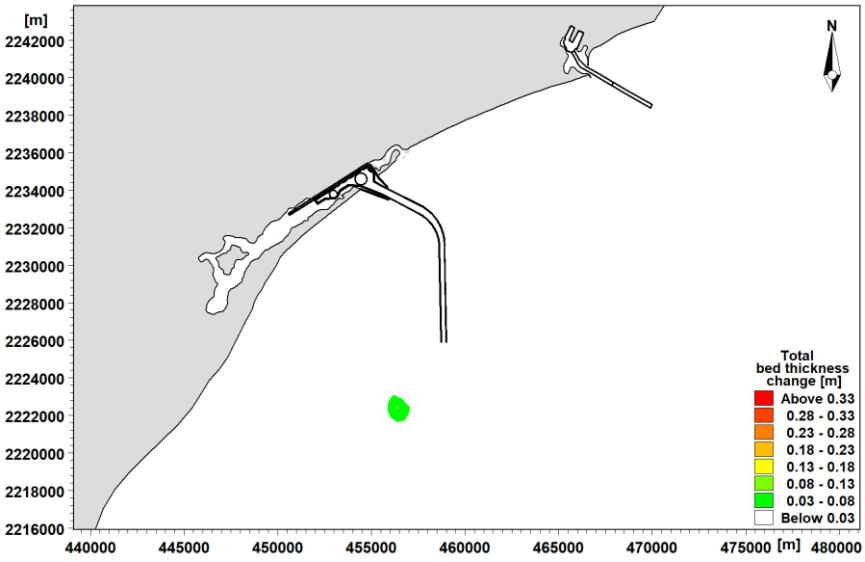


Figure 4-11 Maintenance dredge spoil dispersion from dumping ground after 10 days

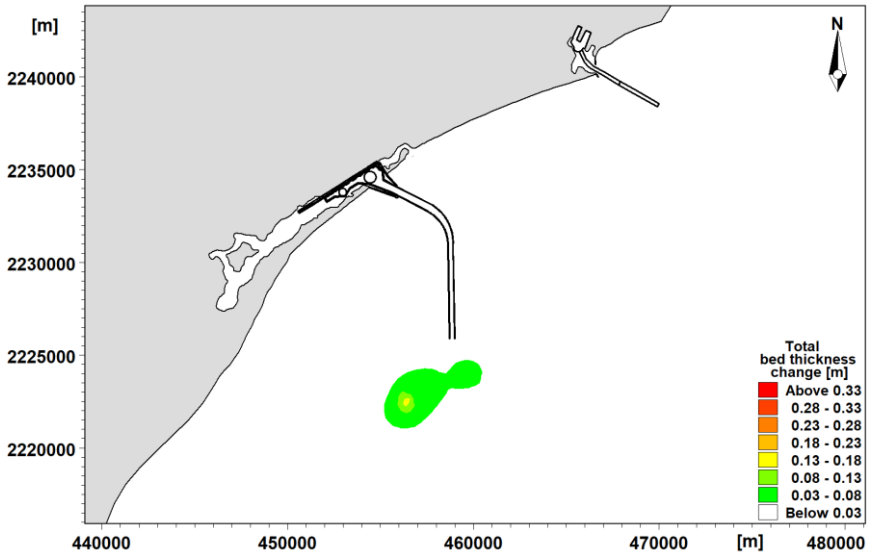


Figure 4-12 Maintenance dredge spoil dispersion from dumping ground after 15 days

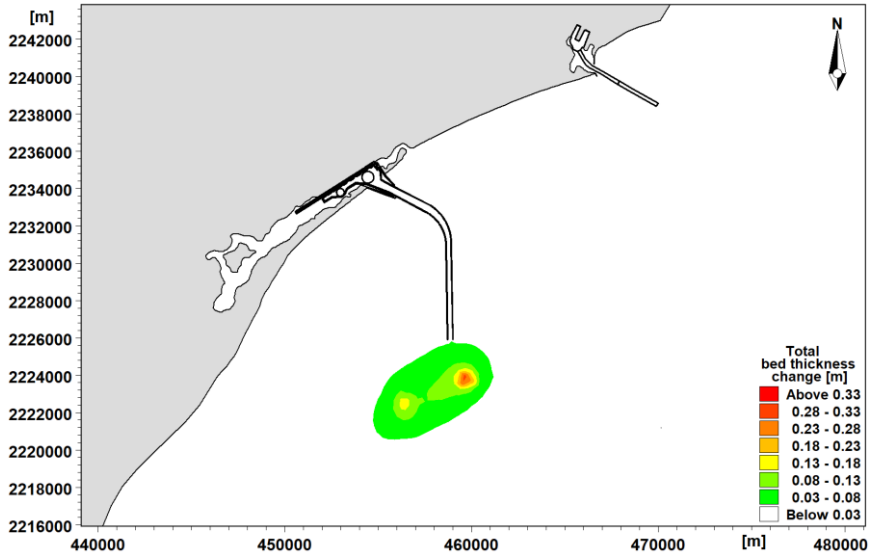


Figure 4-13 Maintenance dredge spoil dispersion from dumping ground after 20 days

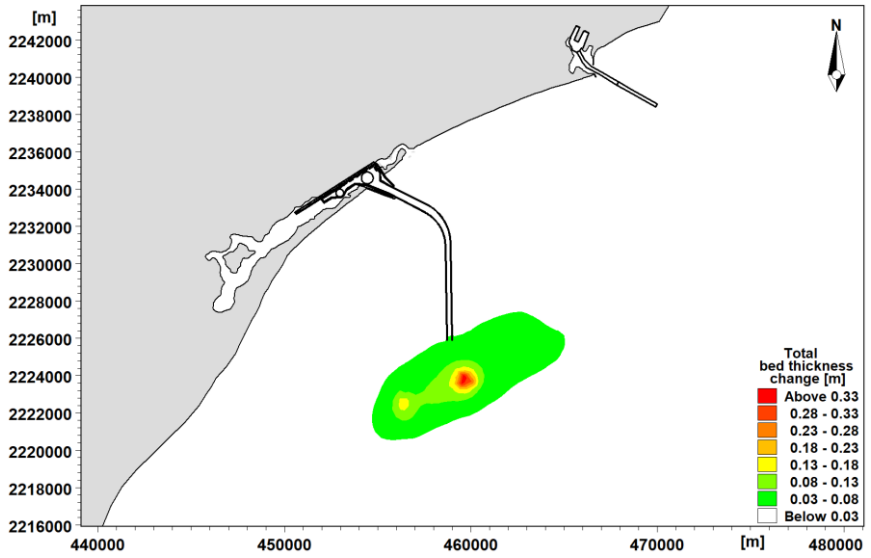


Figure 4-14 Maintenance dredge spoil dispersion from dumping ground after 1-month

5 Conclusion

From the model study, the following inference on the impact of the proposed development on the operational Paradip port has been highlighted.

- The five-year shoreline prediction with the proposed JSW development doesn't show any impact on either side of the Paradip port.
- It is predicted that the shoreline is accreted approximately 56 m and 86 m on the southern side of Paradip port after 1 year and 5 years respectively.
- Due to the proposed JSW development the possible sedimentation on the southern side of Paradip port is reduced. This is due to the deficiency of the longshore transport material which has been arrested by the proposed breakwaters of JSW development.
- Also, the proposed sand trap captures the longshore sediments which reduces the sediment transport further north and hence the sedimentation in the Paradip port's navigation channel also being reduced compared to the baseline conditions.
- Due to the proposed JSW development the annual siltation rates at the Paradip port are reduced such as in the Port basin by 25%, inner channel by 35% and outer channel by 31%.
- Considering the effect of dredged material (capital and maintenance), the disposal from the JSW development to the Paradip port, shows that, the majority of dredged material is deposited directly onto the seabed at the dredge disposal site and remains at this location during the simulation period. No dredged material is transported to the Paradip port vicinity. The material dispersion leaved a bed residue of about 0.08 m which is in significant.
- From the modelling studies it is concluded that the proposed captive jetty at Jatadharimuhan River by M/S JSW Steel Limited has no direct or indirect impact on the Paradip port.

ANNEXURE V

JSW Utkal Steel Limited

LETTER OF UNDERTAKING

No. JSW/U/O/2021/107 Date: 2nd June, 2021

To

The Member Secretary (Infra-1)
Ministry of Environment, Forest & Climate Change (MoEFCC)
Indira Paryavaran Bhawan,
Jor Bagh Road,
NEW DELHI- 110 003

Subject: Development of All-weather, Multi cargo, Greenfield, Captive Jetty(ies) for handling capacity 52 MTPA at Jatadhari Muhan River, Dist. Jagatsinghpur, Odisha by M/s JSW Utkal Steel Limited. - Undertaking Reg.
[Proposal No. IA/OR/MIS/74417/2018; F. No. 10-68/2018-IA.III]

Dear Sir,

JSW Utkal Steel Limited has proposed to develop the captive jetty(ies) facility for handling capacity of 52 MTPA for the 13.2 MTPA integrated steel plant (ISP) near the mouth of the Jatadhari River, at about 12 km south of the Paradip Port.

The proposal has been considered under the EIA Notification 2006 and CRZ Notification 2011 and appraised by the esteemed EAC during 256th meeting held on 3rd March, 2021 and 260th meeting held on 5th April, 2021.

As directed by the esteemed EAC, we undertake that;

"The activities proposed for the Captive Jetty(ies) facility by JSW Utkal Steel Ltd. shall not overlap the Master Plan of the Paradip Port".

Thanking you.

Yours Faithfully,
For JSW Utkal Steel Limited.

[Ranjan Nayak]
DIRECTOR

Registered Office:
JSW Centre
BandraKurla Complex,
Bandra (East), Mumbai 400 051
CIN. : U27209MH2017PLC301887
T +91 22 4286 1000
F +91 22 4286 3000
www.jsw.in

Plot No-3, Forest Park, Shishubhawan Square
Bhubaneshwar 751009, Odisha
T +91 674 2596117

OP Jindal Group

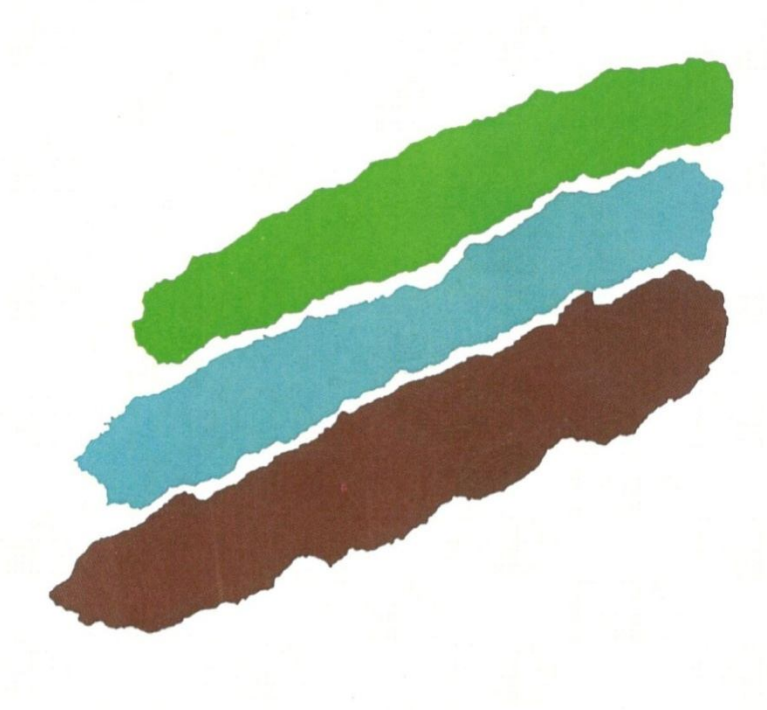
ANNEXURE VI

ADDENDUM

NIO/SP-07/2020
SSP3265

Marine Biodiversity Impact Assessment and management Plan for the proposed All-Weather Multi cargo Greenfield Captive Jetty (ies) for handling capacity of 52 MTPA at Jatadharimuhan Creek, District Jagatsinghpur, Odisha

SPONSORED BY
JSW Utkal Steel Limited
Bhubaneswar, Odisha



सीएसआईआर – राष्ट्रीयसमुद्रविज्ञानसंस्थान
CSIR-NATIONAL INSTITUTE OF OCEANOGRAPHY
(वैज्ञानिकतथाऔद्योगिकअनुसंधानपरिषद)
(COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH)
क्षेत्रीयकेंद्र : चारबंगला,अंधेरी (प.) मुम्बई – 400 0053.
Regional Centre : 4 Bungalows, Andheri (W), Mumbai- 400 053
फ़ोन/Tel : 91(0)022-26359605-08 • फैक्स /Fax: 91(0)022-26364627
(ई-मेल) e-mail: rcm@nio.org

HQ: दोनापावला,गोवाभारत / Dona Paula, Goa – 403 004.

10. ADDENDUM

The CSIR-National Institute of Oceanography (CSIR-NIO), conducted Marine Biodiversity Impact Assessment and management Plan for the proposed All-Weather Multi cargo Greenfield Captive Jetty (ies) for handling capacity of 52 MTPA at Jatadharimuhan Creek, District Jagatsinghpur, Odisha. CSIR-NIO conducted detailed study along predefined transects covering the longitude gradient of creek, nearshore, and offshore zones along the region during postmonsoon, premonsoon and monsoon as follows:

- January2019 (Postmonsoon)
- April 2019 (Premonsoon)
- September 2019 (Monsoon)

The objectives of study conducted with a multidisciplinary approach encompassed the following:

a) To establish the prevailing water quality, sediment quality and biological characteristics of the Jatadharimuhan Creek and the adjacent coastal water.
b) To study the impact of dredging and dumping of dredged material on marine ecology
c) Study the impact of marine discharge of treated effluent from different sources of the proposed project and draw up a management plan.
d) To prepare a detailed biodiversity impact assessment report and management plan
e) To recommend environmental monitoring plan

Final report of marine biodiversity study was submitted by CSIR-NIO, Mumbai to M/s JSW Utkal Steel Limited, Bhubaneshwar, Odisha in August 2020. The 256thMeeting of Expert Appraisal Committee (EAC) of Infra-1 (IA-III) was held through Video Conferencing at the Ministry of Environment, Forest & Climate Change (MoEF&CC), Indira Paryavaran Bhavan, New Delhi on 3rdMarch, 2021, wherein respected EAC desired to include the following information pertaining to the Report:

- Re-assess the marine ecology study performed by CSIR-NIO Mumbai for its completeness, and resubmit detailed base line data and impact mitigation plan.
- Detailed Environmental Base line study and Mitigation plan along with the financial allocation be submitted.

Accordingly, the following information/addendum is added in the Final Report.

10.1. ENVIRONMENTAL BASELINE DATA;

Re-assess the marine ecology study performed by CSIR-NIO Mumbai for its completeness, and resubmit detailed base line data and impact mitigation plan.

Environmental parameter limits that pertain to the water and sediment quality around the Jatadharmuhan creek and nearshore region before the proposed activities. The detailed environmental data are given in section 5.0. Detailed biological baseline data is given in section 5.3. The area-averaged limits, as well as annual limits in different zones for environmental parameter are presented below in Table1-4, which can be considered as baseline for the region. Table 5 indicates the distribution of biological parameters in the study area.

Table: 1 Zone wise distribution of environmental water quality parameters (Minimum-Maximum (Average)) off JatadharMuhan, Odisha during 2019, the period of proposed project activities. The limits represent the seasonal variation.

Parameters	Creek	Nearshore	Towards offshore	Offshore
Temperature (℃)	20.3-29.8 (25.8)	21.3-28.5 (26.1)	23-28.8 (26.6)	19.8-29.8 (26)
pH	7.2-8.4 (7.9)	7.8-8.4 (8.1)	7.9-8.3 (8.1)	7.8-8.3 (8.1)
SS (mg/L)	15.3-117.2 (38.1)	5.8-65.6 (32.2)	12.7-59.2 (34.7)	17.6-25.9 (21.4)
Turbidity (NTU)	0.4-29.8 (8.2)	0.6-8.4 (2.8)	0.6-1.9 (1.1)	0.2-2.4 (1.2)
Salinity (ppt)	1.1-34.1 (22.1)	28.1-34.3 (31.6)	28.7-34.1 (31.4)	28.7-34.1 (31.3)
DO (mg/L)	3.5-7.7 (6.6)	5.3-7.2 (6.2)	5.3-6.9 (6.3)	5.3-7 (6.2)
BOD (mg/L)	1.4-11.2 (4.2)	1.4-3.2 (2.3)	1.3-3.2 (2.3)	1-3.4 (2.1)
PO_4^{3-}-P (µmol/L)	0.1-2.6 (0.7)	0.1-0.8 (0.4)	0.3-0.8 (0.5)	0.1-0.9 (0.4)
NO_3^--N (µmol/L)	0.2-7.6 (2.1)	0.6-4.4 (2.2)	0.6-6 (2.9)	0.4-4.8 (3.1)
NO_2^--N (µmol/L)	0-2.3 (0.5)	0.1-0.7 (0.3)	0-0.4 (0.2)	0.1-0.4 (0.2)
NH_4^+-N (µmol/L)	0.3-12.2 (2.9)	0.3-1.6 (0.8)	0.2-1.2 (0.7)	0.4-1.1 (0.6)
PHc (µg/L)	1.7-10.4 (4.6)	2.1-25.4 (9)	4-8.3 (5.8)	6.6-15.5 (10.7)
Phenol (µg/L)	2.9-16.8 (11.9)	11.3-16.6 (13.8)	0-28.3 (16.6)	12.5-24.5 (18.3)

Table: 2 Area averaged distribution of environmental water quality parameters (Minimum-Maximum (Average)) off JatadharMuhan, Odisha during 2019, the period of proposed project activities. The limits represent the seasonal variation.

Parameters	January 2019	April 2019	September 2019	Annual	*CPCB
Temperature (℃)	19.8-23.8 (22.4)	26.8-29.8 (28)	27-29.8 (27.9)	19.8-29.8 (26.1)	
pH	8.3-8.4 (8.3)	7.9-8 (8)	7.2-8 (7.8)	7.2-8.4 (8)	6.5-9
SS (mg/L)	13-26 (19)	6-33 (25)	24-117 (60)	5.8-117.2 (34.6)	
Turbidity (NTU)	0.2-4.2 (1.1)	0.6-1.9 (1.1)	1.2-29.8 (7.2)	0.2-29.8 (3.1)	30
Salinity (ppt)	23.3-29.6 (28)	33.2-34.3 (34)	1.1-32.7 (25.3)	1.1-34.3 (29.1)	
DO (mg/L)	6.2-7.7 (6.9)	5.9-7.5 (6.8)	3.5-7.3 (5.4)	3.5-7.7 (6.4)	3-4
BOD (mg/L)	1.4-3.2 (2.7)	1.9-4.6 (3)	1-11.2 (2.3)	1-11.2 (2.6)	3-5
PO_4^{3-}-P (µM)	0.1-0.8 (0.5)	0.1-0.9 (0.5)	0.1-2.6 (0.5)	0.1-2.6 (0.5)	
NO_3^--N (µM)	0.2-6 (2.7)	0.2-1.6 (0.9)	3.2-7.6 (4.4)	0.2-7.6 (2.7)	
NO_2^--N (µM)	0-0.7 (0.3)	0-0.3 (0.1)	0.2-2.3 (0.6)	0-2.3 (0.3)	

NH_4^+-N (µM)	0.6-2 (1.3)	0.2-0.9 (0.6)	0.4-12.2 (2.2)	0.2-12.2 (1.3)	
PHc (µg/L)	3.3-25.4 (10.5)	2.1-15.5 (7.7)	1.7-6.1 (3.4)	1.7-25.4 (7.2)	**10000
Phenol (µg/L)	11.3-28.3 (18)	12.5-24.5 (18.1)	2.9-16.6 (11.3)	2.9-28.3 (15.8)	

CPCB prescribed ranges for SW- II (For Bathing, Contact Water Sports and Commercial Fishing) and SW-IV (For Harbour Waters); ** In terms of oil and grease and scum (including petroleum products: 10 mg/L).

Table: 3 Zone wise distribution of sedimentary metals (Minimum-Maximum (Average)) off JatadharMuhan, Odisha during 2019, the period of proposed project activities. The limits represent the seasonal variation.

Parameters	Creek	Nearshore	Towards offshore	Offshore
Al (%)	3.9-8 (5.5)	4.6-7.2 (6.2)	5-8.2 (6.3)	7.1-7.2 (7.2)
Cr (µg/g)	49-89.7 (68.3)	38.7-90.5 (67.6)	45.5-132 (79.8)	71.7-98.5 (85.1)
Mn (µg/g)	379-1013 (738)	618-857 (748)	578-874 (748)	632-647 (639)
Fe(%)	2.4-5.9 (4.3)	2.8-5.3 (4.3)	3.3-6 (4.5)	4.5-4.9 (4.7)
Co (µg/g)	12.7-26 (18.9)	13.6-19.5 (16.8)	13.5-24 (19.5)	18.3-20.5 (19.4)
Ni (µg/g)	12.9-36.7 (23.2)	13.3-36 (26)	15.5-52 (30.2)	32-37.5 (34.8)
Cu (µg/g)	5.8-37 (20.5)	6.1-14.7 (11.8)	14-23 (18.7)	13.7-15.5 (14.6)
Zn (µg/g)	30.3-68.7 (51.3)	34-63 (50.9)	38-83.5 (58.8)	55.7-64 (59.9)
Hg (µg/g)	0.1-0.1 (0.1)	0-0.1 (0.03)	0-0.1 (0.07)	BDL

Table: 4 Area averaged distribution of environmental water quality parameters (Minimum-Maximum (Average)) off JatadharMuhan, Odisha during 2019, the period of proposed project activities. The limits represent the seasonal variation.

Parameters	January 2019	April 2019	September 2019	Annual
Al (%)	4.7-9.3 (6.9)	2.3-9.4 (6)	2.1-9.8 (4.7)	2.1-9.8 (5.9)
Cr (µg/g)	45-106 (72.4)	18-149 (82.9)	21-114 (52.5)	18-149 (69.3)
Mn (µg/g)	499-1434 (763.4)	101-1008 (649.1)	292-1535 (719.5)	101-1535 (710.7)
Fe(%)	0.8-7.3 (4.7)	1.4-7.1 (4.2)	1.6-7.4 (3.7)	0.8-7.4 (4.2)
Co (µg/g)	3.9-24 (17.1)	8.8-27 (18)	7.9-38 (19.8)	3.9-38 (18.3)
Ni (µg/g)	14-46 (29.4)	4.7-59 (29.6)	3.3-51 (16.6)	3.3-59 (25.2)
Cu (µg/g)	10-23 (16.3)	0.5-31 (12.9)	1-37 (13.8)	0.5-37 (14.3)
Zn (µg/g)	36-84 (56)	8-93 (53.7)	18-90 (44.5)	8-93 (51.4)
Hg (µg/g)	0.01-0.1 (0.03)	0.01-0.09 (0.05)	0.05-0.17 (0.1)	0.01-0.17 (0.06)

Table 5. Distribution of biological parameters [Minimum-Maximum (Average)] off JatadharMuhan, Odhisa during 2019, the proposed project activity region. The limits represent the seasonal variations.

Parameters	January 2019	April 2019	September 2019	Annual
Microbiology				
Water (CFU/ml)				
TVC x 102	10-700 (168)	50-500 (237)	10-180 (76)	10-700 (160)
TC	40-50 (8)	20-210 (60)	30-50 (9)	20-210 (26)
FC	30-50 (7)	10-100 (19)	0-20 (2)	0-100 (9)
ECLO	10-40 (5)	10-30 (5)	-	10-40 (3)
SFLO	-	-	40-920 (242)	40-920 (81)
Sediment (CFU/g)				
TVC x 104	30-140 (73)	50-250 (116)	10-300 (116)	30-300 (102)
TC	0-2000(182)	-	2000-3000 (714)	0-3000 (299)
FC	0-1000(91)	-	-	0-1000(30)
ECLO	0-1000(91)	-	-	0-1000(30)
SFLO	700-1000(155)	-	2000-48000 (7571)	700-48000(2575)
Phytoplankton				
Cell count(no x10^3 Cells/l)	8.8- 347.6 (79.5)	20.6 -950.4 (178.0)	6.0-55.0 (19.5)	6.0 - 950.4 (92)
Total Genera (no)	7.0-22.0 (12.1)	7.0-23.0 (14.0)	4.0-14.0 (7.8)	4.0 -23.0 (11.3)
Zooplankton				
Biomass (ml/100m^3)	1.6 -21.5 (8.86)	1.7 -26.8 (8.66)	0.1 -1.9 (0.88)	0.1 -26.8 (6.1)
Population (no.×10^3/100m^3)	2 -71 (20)	1 -75 (26)	0 -9 (4)	0 -75 (16)
Total groups (no.)	7 -22 (16)	6 -19 (13)	6 -18 (12)	6 -22 (14)
Benthic meiofauna (Subtidal)				
Biomass (g/m^2)	0.8 -2.69 (0.79)	0.02 -3.08 (0.75)	0.29 -1.81 (0.83)	0.02 -3.08 (0.78)
Population (no.×10^3/m^2)	78 - 439 (206)	63 -1656 (473)	99 -2031 (621)	63 -2031 (433)
Total Groups (no.)	3 -8 (5)	1 -12 (6)	4 -9 (7)	1 -12 (6)
Benthic meiofauna (Intertidal)				
Biomass(g/m^2)	0.12 -1.59 (0.54)	0.15 -4.04 (1.00)	0.12 -1.82 (0.68)	0.02 -3.08 (0.73)
Population(no.×10^3/m^2)	134 -679 (313)	431 -1974 (803)	142 -892 (534)	134 -1974 (550)
Total Groups (no.)	4 -11 (6)	4 -10 (7)	5 -15 (9)	4 -15 (7)
Benthic macrofauna (Subtidal)				
Biomass (g/m²; wet wt.)	0.003 - 44.19 (7.72)	0 - 23.07 (4.94)	0 - 31.25 (9.25)	0 - 44.19 (7.3)

Population (no./m²)	25 - 6900 (2494)	0 - 4375 (711)	0 - 1250 (363)	0 - 6900 (1189.3)
Total Groups (no.)	1 - 12 (6)	0 - 8 (4)	0 - 3 (1)	0 - 12 (3.6)
Benthic macrofauna (Intertidal)				
Biomass (g/m²; wet wt.)	0.58 - 247.89 (49.8)	0.02 - 1545.01 (153.6)	0 - 3.38 (0.52)	0 - 1545.01 (67.1)
Population (no./m²)	192 - 8816 (2829)	16 - 1696 (454)	0 - 80 (16)	0 - 8816 (1099.66)
Total Groups (no.)	3 -6 (5)	1-6 (3)	0-4 (1)	0-6 (3)

10.1.1 MITIGATION MEASURES

Detailed Environmental Base line study and Mitigation plan along with the financial allocation be submitted.

The physico-chemicals parameters and the biological diversity in the Jatadharmuhan creek and nearby coastal waters are detailed in Section 5 of the report.

The recovery of biodiversity is dependent on various ecological and physical factors and also on the magnitude of impact posed by anthropogenic activity. In order to reduce and recover from such multiple stressors, the competition among various species for resilience and recovery potential of sensitive species pose another hurdle in mitigation. Thus, it is empirical to validate the diversity before and after the impact to ensure the damage caused and to understand the recovery. However, it is hard to avoid all ecological damage by any means of mitigation nevertheless the impact can be minimized as far as possible. The detailed mitigations measures are given in section 7.0. As suggested following are a few additional mitigation measures should be considered during the proposed project activity:

A well-defined environmental management and monitoring plan need to be in place for each of the aspect related to proposed project activity.

A dedicated team of experts, comprising of environment engineers, ecologists should be deployed at the site for planning and execution of the project.

- The project proponent should consider and adhere to all the international treaties and agreements to which India is signatory and party on marine pollution and biodiversity conservation.
- All the international, national and state level legislations have to be followed and necessary approvals from the statutory bodies have to be taken before commencement of the proposed activity.
- Regular maintenance of all the activities and deployment of trained personnel will reduce many impacts and unplanned events will not occur. Planning and maintaining a record of the activities will reduce the occurrence of unwarranted events. Deploying trained personnel will help to identify the events and constrain its impacts.

- Quality and standards have to the priority for usage of resources, raw material, equipment and man power with regular calibration and checking with proper record keeping.
- Emissions from vessels at port and equipment used for project execution should be within the permissible limits prescribed.
- Noise levels of the machinery and equipment should be within the permissible limits and the baseline described in the EIA/EMP report.
- Organic solid and liquid waste on the vessels involved in project should not be disposed in the ambient waters. It should be properly processed and or disposed as per the guidelines.
- Inorganic waste, hazards waste including oil and grease should be stored appropriately and should be delivered to authorized vendors for proper disposal.

- Site specific:
- Piling and dredging associated activities related to proposed project area located at creek need to be avoided during monsoon, considering the fish breeding, egg laying and larval recruitment seasons of the fish noted in the region.
- Wherever filling construction activity has been done; same area has to be restored to its pre-disturbance conditions, once the construction phase is completed. This should be done by suggested management and monitoring plan of this report.
- Fish fauna is diverse and comprised of commercial and non-commercial species along the Jatadharimuhan creek and adjacent coastal waters (see Section 5.3.10). Therefore, necessary care such as maintaining the water quality in the region should be taken to avoid damaging this important resource insuring its sustainable utilization.
- The fishermen folks normally engaged in fishing during both tides, while a large quantity of molluscans, crustacean and fish species are collected from the intertidal region along the Jatadharimuhan creek. Care should be taken that the project activities do not obstruct the activities of the fishermen.

10.1.2 MARINE BIODIVERSITY CONVERSATION PLAN

An elaborative biodiversity conversation plan for the project is detailed in section 8 of the report. The main objectives of biodiversity conversation plan are as follows;

- To maintain direct and indirect disturbance to marine flora and fauna other than within the immediate work areas.
- To ensure turbid plumes from the works and re-suspension of material from the activity site do not significantly impact the long term ecological values and integrity of the adjacent benthic assemblages.
- To reduce impact to the intertidal sensitive habitats to the extent possible.

11 ENVIRONMENTAL MANAGEMENT PLAN:

The guiding principle of marine environment management is to ensure that the perturbations due to the proposed activities are within the assimilative capacity of the creek and coastal environment off Jatadharimuhan. This is best done by integrating into the project itself, a plan of actions for mitigating predicted adverse effects as discussed in Section 6. The detailed

EMP is given in section 9. The data presented in this report can be considered for comparing the results of future monitoring studies. The monitoring however should be confined to the months in which the data are collected. It is necessary to verify the predicted environmental changes from the pre-project baseline. Hence, EMP needs to be followed by periodic monitoring of the environment to identify deviations from the pre-project baseline as mention above. Basic framework for efficient management of the marine environment should include the following:

a) Marine environmental quality criteria on the basis of pre-project monitoring,
b) Construction phase
b) Operational phase,
c) Inspection protocols and
d) Institutional arrangements.

These plans/manuals should be available before the jetty(ies) facility becomes operational and there should be provisions for updating them based on actual operational experiences. Management approach towards maintenance of health of the prevailing ecology should be considered under two categories; preventive and corrective. Training to the operational staff to consciously prevent the spillage of cargo, surveillance to target the defaulters of MARPOL (1973/78) Protocol, traffic control in the channel etc. fall under the preventive management. Management strategies to prevent deterioration in the marine environmental quality due to the establishment of the jetty are discussed in this section. Addressing the marine environmental issues directly related to the operations at the jetty(ies) requires the preparation of basic frame work.

M/s JUSL shall carry out environmental monitoring program for protection of marine environment in and around dredged area, disposal area and also at neighboring marine ecological area to the dredged area and disposal ground. Hence a general guideline for the dredging operator or JUSL itself is to be drawn for implementation of EMP and compliance thereof to be submitted to the regulatory authorities so as to arrest the degradation ecology of the area.

The construction phase is a relatively short-term activity. In this phase it is necessary to monitor those crucial parameters that can cause negative impacts on marine ecology of the region. The proposed project includes construction of jetty(ies), dredging, dredge disposal and effluent discharge from integrated steel plant as well as thermal power plant. The important parameters to be monitored in this context are suspended particulate matter or turbidity and

dissolved oxygen (DO) since during dredging, piling and construction there is potential for dispersion of bed sediment in the water column. The detailed about marine environmental quality criteria discussed in section 9.1 for construction and operational phase.

The plan aims to create an enabling integrated coastal and marine biodiversity management and protection, and to mainstream marine and coastal biodiversity into national plans and coastal zone management plans, with particular focus on biodiversity. As such, it provides an opportunity to coordinate with past and new initiatives in the region to address gaps in assessments, and seek sustainable and economically viable policy and technological options for the protection of key marine and coastal biodiversity to be included in coastal zone management plans, Marine Protected Area (MPA) plans and integrated into national plans.

Biodiversity Monitoring Plan	• A comprehensive environmental quality monitoring programme with periodic (Pre-monsoon and Post-monsoon) investigations at predetermined locations (these should coincide with those used for the baseline quality) by a competent agency is a practical solution to ensure quality data acquisition. • A monitoring program shall include seasonal monitoring (once every season) for all the sites recognized as sensitive within the buffer zone. • A seasonal survey shall include the status of intertidal benthic faunal groups of commercial importance. • A socio-ecological survey to quantify the economically important species resources collected at each of the designated sites. • Monitoring of the subtidal water column for any species of importance such as invasive and exotic species, any events of blooms (algal, jellyfish or others). • The effects of sediment deposition on the offshore and coastal environment and especially the impact on commercially important fisheries need to be assessed

	seasonally. • Assist in improvement of scientific information and knowledge which will help in sustainable management of the Marine area under port jurisdiction. • Under the CSR activity, the JUSL can monetarily assist research projects conducted by post graduate students, provided these are relevant to the said objective. • Under CSR, JUSL can also promote projects which contribute to the identification of marine areas of particular importance to marine biodiversity. • Identification of invasive species which enter the marine area under the project jurisdiction and prevent/minimize the entry of the same by appropriate control of ballast waters and other such means.

11.1BUDGETS FOR THE EMP: [Marine]

Budgetary planning is the process of constructing a budget and then utilizing it to control the operations of a business. In this present study, there is few management/monitoring plans are described below in tabular form with their estimated budget cost:

Sr No	Description of Item	Cost(Crore INR) during construction phase (considering 2 years)	Cost /yr (Crore INR) during operation phase
1	Biodiversity monitoring Plan (intertidal and subtidal areas)	1.00	0.70
2	Periodic Monitoring Plan (intertidal and subtidal areas)	0.40	0.20
3	Fishery Management Plan	0.30	0.20
4	Stakeholder's Participation Program	0.20	0.10
	Total (INR)	**1.90**	**1.20**

ANNEXURE VII

The PH issues and the commitment and mitigation measures/plans along with the budgetary provisions be submitted in a tabular form. EMP shall be revised by making financial allocations for activities for fulfilling these commitments.

1.0 PH Issues and Commitment

During Public hearing (PH) a detailed presentation about the project and its environmental and socio-economic benefits are given to the public. The participants were then invited to give their objections and suggestions. About 40 persons have delivered their views/suggestions during the meeting and 262 participants have submitted their views/suggestions through written statements. Reply to the objections/ suggestions raised by the public is prepared and submitted along with the EIA report. Summary of the issues raised and clarification by PP are given in the Table 1.0.

Table 1.0: PH issues and commitment by PP

S. No.	Activity	Issues raised by Public	Commitment by PP	Remarks
01	**Environment**	The participants have raised various common environmental issues like air pollution, water pollution, dust pollution, ground water contamination etc. from the proposed project.	JSW Utkal Steel Ltd (JSWUSL) has assured to adopt advanced technology for controlling of environmental pollution in the proposed project, such as; i. Jetty facilities would be well equipped with fully mechanized handling systems. ii. All bulk cargoes would be handled with special purpose quay unloaders equipped with locking grab buckets and discharge hoppers. Cargo is moistened at this point with plenum water fogging ring. iii. Moistened cargo would be transported by a series of covered conveyor belts to stockpile. iv. Stacking and reclamation of cargo would be carried out in mechanized fashion by use of	The facilities shall be created under the project development of captive jetty(ies) and its backup facilities.

S. No.	Activity	Issues raised by Public	Commitment by PP	Remarks
			Stacker-cum-Reclaimers, under continuous sprinkling of water under covered storage. v. Cargos would be transported to the steel plant through covered conveyor belts under continuous water fogging with installation of dust suppression system (DSS) at all the transfer points. vi. In addition, geotextile wind barrier would be erected around the stockpiles. vii. Sufficient greenbelts around the periphery shall be created to contain the fugitive emissions. viii. The jetty backup facility will have longitudinal covered storage to reduce fugitive emissions in the jetty area. The facility will have also covered godowns for storing different cargos bulk and bagged cargos. ix. Sewage generated from the domestic consumption shall be treated in a sewage treatment plant (STP). Treated water after disinfection shall be used for gardening and for dust suppression. x. Solid waste of municipal origin shall be segregated into biodegradable and non-biodegradable waste. Non-biodegradable waste shall be disposed off through	

S. No.	Activity	Issues raised by Public	Commitment by PP	Remarks
			authorized vendors. Biodegradable waste shall be composted onsite and shall be used as manure in horticulture. Necessary synergy in handling of wastes will be developed within the ISP.	
02	**Employment**	i. The participants have demanded for direct and indirect employment in the proposed project. ii. Demanded for establishment of technical training institute.	i. JSWUSL informed that during project construction phase there will be employment opportunities for about 1000 manpower, whereas during operation phase there will be requirement of 250 direct and 750 indirect employments as per the eligibility criteria and qualifications. ii. The following recruitment guidelines of Govt. for locals will be followed; Unskilled employment-90% Semi-skilled employment-60% Supervisor/Manager-30% iii. The project proponent assured for imparting vocational training to the local people for their self-employment as per their eligibility and qualification. iv. JSWUSL has proposed to facilitate employment to the youth after training through Govt. Organizations like	iii. The training activities shall be supported under the CSR activities. iv. Our response is same as

S. No.	Activity	Issues raised by Public	Commitment by PP	Remarks
			CIPET & ORMAS and other suitable institutions.	above.
03	**Health**	i. Demand for upgradation of exiting Govt. hospitals in three GPs. ii. Demand for 200 bedded Hi-Tech Super Specialty Hospital in the local area.	i. JSWUSL has committed to upgrade the Public Health Centres (PHC) with facilities like General OPD, Pediatric facility and mini operation theatre etc.	Budget allocation of Rs. 2.25 Crore under the CER activity plan.
04	**Education**	i. Demand for Upgradation of exiting educational institutions.	JSWUSL has proposed to upgrade the village schools in three Gram Panchayats of Project area with the facility of. i. Electrification ii. Provide computer iii. Provision of safe drinking water iv. Toilets v. Dining hall, and vi. Playground facility. The facilities shall be provided in phased manner and completed in three years' time.	Budget allocation of Rs. 2.50 Crore under the CER activity plan.
05	**Drinking Water Facility**	Demand for safe drinking water facilities in every village.	JSWUSL assured to establish provision for safe drinking water facility at every village in three Gram Panchayats. This facility shall be developed in phased manner and completed in three years' time.	Budget allocation of Rs. 2.50 Crore under the CER activity Plan.

S. No.	Activity	Issues raised by Public	Commitment by PP	Remarks
06	**Women Empowerment**	i. Demanded that all the SHG are to be empowered with skill development and better Management of financial implementation and training etc. ii. Establishment of BPO Centers in the village.	i. JSWUSL assured that All the SHGs in three Gram Panchayats will be properly trained on various aspects of SHG through State Govt's initiatives including digital literacy for better marketing and financial aspects of entrepreneurships through Mission Shakti. ii. JSWUSL has proposed to open BPO Centres in the villages.	Allocation of Rs. 1.50 Crore under CER activity plan.
07	**Sports**	Demand before the company authority to develop sports infrastructure in the villages.	JSWUSL has assured to develop sports infrastructure in the area and arrange special training for talented youths.	Budget allocation of Rs. 50.00 Lakh under the CER activity Plan.
08	**Culture**	i. Demand before the company authority to protect and develop the local culture. ii. Demand before the company authority to provide with electrification and maintenance work of old existing Lord Jagannath Temple.	i. JSWUSL has assured to protect and promote the local culture. ii. The existing Lord Jagannath Temple at Gadakujanga shall be provided with electrification and maintenance.	Budget allocation of Rs. 50.00 Lakh under the CER activity Plan.
09	**Livelihood**	Demand for fishing jetty and to provide fishing boat and equipment.	JSWUSL has assured livelihood development of the fishing community by providing fishing boats, engines, fishing nets, etc.	Budget allocation of Rs. 1.25 Crore under the CER activity Plan.
10	**CSR Activities**	The public have demanded the following other various	JSWUSL assured that a master plan will be prepared in discussion with Local authority	The activities committed under various

S. No.	Activity	Issues raised by Public	Commitment by PP	Remarks
		developmental works under CSR activities. i. Upgradation with advanced medical equipment at PHC, Balitutha. ii. Establishment of technical training Institute at Balitutha. iii. Construction or upgradation of road and drainage system. iv. Free Electrification/ Solar system/ Street lighting. v. Free LPG gas connection to every house hold in the village. vi. Impart training to unskilled labourers. vii. Upgradation of health Care System. viii. Construction of shopping complex. ix. Upgradation of betel farming and provide training for advanced betel cultivation. x. Establishment and upgradation of public community centre and recreation centre. xi. Provision of fishing	and State Govt. for all round development of villages in three Gram Panchayats and shall be implemented for various CSR activities which are as below. i. Upgradation with advanced medical facilities at PHC, Balitutha. ii. Establishment of technical training institute. iii. Construction or upgradation of road and drainage system. iv. Electrification/ Solar system/ Street lighting. v. LPG connections shall be provided. vi. Impart training to unskilled labourers. vii. Upgradation of Health Care System. viii. Construction of shopping complex. ix. Upgradation of betel farming practices. x. Establishment and upgradation of public community center and recreation center. xi. Fishing jetty for fishing community would be established. xii. Cyclone relief centers would be renovated and upgraded.	categories shall be implemented under the CSR activity plan during the operational phase of the project.

S. No.	Activity	Issues raised by Public	Commitment by PP	Remarks
		jetty. xii. Cyclone relief centres to be upgraded.		

2.0 Corporate Environment Responsibility (CER)

PH issues and our commitments towards the corporate environment responsibility (CER) for socio-economic development of the local area population is summarized in the following Table 2.0.

Table 2.0: Commitment on CER

Activities	Year 1	Year 2	Year 3	Total (Rs. In Lakhs)
Health				
Upgradation of Public Health Centres (PHC) with facilities like General OPD, Pediatric facility and mini operation theatre etc.	Balitutha PHC (75)	Dhinkia PHC (75)	Kujang PHC (75)	225
Education				
Upgradation of existing village schools through Electrification, Provide computer, Provision of safe drinking water, Toilets, Dining hall and Playground facility.	Kapteswar Bidyapitha, Dhinkia (40) Sri Aurobindo Shiksya Sadhana, Taladanda (30)	Pankapal UP School, Pankapal (30) Balitutha UP School, Balitutha (30) Janata High School, Kothi (30)	Noliashahi UP School, Noliashahi (30) AK Bidyapitha UP School, Khuranta (30) Baladevjiew UP School Sahada (30)	250
Drinking Water Facility				
Provision of drinking water through pipelines/ tanker facility	75	75	100	250
Women Empowerment				
Skill development training on livelihood programs like tailoring, beautician course, and animal husbandry, etc. Providing training to SHG members.	50	50	50	150
Sports				

Activities	Year 1	Year 2	Year 3	Total (Rs. In Lakhs)
Develop sports infrastructure in the area and arrange special training for the talented youths.	25	25	-	50
Culture				
Lord Jagannath Temple at Gadakujanga shall be provided with electrification and maintenance.	25	25	-	50
Fisherman Livelihood				
Fishing boat, engines and nets would be provided to the fishermen for their livelihood development.	25	50	50	125

3.0 Revised Environment Management Plan (EMP)

The Environmental Management Plan (EMP) has been formulated to ensure that the adverse impacts likely to accrue are removed or minimized to the extent possible during project construction and operation phase.

The EMP has been duly revised as per the financial allocations made for the biodiversity management plan, and also the commitments made towards the corporate environment responsibility (CER). The detailed EMP has been discussed in the EIA/EMP report as Chapter 10.

a) EMP during Construction Phase

Land Environment

A proper system to drain out the rainwater would be installed. Material excavated during construction will be used for refilling and reclamation purposes. A reclamation embankment would be constructed to prevent spillage of reclamation material.

Water Environment

A sewerage system to be designed to integrate ISP and the jetty(ies) facility. A sewer lines will be laid in the jetty(ies) and will be connected to the main sewer lines. Sewage generated from the labour camps would be treated in Modular STP.

Marine Environment

It is necessary to evolve an environment friendly dredging Plan, where the depth of cut is engineered on scientific principles and steps taken to minimize the turbidity cloud in the vicinity of the drag/cutter head. The timing of dredging and disposal activities could be planned, where practical, to avoid and reduce any adverse impacts on sensitive marine flora and fauna.

Solid Waste Management

Adequate facilities for collection, conveyance and disposal of solid waste would be developed. The solid waste will be disposed at the designated landfill sites.

Pollution control due to increased vehicles

The movement of vehicles is likely to increase during construction phase and later in the operation phase of the project. The vehicles with valid PUC will only be allowed to ply in the project construction or in the operation phases.

b) EMP during Operation Phase

Water Environment

The domestic sewage will be collected and treated in STP proposed at ISP and waste water collected from the stackyard shall be treated in settling tanks and reused for gardening purposes.

To combat water pollution due to oil spills near the port, portable oil skimmers should be made available at the berth. The response plan should describe the recommended procedures for responding to an oil spill with essential information. The deployment of trained manpower is recommended to successfully combat an oil spill.

Terrestrial Environment

No significant impact is envisaged on terrestrial ecology in the area due to the proposed project. However, tree plantation programme along the roads in and around the project area shall be carried out with native species to maintain an aesthetic environment. Adequate greenbelt of 15 m wide would be developed around the periphery of the jetty facility.

c) Biodiversity Management Plan

Detailed environmental base line study and mitigation plan along with the financial allocation has been prepared by CSIR-NIO and the biodiversity management plan has been be submitted as previous submissions at Annexure V and VI.

c) Energy Conservation Measures

Energy conservation measures would be implemented to ensure that the use of non- renewable resources is minimized. A key component of achieving energy conservation would be the development of an Energy Management Action Plan. This plan would be included as part of the Construction and Operational EMPs.

d) Corporate Environment Responsibility

For the proposed project implementation of corporate environment responsibility (CER), an amount of Rs. 11 Crore has been earmarked as per the MoEFCC OM F.No. 22-65/2017-IA.III, dated 30.09.2020. The allocated amount would be utilized as per the issues raised during the public hearing. The detailed CER expenditure plan for developments in various socio-economic sectors is given in the Table 2.0.

e) Environment Management Cell (EMC)

It is proposed to develop an Environmental Management Cell (EMC) comprising of environmental engineers, chemists and horticulturist to work for environmental related issues.

3.1 BUDGET for implementation of EMP

The budget provisioned for effective implementation of the environmental management plan (EMP) due to the proposed project development is about Rs. 1638 Lakh or say 16.50 Crore. In addition, about 212 Lakh has been provisioned for environmental monitoring, including the biodiversity monitoring and management plan during construction phase (for 2 years), and about 135 Lakh per year has been provisioned for the operation phase. The detailed budget is given in Table 3.0.

Table 3.0: Budget for implementation of Environmental Management Plan (EMP).

S. No.	Particulars	Cost (Rs. in Lakhs)
1	Sanitary facilities at labour camps	55.0
2	Treatment of effluent from coal stackyard	100
3	Solid waste management facility	100
4	Development of health facility	100
5	Treatment of effluent from workshops	20.0
6	Toilet facilities and sewerage network	50.0
7	Water pollution control from oil spill	50.0
8	Horticulture Development	20.0
9	Greenbelt Development	23.0
10	Corporate Environmental Responsibility (CER)	1100
11	Energy Conservation Measures	20.0
12	*Implementation of Environmental Monitoring and Management during construction phase (2 years)***	*212*
13	*Implementation of Environmental Monitoring and Management during operation phase per year****	*135*
14	**Total (Item 1-11)**	**1638**

**Out of this 190 Lakh is earmarked for monitoring and management of marine biodiversity during construction phase. The details are given in the Addendum Report of CSIR-NIO.

***Out of this 120 Lakh is earmarked for monitoring and management of marine biodiversity during operation phase. The details are given in the Addendum Report of CSIR-NIO.

CRZ MAP & REPORT

Government of Odisha
Forest & Environment Department
*****

ODISHA COASTAL ZONE MANAGEMENT AUTHORITY
1st Floor, Administrative Building,
RPRC Campus, Nayapalli, Bhubaneswar- 751015
Email – oczma1@gmail.com

No. OCZMA/56/2020 41 /OCZMA Dt. 01.02.2021

From

Sri Susanta Nanda, IFS
Director, Environment-cum-
Special Secretary to Govt.
and Member Secretary, OCZMA

To

The Secretary,
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhavan,
Aliganj, Jorbagh Road, New Delhi-110003

Sub: CRZ Clearance for "Development of all-weather multi cargo green field captive jetty (ies) of handling capacity 52 MTPA in Jatadharimuhan River, Dist-Jagatsinghpur, Odisha by JSW Steel Limited.

Sir,

This has reference to a proposal received from the Director,JSW Utkal Steel Limited namely "Development of all-weather multi cargo green field captive jetty (ies) of handling capacity 52 MTPA in Jatadharimuhan River, Dist-Jagatsinghpur,Odisha by JSW Steel Limited" vide letter no. JSW/U/O/2020/105 Dt.16.10.2020 seeking CRZ Clearance in accordance with the provisions of Coastal Regulation Zone (CRZ) Notification 2011.

The proposal was considered by the Authority it its 35th Meeting held on 12.01.2021. The details of the project as per documents submitted by the project proponent and presentation made during the aforesaid meeting as under:

1. JSW Utkal Steel has proposed to set up a green field Integrated Steel Plant (ISP) to produce 13.2 MTPA crude steel along with captive power plant of 900 MW capacity and Cement grinding unit of 10.0 MTPA in Jagatsinghpur district near Paradip. The proposed project is to cater the material import & export requirement of the Integrated Steel Plant of JSW Utkal Steel located adjacent to the Jetty site. The ISP will be served by the captive jetty of handling capacity of 52.0 MTPA which is proposed to be located adjacent to the steel plant near the mouth of Jatadhari muhan River Creek.

2. The Captive Jetty and its back up areas are proposed over 170 ac. of land. In the jetties total 10 berths are proposed with a continuous quay length of about 3400 m. the berths and jetty are proposed on pile and concrete platforms. For material storage, material handling, transit sheds and other related utilities and infrastructure the foreshore area behind the jetty will be reclaimed. For the development of jetty, about 30 million m^3 of material is proposed to be dredged for creation of navigational channel and dredge

material will be used in the jetty back up areas and ISP areas. Two nos of break water i.e South break water of about 1600 m length and North breakwater of about 1200m length will be constructed to provide tranquillity to the jetties.

3. The proposed jetty will handle 52 MTPA capacities of import and expert cargoes. The import material includes cooking coal, anthracite, PCI Coal, thermal coal, limestone, dolomite, bentonite, clinker, quartzite. The expert cargo includes the finished steel products, pallets/iron ore concentrate and cement.

4. The proposed project will be involved for laying of pipeline for intake of sea water for the Captive power plant (CPP) and discharge of effluents from the integrated steel plant (ISP) and CPP in the CRZ areas. The slurry recovered water and RO treated effluent will be discharged to the sea at a distance of 500 m from sea coast and at a depth of 5m in the sea through separate pipelines. About 130,000 M3/hr of cooling water from the captive power plant will be discharged to the sea through a separate pipeline at depth of 13 m inside the sea at a distance of 1500m from the sea coast and an intake pipeline to draw the sea water for the proposed sea water cooling tower.

5. The location of proposed jetty and other facilities were super imposed on the CRZ map in 1:4000 scale by National Centre for Sustainable Coastal Management (NCSCM) Chennai which indicated that the proposed development is coming within the CRZ-IA, IB (inter tidal area), II, IIIA(NDZ), IVA(sea) &IVB (river) area. The report of the NCSCM, indicated that Mangroves areas are present opposite to the proposed project site along the banks of Jatadhari Muhan river. The proposed captive jetty and related facilities is partially located within the CRZ Categories such as CRZ-IA (Denotified Reserve forest MoEF order no.63/2007-FC dt. 4.5.2011). The south east part of the proposed project falls within CRZ-IA (Sand dunes area) and is proposed for green belt development. The total cost of the Project is Rs. 2104 Crores.

6. The proposed construction of jetties and pipeline is a permissible activity as per the provisions of CRZ Notification, 2011 under
Para 3(i)(a) " those directly related to water front or directly needing foreshore facilities"
Explanation: The expression "foreshore facilities" means those activities permissible under this notification and they require waterfront for their operations such as ports and harbours, jetties, quays, wharves, erosion control measures, breakwaters, pipelines, lighthouses, navigational safety facilities, coastal police stations and the like.;
4(i)(a) " Clearance shall be given any activity within the CRZ only if it requires waterfront and foreshore facilities.
4(i) (f) " construction and operation for ports and harbours, jetties, wharves, quays, Slipways, Ship Construction yards, Breakwaters, groynes, erosion control measures.
Para 4. II (d) laying of pipelines, conveying systems, transmission line
Para 8(i) (I) (i) (b) "pipeline, conveying systems including transmission lines"

The project requires CRZ clearance from MoEF & CC, Govt. of India, under CRZ Notification, 2011 as per Para 4(ii) (d) after the recommendation of the concerned CZMA.

7. OCZMA discussed the proposal and consider recommending the proposal to MoEF & CC, Govt. of India for considering grant of CRZ clearance, under Para 4(ii) (d) of CRZ Notification, 2011 with the following conditions:

I. Regular monitoring of shoreline changes for the first 5 years as per the following frequency:
   - 1st year- ones in every month
   - 2nd year-ones in every 3 months
   - 3rd year- ones in every 4 months
   - 4th year- ones in every 6 months
   - 5th year and after - yearly basis

II. Sand bypassing shall be done using the best technology and the methodology part need to be shared with the Authority.

III. Regular monitoring of dredging and its impact on adjoining area.

Following documents submitted by the project proponent are enclosed for consideration of grant of CRZ Clearance by MoEF & CC, Govt. of India.

I. Form-I (Annexure-IV)-Annexure-I
II. Environmental Impact Assessment form and study report & Environmental management plan Annexure-II
III. Disaster management plan, Risk assessment and management plan.- Annexure-III
IV. Mathematical modelling study report- Annexure-IV
V. Drawings and Design of the structures.- Annexure-V
VI. Detailed project report - Annexure-VI
VII. CRZ Map (in 1:25,000 scales) prepared by ORSAC and sponsored by F & E Dept. Govt. of Odisha superimposing the project site in the CRZ Map.- Annexure-VII
VIII. CRZ Map (in 1:4000 scale) indicating the CRZ-I, II, III& IV area and the project area superimposed in the CRZ map (prepare by NCSCM, Chennai). - Annexure-VIII
IX. Land allotment letter by IPICOL, Odisha- Annexure-IX
X. Extract of the Proceedings of 35th meeting of OCZMA- Annexure-X

Director, Environment-cum-
Special Secretary to Govt. and
Member Secretary, OCZMA

Memo No. 42 /OCZMA Dt. 01/02/2021

Copy forwarded to Mr. Ranjan Nayak, Director, JSW Utkal Steel Limited, plot no.-3, Forest Park, Shishu Bhawan Square, Bhubaneswar-751009 for information and necessary action.

Director, Environment-cum-
Special Secretary to Govt. and
Member Secretary, OCZMA

HIGH TIDE LINE, LOW TIDE LINE AND COASTAL REGULATION ZONE FOR THE INTEGRATED STEEL PLANT AND CAPTIVE JETTY(IES) NEAR PARADEEP, ODISHA

for

M/s JSW Utkal Steel Ltd.

Prepared By

National Centre for Sustainable Coastal Management
Ministry of Environment, Forest & Climate Change
Government of India

December 2019

HIGH TIDE LINE, LOW TIDE LINE AND COASTAL REGULATION ZONE FOR THE INTEGRATED STEEL PLANT AND CAPTIVE JETTY(IES) NEAR PARADEEP, ODISHA

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December 2019

DOCUMENTATION SHEET

1	Authorised Institute with Letter No. & Date	National Centre for Sustainable Coastal Management J-17011/8/92-IA-III dt 14th March, 2014
2	Report No.	NCSCM/ GEO/CRZ /2019/33
3	Client's/Institute Name	M/s JSW Utkal Steel Ltd.
4	Authors Principal Investigator Co-Investigator Project Staff	 Badarees K O Manik Mahapatra Vimal K C, Balaguru B.
5	Type of Report & Map	CRZ Status Report with CRZ map.
6	Title	HIGH TIDE LINE, LOW TIDE LINE AND COASTAL REGULATION ZONE FOR THE INTEGRATED STEEL PLANT AND CAPTIVE JETTY(IES) NEAR PARADEEP, ODISHA
7	Key words	Coastal Regulation Zone, Cadastral Map, Scale 1:4000, Landuse, High Tide Line (HTL), Low Tide Line (LTL), Ecological Sensitive Areas (ESAs), CRZ IA, CRZ IB, CRZ II, CRZ III, CRZ IVA, CRZ IVB.
8	Abstract	JSW Utkal Steel Ltd., a wholly owned subsidiary of JSWSL (JSW Steel Ltd.) intends to set up a 13.2 MTPA Integrated Steel Plant (ISP) along with Captive Jetty (IES) near Paradeep in the Jagatsinghpur District of Odisha. In line of above M/s JSW Utkal Steel Ltd., requested National Centre for Sustainable Coastal Zone Management, MoEF&CC, Govt. of India, Chennai to prepare a CRZ map at the scale of 1:4000 by demarcating the HTL, LTL and ESAs for the project site. In this regard NCSCM conducted a field investigation for the proposed site during March 2018 to demarcate HTL and ESAs. The proposed project site has CRZ on the river as well as the seaside. The proposed Captive Jetty area fall within the CRZ categories such as CRZ IA, CRZ IB (Intertidal Zone), CRZ III, CRZ IVA (Sea) and CRZ IVB (River). The proposed Integrated Steel Plant (ISP) units fall within the Denotified Reserved Forest area (MoEF order no. 8-63//2007-FC dated 04.05.2011). Mangroves, which are CRZ IA, are present opposite to the proposed project site along the banks of Jatadharmuhan River. The CRZ map has been prepared in accordance with the 2011 approved CZMP maps of Odisha state. The proposed project site falls within the Sheet No. F 45 U 12/NW, Map No. OD 42 of approved CZMP prepared as per CRZ Notification 2011.
9	Distribution Statement	Not for Circulation

CONTENTS

	Page No.
1.0 Introduction	1
2.0 Objective	1
3.0 Location	2
4.0 Approach & Methodology	3
4.1 Base Map	4
4.2 Data Source	5
4.3 Tide	5
4.4 Field Investigation	6
5.0 Landuse	6
6.0 HTL/LTL with respect to the Site	6
7.0 Coastal Regulation Zone (CRZ) for the Project Site	6
8.0 SUMMARY AND CONCLUSION	7
REFERENCES	

PLATES

Plate 1: A view of proposed Captive Jetty(ies) Location

Plate 2: Site proposed for Integrated Steel Plant (ISP)

Plate 3: Sand Dune along the bank of Jatadharmuhan River

Plate 4: Mangrove patches along the bank of Jatadharmuhan River

FIGURES

Fig. 1: Location map

Fig. 2: Coastal Regulation Zone Map

Fig. 3: CRZ map covering about 7 Km radius of the project site

HIGH TIDE LINE, LOW TIDE LINE AND COASTAL REGULATION ZONE FOR THE INTEGRATED STEEL PLANT AND CAPTIVE JETTY(IES) NEAR PARADEEP, ODISHA

1.0 Introduction

JSW Utkal Steel Ltd., a wholly owned subsidiary of JSWSL (JSW Steel Ltd.) intends to set up a 13.2 MTPA Integrated Steel Plant (ISP) along with Captive Jetty (IES) near Paradeep in the Jagatsinghpur District of Odisha. The High Level Clearance Authority (HLCA), Government of Odisha (GoO) has in-principle approved for setting up a 13.2 MTPA Integrated Steel Plant (ISP) along with 900 MW Captive Power Plant (CPP), 10 MTPA Cement Plant. The ISP would be served by the Captive Jetty (IES) of handling capacity of 52 MTPA, to be located adjacent to the steel plant along the Jatadharmuhan River. The Cargo requirement for the Integrated steel plant, CPP and Cement Plant, are coking coal, clinker, limestone and other fluxes, etc. would be brought in by sea, and iron ore concentrate, pallets and steel products would be sent out by sea to the east and west coastlines of India and abroad.

In line of above M/s JSW Utkal Steel Ltd., requested National Centre for Sustainable Coastal Zone Management (NCSCM), Ministry of Environment, Forests & Climate Change (MoEF&CC), Government of India, Chennai to prepare a Coastal Regulation Zone map at the scale of 1:4000 by demarcating the High Tide Line (HTL), Low Tide Line (LTL) and Ecological Sensitive Areas (ESAs) for the project site. In this regard NCSCM conducted a field investigation for the proposed site during March 2018 to demarcate HTL and ESAs. Demarcation of the HTL, LTL, ESAs and identification of Coastal Regulation Zones (CRZ) have been carried out in 1:4000 scale to provide information on the CRZ categories with respect to the proposed project site.

2.0 Objective

The objectives of the study are:

- Identification and demarcation of HTL and LTL for the proposed project area

- Demarcation of Coastal Regulation Zones
- CRZ categorization

3.0 Location

The proposed development area is located along the Jatadharmuhan River at about 12 km south-west of the Paradeep Port. The proposed site is located within 86°30'53.15"E 20°11'51.19"N; 86°35'17.53"E 20°14'7.00"N and 86°35'35.45"E 20°13'42.58"N; 86°31'38.54"E 20°11'26.20"N (Fig. 1).

Fig. 1: Location Map

4.0 Approach & Methodology

The Government of India Notification [S.O.19 (E) dated 6.1.2011] under Section 3(1) and Section 3(2)(v) of the Environment (Protection) Act, 1986 and Rule 5(3)(d) of Environment (Protection) Rules, 1986 declares 'the coastal stretches of the country and the water area upto its territorial water limit as Coastal Regulation Zone (CRZ)' (MoEF & CC, 2011). All developmental activities in the CRZ are regulated through the CRZ Notification (MoEF & CC, 2011).

The CRZ consists of the following:

1. Land area from High Tide Line (HTL) to 500 m on the landward side along the sea front.
2. Land area from HTL to 100 m or width of the creek whichever is less on the landward side along the tidal influenced water bodies that are connected to the sea and the distance up to which development along such tidal influenced water bodies is to be regulated are governed by the distance upto which the tidal effects are experienced which is determined based on salinity concentration of 5 parts per thousand (ppt) measured during the driest period of the year and distance up to which tidal effects are experienced would be clearly identified and demarcated accordingly in the Coastal Zone Management Plans (CZMPs). Tidal influenced water bodies mean the water bodies influenced by tidal effects from sea, in the bays, estuaries, rivers, creeks, backwaters, lagoons, ponds connected to the sea or creeks and the like.
3. Land area falling between the hazard line and 500 m from HTL on the landward side, in case of seafront and between the hazard line and 100 m line in case of tidal influenced water body. The word 'hazard line' denotes the line demarcated by Ministry of Environment and Forests & Climate Change (MoEF & CC) through the Survey of India (SOI) taking into account tides, waves, sea level rise and shoreline changes.
4. Land area between HTL and Low Tide Line (LTL) which will be termed as the

intertidal zone.

5. The water and the bed area from the LTL to the territorial water limit (12 Nm) in case of sea and the water and the bed area from LTL at the bank to the LTL on the opposite side of the bank, of tidal influenced water bodies.

According to the CRZ Notification, 2011, the tidal influenced water body has been defined as bays, estuaries, rivers, creeks, backwaters, lagoons and ponds connected to the sea or creeks and the like. The distance from the HTL shall apply to both sides of the tidal influenced water body. The CRZ Notification categorizes Coastal Regulation Zones as CRZ I, CRZ II, CRZ III and CRZ IV based on whether the area is ecologically sensitive, developed, undeveloped or water body and its bed. Ecologically sensitive and important areas and the intertidal zone constitute CRZ I. Sensitive ecosystems such as mangroves, corals, turtle nesting grounds, salt marshes, mudflats, etc., are classified as CRZ IA. Intertidal zone is CRZ IB. The areas that have already been developed up to or close to the shoreline are categorized as CRZ II. Areas that are relatively undisturbed belong to CRZ III. The water area and the bed constitute CRZ IV.

The CRZ Notification of 2011 has also defined Critical Vulnerable Coastal Areas (CVCA), which includes Sunderbans, and other identified ecological important areas including Gulf of Khambhat and Gulf of Kachchh in Gujarat. It is to prepare Integrated Management Plans (IMPs) for such CVCA keeping in view of the conservation and management of mangroves, needs of local communities such as, dispensaries, schools, public rain shelter, community toilets, bridges, roads, jetties, water supply, drainage, sewerage and the impact of sea level rise and other natural disasters. The IMPs will be prepared as per the guidelines of the MoEF&CC.

The Coastal Zone Management Plan (CZMP) prepared based on CRZ Notification 2011 and approved in 2018 is valid for Odisha state for the approval of CRZ projects.

4.1 Base Map

Cadastral map of scale 1:5000 of the project area was made available from the project proponent. The cadastral maps were geo-referenced in ArcGIS platform. Before

transferring HTL and LTL to the base maps the reliability/scale factor error of map was checked at field and corrected the base maps with the control point data, which is mainly associated with duplication and reproduction.

4.2 Data Source

In addition to field investigation, data from a various source were used for compilation of the final CRZ map and preparation of the CRZ report. The principal data sources include:

- Hydrographic charts of Nava Hydrographic Office
- Survey of India Toposheets
- Aerial Photos
- Satellite Images

4.3 Tide

Coastal zone regulations are restricted to the sea coast and banks of water bodies influenced by tidal action. The tidal range is an important parameter that decides the landward extent of the reach of seawater into the land and the location of the HTL including the extent of CRZ. The distance up to which development along rivers, creeks and backwaters is regulated depends on the landward extent of tidal influence. Tidal range data with respect to Chart Datum pertaining to Paradeep Anchorage provided by Naval Hydrographic Office, Dehradun is given below in Table 1.

Table 1: Tidal range at Paradeep

Tide Condition	Height (m)
Mean High Water Spring	2.58
Mean High Water Neap	2.02
Mean Sea Level	1.66
Mean Low Water Neap	1.32
Mean Low Water Spring	0.71

4.4 Field Investigation

Field investigations were carried out during March 2018. HTL was identified from Aerial photo based on geomorphologic features and other features such as embankments, landward boundaries of tidal flats (MoEF&CC, 2011). The distance and positions of HTL which was extracted from the aerial photographs were verified in the field using high precision Trimble GPS. An appraisal of existing landuse/landform in the project area was also carried out.

5.0 Landuse

The Landuse mainly consists of diverted forest land and the rest is a non-forest coastal barren land. Patchy mangroves exist on the opposite side of the project site. Jatadharmuhan River flows downstream towards north-east into a narrow estuary with the width nearly 260m in the mouth to Bay of Bengal.

6.0 HTL/LTL with respect to the Site

The CRZ Notification defines the "HTL as the line on the land up to which the highest water line reaches during the spring tide". The HTL/LTL has to be identified based on coastal geomorphologic signatures in the field/satellite imageries/aerial photographs following the guidelines given by MoEF&CC (2011). Delineation of the HTL, LTL and identification of Coastal Regulation Zones were carried out based on field investigations and the approved CZMP as per 2011 notification of Odisha state.

7.0 Coastal Regulation Zone (CRZ) for the Project Site

The proposed project site has CRZ on the river as well as the seaside. The landward extent of CRZ is equal to the width of the creek/river subject to a maximum of 100 m in the case of creek and river. In the case of seacoast, the landward extent of CRZ is 500m from the High Tide Line. The proposed Captive Jetty area fall within the CRZ categories such as CRZ IA, CRZ IB (Intertidal Zone), CRZ III, CRZ IVA (Sea) and CRZ IVB (River). The proposed Integrated Steel Plant (ISP) units fall within the Denotified Reserved

Forest area (MoEF order no. 8-63//2007-FC dated 04.05.2011). The water body part except the intertidal zones, mudflat, salt marshes and mangroves are CRZ IV. The intertidal zone without mangroves, salt marshes and mudflat is CRZ IB. Mangroves, which are CRZ IA, are present opposite to the proposed project site along the banks of Jatadharmuhan River. A buffer zone of 50m is provided wherever the mangrove coverage is more than 1000m^2. The categorization of CRZ in the approved CZMP may be followed for the present CRZ map. The CRZ map has been prepared in accordance with the CRZ Notification 2011 and approved CZMP maps of Odisha state. The proposed project site falls within the Sheet No. F 45 U 12/NW, Map No. OD 42 of approved CZMP prepared as per CRZ Notification 2011. Project layout superimposed on the 1:4000 scale CRZ map is given in Figure 2 (Sheet No. 1 to 15). A CRZ map covering about 7Km radius of the project site representing CRZ categories is given in Figure 3.

8.0 SUMMARY AND CONCLUSION

- The HTL, LTL and CRZ categories are presented in 1:4000 scale cadastral maps with survey plot information whereas the base map is of 1:5000 scale.

- The HTL and LTL are demarcated from aerial photographs/satellite images by taking into consideration different signatures such as boundaries of embankments, vegetation and bunds as existed at the aerial photo/satellite image is verified in the field during March 2018.

- Mangroves, which are CRZ IA, are present opposite to the proposed project site along the banks of Jatadharmuhan River.

- The proposed Captive Jetty and related activities is partly located within the CRZ categories such as CRZ IA (Denotified Reserved Forest- MoEF order no. 8-63//2007-FC dated 04.05.2011), CRZ IB (Intertidal Zone), CRZ III (NDZ), CRZ IVA (Sea) and CRZ IVB (River).

- The Steel Plant units are located within the CRZ category such as CRZ IA (Denotified Reserved Forest area - MoEF order no. 8-63//2007-FC dated 04.05.2011).

- The south east part of the project activities falls within the CRZ IA (Sand Dune - Refer Sheet No. 11 & 12) is proposed for Green belt development.

- The south east part of the project activities falls within CRZ II is proposed for green belt activities (Refer Sheet No. 12 & 15).

- Layout plan of the proposed development within the proposed area is incorporated in the CRZ map.

- The CRZ map is prepared in accordance to the CRZ Notification, 2011. The CRZ mapping area falls within the approved CZMP of Sheet No. F 45 U 12/NW (Map No. 42) of State of Odisha.

REFERENCE

MoEF, 1991. Notification No.S.0114 dated 19th February, 1991, Ministry of Environment and Forest, Government of India, New Delhi.

MoEF, 2011. Notification No. S.O.19 (E) dated 6.1.2011, Ministry of Environment and Forest, Government of India, New Delhi.

NHO, 2016. Hydrographic Chart no 3010, Paradeep Anchorage, Naval Hydrographic Office, Dehra Dun, 2016.

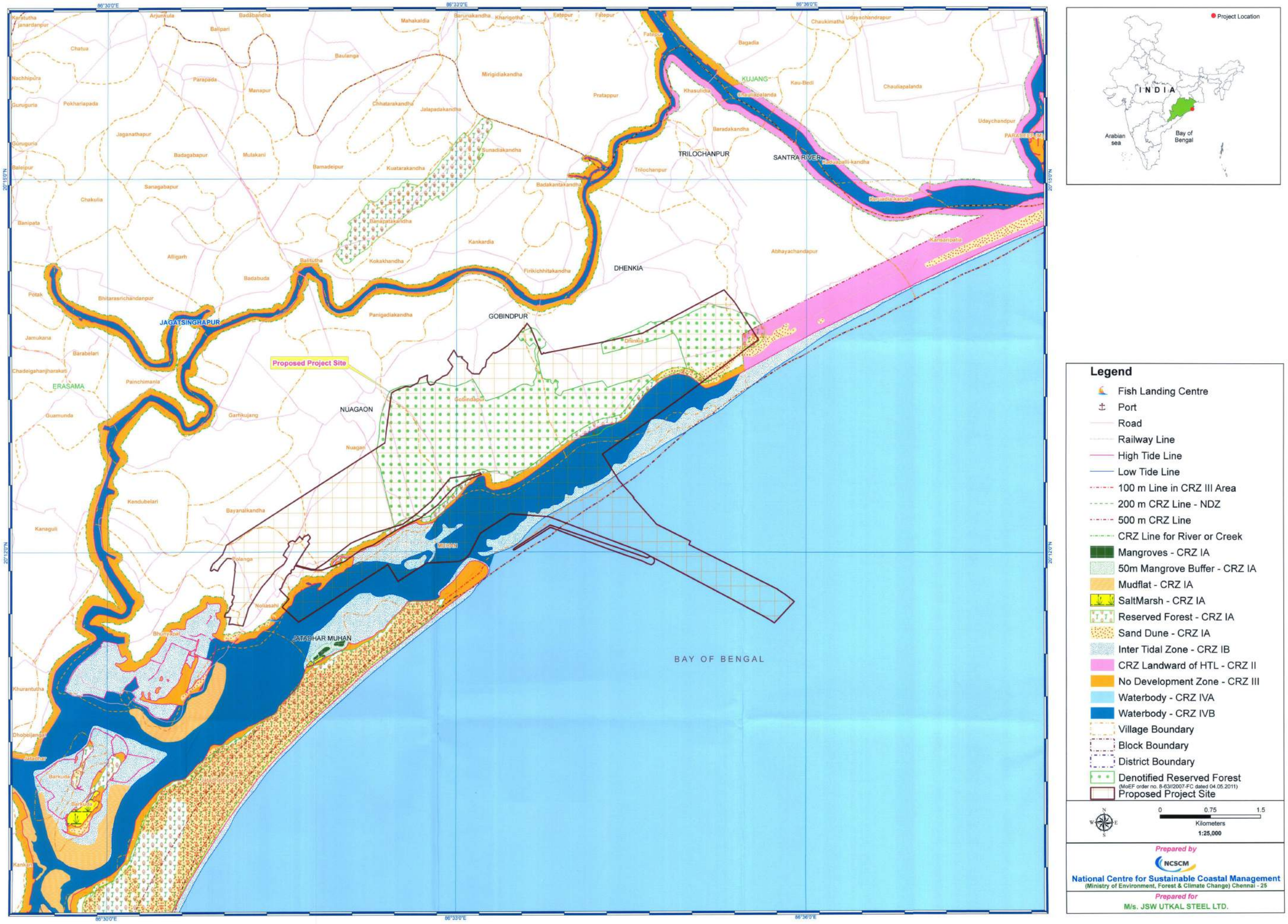
PLATES

Plate 1: A view of proposed Captive Jetty(ies) Location

Plate 2: Site proposed for Integrated Steel Plant (ISP)

Plate 3: Sand Dune along the bank of Jatadharmuhan River

Plate 4: Mangrove patches along the bank of Jatadharmuhan River



Legend

- Fish Landing Centre
- Port
- Road
- Railway Line
- High Tide Line
- Low Tide Line
- 100 m Line in CRZ III Area
- 200 m CRZ Line - NDZ
- 500 m CRZ Line
- CRZ Line for River or Creek
- Mangroves - CRZ IA
- 50m Mangrove Buffer - CRZ IA
- Mudflat - CRZ IA
- SaltMarsh - CRZ IA
- Reserved Forest - CRZ IA
- Sand Dune - CRZ IA
- Inter Tidal Zone - CRZ IB
- CRZ Landward of HTL - CRZ II
- No Development Zone - CRZ III
- Waterbody - CRZ IVA
- Waterbody - CRZ IVB
- Village Boundary
- Block Boundary
- District Boundary
- Denotified Reserved Forest (MoEF order no. 8-63/2007-FC dated 04.05.2011)
- Proposed Project Site

0 0.75 1.5
Kilometers
1:25,000

Prepared by

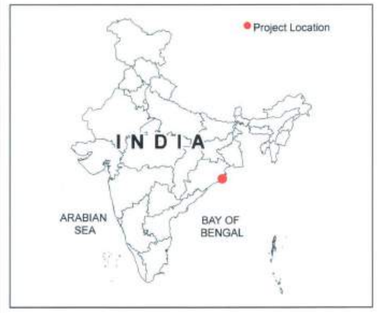
NCSCM
National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change) Chennai - 25

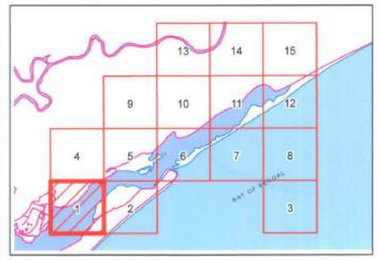
Prepared for

M/s. JSW UTKAL STEEL LTD.

Fig.3 CRZ Map covering about 7 km around the Proposed Site *(For Details Refer Report No. NCSCM/ GEO/CRZ/2019/33)*

SHEET NO: 1





N
W E
S

0 150 300

Meters

1:4,000

Legend

- Fish Landing Centre
- Road
- High Tide Line
- Low Tide Line
- 100 m CRZ Line - CRZ III Area
- 200 m CRZ Line - NDZ
- 500 m CRZ Line
- CRZ Line for River or Creek
- 2614 Survey Plots
- Village Boundary
- Block Boundary
- District Boundary
- Mangroves - CRZ IA
- 50m Mangrove Buffer Zone - CRZ IA
- Mudflat - CRZ IA
- Salt Marsh - CRZ IA
- Sand Dune - CRZ IA
- Reserved Forest - CRZ IA
- Intertidal Zone - CRZ IB
- CRZ Landward of HTL - CRZ II
- No Development Zone - CRZ III
- Waterbody - CRZ IVA
- Waterbody - CRZ IVB
- Denotified Reserved Forest
  (MoEF order no. 8-63//2007-FC dated 04.05.2011)

Proposed Layout Plan
(As given by Project Proponent)

- Proposed Project Activities

HIGH TIDE LINE, LOW TIDE LINE AND CRZ FOR JSW UTKAL INTEGRATED STEEL PLANT AND CAPTIVE JETTY (IES) NEAR PARADIP, ODISHA

Mapped During March 2018

Verified by	*Approved by*

Prepared by

NCSCM

National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 25

Prepared for

M/s. JSW Utkal Steel Ltd.

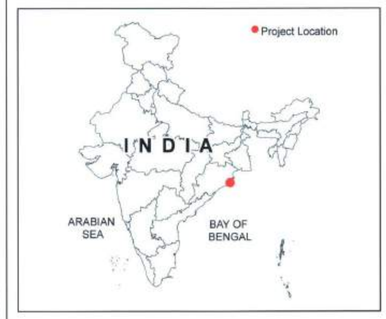
Prepared As Per CRZ Notification, 2011

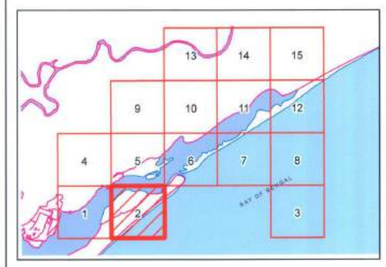
Proposed Activities (As given by Project Proponent)

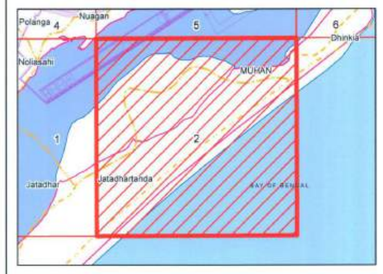
1. RAW MATERIAL UNLOADING YARD
2A. JETTY FOR RECEIPT OF IMPORTED RAW MATERIALS
3. ORE AND FLUX YARD
4A. EMERGENCY DUMP POND
5. THERMAL COAL YARD
6. IMPORTED COAL, PCI, LIME STONE (SMS), PELLET STORAGE
7A. ASH POND
7. 3 X 300 MW CAPTIVE POWER PLANT
8. PELLET PLANT 1,2.
9. PELLET PLANT 3,4.
10. SINTER PLANT
11. DR PLANT
12. COKE OVEN AND BY PRODUCT PLANT 1*
13. COKE OVEN AND BY PRODUCT PLANT 2*
14. COKE OVEN GAS HOLDER
15. BLAST FURNACE 1
16. BLAST FURNACE 2
17. BLAST FURNACE 3
18. BLAST FURNACE GAS HOLDER
19. GRANULATED SLAG STORAGE & CEMENT PLANT
20. LIME & DOLO PLANT 1
21. LIME & DOLO PLANT 2
22. STEEL MELT SHOP 1
23. STEEL MELT SHOP 2
24. LD GAS HOLDER
25. AIR SEPERATION PLANT & BUFFER VESSEL
26. MRSS (GIS) & MPDS
27. ADMINISTRATIVE BUILDING / OFFICE / LABORATORY/ DATA CENTRE / TELEPHONE EXCHANGE / TRAINING /PARKING
28. HOT STRIP MILL 1
29. HOT STRIP MILL 2
30. WIRE ROD MILL
31. MEDIUM SECTION MILL
32. BAR MILL
33. COLD ROLLING MILL 1 WITH ACL FOR ELECTRICAL STEEL
34. COLD ROLLING MILL 2 WITH ACL FOR ELECTRICAL STEEL
35. PLATE MILL
36. TIN PLATE MILL 1
37. TIN PLATE MILL 2
38. HOT METAL GRANULATION UNIT
39. COMPRESSED AIR STATION
40. CLARIFIED WATER STORAGE
41. METAL RECOVERY PLANT & DEBRIS DUMP
42. PRODUCT DESPATCH YARD
43. STORES AND REPAIR SHOP
44. PARKING AREA
45. RAW WATER RESERVOIR
46. RAW WATER, EFFLUENT & SEWAGE TREATMENT PLANT
47. CHILLED WATER PLANT
48. HOT METAL POOLING PIT
49. LADLE REPAIR SHOP
50. LOCO REPAIR SHOP
51. FUEL STORAGE FOR PELLET PLANT
52. ASSEMBLY POINT
53. REST ROOM WITH TOILET
54. MEDICAL CENTER WITH AMBULANCE
55. FIRE BRIGADE / CENTRAL FIRE MONITORING STATION
56. CAPTIVE JETTY LAYOUT
57. TSDF - HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES
58. ASSEMBLY POINTS
- GREEN BELT

Fig. 2: Coastal Regulation Zone Map *(For Details Refer Report No. NCSCM/ GEO/CRZ/2019/33)*

SHEET NO: 2







0 150 300
Meters
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Prepared As Per CRZ Notification, 2011

Legend

- Fish Landing Centre
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Chennai - 25

Prepared for

M/s. JSW Utkal Steel Ltd.

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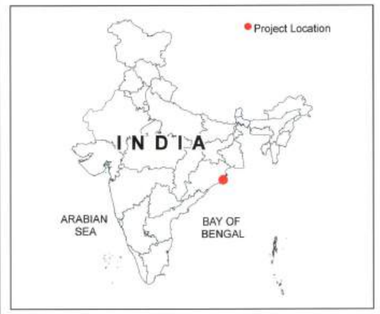
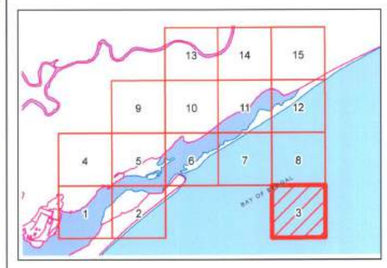
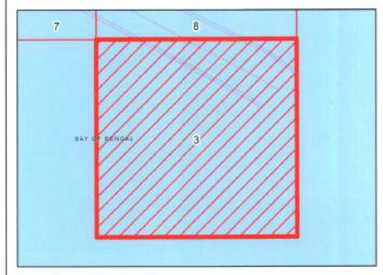
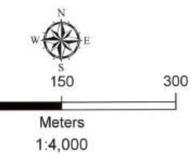
Fig. 2: Coastal Regulation Zone Map *(For Details Refer Report No. NCSCM/ GEO/CRZ/2019/33)*

SHEET NO: 3









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Mapped During March 2018

Verified by	*Approved by*

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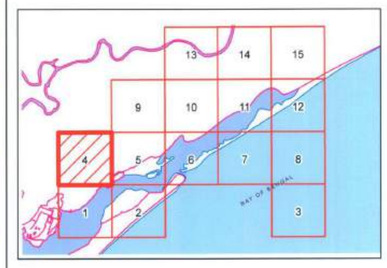

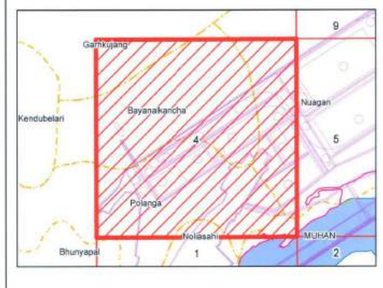

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Meters

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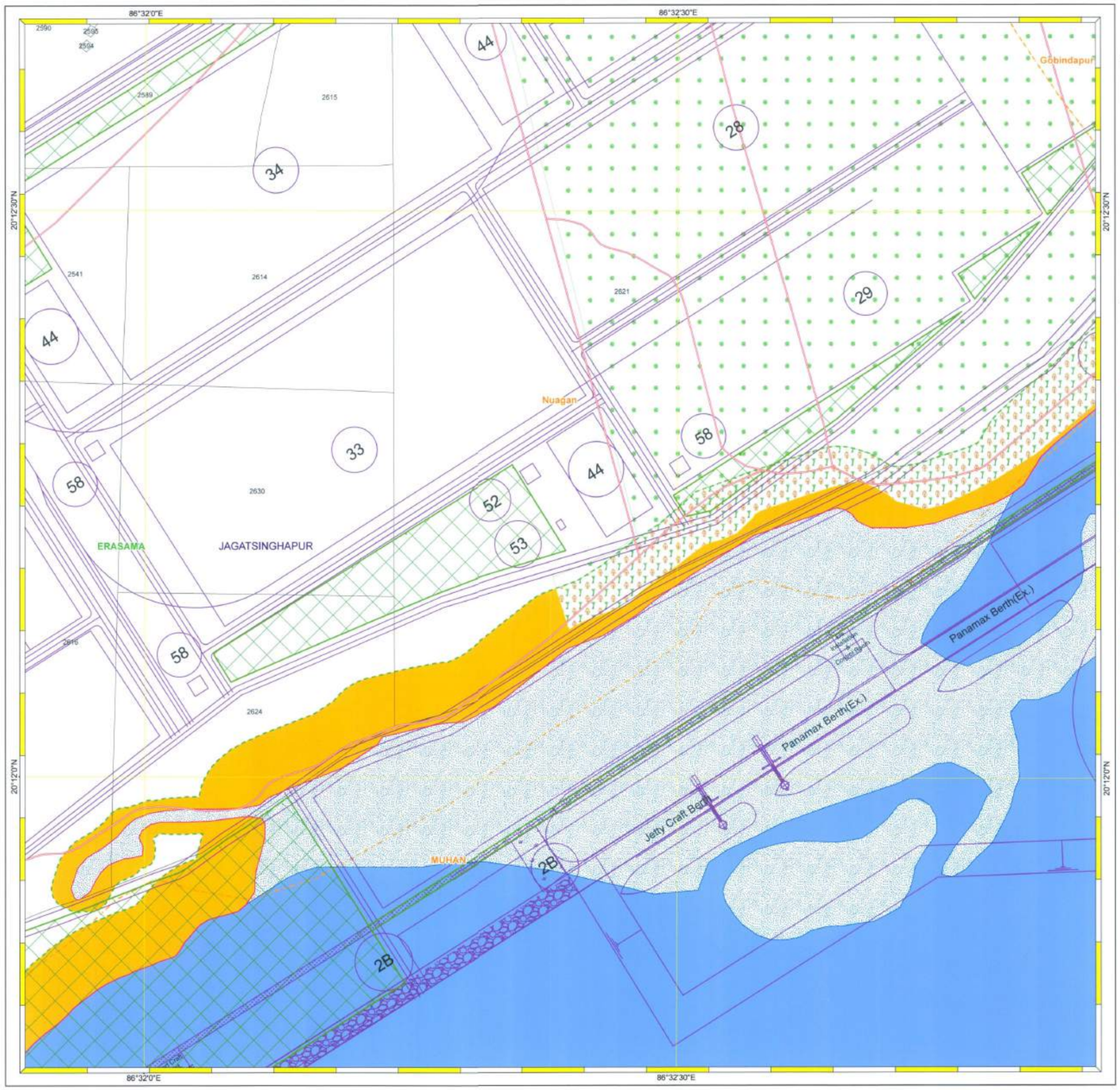

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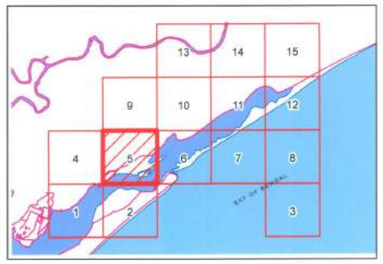

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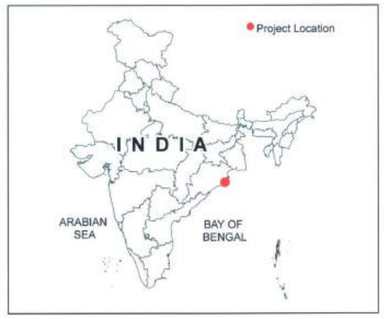
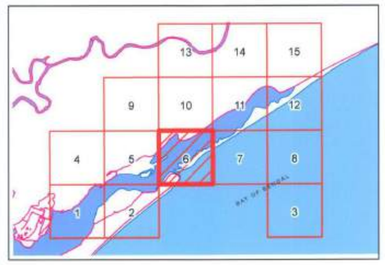
SHEET NO: 6





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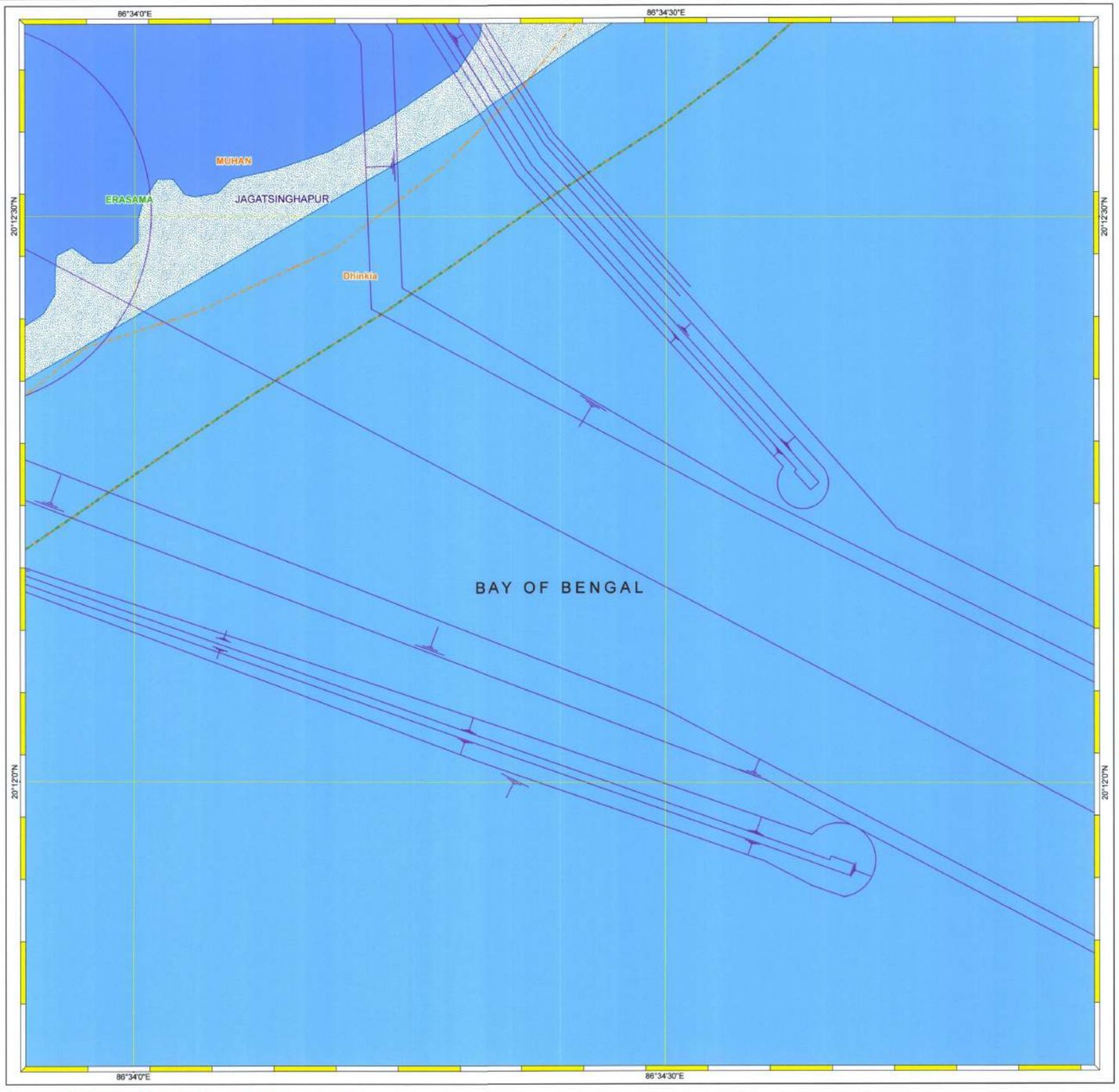

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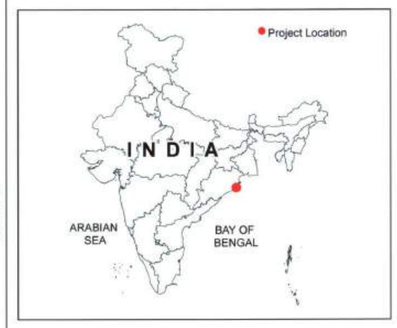

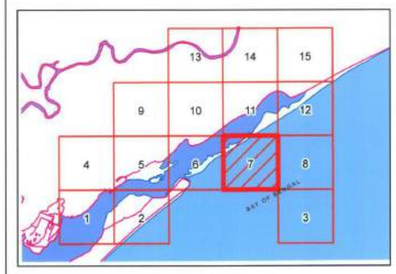

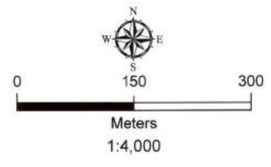

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56. CAPTIVE JETTY LAYOUT
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58. ASSEMBLY POINTS
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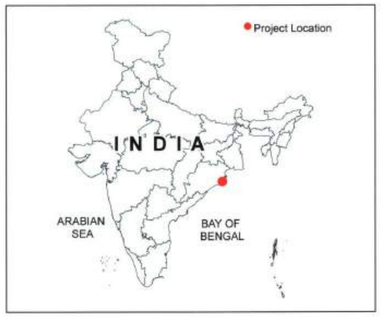
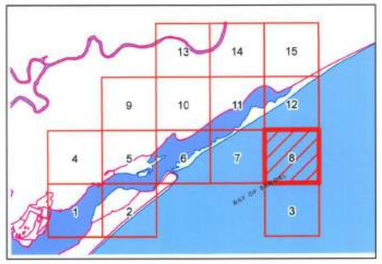
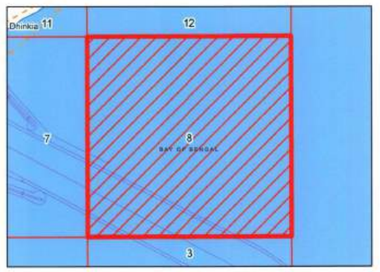
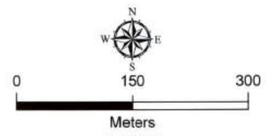
Fig. 2: Coastal Regulation Zone Map *(For Details Refer Report No. NCSCM/ GEO/CRZ/2019/33)*

SHEET NO: 8









Prepared As Per CRZ Notification, 2011

Legend

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Mapped During March 2018

Verified by	*Approved by*

Prepared by

NCSCM

National Centre for Sustainable Coastal Management
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Chennai - 25

Prepared for

M/s. JSW Utkal Steel Ltd.

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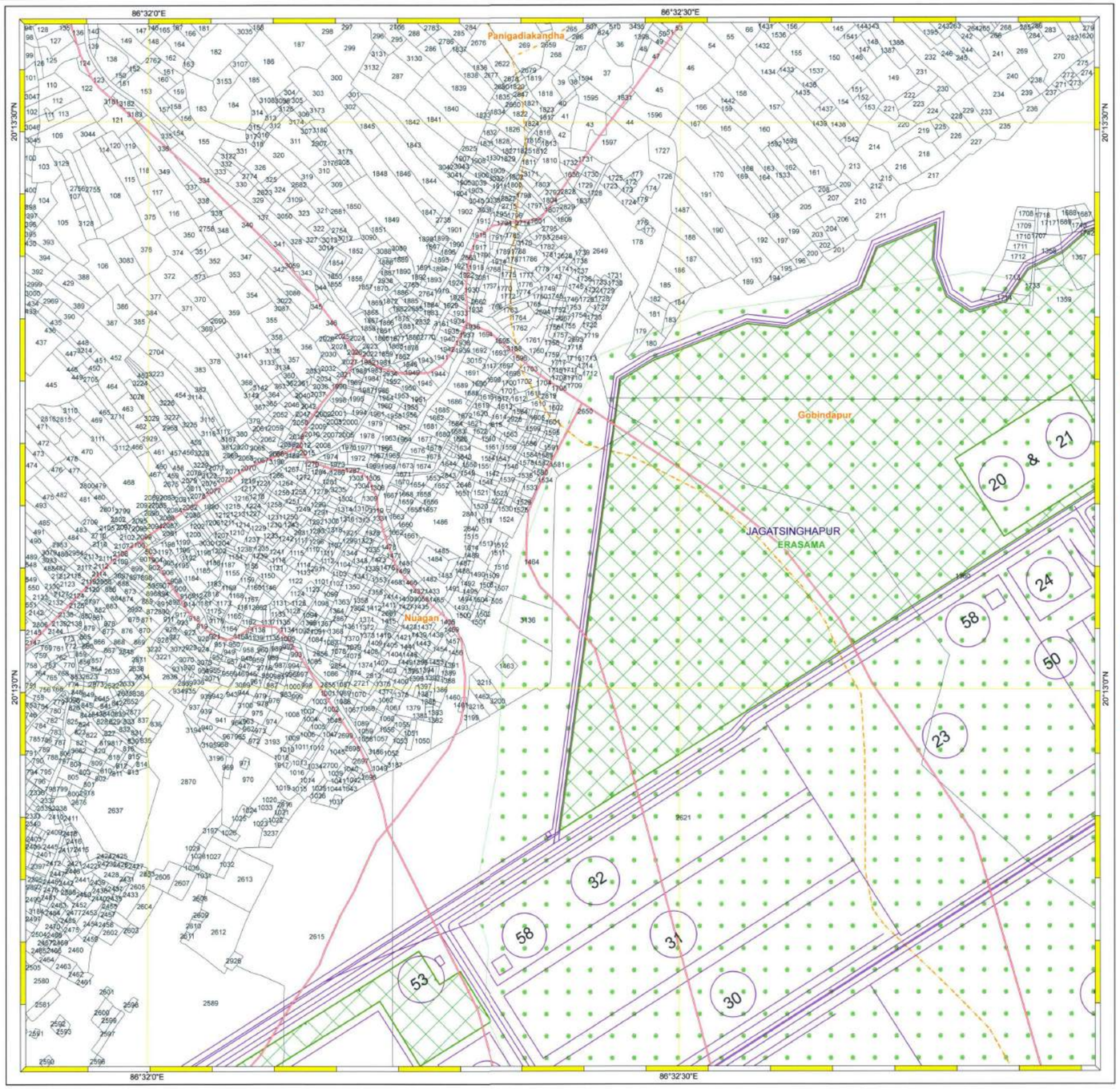

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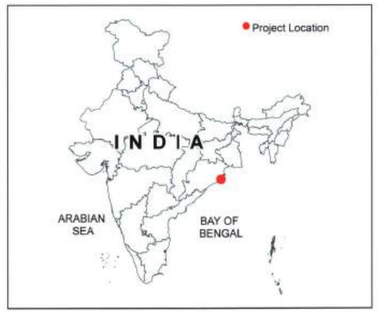

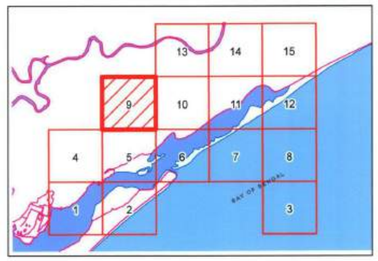

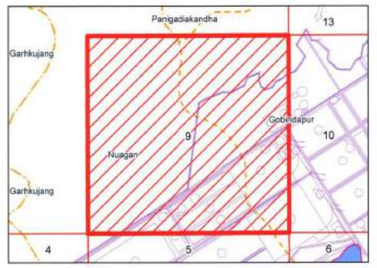

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Meters

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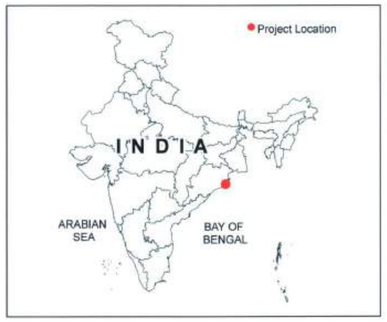

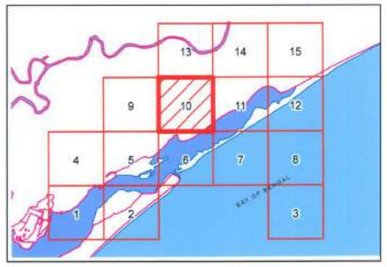

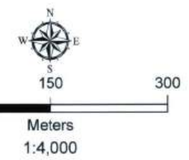

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Mapped During March 2018

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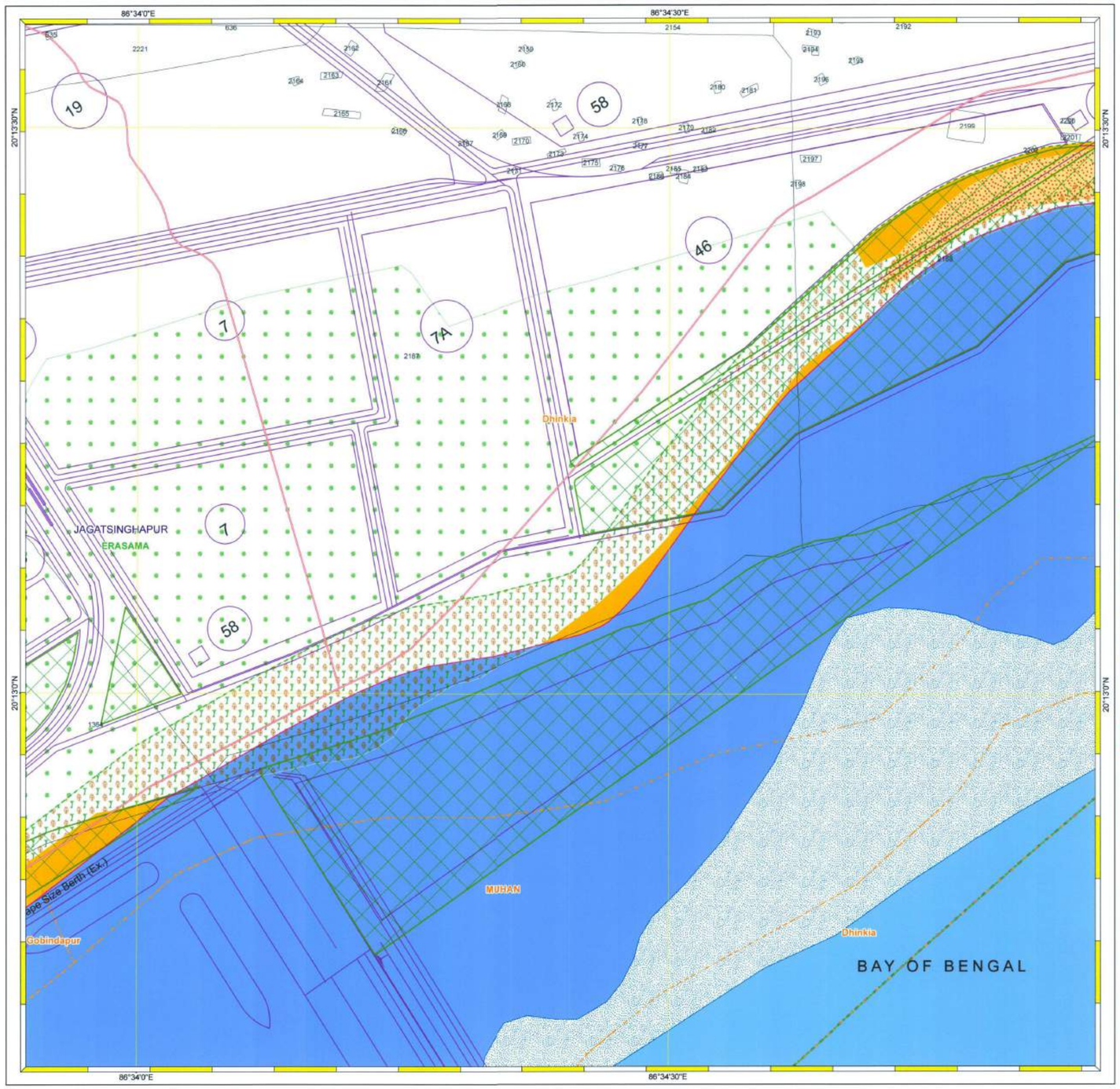

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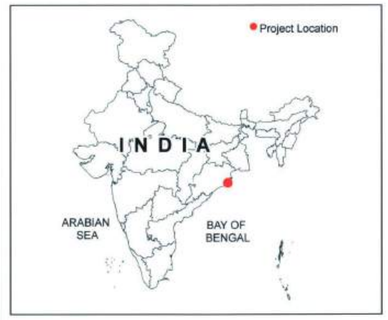

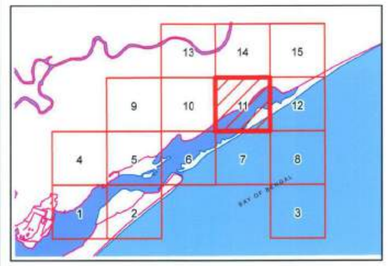

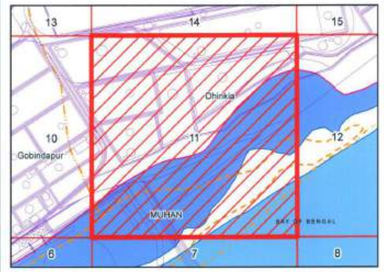

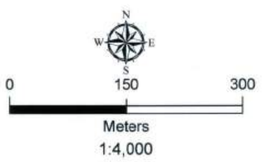

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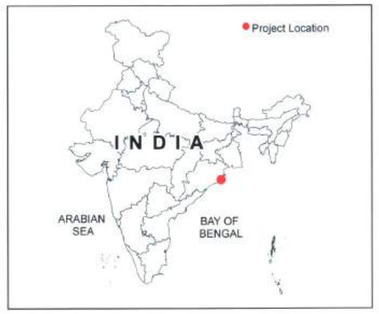
SHEET NO: 12



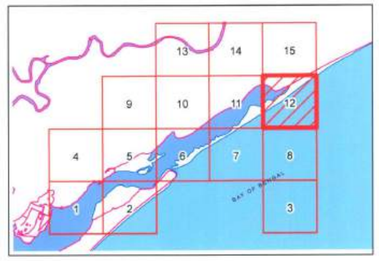


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Fig. 2: Coastal Regulation Zone Map *(For Details Refer Report No. NCSCM/ GEO/CRZ/2019/33)*

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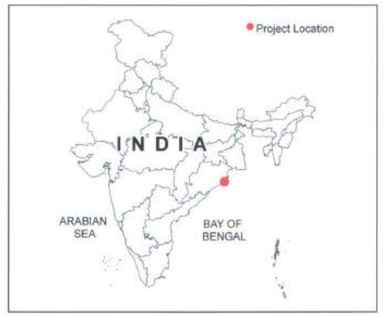

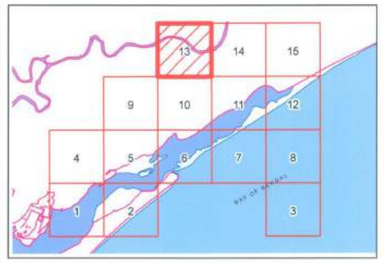

0 150 300

Meters

1:4,000

Prepared As Per CRZ Notification, 2011

Legend

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- 200 m CRZ Line - NDZ
- 500 m CRZ Line
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HIGH TIDE LINE, LOW TIDE LINE AND CRZ FOR JSW UTKAL INTEGRATED STEEL PLANT AND CAPTIVE JETTY (IES) NEAR PARADIP, ODISHA

Mapped During March 2018

Verified by	Approved by

Prepared by

NCSCM

National Centre for Sustainable Coastal Management

(Ministry of Environment, Forest & Climate Change)
Chennai - 25

Prepared for

M/s. JSW Utkal Steel Ltd.

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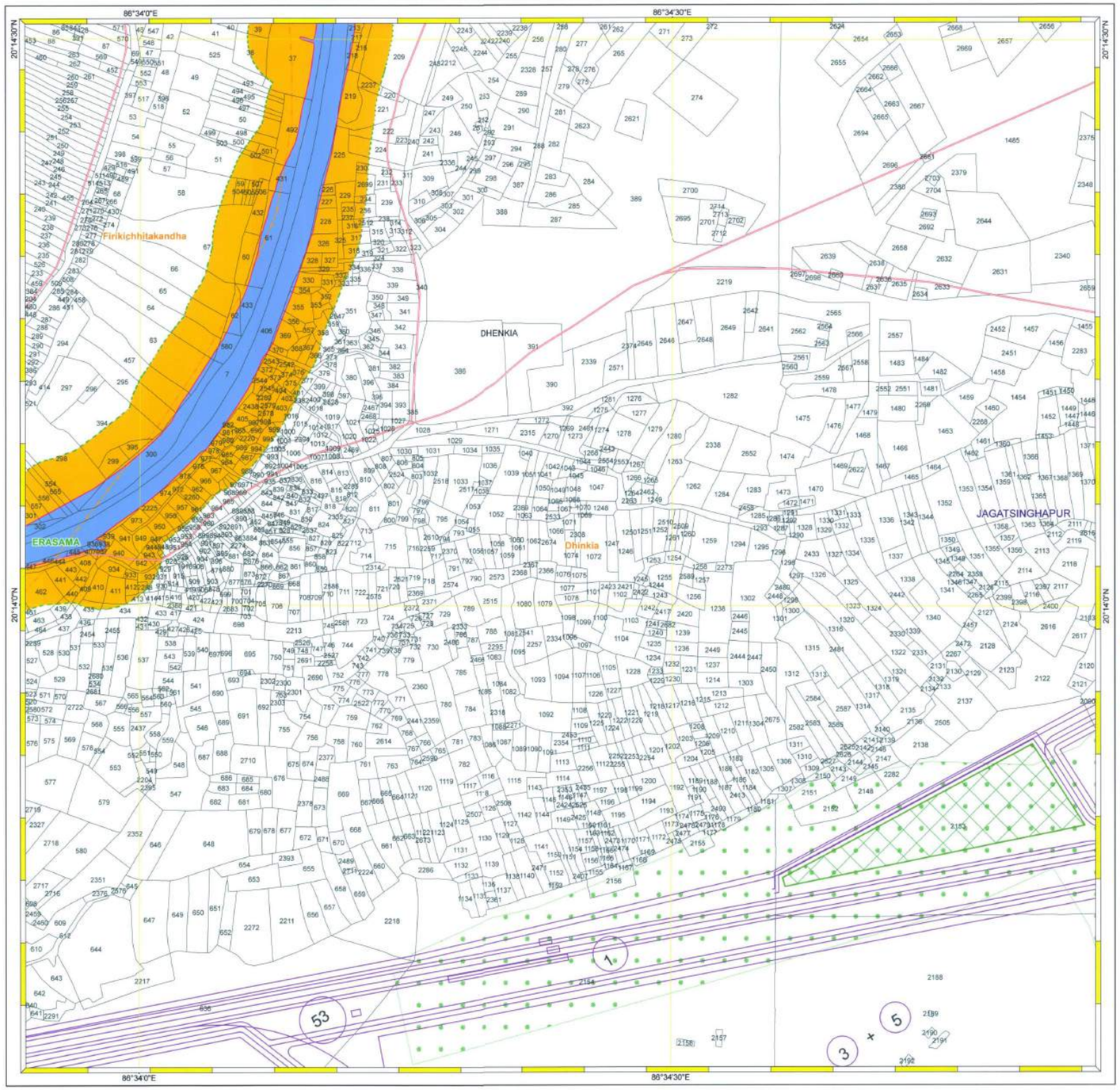
Fig. 2: Coastal Regulation Zone Map *(For Details Refer Report No. NCSCM/ GEO/CRZ/2019/33)*



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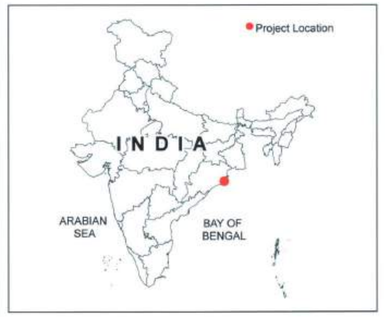

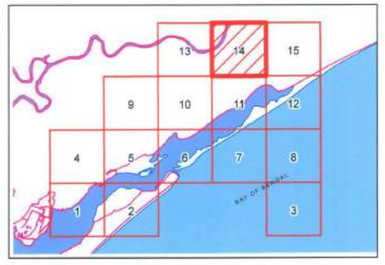

N
W E
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0 150 300

Meters

1:4,000

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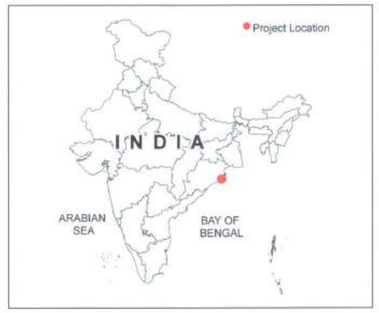

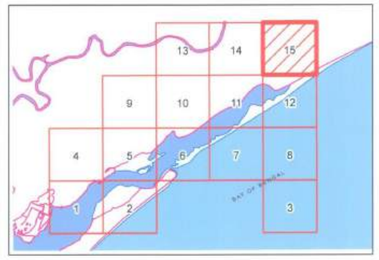

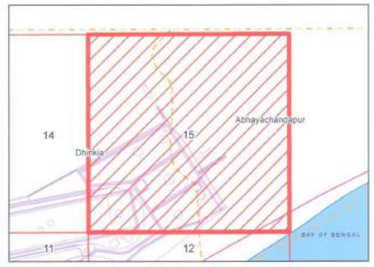

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