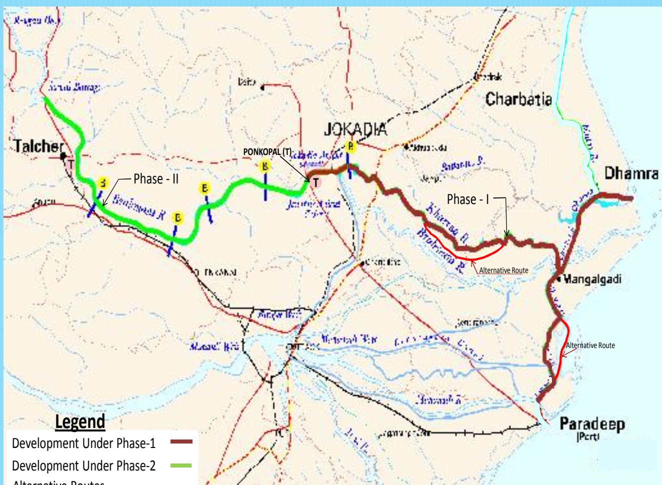
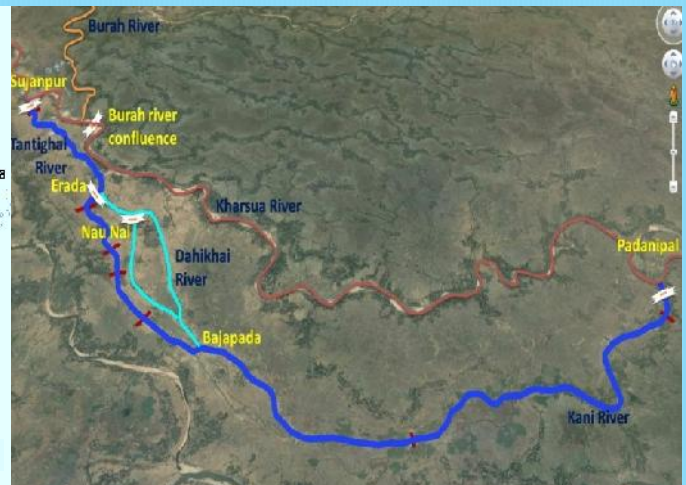
INLAND WATERWAYS AUTHORITY OF INDIA





CONSULTANCY SERVICES FOR THE STUDY FOR REVISING THE DPR OF NATIONAL WATERWAY-5 FOR DEVELOPING THE STRETCH BETWEEN PANKAPAL/JOKADIA TO DHAMRA & PARADIP IN THE STATE OF ODISHA

FINAL REPORT

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EXECUTIVE SUMMARY

1.0 Background and Introduction:

Government of India had declared the National waterway NW-5 in Mahanadi / Brahmani delta, Matai River & East Coast Canal (ECC) in November 2008 for total length of about 600 km. The Brahmani / Mahanadi river basins extending in Madhya Pradesh, Jharkhand, and Odisha have rich deposits of minerals, coal, iron ore and large production of various industrial and agricultural products. The likely commodities to be transported through proposed NW-5 mode could be divided into three groups namely Minerals (Coal, Iron Ore), Agricultural products (Paddy, Rice, Straw, Animal fodder, fish, Jute) and Finished goods / Manufactured products (from Kalinganagar industries, textiles and forest)

The Inland Waterways Authority of India (IWAI) had awarded work of preparation of a detail project report on NW-5 to WAPCOS Ltd. This DPR for Development of IWT along ECC and Brahmani / Kharsua River System was submitted by WAPCOS in March 2010. The lengthwise distribution of the proposed waterway for NW-5 in three different stretches as per the DPR was as given below:

(i) Stretch I : Talcher to Mangalgadi (237km)

(ii) Stretch II : Dhamra to Paradip (95km)

(iii) Stretch III : Dhamra to Geonkhali (256km)

In the said DPR WAPCOS had dealt issues such as Topographic and hydrographic surveys, Geotechnical investigations, Waterway Hydraulics, Traffic forecasting and vessel sizes, Terminal locations and planning and Designs of various engineering works.

The IWAI has now given priority for development of stretch I and II from various considerations. A joint agreement has been signed by IWAI, Odisha

Government and Paradip & Dhamra Port Authorities in the month of July 2014 for early development of these two stretches in following two phases.

- **Phase I - Development of waterway from Pankpal / Jokadia to Dhamra & Paradip via Mangalgadi**

As per earlier proposal, this route was entirely considered through river Kharsua in the reach between Sujanpur to Padanipal. River Kharsua is widen for 250m to 500 m and the deep channel becomes relatively shallow. Survey of a parallel river branch (Tantighai / Kani) from Sujanpur to Padanipal has indicated that this river branch is relatively narrow (100 to 125 m) and deeper. IWAI has decided to explore possibility of utilizing this route.

As per the earlier proposal, Mangalgadhi- Paradip IWT route was proposed through rivers Hansua, Babar, Nuna, Gobri, Ramchandi Galia, Kharnasi and Mahanadi. After Joint Reconnaissance survey by IWAI, WAPCOS and PPT it was decided to take route through a bay between Hansua and Kharnasi river mouth and exclude winding and shallow stretches through Babar, Nuna, Gobri and Ramchandi Galia creeks. This route has many advantages over the old route.

- **Phase II - Development of waterway from Talcher to Pankapal / Jokadia**

In this stretch, 5 barrages have been proposed for maintaining 3 m depths (LAD). The investigations, detail designs, approvals by different authorities and construction of these structures will require more time. Therefore, IWAI has decided to take up this stretch in phase II and develop Phase I keeping in view of the requirement of industries.

Keeping in view various aspects discussed above, IWAI entrusted the work of revising DPR for reach under Phase-I mentioned above to WAPCOS. Subsequent to that WAPCOS officers carried out site inspection and arranged number of meetings with State Govt. and stake holders to explain various data required for studies. Based on topographical, hydrological, hydraulic and structural data made available studies on various aspects were carried out. Brief review of outcome of these studies is presented below.

Hydrological studies were carried out to assess water availability in the Brahmani river delta network by analyzing the Gauge discharge data at Jenapur for the period 1980 to 2012. These studies indicated that in post Rengali period lean season flows have improved and flow less than 50 m^3/s may occur on an average for a period of 7 to 15 day in a year. For about 84% of days in a year the days the Brahmani river discharge will be 100 to 150 m^3/s which will be adequate to generate 2 to 3 m depths in dredged channel of about 50 m width (base width 45 m and side slopes 1:3). Thus, navigation will be feasible for about 330 days in a year excluding few days of non-navigable high floods and period of flows less than 50 m^3/s during lean season. The highest flood discharge at Jenapur in Pre-Rengali period was 24246 m^3/s in August with the flood level EL of 24.78 mat SH200 road bridge. In Post-Rengali period peak flood discharges were about 10000 m^3/s. The period of flood hydrographs above flood of 2000 m^3/s was 7 to 8 days. The design flood recommended by Odisha WRD at Brahmani delta head is 11326 m^3/s which is 25 year return period flood.

Navigation from Pankapal to Dhamra and Paradip along the route through Brahmani / Kharsua / Tantighai / Kani as proposed by IWAI will be feasible subject to Jokadia and Jenapur weirs are reconstructed to maintain pond level of EL 19.50 /20.0m, navigation lock (110 m x 18 m) is provided at Jokadia and Sujanpur and capital dredging of about 16 Mm^3 is for a depth of 3 m below CD carried out. WAPCOS has recommended that the dredging activity may be synchronized with development of terminal. Appropriate measures have been suggested for disposal of dredged material.

In view of urgency of IWAI to make the route operational based on the requirements of industries, an alternate route partly through Kharsua upto Bouda was suggested in the Draft Report till the time navigation locks are constructed at Sujanpur weir and at Bouda, a link channel of about 600 m length connecting Kharsua and Tantighai/ Kani was also suggested in the Report.

But, WRD, Odisha has denied dismantling of Sujanpur weir and has decided to reconstruct this weir. Therefore, vessels will not be able to cross Sujanpur weir and go to Jokadia till Sujanpur weir is re-constructed with navigation locks. Since Sujanpur weir is to be retained and reconstructed as Barrage with Navigation locks, immediate operations of 500 DWT vessels upto Jokadia through Kharsua/Tantighai/Kani via Sujanpur will not be feasible and as well Bypass through Kharsua for stretch Bodua to Sujanpur is also not feasible. As per the minutes of meeting taken by Principal Secretary, WRD with IWAI, WAPCOS & Officials of Water Resource Department (WRD), Govt. of Odisha on 12.12.2014 for resolving the technical issues pertaining to developing a viable fairway in the Sujanpur to Padnipal of NW5, it was suggested that the Sujanpur weir needs to be reconstructed with original design crest level along with gates and navigational locks so as to facilitate creation of reservoir in the upstream to provide required LAD for navigation and also regulate water during flood.

In view of start with immediate operations of 500 DWT vessels from Dhamra and Paradip to downstream of Sujanpur weir through Tantighai/Kani and Kharsua, a suitable location for floating / temporary terminal have been identified on the downstream area of Sujanpur weir. This floating / temporary terminal at downstream of Sujanpur weor has been proposed as same type as that of Jokadia floating terminal for transportation of cargoes, etc.,

Four Cross Structures have been proposed along the waterway in the modified route from Sujanpur to Padanipal along Kani River enroute via., at Burah River confluence, Erada, Nua nai and Padanipal (Refer Fig.9.6), as there are number of low level bridges in the earlier route of Kani river for which the survey has been completed. These cross structures have been proposed along with gates and bridges and their location shall be finalised subject to mathematical model studies, detailed designs, investigations, etc., The cross structure / Barrage for

Bajapada as indicated in Fig.9.6 can be concluded only after conducting the mathematical model studies and hence the same has not been included in the Report. One navigational lock have been proposed at Padanipal in addition to the proposed locks at Jokadia and Sujanpur.

The navigation route from Mangalgadi to Paradip, as per the revised alignment passing through Hansua, Kharnasi and Mahanadi rivers and a bay between Hansua and Kharnasi river mouth, appears to be most appropriate due to various reasons such as reduced length, practically no land acquisition, reduced dredging, no reconstruction/dismantling of structures involved, adequate vertical clearance at the only bridge (at Rajnagar) enroute etc. thereby leading to reduced cost.

It is recommended that IWAI may take review of certain provisions in section IV of IWAI notification such as navigable discharge, vertical clearance and radius of bend on navigation route, in light of constraints on proposed navigation through Kharsua and Tantighai / Kani.

In order to investigate various hydraulic issues related to proposed navigation channel through Brahmani river delta some mathematical model studies have been recommended to be carried out by CWPRS / WAPCOS.

Based on the traffic data supplied by Kalinganagar industries, Dhamra Port Company Ltd. (DPCL), Paradip Port Trust (PPT) the cargo for next 15 years has been estimated as 10 MTPA for the permanent terminal at Pankapal.

The location for the terminal at Pankapal is recommended at about 200 m downstream of SH200 Road Bridge on the left bank of the Brahmani River. This location is at the nodal point where the deep channel will always hug the left bank of the river. The total area required for the terminal is approximately 40 Ha. The safe grade elevation for the Pankapal terminal and backup area has been proposed at EL 24.5 m assuming freeboard of 1.50 m above the danger level at SH200. The number of Barges required were estimated as 33 for handling 10 MTPA. Four berths of 100 m length each are proposed considering the vessel length of 86 m. The width of terminal is proposed as 22 m. The terminal is proposed as RCC piled structure with 1 m diameter piles.

A temporary terminal with floating barges and backup area of 20 Ha which can handle 1.65 MTPA is proposed at Jokadia and at the down stream of Sujanpur weir.

The total cost of the inland navigation project for Phase I i.e Pankapal to Dhamra and Paradip has been estimated as **Rs.1462 Crore** for the Permanent Terminal at Pankapal (excluding land cost for construction of terminals, navigational locks & land cost of reconstruction of Jenapur & Jokadia Barrages & reconstruction of Sujanpur wier / Barrages) and **Rs.693.50 Crore** for Temporary Terminal at Sujanpur (excluding land cost for temporary terminal and back up land for terminal at Sujanpur weir).

It is assumed that the Barrages at Jokadia, Sujanpur and Jenapur will be constructed by State Government. In case if these Barrages are to be constructed by IWAI, then cost for these Barrages are to be considered which may be in the range of Rs.350 to Rs.450 Crores per Barrage (including Bridge, Gates, etc.,) depending upon the design foundation etc., and subject to mathematical model studies, detailed designs, investigations, etc., and accordingly provision has been kept for construction of navigational locks in the cost estimate. This is only for indicative purpose.

The tentative cost for the four Control Structures proposed along the waterway at Burah River confluence, Erada, Nua nai and Padanipal, subject to mathematical model studies, detailed designs, investigations, etc., would be in the range of Rs.150 Crore to Rs.200 Crore per Cross Structure (Barrage including gates and bridge). This is only for indicative purpose. The necessity of Barrage at Bajapada can be concluded only after conducting the mathematical model studies and hence the cost for the same has not been furnished in the estimate.

Chapter 1

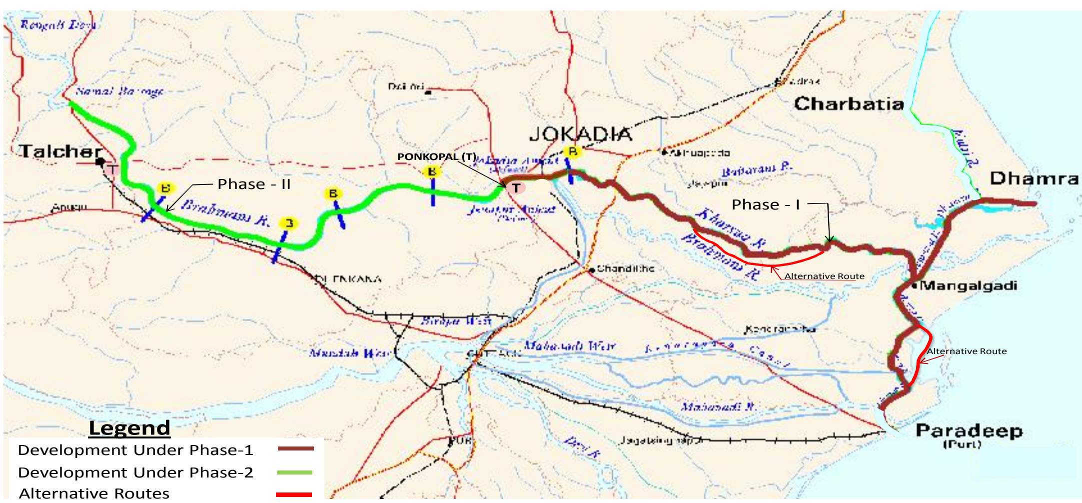
Introduction and Background

Chapter 1 – Introduction and Background

1.1 General

Government of India had declared six national waterways (National Waterway - 1 to National Waterway - 6) for inland water borne transport. These waterways include river stretches of Ganga and Bhagirathi (NW-1, Haldia to Allahabad), Brahmaputra (NW-2, Sadiya to Dubri), Kerala Backwater canals (NW-3, Kollam to Kottapuram), Krishna-Godavari delta (NW-4, Pondicherry to Kakinada and Bhadrachalam to Rajmundry), Mahanadi – Brahmani - Matai delta (NW-5) and Barak (NW-6, Lakhipur to Bhanga). The National waterway NW-5 in Mahanadi / Brahmani delta, Matai river and East Coast Canal (ECC) was declared / notified in November 2008 for total length of about 600 km (see Figure No. 1-1).

Figure No. 1-1 Index Map of National Waterway - 5



The Brahmani / Mahanadi river basins extending in Madhya Pradesh, Jharkhand and Odisha have rich deposits of minerals, coal, iron ore and large production of various industrial and agricultural products. The likely commodities to be transported through proposed NW-5 mode could be divided into the following groups:

- Minerals : Coal, Iron Ore

- Agricultural products: Paddy, Rice, Straw, Animal fodder, Jute, Coconut and manure, consumables, fish products.
- Finished goods / manufactured products: Ferro-chrome, steel alloys, tires, granites, Fertilizers, cement, sugar, salt, building materials (sand, bricks, metals, tiles, Asbestos sheets and fabricated steel items), textiles and forest products etc.

Considering these aspects, the Inland Waterways Authority of India (IWAI) had entrusted task of preparation of a detail project report on National Waterway – 5 (NW-5) to WAPCOS Limited. The report (Detailed project report for Development of Inland Water Transport (IWT) along East Coast Canal (ECC) and Brahmani / Kharsua River System) was submitted by WAPCOS Limited in March 2010. The lengthwise distribution of the proposed waterway for NW-5 through different river channels of Brahmani - Mahanadi deltaic network as per this detailed project report is given below in Table No. 1-1.

Table No. 1-1 Length wise Distribution of Proposed waterway for NW - 5

Sr. No.	Routes	Length in Km
1.	Dhamra to Mangalgadi (Kharsua / Dhamra)	28
2.	Mangalgadi to Paradip (Hansua / Babar / Nuna / Gobri)	67
3.	Talcher to Jokadia (Brahmani / Kharsua)	131
4.	Jokadia to Mangalgadi (Kharsua / Kani)	106
5.	Geonkhali to Charbatia (ECC)	217
6.	Charbatia to Dhamra (Matia river)	39
	Total in Km	**588**

The proposed waterway has been divided into three stretches in the previous DPR, as given below in Table No. 1-2.

Table No. 1-2 Stretch wise Distribution of Proposed waterway for NW - 5

Sr. No.	Stretches	Length in Km
1.	Stretch I – Talcher to Mangalgadi	237
2.	Stretch II – Dhamra to Paradip	95
3.	Stretch III – Dhamra to Goenkhali	256
	Total in Km	**588**

The stretches as defined above have been shown in Figure No. 1-1. In this report WAPCOS Limited had dealt following issues.

- Topographic and hydrographic surveys
- Geotechnical investigations
- Waterway Hydraulics
- Traffic forecasting and vessel sizes
- Terminal locations and planning
- Designs of various engineering works

1.2 Phase wise Development

The Executive summary of their previous DPR is enclosed as Annexure -1, which gives more information on above issues. The IWAI has now given priority for development of Phase I and Phase II from various considerations. A joint agreement has been signed by IWAI, Government of Odisha and Paradip and Dhamra Port authorities in the month of July 2014 for early development of these two stretches in following two phases.

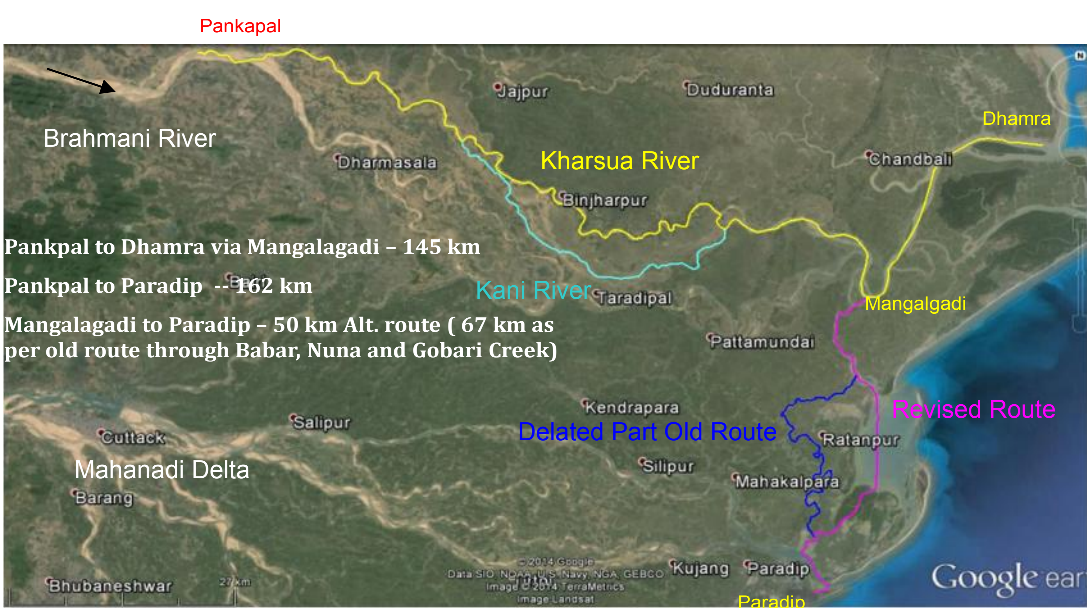
- Phase I - Development of waterway from Pankpal / Jokadia to Dhamra & Paradip via Mangalgadi
- Phase II - Development of waterway from Talcher to Pankpal / Jokadia

In view these developments and various additional aspects related to above two phases (discussed in further para), IWAI entrusted work of revising Detailed Project Report (DPR) to WAPCOS Limited in February 2014. Brief description of Phase I and Phase II is given below.

Phase I - Development of waterway from Pankpal / Jokadia to Dhamra & Paradip via Mangalgadi

As per earlier proposal, this route was entirely considered through river Kharsua. In the reach between Sujanpur to Padanipal, river Kharsua widens (250m to 500 m) and the deep channel becomes relatively shallow and more braided. Survey of a parallel river branch (Tantighai / Kani) from Sujanpur to Padanipal has indicated that this river branch is relatively narrow (100 to 125 m) and deeper. IWAI has decided to explore possibility of utilizing this route, as shown in Figure No. 1-2.

Figure No. 1-2 Proposed Phase I of NW-5, Pankapal to Dhamra and Paradip via Mangalgadi



It may be mentioned here that as per earlier proposal, Mangalgadi- Paradip IWT route was proposed through rivers Hansua, Babar, Nuna, Gobri, Ramchandi Galia, Kharnasi and Mahanadi. After site visit by WAPCOS officers in February

2014 and meeting with IWAI Authorities in April 2014 it was decided to inspect and survey an alternative route running along Hansua, Karnasi and Mahanadi rivers and through the bay along the coastline near Jambu Dweep (thus eliminating/excluding narrow, shallow and winding stretches in Babar, Nuna, Gobri and Ramchandi Galia rivers). Joint Reconnaissance survey by IWAI, WAPCOS and PPT and subsequent bathymetry survey by IWAI indicated viability of this route having many advantages over old route.

Phase II - Development of waterway from Talcher to Pankpal / Jokadia

In this stretch, 5 barrages have been proposed for maintaining 3.0 m depths (LAD) to facilitate movement of 1000 / 1500 ton barges. The investigations, detail designs, approvals by different authorities and construction of these structures will require more time. Therefore, IWAI has decided to take up this stretch in Phase II and develop Phase I keeping in view of the requirement of Kalinganagar industries.

Keeping in view various aspects discussed above, IWAI entrusted work of revising DPR to WAPCOS Limited for only Phase I stretch, i.e. Pankapal to Dhamra / Paradip. Subsequent to that WAPCOS officers carried out site inspection and arranged number of meetings with Government of Odisha and stake holders to explain various data required for studies. Based on data made available these studies were carried out. This report covers various aspects of these studies such as objectives, site visits, hydrology of Brahmani / Kharsua rivers and minimum / maximum flows, review of survey charts supplied by IWAI, review of proposed navigation route, mathematical modeling for estimation of water levels, dismantling / reconstruction of structures, traffic data analysis, terminal location, layout and facilities, navigational aids, preliminary design of engineering structures, bank protection works and approximate cost estimates.

Chapter 2

Objective of Study

Chapter 2 – Objective of Study

2.1 General

The IWAI vide the work order no. IWAI/PL-8(2)/2002-Pt-III, dated 21.01.2014 has stipulated the scope of work / terms of reference (TOR) for the above studies for revision of Detailed Project Report (DPR) of NW-5 for developing the Brahmani River stretch from Pankapal / Jokadia to Dhamra and Paradip as summarized below. The details Scope of Works and Terms of Reference as per the work order is given below.

2.2 Scope of Works and Terms of Reference

Dredging & Excavation:

- To design the suitable navigational channel of adequate width of about 50m and depth (LAD) of minimum 3.0m for movement of vessels of 2000 tonne capacity in the stretch between Pankapal to Dhamra & Paradip of NW-5.
- To examine the feasibility of dismantling the existing anicut at Sujanpur to ensure movement of vessel without any further navigation lock.
- In case anicut is required to be maintained with modification and repair work and suitable navigation lock, the feasibility of developing original stretch in river Kharsua may be examined with respect to both technical and economic feasibility for early commencement of the navigation.
- To access the dredging quantity for developing the channel in Pankapal (near Jokadia) to Dhamra stretch through river Kani and river Kharsua based on the outcome of the study as above.
- To assess the quantity of dredging and excavation for widening of narrow canals / creeks, river bends and deepening for developing the suggested channel between Mangalgadi and Paradip stretch.

- To assess the requirement of land for widening of the narrow canal / creeks etc in Mahanadi, Delta area between Raj Nagar to Paradip and other stretch if any.
- To suggest the suitable bank protection for the canal / creeks widened / excavated.
- To find out the locations / sites / method for disposal of the dredging material in Mahanadi delta area as well as in river portion.
- To assess the cost estimate for dredging, excavation, bank protection for the entire stretch with break up for each stretch i.e. Pankapal to Dhamra and Mangalgadi to Paradip.
- To suggest the suitable river training work for the river portion to stabilize and improve the fairway.

<u>Design & Construction of Navigational Locks:</u>

- To examine the requirement of constructing suitable navigation lock at Sujanpur, Jokadia and Mahanadi delta area in Babar creek, Nuna Nadi and other location as considered necessary.
- To prepare preliminary design and drawing, cost estimate for navigational locks of suitable size with latest technology for their operation, maintenance etc at the following locations:
    - i) Jokadia in the existing barrage
    - ii) Sujanpur in the existing barrage / Anicut
    - iii) Babar creek existing lock to be dismantled and reconstructed
    - iv) Nuna Nadi existing lock to be dismantled and reconstructed
- To examine for designing and constructing as well as for operation and maintenance of navigational locks of international standard with latest technology.

- To suggest methods to be adopted for dismantling of existing locks at Babar creek and Nuna Nadi.

Dismantling and Re-construction of Existing Bridges / Footpath / Structures:

To examine the requirement for dismantling and reconstruction of the existing bridges / footpaths / structures having insufficient horizontal / vertical clearances with location, preliminary design and cost estimate.

To Develop Suitable Terminal Facilities:

- A detailed study is to be carried out with respect to the cargo forecasting, traffic to be handled and accordingly the requirement of developing suitable type and size of terminal facilities at Pankapal / Jokadia, Paradip and Dhamra for handling the cargo of other industries (since Paradip port and Dhamra port will develop its own captive terminal facilities).
- To suggest the phasing of development of these terminals.
- The terminal facilities to be developed should include:

  i) Conveyor belt (type and length required).

  ii) Adequate stockyard.

  iii) Suitable for berthing of 4 nos. of vessels max. 2000 tonnes.

  iv) Assessment of the land for construction with future scope of expansion.

  v) Road connectivity to National highway / state highway having minimum 2 lanes with scope for expansion of 4 lanes.

  vi) Preliminary design and drawings along with cost estimates.

Construction of Barrages:

To review the requirement of suitable barrages for the movement of vessels of 2000 tonne capacity and suggest the size and location of barrage / barrages and preliminary design of the same with navigational locks with adequate height for maintaining LAD in the reservoir along with drawings and cost estimate.

Navigational Aids:

Navigational aids as proposed in earlier DPR to be reviewed and latest technology as available such as DGPS / RIS (River Information System) / VTMS (Vessel Traffic Management Systems) of nearby ports along with cost estimate.

Environment and CRZ Clearances:

The detailed study for EIA for obtaining the statutory clearances for environment and CRZ from MOEF and state CRZ Management Authority shall be taken up separately after the finalization of the revised DPR. However at this stage it may be limited for identifying the stretch / stretches required for EIA study for obtaining the necessary clearances along with nature of study and data collection requirement.

2.3 Summary of Scope of Works

Summary of above scope of work are given below:

To Design Channel of 50 m Width and 3 m Depth (LAD) for 1500 Tonne Vessels Pankapal to Dhamra and Paradip

- Analysis of survey / bathymetry data for assessment of dredging / excavation and suggesting sites for disposal.
- Study of issues related to Sujanpur and Jokadia weir – such as possibility of dismantling or reconstruction.
- Requirement of land for terminals as well as for widening of the navigation channel especially in Mangalgadi, Paradip route.

- To assess necessity of barrages if any and suggest location and preliminary design.
- To suggest bank protection works for excavated channel / creek and suitable river training works for stabilization of bank.

Design and Construction of Navigation Locks

- To examine requirement of locks and prepare preliminary designs / drawings
- To adopt international standards for suggesting designs / construction and operation methodology

Dismantling Existing Locks / Weirs / Bridges

To Develop Suitable Terminal Facilities for Phase I

- Stock yard with appropriate capacity
- Conveyor belt
- Berthing facilities – for 4 vessels
- Land requirement with future expansion
- Road connectivity
- Preliminary designs / drawings / estimates

Navigational Aids

- To suggest appropriate modern navigational aids for safe navigation such as DGPS, RIS, VTMS etc.

Chapter 3

Site Visit

Chapter 3 – Site Visit

3.1 General

After award of the work by IWAI the WAPCOS officers conducted site visit during February 2014 to inspect the reach from Pankpal to Dhamra / Mangalgadi and Paradip. A detail report on this site visit was sent to IWAI vide in March 2014 and is also enclosed as Annexure – 3. Summary / important findings of site visit are given at end of report.

3.2 Meetings and Site Visits

Subsequent to the visit, WAPCOS team had visited the site for collecting data, traffic details, finalizing the alternate route to approach Paradip Port, meeting with industries of Kalinganagar for traffic details, inspection during, August 2014 floods and collection of traffic data from M/s DPCL as details below.

- WAPCOS officials had visited Bhubaneswar during April 2014 for presentation to State Govt. authorities for discussing the issues of low level road Bridges, Sujanpur weir, Jokadia Barrage and data requirement etc.
- WAPCOS officials had visited Bhubaneswar from 23rd to 25th May, 2014 for inspection of alternative route to Paradip Port Trust along with M/s PPT officials & Nodal officer of State Govt. (which was later got surveyed by IWAI).
- WAPCOS officials had visited Bhubaneswar during July 2014 for a meeting with all the industries at Jajpur for explaining them about the proposed National Waterway development and seeking their input on Cargo / traffic volumes expected to ply in the route and understand the requirements of Industries at Kalinganagar.
- WAPCOS officials had a meeting / presentation at IWAI – NOIDA on 16th July, 2014 to discuss the various issues and status of study.

- WAPCOS officials had visited Bhubaneswar during 11th to 13th August, 2014 for discussing the issues of Sujanpur weir and collecting cargo details of DPCL and inspecting the river during the floods.

- WAPCOS officials had visited Bhubaneswar from 25th August, 2014 to attend a meeting with State Govt. on discussions on dismantling of Sujanpur weir, raising of Jokadia barrage, issues of low level bridges, requirement of land for terminals etc along with Vice Chairperson and Chief Engineer of IWAI – NOIDA, followed with a site visit on 26th August, 2014 along with Vice Chairperson and Chief Engineer, IWAI.

3.3 Inspection of Waterway during August 2014 Floods

As mentioned above the site was visited during the floods of August 2014. The photographs showing the water levels during the floods at Railway Bridge, State Highway Bridge, Jokadia, Sujanpur Weir and Manpur Bridge etc. are given below. The vertical clearance in same of the bridges shall not meet the nolms of IWAI.

Figure No. 3-1 A view of Railway Bridge at Pankapal during August 2014 floods

Figure No. 3-2 A view of Highway Bridge during August 2014 floods

Figure No. 3-3 A view of Jokadia during August 2014 floods

Figure No. 3-4 A view of Jokadia during August 2014 floods

Figure No. 3-5 A view of Sujanpur weir during August 2014 floods

Figure No. 3-6 A view of Sujanpur weir during August 2014 floods

Figure No. 3-7 A view of Manpur Bridge during August 2014 floods

Chapter 4

Brahmani River Catchment and Hydrology

Chapter 4 – Brahmani River Catchment and Hydrology

4.1 About Brahmani River

The river Brahmani is the second largest river of Odisha after Mahanadi. The Brahmani river basin (Figure No. 4 - 1) has catchment area of 39,268 Sq. km which is distributed in three steps namely, Jharkhand (15,405 Sq. km), Chhattisgarh (1,547 Sq. km) and Odisha (22,516 Sq. km). The average annual rainfall in the Brahmani basin from south west monsoon is 1305 mm. It varies from 969 mm minimum to 1574 mm maximum. As per 2001 data of ICID, per capita water availability in Brahmani basin is 2590 cubic metre/year which is fairly above the values for many other river basins in India. The estimated annual renewable water resources of basin are 21920 million cubic metres.

Figure No. 4–1 Index map Brahmani River Catchment

The main tributaries of river Brahmani are river Sankh and South Koel. River Sankh originates in Ranchi district in Jharkhand and has total length of 265 km and catchment area 7350 Sq. km up to the confluence with river South Koel at Vedvyas in Odisha. The river South Koel originates at Nagri in Jharkhand and flows for a distance of 304 km till it joins river Sankh. The catchment area of South Koel is 13378 Sq. km up to confluence with Sankh. After confluence of river Sankh and South Koel at Vedvyas the river is further called as Brahmani. From Vedvyas to the outfall at Bay of Bengal the length of Brahmani river is about 460 km. The Brahmani river delta begins near Jenapur at about 150 km upstream of the outfall into Bay of Bengal. At Jenapur, Brahmani River bifurcates into river Kharsua and river Brahmani. The river Kharsua which flows along the left bank is relatively deeper and narrower. The Brahmani river geometry more or less remains same after bifurcation.

However, the Brahmani river channel is relatively wide but shallow as compare to Kharsua. Study of lean season satellite imageries of river Brahmani / Kharsua at Jenapur during period 2007 to 2014 and toposheets of 1974 presented in Figure No. 4-2 & 4-3 respectively indicate that practically almost 80 to 90% flow during lean season is through Kharsua river.

Figure No. 4–2 Satellite imageries of lean season showing Kharsua and Brahmani river channels at head of Delta

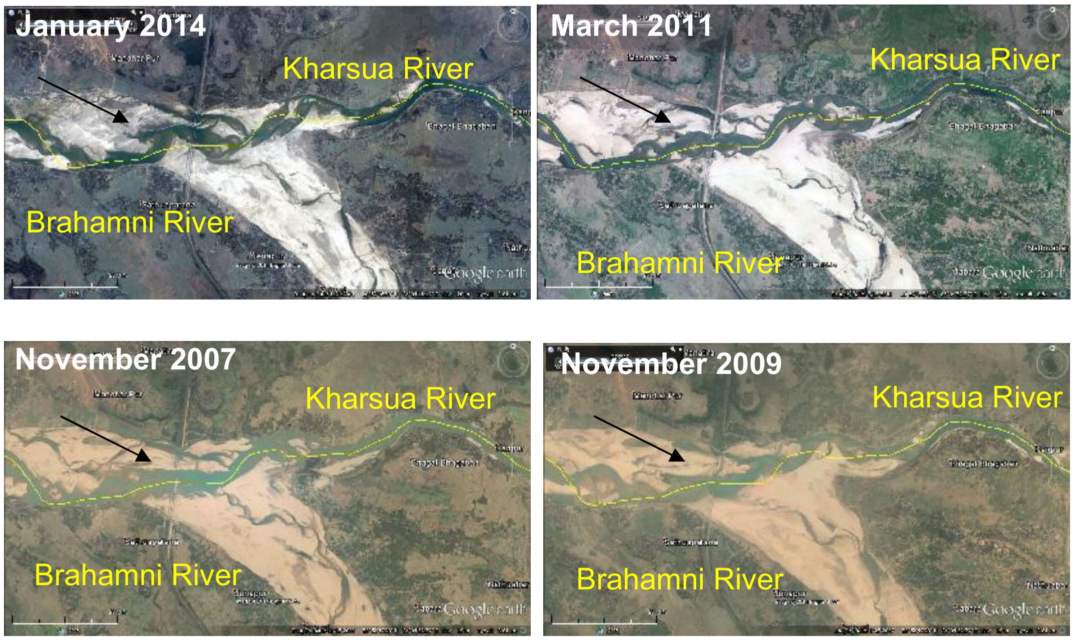
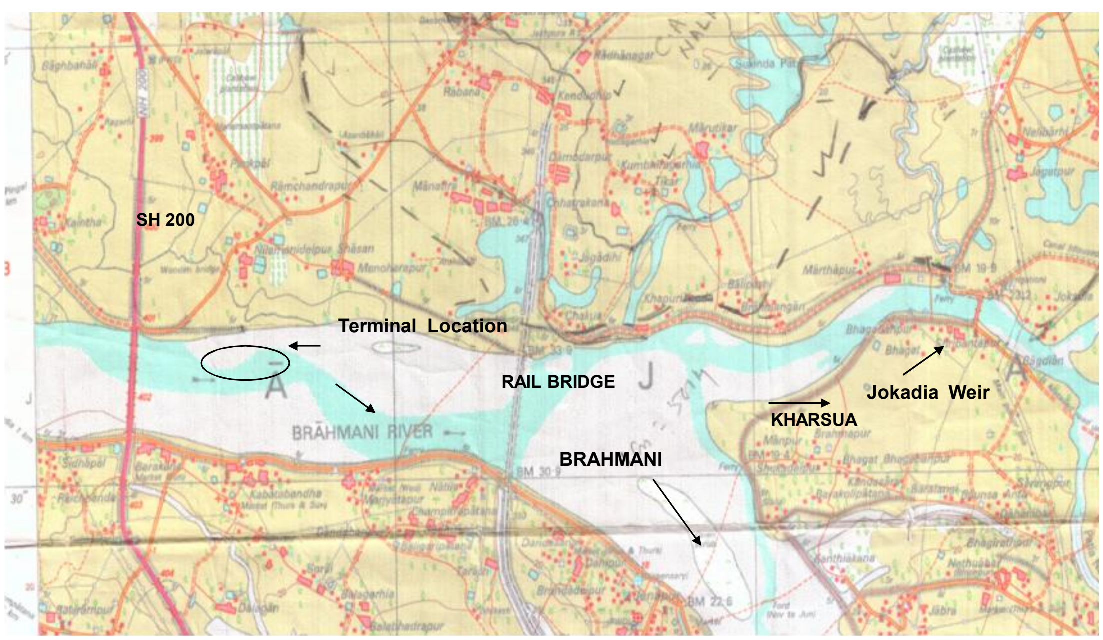


Figure No. 4–3 Brahmani river & Kharsua river near Jenapur at Delta Head



Wide but shallow bed of the river Brahmani practically appears dry with small channels and some deep pools. Both these bifurcated channels again rejoin at about 100 km downstream near Mangalgadi. From Mangalgadi the river again flows into two channels one going to north east flowing towards Dhamra and other flowing to south towards Rajnagar and Koilipur to join Bay of Bengal. River Baitarani a tributary of Brahmani joints the Brahmani river branch flowing towards Dhamra. The tidal flow penetrates in to Brahmani and Kharsua rivers. In Kharsua tidal flow penetrates up to Padanipal about 62 km upstream of Dhamra. From Padanipal tidal flow further travels along Kani River for about 15 Km, the Chart datum at Dhamra is at 2.0 m below MSL.

River Brahmani and Mahanadi had always created flood problems in state of Odisha. The highest flood in river Brahmani was in order of 24,246 m^3/sec on August 20^{th} 1975 when the water level of 24.78 m was observed at Pankapal gauge at the head of Brahmani delta. This was much above the danger level of 23.0 m. The flood of the same order was also observed in the year 1960. In the year 1985 a dam was constructed on river Brahmani at Rengali as multipurpose project with flood moderation/mitigation as one of the main objectives. The Rengali Dam intercepts about 2/3 of total catchment area. It has flood storage capacity of about 4000 MCM. At Rengali dam there is hydro power generation with installed capacity of 250 MW. At about 35 Km downstream of Rengali dam, Samal barrage has been constructed with prime objective of water supply for irrigation. The left bank and right bank channels with capacity of 100 MCM/sec are under construction.

In the post Rengali period, the yearly maximum floods experienced at Jenapur gauging station were in the range 2000-10300 MCM/sec. It is observed that during floods, Kharsua carries nearly 60% of total flood discharge in Brahmani at the head of delta.

4.2 Hydrology of Brahmani River at Jenapur near Delta Head

For planning of any engineering projects on a river like dams, barrages, bridges, water intakes, major navigation channels such as NW-5 and IWT terminals, it is necessary to study hydrology of the river for the reach under consideration. It is essential to estimate high flood discharges, their frequencies and corresponding flood levels, and minimum discharges / low flows and their duration during lean season and corresponding water levels. These data provide important parameters for design of various engineering structures mentioned above. For this purpose the daily water level and discharge data at Jenapur for the period 1980 to 2012 was analyzed to assess minimum flows and their duration, flood discharges for different return periods and flood levels.

4.2.1 Assessment of Minimum Discharges in River Brahmani at Jenapur

The daily discharge and gauge data for the period 1982-2012 at Jenapur gauging station of Central Water Commission (CWC) was made available by the Odisha state authorities. The lean season flow data was analyzed to estimate the minimum flows and their duration for different range of the discharges. Table No. 4-1 to 4-3 for show the different range of the discharges and their duration in the number of days for different years during period 1980 to 2012. The monthly minimum and monthly average flows for the duration 1986-2012 (i.e. post-Rengali period) were analyzed. Table No. 4-4 shows the monthly minimum and average flows for this entire duration. The summary of findings of this analysis is given below.

Table No. 4-1 Analysis of Flow Data at Jenapur (1980 - 1990)

Discharge Range (Cumecs)	Nos. of days in year										
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<50	182	167	187	169	143	140	9	1	0	1	1
50-100	31	56	51	49	40	47	9	0	18	21	24
100 - 150	19	22	25	21	3	2	60	33	29	66	66
150 - 200	30	5	17	9	7	53	74	117	12	39	19
> 200	121	115	86	118	173	123	214	215	307	239	256

Table No. 4-2 Analysis of Flow Data at Jenapur (1991 - 2001)

Discharge Range (Cumecs)	Nos. of days in year										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<50	3	7	117	30	1	0	1	1	1	0	5
50-100	87	98	14	24	9	3	16	18	2	28	145
100 - 150	24	42	20	19	41	68	32	23	65	68	31
150 - 200	31	43	18	16	68	66	90	30	68	88	18
> 200	221	176	197	276	247	229	227	294	230	182	167

Table No. 4-3 Analysis of Flow Data at Jenapur (2002 - 2012)

Discharge Range (Cumecs)	Nos. of days in year										
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<50	3	1	0	1	2	3	16	3	31	7	13
50-100	170	46	75	53	101	96	63	89	94	63	60
100 - 150	80	39	55	83	67	53	82	101	57	55	52
150 - 200	34	18	53	69	46	19	20	39	68	33	53
> 200	142	262	183	160	150	195	185	134	116	208	188

- In Pre - Rengali period the number of days for which the discharge was less than 50 cum/sec was 140-180 which significantly improved after completion of Rengali Dam in 1985. From 1986 onwards it is observed that flow less than 50 cum/sec will prevail not more than 15 days.

- The lowest discharge at Jenapur was 10 cum/sec with water level of 13.0 m.

- In Post-Rengali scenario duration of different range of discharges during lean season in the as below.

  (a) Less than 50 m3/s - 1 to 15 days

  (b) 50 to 100 m3/s - 20 to 90 days

  (c) 100 to 200 m3/s - 60 to 150 days

  (d) Above 200 m3/s - 150 to 240 days

- Table No. 4-4 also shows that average of monthly average flows during lean season varies from 180 m3/s in December to 140 m3/s in May.

- Following Table No. 4-5 shows percentage of days in a year for different range of discharges.

Table 4-5 Duration in Days for Different Range of Discharges in Brahmani at Jenapur

Discharge Range	Total no. of days during 1986 - 2012	% days in a year	Remark
<50	255	2.6	** In year 1993 for 117 days discharge was less then 50 m3/s
50-100	1360	13.7	
100 - 150	1401	14.2	
150 - 200	1246	12.7	
> 200	5600	56.8	
Total days	**9862**	**100%**	

- In general it is felt that except during very low flows less than 50 cum/sec for a period of about 7 to 15 days and period of high floods exceeding 2000 cum/sec for rest of the period navigation could be possible with the adequate depth.

4.2.2 Analysis of Annual Flood Discharges

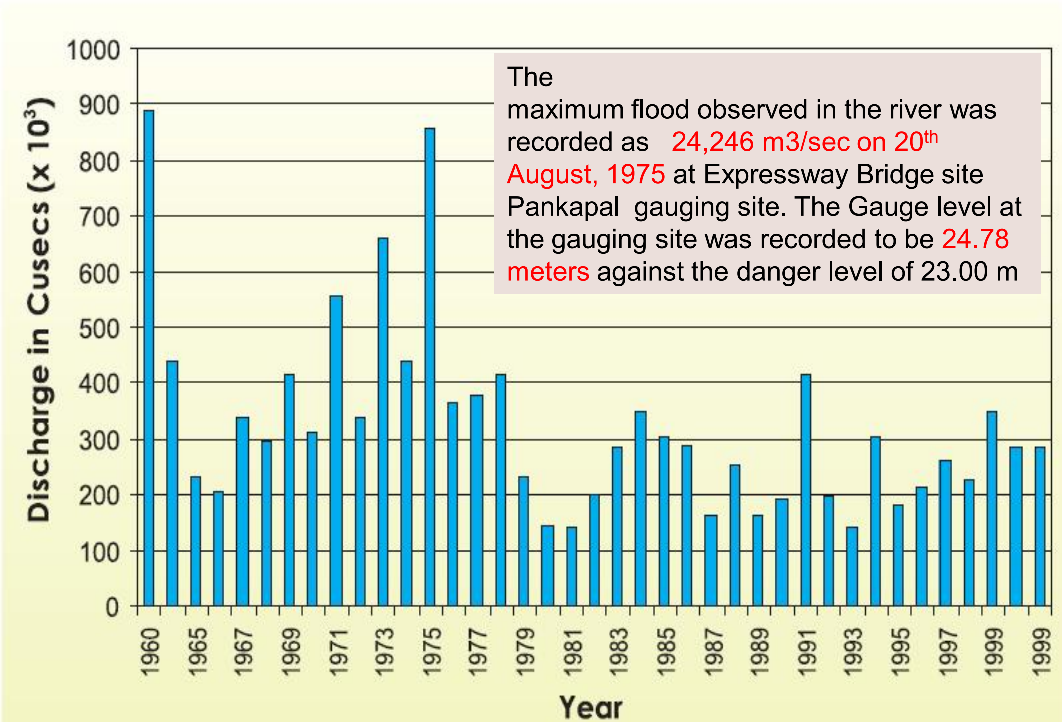
The yearly maximum flood discharge data for the period 1980-2012 is shown in the Table No. 4-6 below.

Table 4-6 Yearly Maximum Brahmani Discharge and Gauge at Jenapur

Year	Discharge m^3/sec	Gauge m	Year	Discharge m^3/sec	Gauge m	Year	Discharge m^3/sec	Gauge m
1980	3036	8.21	1991	9151	9.88	2002	2002	7.22
1981	2804	7.80	1992	4892	8.68	2003	5621	9.14
1982	4660	9.21	1993	3346	7.63	2004	3906	8.38
1983	8505	9.96	1994	8952	9.86	2005	10313	10.06
1984	9701	10.47	1995	3823	8.41	2006	9804	10.11
1985	7485	9.36	1996	4652	8.68	2007	7567	9.59
1986	5056	9.20	1997	7135	9.56	2008	7489	9.24
1987	4737	8.55	1998	5173	9.04	2009	6465	9.29
1988	6216	9.17	1999	8053	9.64	2010	952	6.23
1989	4311	8.39	2000	3545	8.32	2011	10372	10.73
1990	4595	8.67	2001	10076	10.36	2012	3233	7.92

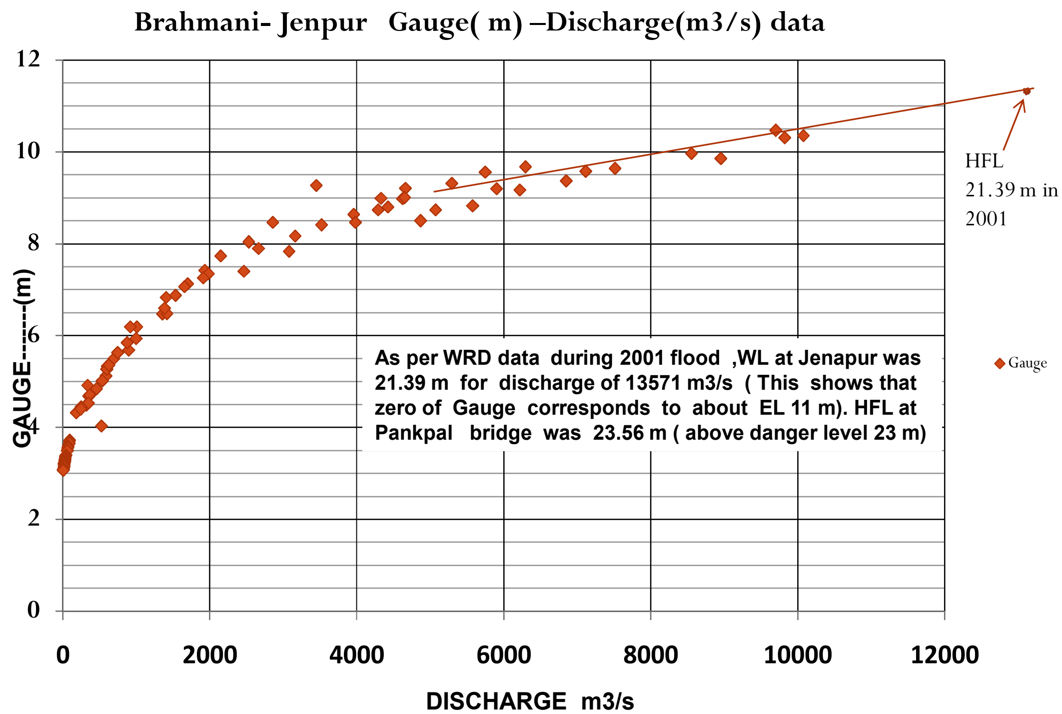
The above data shows that the highest flood at Jenapur during the period 1980-2012 was 10372 cum/sec on September 26th 2011 and the corresponding gauge at Jenapur was 10.73 m. This gauge reading corresponds to water level of 23.73 m considering that the zero of the gauge is at level 13.0 m. Before 1980 the two high floods one in August 1975 with flood discharge of 24246 cum/sec and another in 1960 with somewhat higher discharge than that in 1975 had occurred. The water level of 24.78 m was recorded at Pankapal in 1975 which was higher than the danger level of 23.00 m. Figure No. 4-4 shows the annual maximum flood discharges for the period 1960-1999.

Figure No. 4–4 Annual Maximum Flood Discharges Recorded at Jenapur



This figure also shows that in post-Rengali period there is substantial moderation of floods and the maximum flood discharges were restricted below 11,000 cum/sec. As per WRD Odisha post Rengali design discharge at the head of Brahmani delta is 11326 cum/sec. The gauge discharge data available at Jenapur site is plotted vide Figure No. 4-5. It could be seen that the observed flood of 2001 nicely fits into the extrapolated gauge discharge curve.

Figure No. 4–5 Gauge Discharge Data of River Brahmani at Jenapur



The data of yearly maximum discharges mentioned in the tables above were statistically analyzed using Gumbel extreme value distribution to estimate flood discharges of different return periods. The results of this analysis are given in Table No. 4-7 below.

Table 4-7 Flood Discharges for Different Return Period as per Gumbel

Return Period in Years	2 yrs	5 yrs	10 yrs	25 yrs	50 yrs	100 yrs	200 yrs
Discharge in cum/sec	5555	7889	9435	11388	12837	14275	15708

It may be mentioned here the discharges in the post-Rengali period are after moderation at Rengali reservoir and not the discharges from the entire free catchment. It is also seen that the highest flood observed in 1975 and 1960 were of much higher order as compared to discharges given in above table. The main reason for this difference is that the high discharges were in pre-

Rengali period. The post Rengali design discharge at head of Brahmani Delta 11326 cum/sec estimated by WRD appears to be only 25 year return period discharge as per above analysis. It is felt that for any future designs 100 year return period discharge of 14275 cum/sec may be considered at the head of delta. For design of hydraulic structures on Kharsua river 60 % of this i.e. about 8600 cum/sec may be adopted.

4.2.3 Study of Flood Hydrographs of River Brahmani at Jenapur

An attempt was made to estimate the duration of the flood hydrograph for the major floods above 8000 cum/sec during the period 1984-2012. The Peak flood discharges during these flood events varied from 8952 cum/sec to 10372 cum/sec. The flood hydrographs for these flood events are presented in Figure No. 4-6 to 4-14. These figures indicate that the duration of flood varies from about 8 days to 15 days. If we consider that the discharge above 2000 cum/sec not suitable for proposed navigation then for most of the high flood events the flood period will be about 8 to 10 days. The velocities and high flood levels along the reach during these floods will also be of interest as the vertical clearance at various bridges will be an important aspect to be looked into.

Figure No. 4–6 Flood Hydrograph 1983

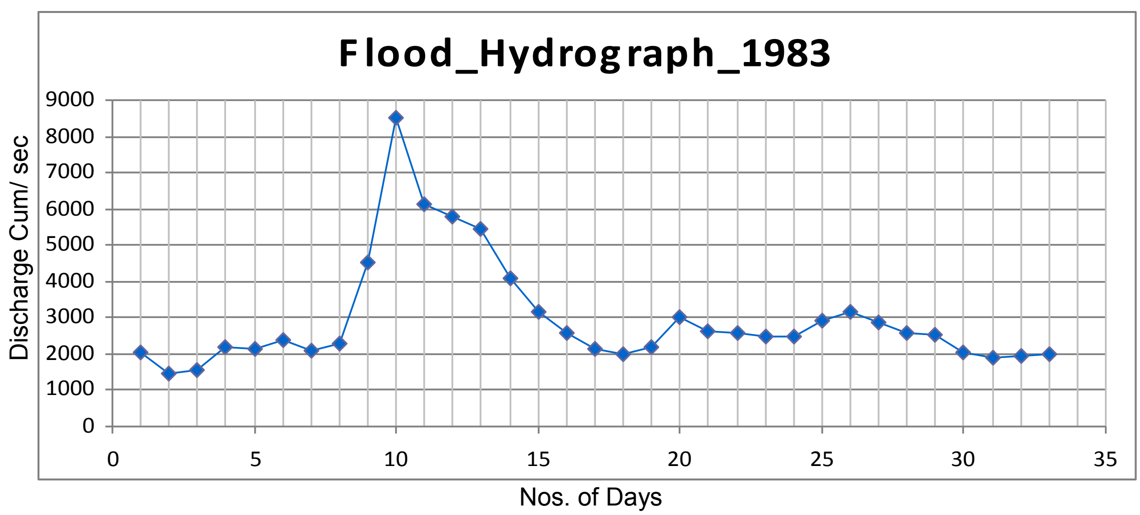


Figure No. 4–7 Flood Hydrograph 1984

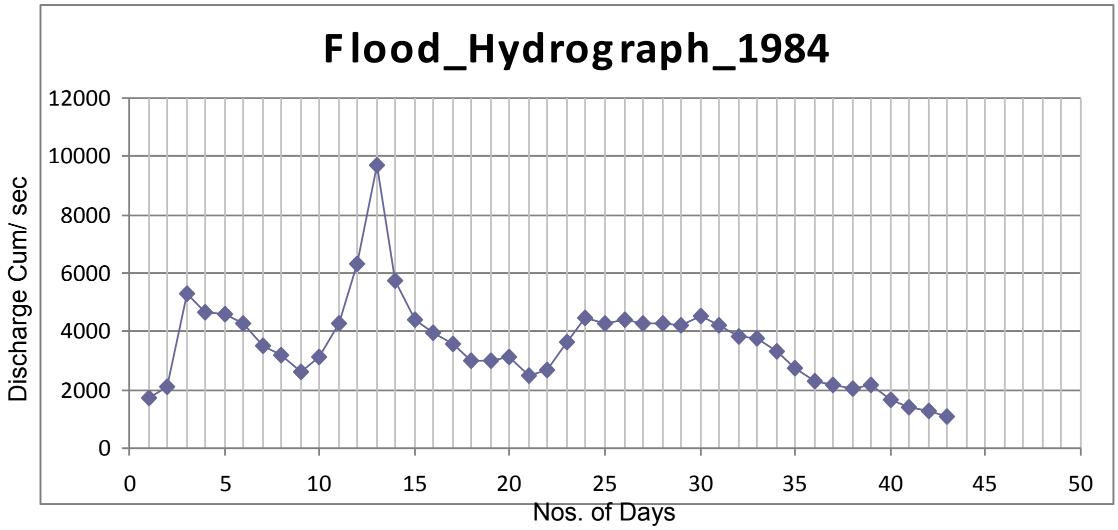


Figure No. 4–8 Flood Hydrograph 1991

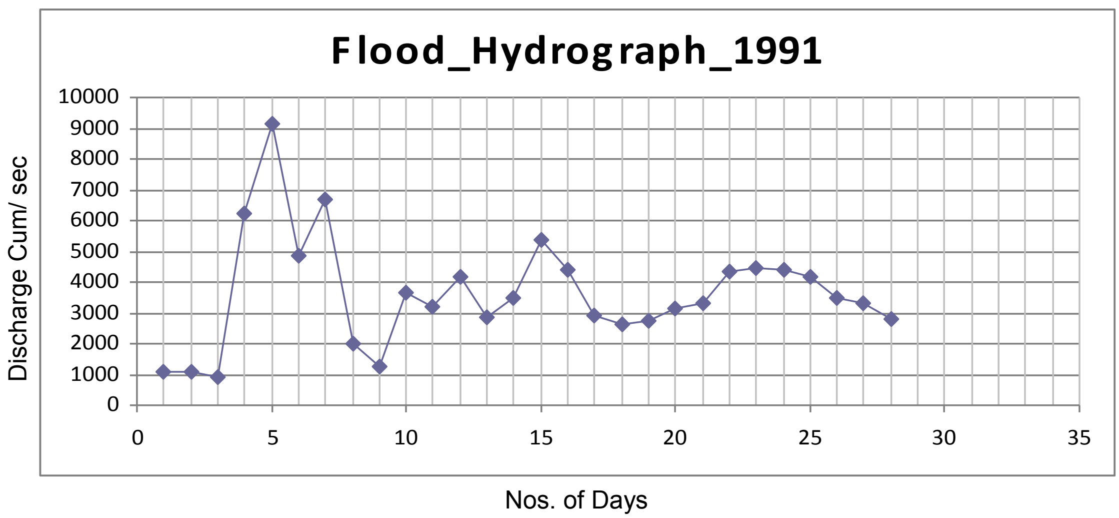


Figure No. 4–9 Flood Hydrograph 1994

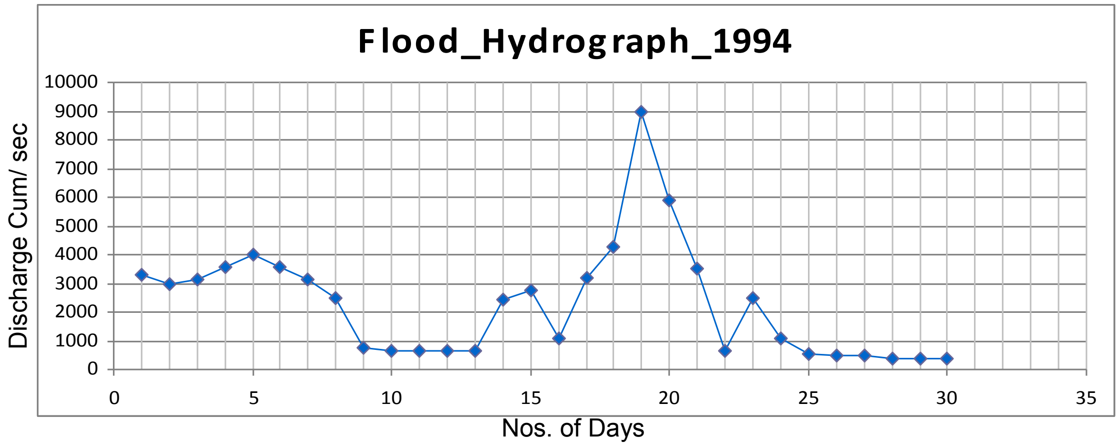


Figure No. 4–10 Flood Hydrograph 1999

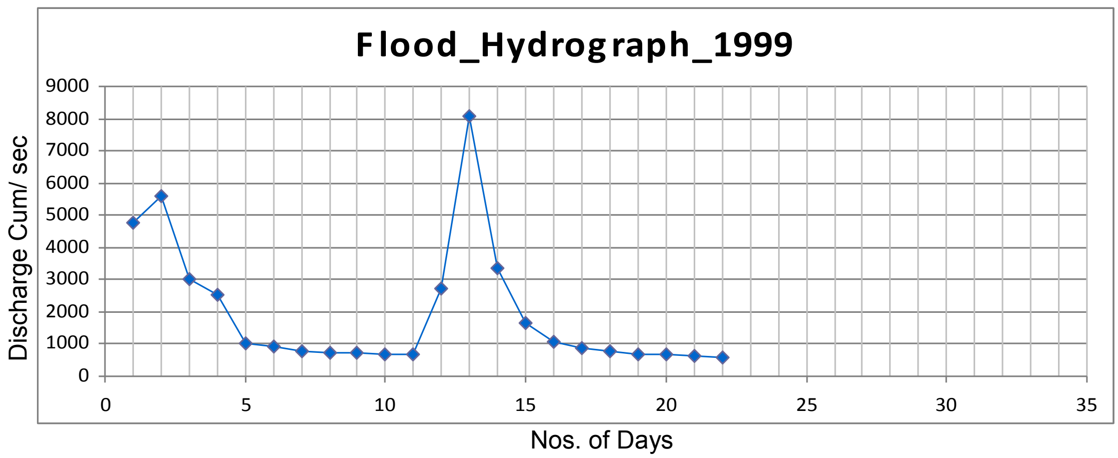


Figure No. 4–11 Flood Hydrograph 2001

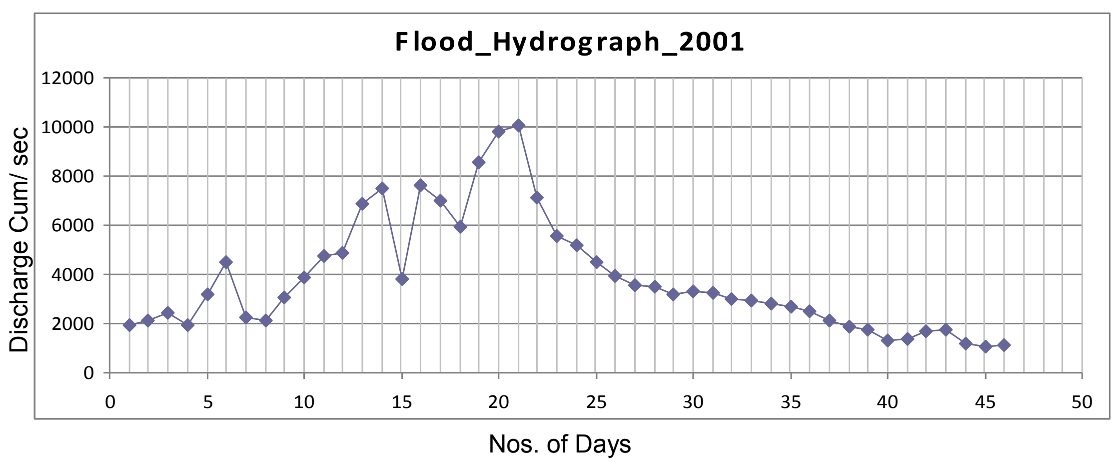


Figure No. 4–12 Flood Hydrograph 2005

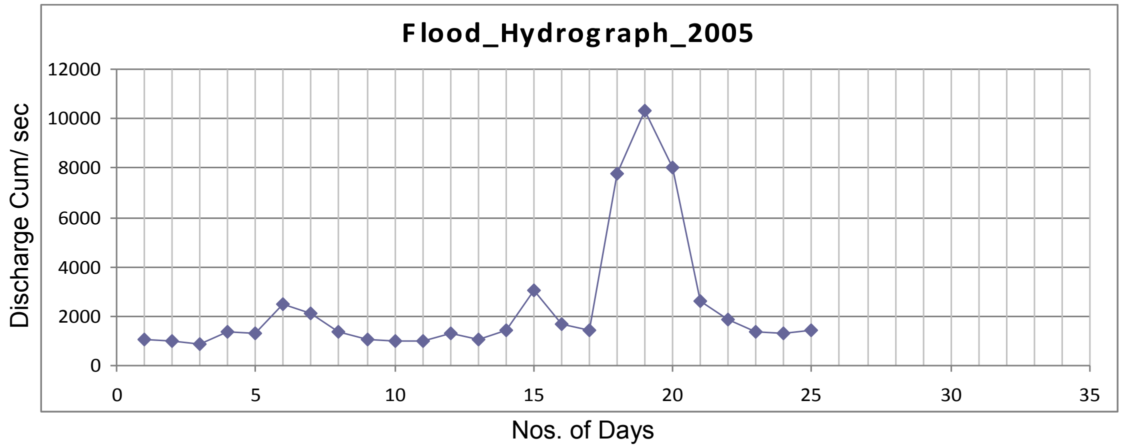


Figure No. 4–13 Flood Hydrograph 2006

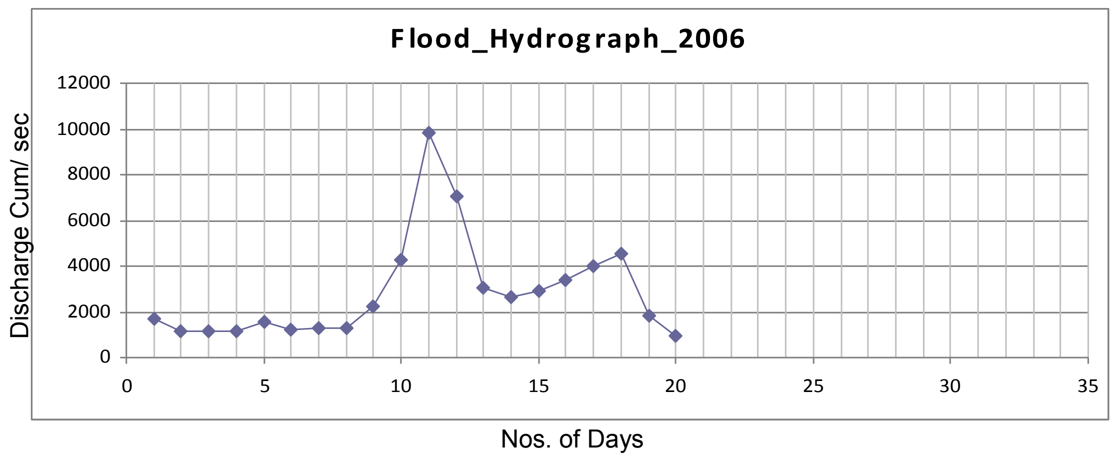
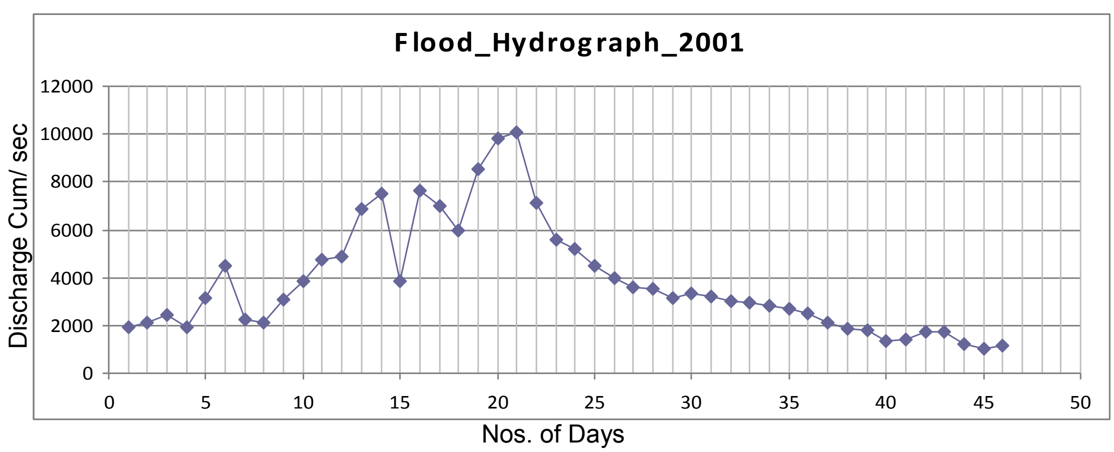


Figure No. 4–14 Flood Hydrograph 2011



Chapter 5

Review of Recent Survey Charts

Chapter 5 – Review of Recent Survey Charts

5.1 General

The IWAI has carried out bathymetry survey of the Brahmani / Kharsua reach from Talcher to Dhamra and Dhampa to Paradip during January to May 2013. The survey for Tantighai / Kani River reach as an alternative to Brahmani river reach from Sujanpur to Padanipal was also carried out during June to August 2013. In addition, as per suggestion from WAPCOS the alternate route between Hansua River to Kharnasi River (excluding the earlier route through Babar, Luna, Gobari, Ramchandani Galliya rivers) was also surveyed. These survey charts were analyzed to study the existing bed levels and review estimated dredging quantities. These surveys were carried out by Global Marine Infratech Private Limited for IWAI. For these surveys established permanent GTS benchmarks at Dhamra Port RI office (+4.171 m MSL) and at Samal barrage (+72.993 m MSL) were used as vertical controls to establish additional temporary bench marks (TBM). The Kharsua / Brahmani river reach from Dhamra to Padanipal is in the tidal reach and remaining upstream reach Kharsua / Kani / Brahmani is non tidal. Also the route from Dhamra to Paradip is entirely in the tidal reach. The Longitudinal sections along Brahmani / Kharsua / Kani are presented in Figure No. 5-1 to 5-5 below, wherein all the levels are with reference to MSL. All Chainages are from Dhamra. The chart datum considered in the different reaches is also indicated in these figures. The general description of these reaches as per the survey reports is summarized below.

Figure No. 5-1 Bed Profile of Brahmani / Kharsua from Pankpal to Jokdia Weir

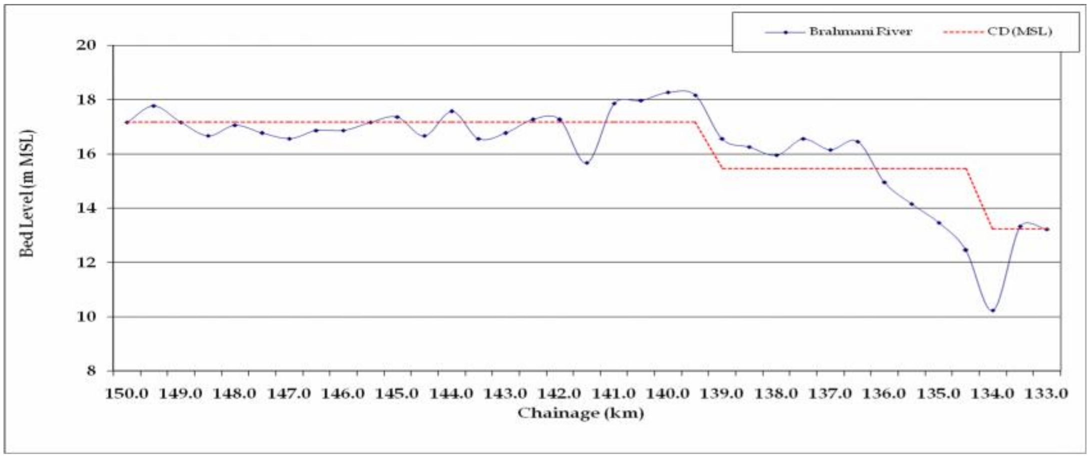


Figure No. 5-2 Bed Profile of Kharsua from Jokdia Weir to Kani off take

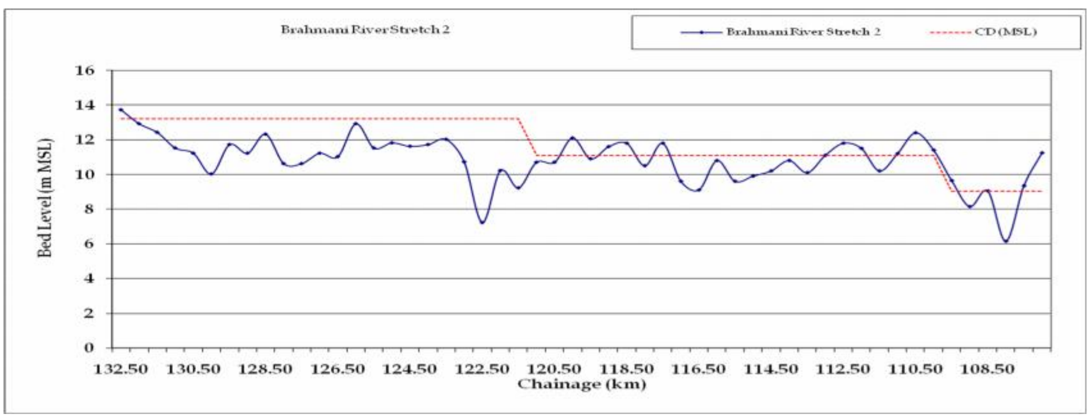


Figure No. 5-3 Bed Profile of Kharsua from Kani off take at Sujanpur to Kani Outfall at Padanipal

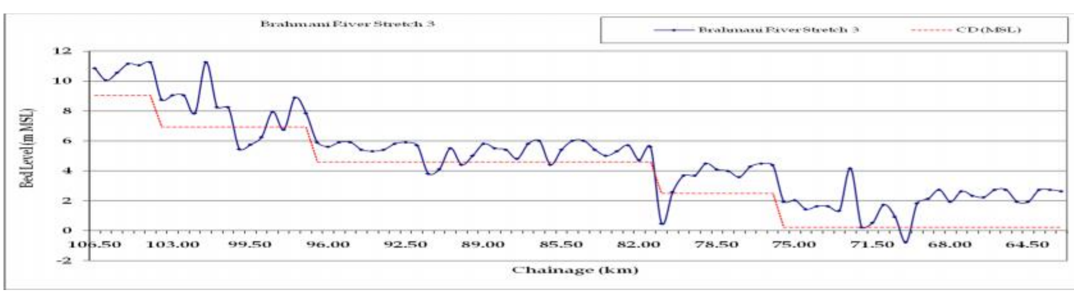


Figure No. 5-4 Bed Profile of Kharsua from Kani Outfall at Padanipal to Dhamra

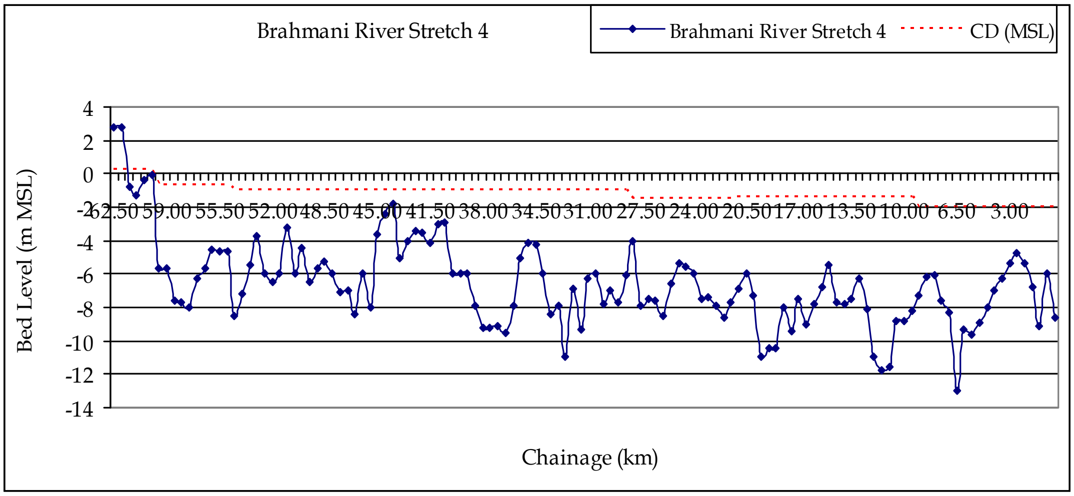
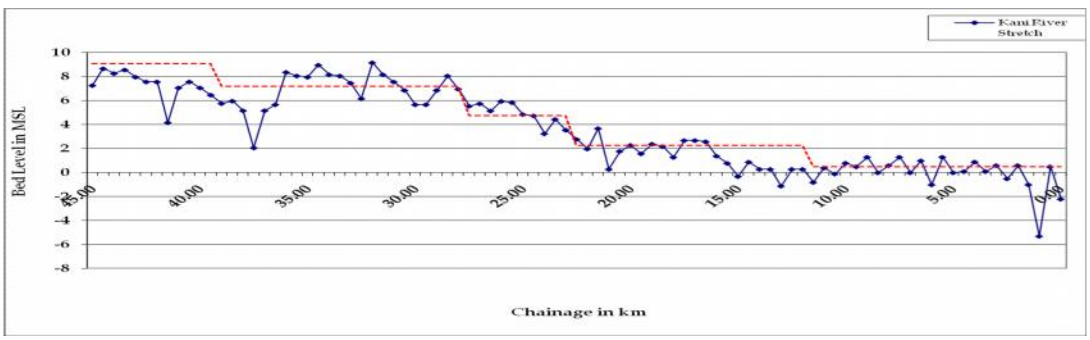


Figure No. 5-5 Kani River Longitudinal Section from Sujanpur to Padanipal



5.2 Brahmani / Kharsua Reach

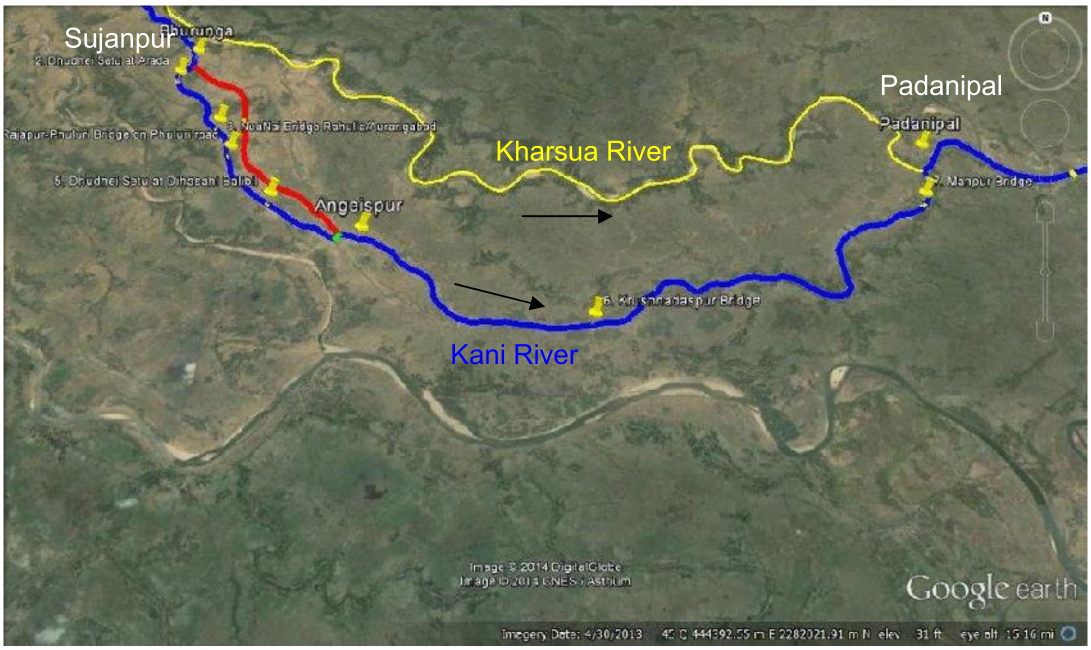
The entire reach of Brahmani / Kharsua from Talcher to Dhamra was surveyed by IWAI to collect bathymetry and topographical data. For the stretch Dhamra to Pankapal (Chainage 0 to 145 km) general description for different reaches is given below. Some details of various structures across rivers in this stretch are given in Table No. 5-1 below.

Table No. 5-1 Structures from Dhamra to Pankpal (Chainage 0 to 145 km)

Chainage (Km) from Dhamra	Details of Structure	Horizontal Clearance (metre)	Vertical Clearance above HFL* (metre)	Place
49.7	Concrete Road Bridge	90	10	Aul
55.3	Power line	NA	7	Tunga
59.8	Power line	NA	7	Bhuinpur
61.5	Power line	NA	5	Padanipal
61.7	Power line	NA	7	Padanipal
68.3	Telephone Line	NA	7	Madhuban
76.2	Concrete Road Bridge	35	6	Singhpur
80.7	Telephone Line	NA	7	Kalyanpur
82.1	Wooden Bridge	NA	NA	Kantipur
89.6	Concrete Bridge under construction	26	5	Binjharpur
94.7	Wooden Bridge	NA	NA	Binjharpur
110	Concrete Road Bridge	30	5.5	Mirzapur
117.5	Power Line		6	Sarifabad
121	Twin Concrete Road Bridge	35	6.5	Sahapur (NH-5)
129.1	High Voltage Power Line	NA	6	Masurpur
133.6	High Voltage Power Line	NA	2	Jokadia
133.7	Concrete Road Bridge	30	6	Jokadia
134.1	Jokadia Anicut (Barrage)	NA	NA	Jokadia
139.8	3 lane Railway Bridge	50	10	Jenapur
144.6	Concrete Road Bridge	40	10	Kamagara (NH-200)
144.8	High Voltage Power Line	330	15	Kamagara

* The Table above is taken from survey report of IWAI. It is felt that the vertical clearance mentioned may not be from HFL but may be from water level during survey or from LWL. Figure No.5-6 showing location of these existing / under construction bridges.

Figure No. 5-6 Existing / under construction Bridges



5.2.1 Dhamra to Bandhamala (Chainage 0 to 25 Km)

The width of the river in the reach varies from 600 to 900 m and the depths from 4.5 to 14.0 m. Thus the channel is very much suitable for navigation without any dredging. These reach experience the tidal flow with the tidal range of about 3.0 m at Dhamra and about 1.50 m at Bandhamala. There is one acute bend and one big island (8.0 Km X 1.20 Km) along with 5 nos. of small islands in this reach. These islands are densely covered with mangroves and are mostly inhabited by crocodiles. This is the reach where famous Bhitar Kanika crocodile sanctuary is located. Dhamra fishing harbour and Talchua fishing jetty is located on north and south bank restricted. There are plenty of fishing stakes and nets which can disturb navigation. River Baitarani joins Brahmani at 16.0 Km. There are 4 nos. of small jetties for passenger ferry services. In general navigation is possible in this reach without any dredging and bank protection work. Only in small reach at chainage 6 & 7 Km shore protection may be required on north bank.

5.2.2 Bandhamala to Aul (Chainage 25 to 50 Km)

In this reach, the Kharsua river width varies from 250 to 800 m and depths from 1.10 to 14.0 m. This reach also experience tidal flow but with less variation. At Km 34 at Mangalgadi the channel leading to Paradip port through Hansua River begins. At chainage 39 Km Brahmani River joins Kharsua. There is a bridge on river Kharsua at 49.7 Km chainage (Gadagadi Bridge) on Raj Kanika to Kendrapada. Navigation is possible throughout the year in this reach with some dredging. There are some existing shore protection works at various chainages.

5.2.3 Aul to Padanipal (Chainage 50 to 62 Km)

In this reach, Kharsua river width varies from 800 to 120 m and depth from 2.20 to 11.90 m. This reach also experience tidal flow which practically diminishes near Padanipal. There is one shallow patch in this reach between chainage 51 to 52 Km. Four electric transmission lines crossed the river between chainage 55 to 61 Km. At chainage 59.9 Km river Kani joins river Kharsua from right bank. Some shore protection works are exists in this reach and there is need of shore protection between Km 55 to 56 where there is erosion. Navigation in this reach will be feasible with minimum dredging.

5.2.4 Padanipal to Sujanpur (Chainage 62 to 107 Km)

In this reach, width of Kharsua River varies from 380 to 130 m and depth from 0.7 to 9.0 m. In lean season period navigation may not be possible in this reach. There is no tidal effect in this reach. There are some leased, sand, plots where sand is extracted. Some shore protection works are exists and there is need for additional shore protection. Two telephone lines cross the river near Madhuban at chainage 68.3 Km. At Singpur there is a concrete bridge at chainage 76.2 Km and another bridge under construction at chainage 89.6 Km near Binjharpor. Some spurs have been constructed at chainage 92 Km, 97 Km and 100.6 Km on the north bank. On south bank also there are two spurs at chainage 104.3 Km and 106.7 Km. At chainage 102.5 tributary of Baitarani joins Kharsua River and at chainage 107 Kharsua river bifurcates as Tantighai / Kani river. Navigation may not be possible in this reach throughout the year and large quantity of dredging will be essential.

5.2.5 Sujanpur to Jenapur (Chainage 107 to 138 Km)

The river width in this reach varies 350 to 170 m and depth from 10 to 0.5 m. There are 3 nos. of bridge crossings in this reach at chainage 110 Km, 121 Km and 133.7 Km also there are 3 nos. of pump houses between chainage 160 to 137 Km. Two high voltage power lines cross the river at chaiange 129.1 Km and 133.6 Km. At chainage 134.1 Km there is a Anicut /weir at Jokadia village. There is no lock gate at Jokadia Barrage. Navigation may be possible in this reach after dredging of the river bed.

5.2.6 Estimated Capital Dredging for the Reach Dhamra to Pankapal Bridge

As per latest survey conducted by M/s.GMI during Jan 2013 to May 2013, the estimated dredging quantities reach wise for a channel of 50 m (base width of 45m) and 2.0 m depth below CD are given below in **Table No. 5-2.**

Table No. 5-2 Reach wise Capital Dredging Quantities

Sr. No.	Reach / Route	Capital Dredging (M cum)
1.	Dhamra to Padanipal	0.02
2.	Padanipal to Sujanpur	
	(a) Via Kharsua	6.82
	(b) Via Kani	2.58
3.	Sujanpur to Jokadia weir	1.26
4.	Jokadia to Pankapal	0.24
5.	Mangalgadi to Paradip	
	(a) Old Route	5.47
	(b) New Route	2.64

5.3 Mangalgadi to Paradip Reach (Along Proposed alternate route)

Figure No. 1-2 show the earlier proposed route from Mangalgadi to Paradip. This route was proposed from Mangalgadi through river Hansua up to Koilipur / Kalupada and then through Babar, Hansua, Gobri and Ranchandi Galia creeks to join Kharnasi creek near Badatubai fishing harbour. Further it joins Mahanadi and the enters in a creek on right bank of Mahanadi just upstream of fishing harbour. During the site visit of WAPCOS officers in February 2014 and meeting at Bhubaneswar with IWAI and Odisha state authorities on April 25th 2014 the alternate route to Paradip excluding the portion of earlier proposed route running through Babar, Nuna, Gobari and Ramchandi Galia creeks was discussed in detail with Chief Engineer, IWAI explaining advantages.

The proposed alternate route running along Hansua river, open sea portion along coast of Jumbudweep and through Kharnasi river has following advantages over earlier proposed route through Babar / Nuna / Gobri creeks.

- Route length is reduced by about 18 Km
- The natural channel width available is more or at par with the desired width of 45 m in Kharnasi creek and in open sea portion it is much more to provide a wider channel.
- Practically no land acquisition required as compared to extensive land acquisition in habited and agricultural land in earlier proposal
- Since the route runs inside the sand bars in sea portion it is protected from waves from outer sea
- The flow velocities along this route will be relatively low as this route will be entirely tidal. (As against in earlier route through Babar, Nuna and Gobri would experience high flows/ velocities during flood period.

- There are no existing bridges/barrages/navigation locks along this route hence there is no expenditure on dismantling /reconstructing these structures.
- Navigation locks are not required
- Capital and maintenance dredging will be less as compared to earlier route
- Practically no sharp bends /curves (as are in earlier proposed route through Babar / Nuna / Gobri creeks) except near badatubai village

5.3.1 Mangalgadi to Koilipur (Babar creek mouth) and outfall of Hansua in Bay of Bengal (Chainage 0 to 17 Km)

This reach along Hansua River is 180 to 475 m wide and 4 m to 17 m wide. This entire reach is in tidal range. At 6.5 Km there is a high level bridge at Rajnagar with vertical clearance of 5.70 m and horizontal clearance of 50 m. The outfall of Hansua river in Bay of Bengal is at about 4 Km downstream near village Baro. Navigation through this route is possible as adequate depth and width is available after marginal dredging of 50,000 cum. This dredging will be in 600 m long shallow patch with bed level of about 1 m below CD. A channel of 50 m base width and 2.0 m deep below CD is desired for proposed navigation.

5.3.2 From Hansua outfall to Kharnasi Creek entrance (Chainage 17 to 28.7 Km)

At the mouth of Hansua river , the water depth are 6.0 m to 0.50 m. But in the open sea portion from Hansua mouth to Kharnasi river mouth / entrance, only for some part, depths 1.0 m to 0.50 m are available but for remaining portion the bed levels are about 0.50 m to 1.50 m above CD which is at (-)1.075 m below MSL. Thus, under existing condition navigation may not be possible but with capital dredging of about 1.30 MCM (for channel of 45 m width and 2.0 m depth below CD) and some maintenance dredging, navigation will be feasible in all seasons. This portion being in bay

/ open sea, width of channel will have to be double. In that case dredging will increase.

5.3.3 From entrance of Kharnasi Creek to its outfall in to Mahanadi (Chainage 28.7 to 41.1 Km)

In this reach through Kharnasi creek, the widths vary from 40 m to 80 m and depths from 0 to 0.50 m. In some portion near entrance the bed levels are 1.0 to 1.5 m above CD. For rest of portion up to Badabutai the channel bed levels vary from 0.5 m below CD to 0.5 m above CD. From Badabutai (chainage 39.7 Km) to Mahanadi the channel widths are about 80m or more and depths 1.0 to 1.50 m. With capital dredging of about 1.20 MCM a navigational channel of 45 m width and 2.0 m depth below CD could be created.

5.3.4 Mahanadi Reach From Kharnasi outfall in Mahanadi to Paradip Fishing Jetty (Chainage 41.1 to 47.7 Km)

This reach of Mahanadi is close to Mahanadi outfall in to Bay of Bengal on north of Paradip port. The tidal range in this reach is about 3.0m. The river widths in this reach are 400 m to 1300 m and depths vary from 9.0 m to 25.0 m. Navigation is possible in this reach without dredging.

5.3.5 Approach Channel – Atharabanki to Paradip Stock yard (4 Km long)

This 4.0 Km long channel on right bank of Mahanadi just upstream of fishing harbour will serve as approach channel to the stock yard of Paradip port. The channel is more than 100 m wide throughout. The deeper portion of this channel is also about 50 m wide with bed levels about 0.50 m below CD. With capital dredging of about 0.30 MCM this could be used for proposed navigation.

5.3.6 Anticipated total capital dredging for Mangalgadi – Paradip route

The anticipated capital dredging reach wise is already discussed above. The total capital dredging for Mangalgadi- Paradip reach (old route) is 5.47 MCM as per GMI for a channel of 50 m (base width of 45m) and 2.0 m depth below CD.

5.4 Tantighai / Kani River Reach from Sujanpur to Padanipal

Tantighai / Kani River takes off from Kharsua at about 300 m upstream of Sujanpur weir and after flowing for distance of 45 km it again joins Kharsua at Padanipal. This branch of Kharsua is relatively narrow and deep. The Tantighai River gets bifurcated near village erda (at about 9 Km from Sujanpur weir or 36 Km upstream of Padanipal). The southern branch is deeper which carries major discharge. The northern branch is shallow and becomes relatively dry in lean season / summer. Both branches again join after flowing for 11 Km near Angeispur. About 15 Km reach upstream of Padanipal experience weak tidal flow. Details of various structures across Kani River are given in Table No. 5-3.

Table No. 5-3 Structures across Kani River

Chainage in Km from Padanipal	Details of Structure	Horizontal Clearance (metre)	Vertical Clearance above HFL* (metre)	Place
1.4	Concrete Road Bridge	30	6	Mangalpur
15.7	Bridge Under Construction	NA	NA	Krushnadasapur
28.1	Bridge Under Construction	NA	NA	Khemeswar / Dandishai
30.7	Concrete Road Bridge	35	5	Reapers
32.1	Bridge Under Construction	NA	NA	Aurangabad
44.2	Bridge Under Construction	30	6	Ramapur
45.0	Anicut (Barrage)	-	-	Sujanpur

* The Table above is taken from survey report of IWAI. It is felt that the vertical clearance mentioned may not be from HFL but may be from water level during survey or from LWL .

5.4.1 Kani Reach from Padanipal to Angeispur (Chainage 0 to 25 Km)

In this reach widths vary from 80 m to 150 m and depths vary from 1.0m to 3.0 m during survey period. There are three bends in this reach at chainage 7 Km, 11.8 Km and 12.5 Km and two bridges as mentioned in Table No. 5-3 above. There is existing bank protection in some reach along right bank.

5.4.2 Kani Reach from Angeispur to Sujanpur (Chainage 25 to 45.4 Km)

In the reach from chainage 25 to 36 Km widths are 50 to 90 m and from chainage 36 to 45 Km widths are 80 to 170 m. Water depth during survey period (June- August 2013) were 2 to 5m. Four road bridges as given in above Table No. 5-3 are located in this reach. At about 400 m downstream of Kharsua Bifurcation an old damaged Sujanpur weir is located.

5.4.3 Estimated Capital Dredging along Kani River

As per estimates of GMI, capital dredging along Kani River will be about 25,81,140.07 cum.

5.5 Estimation of Dredging Quantities

The dredging quantities have been computed for 3 m depth and 2 m depth with respect to chart datum from the survey charts. The calculations for dredging quantities have been carried out for side slopes 1:2 and 1:3, keeping the bottom base width as 45 m. For operating the waterway from Jokadia to Paradip Port / Dhamra Port by setting up a temporary terminal at downstream Jokadia barrage for plying 500 Ton Barges, we can go in for 2 m depth of dredging with side slopes 1:2. These dredging quantities are based on surveys carried out by M/s GMI during the year 2013 for IWAI, which were forwarded to WAPCOS. These quantities are likely to undergo changes, especially change in bed profile due to floods in August 2014 and thereby these quantities can be taken as tentative quantities for tendering purpose. Actual quantities can be arrived during pre-dredging surveys, before the actual commencement of dredging work and the dredging quantities can be finalized based on pre-dredging surveys and post-dredging surveys. These dredging works need to be synchronized with development of temporary terminal at Jokadia and permanent terminal on Pankapal. Estimated quantities are given in Table No. 5-4. Break up details are given in following tables.

Table No. 5-4 Abstract of Dredging Quantities for NW – 5 Stretch from Pankapal to Dhamra & Paradip Port (Via Tantighai / Kani River System)

Pankapal to Jokadia			
		Depth w.r.t. CD (as given in GMI survey report)	**Quantity in M Cum**
a	Slope 1:3	3m CD	1.65
b	Slope 1:3	2m CD	1.06
c	Slope 1:2	3m CD	1.55
d	Slope 1:2	2m CD	1.01
Jokadia to Sujanpur			
a	Slope 1:3	3m CD	2.89
b	Slope 1:3	2m CD	1.55
c	Slope 1:2	3m CD	2.75
d	Slope 1:2	2m CD	1.49
Sujanpur to Padanipal			
a	Slope 1:3	3m CD	7.17
b	Slope 1:3	2m CD	4.49
c	Slope 1:2	3m CD	6.73
d	Slope 1:2	2m CD	4.29
Padanipal to Mangalgadi			
a	Slope 1:3	3m CD	0.21
b	Slope 1:3	2m CD	0.04
c	Slope 1:2	3m CD	0.21
d	Slope 1:2	2m CD	0.04
Mangalgadi to Dhamra			
a	Slope 1:3	3m CD	Dredging is not required in this stretch
b	Slope 1:3	2m CD	
c	Slope 1:2	3m CD	
d	Slope 1:2	2m CD	
Mangalgadi to Paradip			
a	Slope 1:3	3m CD	4.12
b	Slope 1:3	2m CD	2.63
c	Slope 1:2	3m CD	3.88
d	Slope 1:2	2m CD	2.49

Table No. 5-4a Pankapal to Jokadia

Sl. No.	Name of Stretches / Details	Dredging quantity (M Cum)
(a)	Slope 1 in 3, 3 m depth	1.652
(b)	Slope 1 in 3, 2 m depth	1.056
(c)	Slope 1 in 2, 3 m depth	1.553
(d)	Slope 1 in 2, 2 m depth	1.007

Table No. 5-4b Jokadia to Sujanpur through Kharsua River

(a) Dredging depth - 3 m and side slope 1:3		
Name of Stretches / Chainages	**Dredging Quantity (M Cum)**	**Length (m)**
Chainage from 107 Km to 110 Km	0.34	3100
Chainage from 111 Km to 115 Km	0.90	6000
Chainage from 116 Km to 121 Km	0.72	6200
Chainage from 122 Km to 128 Km	0.41	6600
Chainage from 129 Km to 134 Km	0.51	5600
Total	**2.89**	**27500**
(b) Dredging depth - 2 m and side slope 1:3		
Name of Stretches / Chainages	**Dredging Quantity (M Cum)**	**Length (m)**
Chainage from 107 Km to 110 Km	0.18	3100
Chainage from 111 Km to 115 Km	0.55	6000
Chainage from 116 Km to 121 Km	0.41	6200
Chainage from 122 Km to 128 Km	0.14	6600
Chainage from 129 Km to 134 Km	0.25	5600
Total	**1.55**	**27500**
(c) Dredging depth 3m CD and side slope 1:2		
Name of Stretches / Chainages	**Dredging Quantity (M Cum)**	**Length (m)**
Chainage from 107 Km to 110 Km	0.323	3100
Chainage from 111 Km to 115 Km	0.854	6000
Chainage from 116 Km to 121 Km	0.687	6200
Chainage from 122 Km to 128 Km	0.396	6600
Chainage from 129 Km to 134 Km	0.490	5600
Total	**2.750**	**27500**

(d) Dredging depth - 2m and side slope 1 : 2		
Name of Stretches / Chainages	**Dredging Quantity (M Cum)**	**Length (m)**
Chainage from 107 Km to 110 Km	0.177	3100
Chainage from 111 Km to 115 Km	0.529	6000
Chainage from 116 Km to 121 Km	0.397	6200
Chainage from 122 Km to 128 Km	0.140	6600
Chainage from 129 Km to 134 Km	0.247	5600
Total	**1.489**	**27500**

Table No. 5-4c Sujanpur to Padanipal via Kani River

Sl. No.	Name of Stretches / Chainages	Dredging Quantity (M Cum)
(a)	Chainage 0 m to 47000 m, 1:3 side slope, 2m depth CD	4.49
(b)	Chainage 0 m to 47000 m, 1:3 side slope, 3m depth CD	7.17
(c)	Chainage 0 m to 47000 m, 1:2 side slope, 2m depth CD	4.29
(d)	Chainage 0 m to 47000 m, 1:2 side slope, 3m depth CD	6.73

Table No. 5-4d Padanipal to Mangalgadi

Sl. No.	Name of Stretches / Details	Dredging Quantity (M Cum)
(a)	Slope 1 in 3, 3 m depth	0.212
(b)	Slope 1 in 3, 2 m depth	0.039
(c)	Slope 1 in 2, 3 m depth	0.207
(d)	Slope 1 in 2, 2 m depth	0.038

Table No. 5-4e Mangalgadi to Paradip Port

(a) Dredging Depth 3 m CD and Side Slope 1:3		
Name of Stretches / Survey Chart Ref.	**Dredging Quantity (M Cum)**	**Length (m)**
MP1	0.00	6300
MP2	0.00	5700
EXTN1	0.86	10100
EXTN2	1.59	9400
EXTN3	1.30	6600
MP8	0.38	4100

MP9	0.00	5000
Total	**4.12**	**47200**
(b) Dredging Depth 2 m CD and Side Slope 1:3		
Name of Stretches / Survey Chart Ref.	**Dredging Quantity (M Cum)**	**Length (m)**
MP1	0.00	6300
MP2	0.00	5700
EXTN1	0.54	10100
EXTN2	1.02	9400
EXTN3	0.88	6600
MP8	0.20	4100
MP9	0.00	5000
Total	**2.63**	**47200**
(c) Dredging Depth 3 m CD and Side Slope 1:2		
Name of Stretches / Survey Chart Ref.	**Dredging Quantity (M Cum)**	**Length (m)**
MP1	0.00	6300
MP2	0.00	5700
EXTN1	0.81	10100
EXTN2	1.49	9400
EXTN3	1.21	6600
MP8	0.36	4100
MP9	0.00	5000
Total	**3.88**	**47200**
(d) Dredging Depth 2 m CD and Side Slope 1:2		
Name of Stretches / Survey Chart Ref.	**Dredging quantity (M Cum)**	**Length (m)**
MP1	0.00	6300
MP2	0.00	5700
EXTN1	0.51	10100
EXTN2	0.97	9400
EXTN3	0.81	6600
MP8	0.19	4100
MP9	0.00	5000
Total	**2.49**	**47200**

Pankapal to Dhamra / Paradip Port (Through Tantighai / Kani River System)

- For side slopes of 1:3, Bottom width of 45 m and depth of 3 m w.r.t. CD, for plying 2000 T barges (at pay load at 1500 T).

Sl. No.	Stretch of Waterway	Dredging Quantity
(a)	Pankapal to Jokadia	1.65 M Cum
(b)	Jokadia to Sujanpur	2.89 M Cum
(c)	Sujanpur to Padanipal	7.17 M Cum
(d)	Padanipal to Mangalgadi	0.21 M Cum
(e)	Mangalgadi to Paradip Port	4.12 M Cum
	Total Quantity	**16.04 M Cum**

- For plying 500 Ton Barges with Temporary terminal Downstream of Jokadia Barrage with 2 m depth w.r.t. CD, with side slopes of 1:2 and bottom width of 45 m.

Sl. No.	Stretch of Waterway	Dredging Quantity
(a)	Pankapal to Jokadia	Not required to be dredged
(b)	Jokadia to Sujanpur	1.49 M m^3
(c)	Sujanpur to Padanipal	4.29 M m^3
(d)	Padanipal to Mangalgadi	0.04 M m^3
(e)	Mangalgadi to Paradip Port	2.49 M m^3
	Total Quantity	**8.31 M m^3**

- For plying 500 Ton Barges with Temporary terminal at downstream of Sujanpur Weir with 2 m depth w.r.t. CD, side slopes of 1:2 and bottom width of 45 m.

Sl. No.	Stretch of Waterway	Dredging Quantity
(c)	Sujanpur to Padanipal	4.29 M m^3
(d)	Padanipal to Mangalgadi	0.04 M m^3
(e)	Mangalgadi to Paradip Port	2.49 M m^3
	Total Quantity	**6.82 M m^3**

Pankapal to Dhamra / Paradip Port (Through Kharsua (Bypassing Sujanpur Weir)

- Since Sujanpur weir cannot be dismantled and in case State Govt. do not permit construction navigational locks at Sujanpur, the waterway route of Kharsua River reach from Rishipur (located of Kharsua and Tantighai bifurcation) to about 9 km downstream upto Bouda can be used, where a link between Kharsua and Tantighai is probably possible as per the imagery. This needs to be explored by IWAI by a survey. In case the link is possible, the dredging quantity for this reach of 9 km needs to be included and the corresponding quantity deducted from the downstream of the Sujanpur route. The dredging quantities are given below for the same assumptions as indicated above.

Sr. No.	Stretch of Waterway	Dredging Quantity
(a)	Pankapal to Jokadia	Not required to dredged
(b)	Jokadia weir to Sujanpur weir	1.49 M m^3
(c)	Kharsua (Rishipur) bifurcation point to Bouda (bypassing Sujanpur weir)	1.44 M m^3
(d)	Bouda (Kharsua River) to Tantighai link may be 500 m to 800 m length	Needs to be surveyed / ascertained by IWAI
(e)	Tantighai Bouda linkage point to Padanipal (excluding the 9.5 km of upstream Tantighai stretch)	4 M m^3
(f)	Padanipal to Mangalgadi	0.04 M m^3
(g)	Mangalgadi to Paradip Port	2.49 M m^3
	Total Quantity	**9.42 M m^3**

IWAI can get the linkage of Bouda (Kharsua River) to Tantighai surveyed and take a decision on this route of waterway in consultation with State Govt. and make this waterway operational immediately if required. Detail of Kharsua dredging quantities given in Table No. 5-5.

Table No. 5-5 Dredging Quantity from Chainage 107000 m to 96000 m along Kharsua Reach (Rishipur to Bouda 9 km Stretch) (Bypassing Sujanpur Weir)

Sr. No.	Name of Stretches	Dredging Quantity (M Cum)
(a)	Slope 1 in 3, 3 m depth	2.85
(b)	Slope 1 in 3, 2 m depth	1.55
(c)	Slope 1 in 2, 3 m depth	2.64
(d)	Slope 1 in 2, 2 m depth	1.44

If this alternative route does not materialize, then we are left with only one alternative to navigate along Kharsua River all along upto Padanipal, where the dredging quantities will be high. It is also difficult to maintain the depths in channel in this waterway as the river is wide compared to Kani river system. Break up of Kharsua dreading quantities is given in Table No. 5-6.

Table No. 5-6 Computation of Dredging Quantity from Sujanpur to Padnipal through Kharsua River Reach

Sr. No.	Proposed Slope and Dredging Depth	Dredging Quantity (M Cum)
(a)	Slope 1 in 3, 3 m depth	11.20
(b)	Slope 1 in 3, 2 m depth	8.05
(c)	Slope 1 in 2, 3 m depth	10.37
(d)	Slope 1 in 2, 2 m depth	7.56

<u>Pankapal to Dhamra / Paradip Port (Through Kani via., as per modified route)</u>

For operating the waterway from Jokadia to Paradip Port / Dhamra Port by setting up a temporary terminal at downstream Jokadia barrage for plying 500 Tonne Barges, we can go in for 2 m depth of dredging with side slopes 1:3.

Since Sujanpur weir is to be retained and reconstructed as Barrage with Navigation locks, immediate operations of 500 DWT vessels upto Jokadia through Kharsua/Tantighai/Kani via Sujanpur will not be feasible. Also, bypass through Kharsua stretch from Bodua to Sujanpur is not feasible. Therefore, to start immediate operations, a suitable location for temporary terminal have to be identified on the downstream of Sujanpur weir.

As suggested by the Additional Secretary, MoST, this location is to be suggested by Port Authorities in consultation with State Government Officials. However, the suggested location for setting up of Temporary Terminal at downstream side of Sujanpur weir have been shown on a Google image (Refer Figure 11 – 1b) and included in this Report.

The dredging quantities as furnished in this chapter have been estimated for the surveyed stretch of Tantighai / Kani River stretch. Based on the recent discussions with State Government on 12th December 2014, the waterway route from Tantighai/Kani River has been modified via., enroute through Erada, Nau Nai, Dahikhai, Bajapada and Padanipal (Refer Fig.9.6), as there are number of low level bridges in this stretch.

The dredging quantities in this modified route can be assessed only after completion of detailed surveys. However, the dredging quantity shall be comparatively more in this stretch, as this is not in the course of Main River and the river is relatively shallow.

Chapter 6

Prediction of Water Levels

Chapter 6 – Prediction of Water Levels

6.1 General

The bed profiles of Brahmani / Kharsua / Kani rivers in the reach dharma to Pankapal are presented in Figure No. 6-1 to 6-5. These bed profiles indicate that the bed slopes are not uniform but vary along the reach. Also river widths vary along the reach. Therefore, the flow will be non-uniform along the reach for a given discharge. The water depths for a given discharge will also vary from place to place. A mathematical model capable of handling unsteady non-uniform flow in river network provides useful tool to predict water surface profiles by using appropriate boundary conditions. For present studies MIKE11 software of DHI is used to predict water surface profiles for the range of discharges. The mathematical model studies were taken up to assess water flow parameters (water levels / depth, velocities) along different river reaches for lean season low flows as well as for different high discharges during period of floods. Assessment of flow parameters will help to decide suitability of river reaches for proposed navigation and the range of discharges and possible period for safe Navigation.

6.2 The Model Reach and Boundary Conditions

The Brahmani / Kharsua / Kani river network from Pankpal to Mangalgadi was simulated in the model using the river bathymetry and bank topography data. The Brahmani river data after bifurcation at Jenapur was not available hence Brahmani branch was terminated near Jenapur. Both Kharsua and Kani were simulated as per survey data available.

At the upstream boundary, various discharges were given as boundary condition (flood hydrographs can also be given as boundary condition, however for present studies constant discharges were adopted). At Mangalgadi, tide was given as boundary condition. The Discharges of 50 cum/sec, 100 cum/sec and 200 cum/sec were considered for the model runs corresponding to lean season. For Monsoon season, ranges of discharges varying from 1000 cum/sec to 10,000 cum/sec were proposed to be considered. The Manning's roughness coefficient of 0.30 was adopted. The model was calibrated with the available gauge discharge data at Jenapur and Jokadia.

Initially model runs were taken for lean season discharges under existing conditions i.e. without dredging. For these runs, the downstream boundary water level was kept at 0.00 MSL (2.0 m CD). The predicted water surface profiles are presented in Figure No. 6-1 to 6-4 for discharge 100 cum/sec. These plots indicate some steep slope reaches in Kharsua and Kani river where water depths are less than 1.0 m for discharges 50 to 100 cum/sec (and velocities could be in the range 1.50 to 2.00 m/sec). In rest of reach water depths will be about 2.0 m and velocities 0.50 to 0.60 m/sec.

Figure No. 6-1 Water Surface Profile along Kharsua 105 to 150 Km (Kani – Kharsua Bifurcation to Pankapal) – Model run for Q = 100 cum/sec

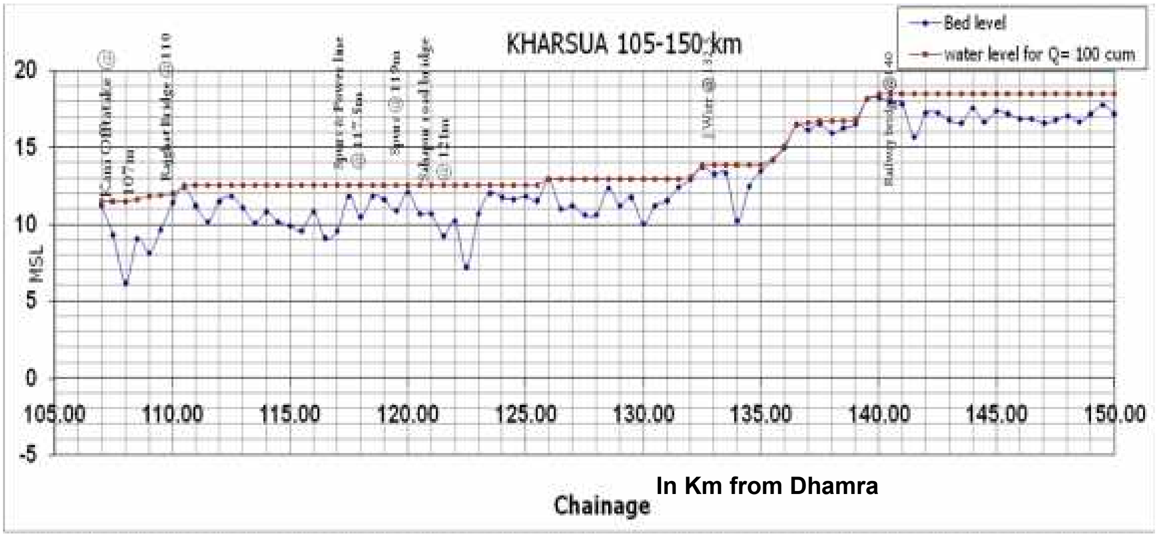


Figure No. 6-2 Water Surface Profile along Kharsua 60 to 105 Km (Padanipal to Kani - Kharsua Bifurcation) – Model run for Q = 100 cum/sec

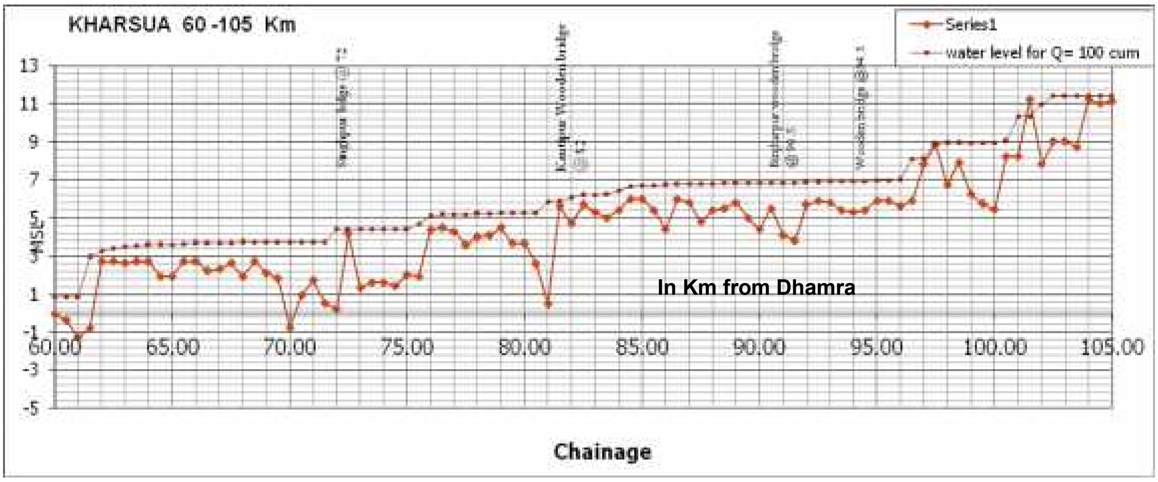
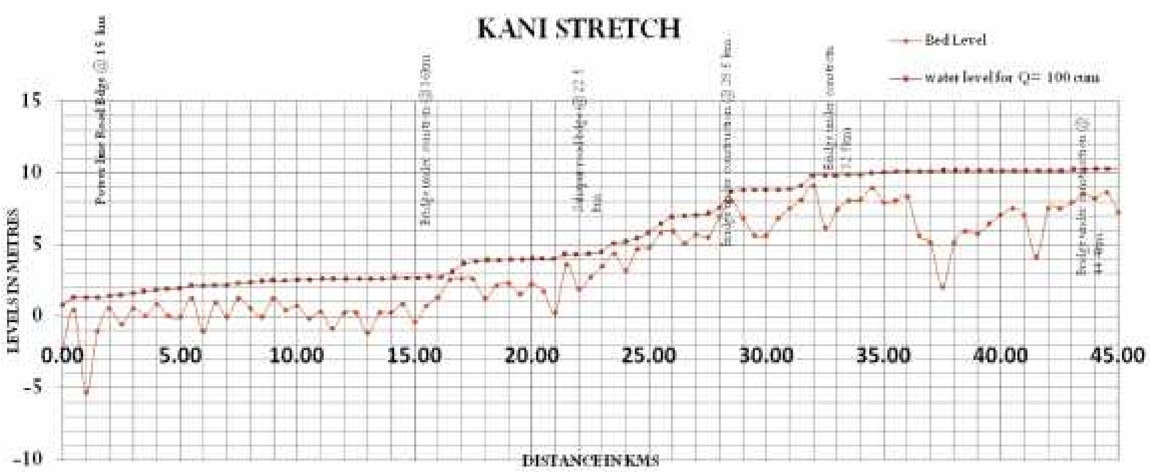


Figure No. 6-3 Water Surface Profile along Kharsua 60 to 105 Km (Padanipal to Mangalgadi) – Model run for Q = 100 cum/sec

Figure No. 6-4 Water Surface Profile along Kani River 0 to 45 Km (Padanipal to Kani – Kharsua Bifurcation) – Model run for Q = 100 cum/sec



Chainage in Km from Padanipal

Further model runs were taken with dredging of a channel 50 m wide , 2.0 m deep channel (with side slopes 1: 3) below CD. The results for these model run for discharges 50, 100, 200 and 200 cum/sec indicate flow depths from 1.50 to 2.50 m and velocities in the range 0.50 to 0.60 m/sec in most of reach except steep slope reaches as indicated above. These model studies indicate that minimum discharge of the order of about 50 to 100 cum/sec will be essential to facilitate navigation during lean season provided that this discharge is confined to the 50 m wide dredged channel.

Model runs with higher discharges for 500 cum/sec, 1000 cum/sec, 3000 cum/sec, 5000 cum/sec, 7000 cum/sec, 10372 cum/sec (highest observed post

Rengali), and 11326 cum/sec (Post Rengali design discharge at the head of Brahmani delta as per WRD) were necessary to investigate following important aspects.

- Up to which flood discharge navigation can take place safely
- To assess locations of overtopping of river banks / flood embankment if any along the reach and corresponding discharge
- To assess the HFL in Brahmani and Kharsua at prospective terminal sites to decide Safe Grade Elevation (SGE) for stockyard and other important areas which should be free from flooding.

However, these mathematical model studies were not in our present scope of present work hence were not taken up. These studies would also require bank to bank river cross section data which will have to be prepared from the survey charts. It is recommended that these mathematical studies for higher discharges may be carried out, as a separate study through CWPRS / WAPCOS.

Studies carried out so far indicate that dredging of a channel 50 m wide (base width of 45m) and 2 to 3 m depth below CD, navigation during lean season will be feasible for discharges 50 to 100 cum/sec. It will be necessary take care of steep slope reaches to bring down velocities in safe navigation limits especially in between chainage 20 Km to 28 Km as shown in Figure No. 5-5.

Chapter 7

Review of the Proposed Waterway

Chapter 7 – Review of the Proposed Waterway

7.1 General

The proposed navigation routes from Pankpal to Dhamra via Mangalgadi and Mangalgadi Paradip along the revised alignment were reviewed on the basis of analysis of hydrological data (available discharges and their duration especially during lean season being critical period due to reduced depths) and hydraulic data, mathematical model results and survey charts discussed above. This review was in light following aspects.

- Depths available for navigation
- Structures (weirs, bridges) across the proposed route and vertical and horizontal clearance
- Radius of bends on the route
- Dredging quantity involved

7.2 Flow Depths

As per IWAI notification for (base width 45 m) class III waterways, minimum water depth of 1.70 m and bottom width of 50 m is necessary for a navigation channel. Considering some additional bottom clearance of 0.30 m the total depth of about 2.0 m plus is preferable. Available river bathymetry data indicate that the Kharsua river reach downstream of Padanipal is tidal reach where depths more than 4 m below CD prevail even during lean season. The problem of required depth will arise in the reach upstream of Padanipal where depths will be controlled by discharge, channel geometry and bed slope. Hydraulic calculations as well as preliminary mathematical model studies for this reach with trapezoidal channel section of 50 m width and existing natural slopes indicate that for 2m and 3m flow depths, the required discharge will be in the 60 cum/sec and 125 cum/sec respectively. The analysis of hydrological data presented in Chapter 4 indicate that in post Rengali period (1986 to 2013) the lean season flows in river Brahmani at Jenapur have improved significantly.

Flows less than 50 cum/sec may prevail for 7 to 15 days in a year. During lean season, almost entire flow goes through Kharsua and Tantighai / Kani. Discharges in the different range will prevail for period as below

- 50 to 100 cum/sec : 20 to 90 days
- 100 to 200 cum/sec : 60 to 150 days
- Above 200 cum/sec : 150 to 240 days

Thus, navigation should be possible for a period of about 300 days in a year excluding flood periods and period of flow less than 50 cum/sec .The only challenge will be to confine flows of 50 to 125 cum/sec in dredged channel width of 50 m in alluvial rivers with natural width varying from 100 to 500m. Without any special protection measures the dredged channel in alluvial bed will tend to be wider and shallower due to flow. No permanent protection measures to maintain dredged deep channel banks will be possible. Any protection measures by conventional methods will be damaged or destroyed during flood periods.

7.3 Vertical and Horizontal Clearance, Bend radius

The vertical and horizontal clearance specified for class III waterways is 7m and 50 m respectively. The reference level for vertical clearance in rivers is the Navigational High Flood Level (NHFL) which is flood level corresponding to 20 year return flood (5% frequency). For the proposed routes under consideration there are bridges and power lines crossing the river channels as already mentioned in Tables No. 6-1 and 6-3. The vertical clearance mentioned in these tables from survey report do not mention reference HFL at different bridges / power lines across the river. Also there are many bends on the proposed navigation route marked on the survey charts. As per IWAI notification, the radius of curvature of bends on route for class III waterway should be minimum 700 m or more.

7.3.1 Review of Pankapal – Mangalgadi to Dhamra Route

The longitudinal section of the existing river bed and banks and the chart datum adopted for survey by IWAI / GMI along the reach are presented in Figure No. 5-1 to 5-5. The proposed level for dredging along this route will be about 2.0 m below CD. Thus, with the proposed dredging about 2.0 m depths will be available in the 50 m wide channel proposed. It is also found that navigation channel route through Tantighai / Kani River will be relatively better option from consideration of water depths available, extent of dredging than a route through Kharsua river reach from Sujanpur to Padanipal. As mentioned earlier the anticipated capital dredging between Sujanpur to Padanipal along Kharsua is about 6.820 MCM is more than predicted dredging of about 2.581 MCM along Tantighai-Kani route. Along Tantighai/Kani River, there are six bridges where vertical clearance is 4.0 to 6.0 m at lean season water level. The numbers of bends with radius of curvature less than 700 m along Tantighai / Kani are however three times more than those along river Kharsua river reach.

For the proposed routes under consideration there are bridges and power lines crossing the river channels as already mentioned in Tables No. 5-1 and 5-3. Following para gives the description about vertical and horizontal clearance aspects along this route.

Pankapal - Mangalgadi to Dhamra (Along Brahmani-Kharsua)

Bridges:	10 Nos. (2 on Brahmani, 8 on Kharsua) with vertical clearance from 5 m to 10 m (probably above lean season water level)
Power/Telephone lines:	10 Nos. with clear clearance 2 to10m

Along Tantighai / Kani river

Bridges:	6 Nos.

Bends along the Route

On this route Pankpal to Dhamra there are many bends along Kharsua as well as Tantighai / Kani River. From study of survey charts and navigation route marked on these charts the locations and chainages of the bends have been identified and are given below.

- **Kharsua River Reach from Pankpal to Sujanpur**

  From Pankpal to Jokadia weir there are no bends with radius less than 700 m which is the limit for class III water level. From Jokadia to Sujanpur (the location of bifurcation of Tantighai and Kharsua) there are two bends at chainages 117.4 km and 123.5 km where radius of curvature is 525 m and 432 m respectively (i.e. less than 700 m specified).

- **From Sujanpur to Padanipal along River Tantighai / Kani**

  In this reach of about 45m along Tantighai / Kani River, there are 24 bends where radius of curvature is less than stipulated limit of 700 m. The radius of curvature in these bends varies from 190 m to 620 m. The chainage of the bend location and respective radius (R) are given below. All chainages are from as per survey charts (zero chainage at Padanipal and 45 Km at Kharsua and Tantighai bifurcation)

Chainage in Km	Radius	Chainage in Km	Radius
5	(R – 350 m)	26.2	(R – 620 m)
6.6	(R – 350 m)	30.0	(R – 500 m)
7.2	(R – 330 m)	32.7	(R - 375 m)
10	(R – 500 m)	33.3	(R – 500 m)
11.8	(R – 250 m)	35.4	(R – 410 m)
13	(R – 310 m)	37.1	(R – 250 m)
13.8	(R – 340 m)	39.4	(R – 250 m)
14.7	(R – 435 m)	41.3	(R - 320 m)
21	(R – 290 m)	41.8	(R - 375 m)
21.7	(R – 500 m)	42.3	(R – 190 m)
25.5	(R – 190 m)	43.3	(R – 310 m)
24.2	(R – 500 m)	44.6	(R – 440 m)

It is felt that since the Tantighai / Kani River has some acute bends and also its width is limited to 100 to 150 m. It is very difficult to achieve desired bend radius of 700 m. Attempts may be made to provide cutoffs (where site conditions permit) to increase the radius of curvature or to avoid acute bends. This may involve land acquisition. It is also suggested that the width of dredged channel may be increased on bends which will facilitate better navigation along the bends.

Along the Kharsua river reach between Sujanpur to Padanipal there are ten bends with radius of curvature varying from 180 m to 700 m. The chainages of locations of these bends and corresponding radius (R) are as given below.

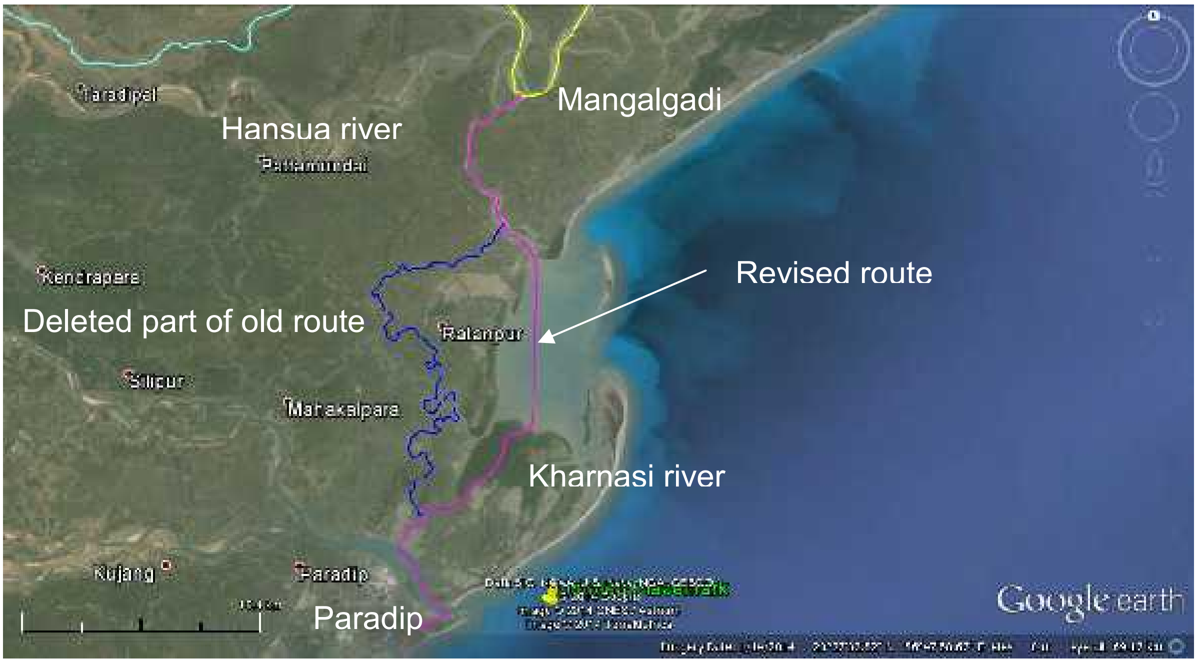
Chainage in Km	Radius	Chainage in Km	Radius
62.4	(R – 375 m)	81	(R – 625 m)
71	(R – 210 m)	84	(R – 500 m)
71.5	(R – 286 m)	92	(R – 375 m)
72	(R – 324 m)	101	(R – 580 m)
73	(R – 180 m)	107	(R – 700 m)

In the remaining reach from Padanipal to Dhamra via Mangalgadi the bend radius there are only two locations where the bend radius is close to less than 700 m.

7.3.2 Mangalgadi to Paradip Route (Revised Proposal)

The alignment of the revised route passes through river Hansua, and a bay at the mouth of Hansua, Gobri and Kharnasi rivers and then goes through Kharnasi and Mahanadi as shown in Figure No. 1-2 and Figure No. 7-1. (Figure No. 7-1 also indicates the rejected portion of old alignment passing through Babar, Nuna, Gobriand, Ramchandi Galia creeks.) On this route there is only one bridge (chainage 6.70 Km) and one power line (6.50 Km) at Rajnagar. Vertical clearance above HWL is 5.70 m and 7.0 m for the bridge and the power line. In Hansua river, depth of the order of 4 to 6 m below CD are available and no dredging is required except some portion before mouth. In the bay portion and Kharnasi River, with the proposed dredging of about 2 m below CD, adequate depths will be available for proposed navigation.

Figure No. 7-1 Alignment of Mangalgadi to Paradip route (Old and New)



On the proposed alignment through Hansua river there are 3 bends with radius of curvature is close to 700 m. On river Kharnasi there are 3 bends with radius less than 300 m. Especially near fishing jetty at village Badatubai the Kharnasi river undergoes through a U shape bend where radius is 250 to 300m.It is recommended that a bypass channel may be considered to avoid this U bend as well as traffic congestion near fisheries jetty. Rest of the route through Kharnasi, Mahanadi and through bay between Hansua and Kharnasi outfall is free from any restrictive bends.

This route being in tidal reach, adequate depths will be available after proposed capital dredging of about 2.66 MCM estimated by IWAI. Maintenance dredging may be necessary in the bay portion as Hansua and Gobri rivers are expected to bring in sediment during monsoon. This sediment is likely to settle in the creek portion (on downstream of outfalls of these rivers) where navigation route is proposed. The boundary of Gahirmatha wild life sanctuary is located on east of the proposed navigation route in this creek as shown in Figure No. 7-2 and 7-3.

Figure No. 7-2 Boundaries of Gahirmatha Wild life Sanctuary

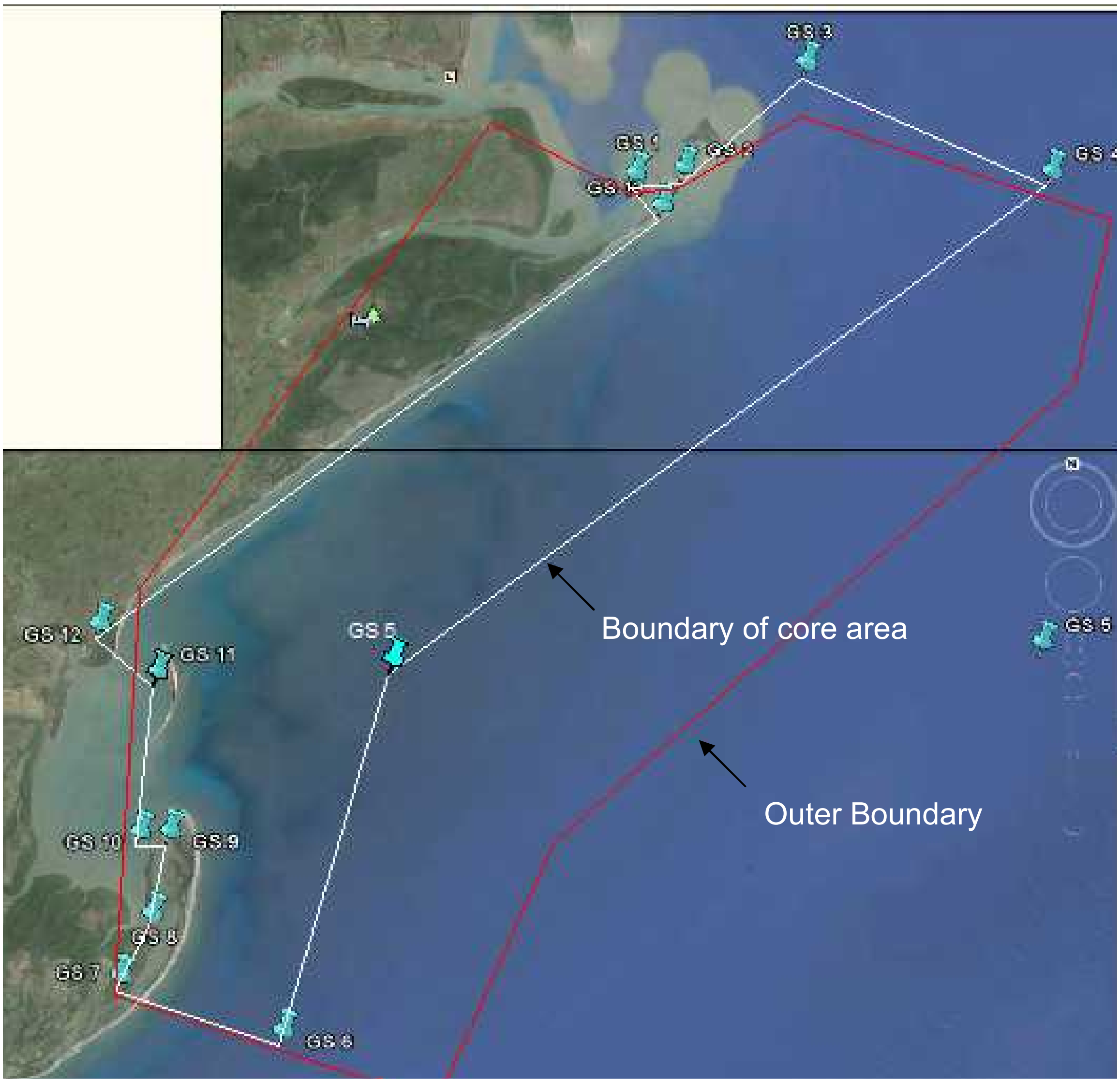
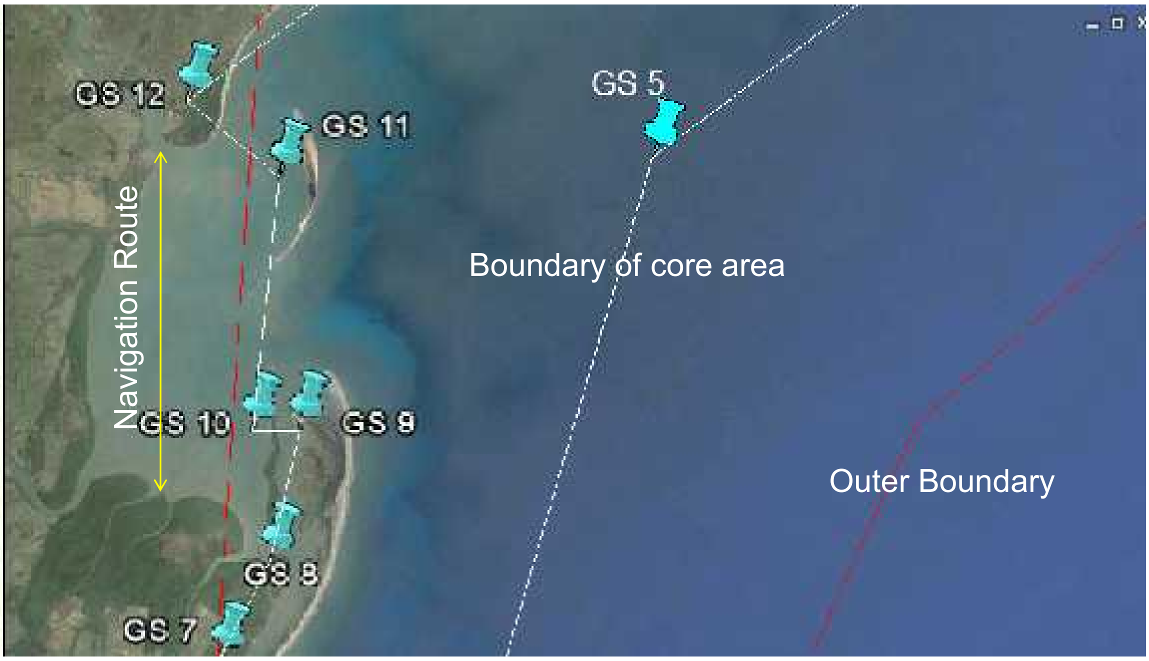


Figure No. 7-3 Mangalgadi- Paradip Route and Marine Wild life Sanctuary Boundary



These figures indicate outer boundary and core area boundary of the sanctuary which extends from Kharnasi river mouth to Dhamra. The proposed route to Paradip runs almost parallel to the western boundary of Gahirmatha wild life sanctuary at a distance of about 2.50 to 3.0 Km.

Chapter 8

Identification of Structures for Demolition and Modification

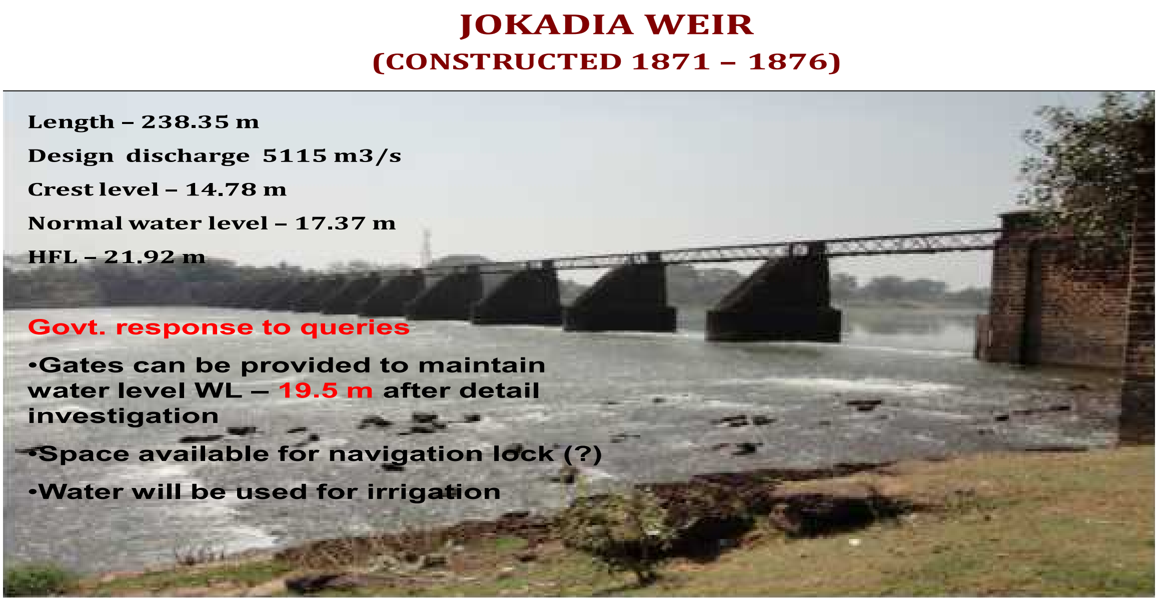
Chapter 8 – Identification of Structures for Demolition and Modification

8.1 Jokadia and Jenapur Weir

Along the route Pankapal to Mangalgadi there are three weirs which are required to be reconstructed / demolished. These are Jokadia weir on river Kharsua about 6 Km downstream of railway bridge (Figure No.8-1 and 8-2),

Figure No. 8-1 Location Jokadia weir on River Kharsua

Figure No. 8-2 Jokadia weir on River Kharsua



Jenapur anicut / weir on river Brahmani at about 2 km downstream of railway bridge and a weir on river Tantighai / Kani (a branch of Kharsua) near at about 400m downstream of bifurcation from Kharsua near Sujanpur (Figure No. 8-3 and 8-4).

Figure No. 8-3 Location of Sujanpur weir

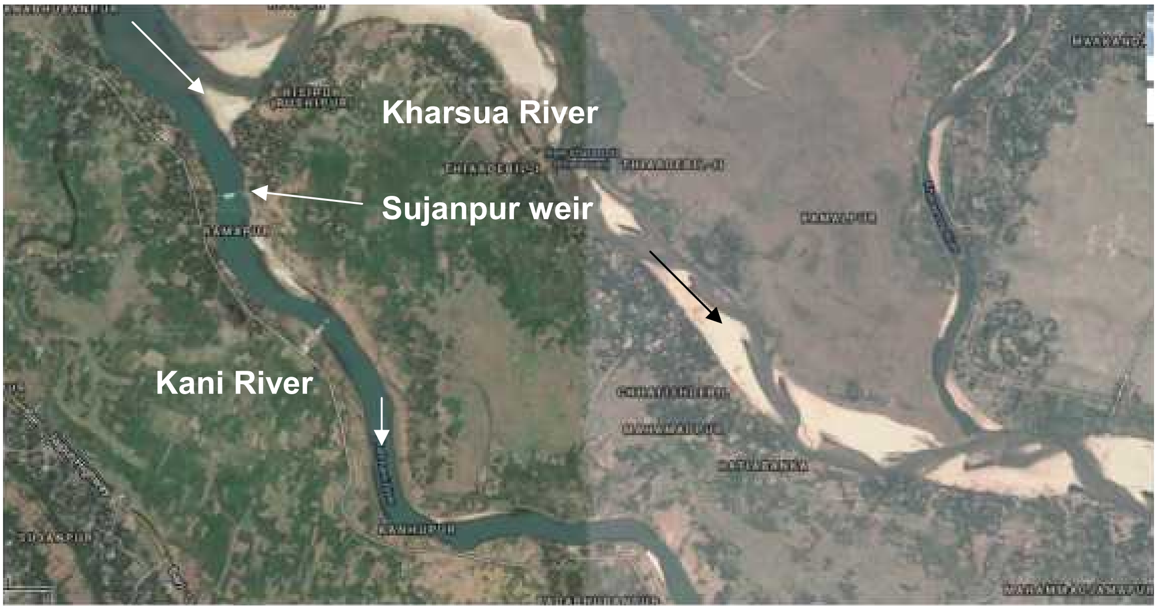
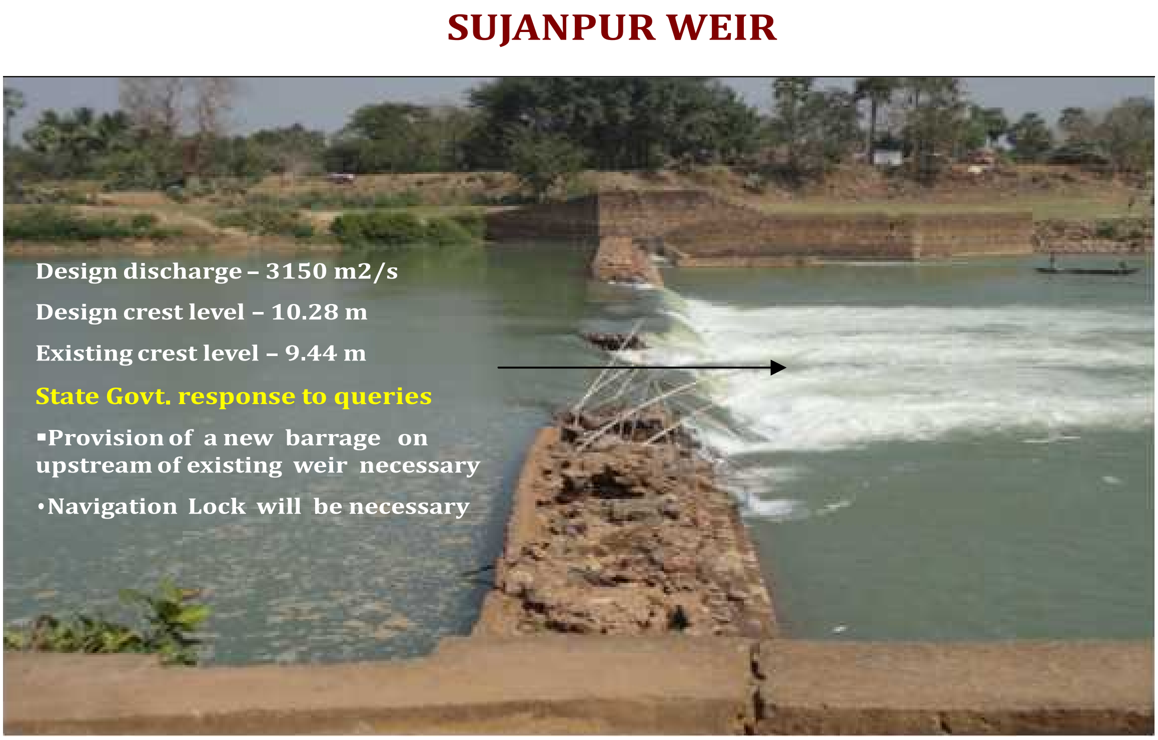


Figure No. 8-4 Existing Sujanpur weir on Tantighai / Kani River



The hydraulic details of these structures as per the data supplied by Odisha WRD are given in Table No. 8-1 as follows.

Table No. 8-1 Hydraulic details of the weirs

Item	Structure and its hydraulic design details		
	Jokadia weir	**Jenapur weir**	**Sujanpur weir**
River & year of construction	Kharsua !871- 1876	Brahmani 1871-1876	Tantighai
Design Discharge	5681 cum/s	4700 cum/s	3150 cum/s
Length of weir	238.35 m	1219 m	129.25 m
Weir crest level	14.78 m	17.41 m	10.28 / 9.44 m
Scouring sluice crest level	14.78 m	15.12 m	-
Design pond level	17.37 m	17.41 m	-
Number of spans	14	-	-
HFL (observed in 1975)	21.92 m	22.65 m	-
Embankment top level	23.12 m	24.28 m	16.0 m
Purpose	Irrigation	Irrigation	Flood escape

As per information from Odisha WRD, at present the irrigation canals from Jokadia and Jenapur weir are defunct. The WRD has a proposal to reconstruct Jokadia weir for utilizing non monsoon flows for irrigation. For this purpose it is proposed to reconstruct the Jokadia weir as per following design details.

- Crest level: 14.78 m (same as existing)
- Pond level: 19.50 m
- Operating level: 19.00 m
- Number of spans with gates - 14 including 2 spans for under sluice

- Length of each span: 18 m
- Crest level of Under sluice: 13.78 m

This proposal of WRD if implemented will be beneficial for inland navigation along NW-5. Apart from increased irrigation, this proposed weir will lead to following benefits.

- Depths of about 2.5 to 4.5 m above CD will be created (without dredging) in about 25 km reach upstream of Barrage which will facilitate navigation.
- Due to increased depths, adequate submergence created at intakes of various industries will ensure required discharge throughout the year.

For implementing re-construction of Jokadia weir as per the new proposal of WRD it will be necessary to raise the crest level of Jenapur weir from 17.41 m to 19.5 m so that the stored water will not spill into Brahmani river. The WRD Odisha has proposed to construct the temporary bund of 3.5 m to 4 m height and 800 m length across Brahmani branch every year. But this bund will have to be removed before onset of monsoon. Instead of this, either the crest level of the existing Jenapur weir could be raised by about 2 m or suitable gates could be provided over the entire length of weir of 1219 m. Probably provision of gates for such a long length and their operations during high flows in monsoon may pose problems apart from high capital and running and maintenance cost. It is felt that raising of the crest level of Jenapur weir by 2.5 m to a level of 20.5 m without any gates may be a better proposal from construction as well as operation aspects. However, impact of raising height of this weir on the flood levels on upstream need to be studied especially for high flood events. From the point of navigation aspects re-construction of Jokadia barrage with a pond level of 19.5 m or if possible 20.0 m will be very much beneficial for the proposed route of NW-5. Provision of a navigation lock will be essential at the Jokadia weir. If there is land availability problem on the either banks then the lock may be provided in some of the intermediate bay of the structure. Maintaining pond level 19.5 m or 20.0 m on upstream of Jokadia weir may not pose any flooding or submergence problem as the existing bank levels along Kharsua and Brahmani are of the order of 22 to 24 m. This barrage is one of the five barrages proposed for extension of NW-5 from Jokadia to Samal barrage therefore re-construction of the barrage should be taken up as per the hydraulic design proposed by WRD except that the pond level may be kept at 20.0 m instead of 19.50 m. It is felt that Physical/ mathematical model studies may be carried out at CWPRS to assess performance of proposed barrage at Jokadia and weir at Jenapur and also to asses impact of raising of Jenapur weir level from 17.41 m to 20.0 m. on rise in flood levels in upstream reach. The mathematical model studies may be of help to assess long term impact of these structures on morphology of river reach from Jokadia barrage to about 25 km upstream and downstream. These studies need to be initiated separately by IWAI.

8.2 Sujanpur Weir

As already mentioned above, the Sujanpur weir on Tantighai River is a low crest weir constructed basically to divert lean season flow to Kharsua River and allow part of the flood discharge through Tantighai during monsoon. The weir presently is in a bad shape and the crest of the weir has been eroded partly. The design crest level was 10.28 m whereas the existing crest level is 9.44 m. If the Tantighai / Kani river channel is to be utilized for navigation then this weir will pose difficulties. The alternative solutions will be either to dismantle Sujanpur weir totally or re-construct it at existing crest level and make a provision of navigation lock. As per information received from IWAI, the water resources department of the state Government is not in favour of dismantling Sujanpur weir. Also, the WRD Odisha has also stated that no land is available on either banks for construction of navigation lock.

It is felt that impact of removal of Sujanpur weir need to be considered before taking such a decision. If Sujanpur weir is removed then it is likely that the Tantighai river bed, upstream of the weir will get eroded during flood season resulting into overall lowering of the river bed on upstream of the weir location. As a result of this, during the lean season, more flow will go through Tantighai

River that may create water availability problems in Kharsua River reach between Sujanpur and Padanipal especially during lean season. During monsoon the flood discharge through Tantighai / Kani may increase. If Sujanpur weir is required to be maintained, then the weir crest needs to be repaired and finished properly. A navigation lock will have to be constructed within the weir preferably at channel centre since the Odisha WRD , government has intimated that land is not available on the banks. However, during site inspection of Sujanpur weir it was seen that adequate space was available between the abutment of weir and the flood embankment on both the banks to facilitate construction of the navigation locks on both banks. If weir is to be dismantled then navigation locks may not be necessary.

It is recommended to conduct mathematical model studies to assess impact of removal of Sujanpur weir on morphology of river Kharsua and Kani on upstream and downstream of the weir.

8.3 Structures on Mangalgadi Paradip Route

As per the earlier alignment of this route through Hansua, Babar, Nuna, Gogari and Ramchandi Galiya rivers there were many bridges, few locks and one barrage along the route which required either dismantling or re-construction. However, with the revised route which runs through Hansua River and then Kharnasi River, these obstacles are eliminated and there is no dismantling or re-construction on this route.

8.4 Existing / under construction structures

The existing / under construction, low level bridges along this route from Tantighai / Kani needs to be reclaimed to maintain the navigable vertical clearance. These issues have discussed in detail already been in Chapter 7.

Chapter 9

Constraints of the Proposed Waterway

Chapter 9 – Constraints of the Proposed Waterway

9.1 Pankapal – Jokadia – Sujanpur – Padanipal – Mangalgadi – Dhamra (Via Tantighai / Kani) Route

Along this route adequate depths will be available after dredging but maintaining these depths in navigation channel of width of 50 m (base width 45m) in alluvial river bed of bank to bank width 250 m to 500 m in Kharsua river and 100m to 125 m in non-tidal reach will be a major challenge. There are some reaches in Kharsua and Tantighai / Kani river where steep bed slopes will generate velocities of the order of 1.50 m/sec during lean season flows. Apart from this, vertical clearance at bridges / telephone lines and radius of curvature on number of bends along Tantighai / Kani will not be as per norms of IWAI. In respect of these constraints, WAPCOS have following views.

- In the Tantighai / Kani river each between chainage 22 Km and 28 Km (chainages as per survey charts) the river bed levels change by about 6 m to generate bed slope of about 1/1000. This steep slope may result in depths less than 2 m in this reach during lean season flows less than 100 m^3/sec. Provision of flatter slope will increase dredging quantities.

- As per section IV of IWAI notification, for waterways of all classes the vertical clearance at bridges / power lines / telephone lines is with reference to the water level corresponding to a navigable flood discharge which is of 5% frequency (i.e. flood of 20 year return period). For Brahmani river at Jenapur, this flood is of the order of 10000 m^3/sec. About 60% of this i.e. 6000 m^3/sec could be considered for Kharsua river reach up to bifurcation at Sujanpur. For Kani River reach, 3000 m^3/sec could be considered. These are relatively high floods when water depths are likely to be 6 to 8 m and the water levels will be such that the criteria of 7 m vertical clearance navigable with respect to HFL as specified for class III waterway will not be satisfied at all bridges on Kani as well as on Kharsua.

- Some compromise is necessary on the issue of navigable flood discharge and the vertical clearance. The navigable flood discharge as well as limit of vertical clearance may have to be lowered. The possibility of vessel designs with low vertical clearance might have to be explored.

- As per the section IV , the radius of curvature on bend for class III waterway should be 700 m. This condition is not satisfied at about 24 locations on Kani river and at 2 locations on Kharsua. Some bends have radius less than 300 m. The Kani river width being relatively less (in the range 100 to 125 m) it is very difficult to provide large radius of curvatures at these bends. IWAI may have to also look in to this aspect. To sort out this issue either suitable cut-offs need to be provided to avoid bends or the norms need to be reviewed Provision of cut-offs may need land acquisition.

- As per report of WRD of Odisha Government, Sujanpur weir is to be maintained or reconstructed as Barrage with provision of gates. This will require navigation lock at Sujanpur weir. We would like to mention that this Sujanpur weir can be repaired and maintained in the present form, may be with increased height instead of constructing new barrage and provide land for construction of navigational locks.

9.2 Discussions on alternate routes through Tantighai / Kharsua, if Sujanpur weir is to be maintained

In the reach between Sujanpur / Rishipur to Padanipal two options available for navigation routes are Kharsua river channel and Tantighai / Kani river channel. The Kharsua river channel is less suitable for following reasons.

- The river bed has aggraded due to which less flow of water during lean season as compared to Tantighai / Kani river

- The bank to bank width of alluvial river bed is 250 to 400m. It also has large shoals through which meandering deep channel flows. It will be very difficult to maintain navigation channel of 50 m width and 2 m depth. No permanent protection to the banks of this 50 m wide dredged deep channel is feasible. Any protection to the provided dredged channel will get washed / damaged during monsoon flows.

- Capital and Maintenance dredging will be relatively more than that in Tantighai / Kani which is relatively narrow river with width of about 100m .

Suitability of Tantighai / Kani river channel for proposed navigation route is due to following reasons

- River width in the reach of about 30 Km from Sujanpur to Dandishai is about 80 to 100 m and the deep channel is less meandering

- In the lean season, major part of Kharsua river discharge flows into Tantighai

- Capital and Maintenance dredging will be relatively less

- The reach of about 15 Km from Dandishai to Padanipal has tidal flow and better depths

The Odisha State water resources department has conveyed that the Sujanpur weir which serves as flood escape cannot be dismantled as removal of weir will increase flood levels along Tantighai / Kani. State Government has suggested that the navigation be planned through Kharsua River rather than Tantighai. WRD has also suggested that if weir is to be removed then a barrage should be provided. In that case provision of a navigation lock will be necessary. WAPCOS feel that this Sujanpur weir can be repaired and maintained in the present form, may with increased height instead of constructing new barrage and provide land for construction of navigational locks.

9.3 Alternate route – Jokadia / Pankapal to Dhamra / Paradip

In view of urgency of IWAI to start cargo movement between Jokadia / Pankapal to Dhamra / Paradip Port, the following alternatives were considered keeping in view of the various difficulties / constraints discussed earlier.

(a) Maintain Sujanpur weir as it is and provide navigation locks on either banks or one bank of Tantighai river

Government of Odisha has denied availability of space on the river banks for construction of navigation locks. However, during site visit it was seen that adequate space on both river banks was available between weir abutments and the flood embankment on the river banks. The distance between weir abutment and flood embankment was about 80 m. Therefore, navigation locks could be constructed on both banks. In view of urgency of IWAI, till the time navigation locks are constructed, cargo movement could be made through Kharsua river reach from Rishipur (location of Kharsua and Tantighai bifurcation) to about 9 Km downstream upto Bodua where a link between Kharsua and Tantighai is possible (please refer Figure No. 9-1). At about 1.5 Km downstream of Bodua, the river Tantighai bifurcates near village Erda (Figure No. 9-2). This area needs to be got surveyed by IWAI for further examination.

Figure No. 9-1 Kharsua and Tantighai River reach Downstream of Sujanpur

Figure No. 9-2 Tantighai River bifurcation at Erda

The channel on west (marked in blue colour) is the Tantighai channel which is relatively deeper and about 80 to 100 m wide is proposed for Navigation especially during non-monsoon period. The other channel on East gets bifurcated again at a distance of about 1.5 Km near Udayanpur village. These two channels again meet Tantighai channel near village Angeshi after travelling a distance of about 8 Km. Between village Erda and Angeshi there are three bridges on Tantighai where vertical clearance of about 5 to 6 m will be available during non-monsoon period for flows less than 500 m^3/sec. During non- monsoon period, the flows in the two channels near Udayanpur on east of Tantighai channel are relatively less as these channels appear to be relatively shallow. (Satellite imageries of lean season in 2014 and 2006 vide Figure No. 9-3 and 9-4 indicate little flows in these channels) . However, these channels needs to be got surveyed by IWAI for clear understanding of the river datum.

Figure No. 9-3 Satellite Imagery of February 2014 showing alternate channel

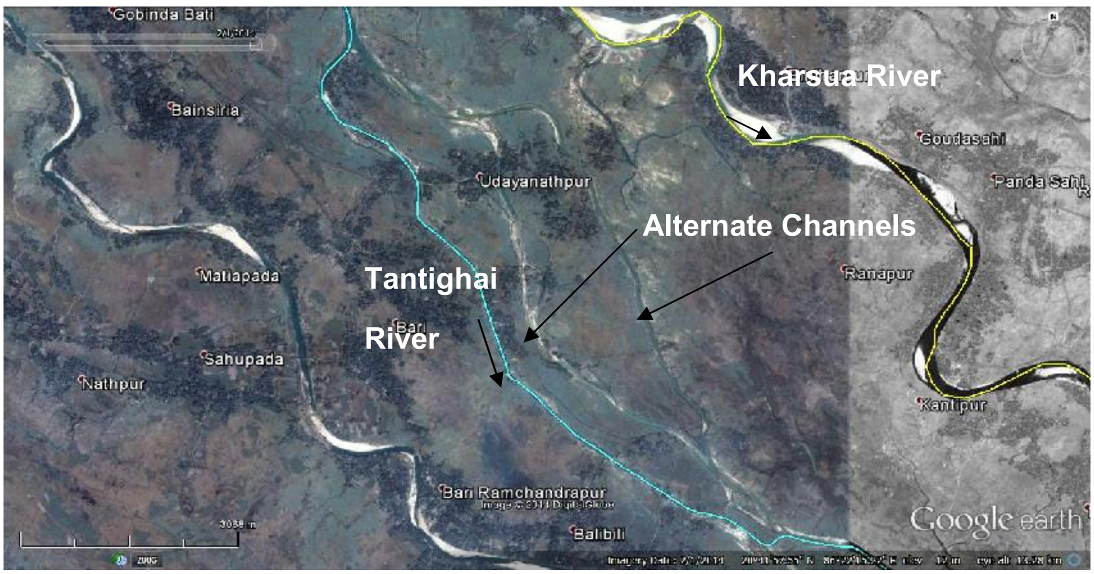
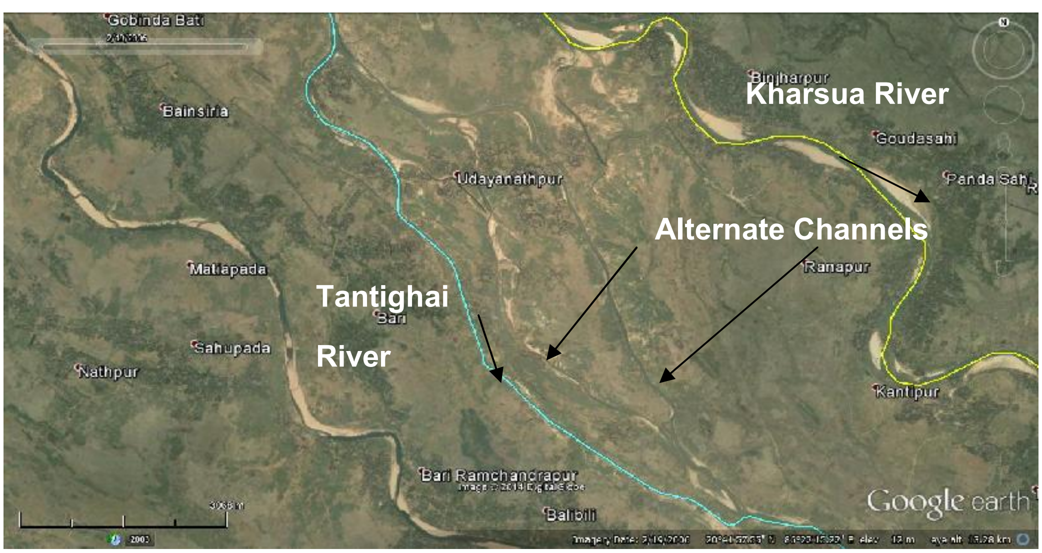
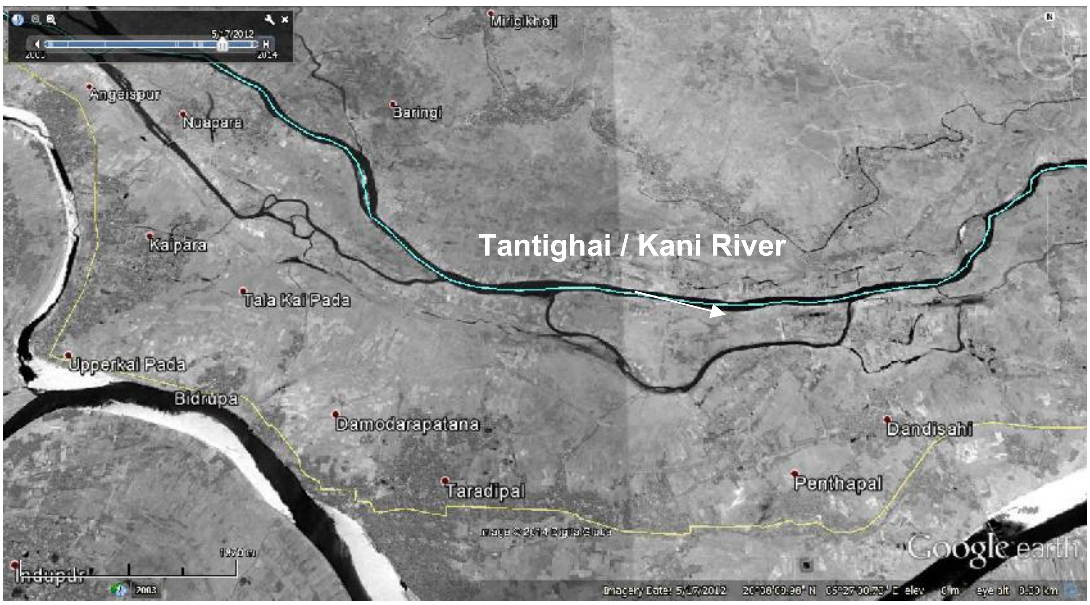


Figure No. 9-4 Satellite Imagery of February 2006 showing alternate channel



There are no bridges on these two channels. It is proposed that during high flow periods in monsoon when vertical clearance at four bridges along Tantighai will be inadequate the barges could be diverted through the central channel running from Udayanpur to Angeshi. At about 6 Km downstream of Angeishi one bridge is under construction near village Krushandaspur / Dandishai (Figure No. 9-5).

Figure No. 9-5 Tantighai / Kani river reach downstream of Angeishi



The well foundation of the bridge was in progress during summer of 2014. The superstructure of this bridge could be redesigned to provide desired freeboard for dominant flow during monsoon. In the further stretch of river up to confluence with Kharsua near Padanipal, there is only one bridge near Mangalpur /Manpur at about 1.5 Km upstream of Padanipal. The vertical clearance at this bridge is adequate even during moderate floods during Monsoon. There is need to conduct mathematical model studies for Brahmani – Kharsua - Kani river network for the reach from Pankapal to Dhamra and Hansua river mouth at Koilipur. These studies will be helpful to predict water levels, depths and velocities along various channels for different discharges. The topographical survey of all the major channels in network will be essential for these studies. However, these channels needs to be got surveyed by IWAI for clear understanding of the river system.

For making this route operational, a link of about 500 m length between river Tantighai and Kharsua will have to be investigated by IWAI and created with approval of State WRD. Once the navigational lock is ready, the Tantighai stretch between Sujanpur to Erda could be made operative.

(b) If space for navigation locks is not made available, then locks will have to be planned in the body of weir. Remaining things same as option no 1

(c) Reconstructing Sujanpur weir with crest level 1.5 to 2.0 m above the design crest level of 10.28 m and divert water to Kharsua to develop waterway up to Padanipal through Kharsua or partly through Kharsua and Tantighai.

This above proposal could be considered under following circumstances

- If no space is made available on river banks for construction of navigational lock at Sujanpur weir .
- The topographic and bathymetry survey as well as various other factors including opinion of Odisha WRD indicating difficulties in diversion of water from Kharsua to Tahtighai at Bouda
- The suggested alternate channel from Erda to Angeshpur on east of Tantighai river is not found suitable as per detail hydrographic surveys and morphological considerations

If WRD Odisha agrees to reconstruct Sujanpur weir with crest level raised by about 1.5 to 2 m then this could be implemented to develop navigation from Sujanpur / Rishipur to Padanipal through Kharsua. This re-constructed weir will have following impact on river stretches under consideration.

- The lean season flow in Kharsua will be improved. This will help to improve depths to some extent.

- Due to increased height of Sujanpur weir the lean season flow in Tantighai will be reduced or may become practically insignificant.

Mathematical model studies will be necessary to assess impact of reconstructed Sujanpur weir on distribution of flow in Kharsua and Tantighai for range of discharges during monsoon and non-monsoon period. Also the long term morphological changes in the two rivers can to be studied through the model studies.

9.4 Outcome of Discussions with Odisha State Water Resources Authorities regarding possible solutions to overcome constraints of proposed route Through Kharsua- Tantighai- Kani

Hon. Secretary ministry of surface transport called a joint meeting of officers of IWAI , Odisha State Transport and Water Resources department, Port authorities and other stake holders on 20 October 2014 to discuss various constraints as mentioned earlier. In this meeting following decisions were taken.

i. To develop the fairway initially for 2 mtr LAD between Jokadia to Dhamra and Paradip.

ii. To allow the construction of a new barrage with navigation lock across Tantighai at Sujanpur followed by removal of existing weir by State Govt considering the fact that the development of fairway having 3.0 m LAD throughout the year through this river system is only feasible for providing an economically viable waterways.

iii. To develop an alternative route through river Kharsuan from Sujanpur to Bodua with connectivity to Tantighai & Kani river system till the construction of a new barrage with navigation lock on Tantighai followed by removal of existing weir.

iv. To obtain the assurance and confirmation of Govt of Odisha on the maintaining of minimum 150 m^3/sec during the lean season from Nov to May, the re-construction of barrage with navigation lock at Jokadia and suitable structure at Jenapur on time bound manner.

v. State Government shall also consider and approve the proposal for developing an alternative route through Kharsuan and Bouda for 9 km having the linkage to Tantighai and Kani river system for execution & cargo operation on immediate basis.

vi. To issue immediate stoppage order for the ongoing construction work for the identified bridges having less navigation clearance across Tantighai and Kani river system with advice to the concerned for re-designing and modification to improve the navigation clearance and thereafter demolition of the same.

vii. IWAI also examine the feasibility of developing a fairway in other tributaries of Tantighai for navigation to avoid the re-construction & demolition of the bridges under construction & execution.

viii. IWAI to initiate the action for operation of suitable cargo vessel between Dhamra to Sujanpur on pilot project basis within Feb 2015

ix. DPCL shall identify the site near Sujanpur for setting up of temporary terminal facilities for movement of their cargo through waterways.

x. Chairman, IWAI may hold a meeting with Chief Secretary and other officials of Govt of Odisha preferably by 2nd week of November 2014 to carry forward the project further.

Accordingly meetings were held with Odisha State authorities on 15th November and 12th December 2014 to sort out concerned issues. Following was outcome on various issues during meeting on 12th December 2014.

1) Assurance for maintaining 150 m^3/s during lean season.

The minimum discharge of 150 m^3/s in Brahmani-Kharsua-Tantighai-Kani river system during lean season was considered necessary for maintaining LAD of 3.0m for facilitating safe navigation of cargo vessels of above 1500 T capacity due to the alluvial and meandering nature of the river system.On further analysis,it was confirmed by WRD that 150 m^3/s discharge cannot be maintained for only navigation purpose during lean season due to various requirements such as water for Power generation, irrigation, Industries and urban/rural water supply.

In order to ensure LAD of 3.0m during lean season, it was however suggested to examine the feasibility of creation of reservoirs along the proposed route by providing control structures at four locations as shown in Fig 9.6. One barrage with navigation lock will be on Tantighai river at Sujanpur and another gated weir on river Kharsua at downstream of confluence with Burha river (an outshoot of Baitarni). This arrangement will create reservoir in upstream reach of Kharsua river which may improve LAD towards Jokadia.

Out of the balance two control structures, one will be on Tantighai river at Erada(Chingudia)for diverting the flow towards Dahikhai river and other at Ratlam to divert flow from Nuanai to Dahikai river for developing a navigation channel with adequate water depth.

These four control structures shall be designed and built at low crest levels with gates.The WRD suggested that the normal water levels in these reservoirs should be 1.2 m below the top level of the flood embankment. It was also suggested by WRD that if necessary, the bank levels may be raised where ever the existing bank levels are lower.

With regard to maintain adequate depth in non-tidal reach of Tantighai-Dahikhai-Kani river system, it was proposed to examine the necessity for construction of one more control structure (weir) with navigation lock upstream of Padanipal in Kani river.

IWAI will further examine these proposals in detail by undertaking a mathematical model study of this network system and finalise the project proposal accordingly in consultation with WRD, Government of Odisha.

2) Reconstruction of Sujanpur weir with a Navigation lock

WRD had already expressed need of retaining Sujanpur weir and also agreed that the weir need to be reconstructed with gates and Navigation lock which will facilitate creation of reservoir in upstream to provide required LAD for navigation and also regulate water during flood period. Sujanpur weir should be reconstructed with original design crest level along with a navigational lock

3) Developing an alternate route partly through Kharsua at Bodua escape

The site condition seen during joint visit on 11 December 2014 indicated that a link between Kharsua and Tantighai near Bouda will not be feasible since Tantighai river bed was observed to be at lower level than Kharsua river. Such a link without control structure may attract more flood in Tantighai river system during monsoon and reduce flow in downstream reach of Kharsua river during lean season. Hence the proposal is not acceptable to Odisha Government and accordingly WRD suggested that navigation should be limited upto downstream of Sujanpur weir till the construction of barrage/weir with navigation lock at Sujanpur is completed and made operational.

4) Design and reconstruction of Jokadia and Jenapur Barrage with a Navigation lock

WRD informed that the necessary action is being taken for finalising the design as per the navigation requirements based on information given by IWAI/WAPCOS.

5) Further scientific study and analysis with mathematical model

It was emphasised that mathematical model studies for flow conditions in Brahmani and its tributaries from Talcher to Mangalgadi should be studied for different flood discharges as well as lean season discharges. The required river topography/ Bathymetry data as well as gauge-discharge data will be supplied to the extent available by WRD and IWAI.

9.5 Proposed route from Pankapal to Padanipal through Kharsua / Tantighai / Dahikhai / Kani rivers and necessary arrangements to improve LAD

Out of the entire route from Pankapal to Dhamra and Pardip via Mangalgadhi, the stretch from Pankapal to Padanipal is dependent on upland discharge for required depths for navigation. From the analysis of daily discharge data at Jenapur for post Rengali period of 28 years, WAPCOS studies have already indicated that required discharge of **150 m^3/s for 3 m LAD will not be available at Jenapur in lean season.** The Odisha WRD has also confirmed that it will not be possible to maintain this discharge only for navigation purpose. The WRD has agreed for creation of pools/ponds to get required LAD by reconstruction of existing barrages/weirs and also suggested construction of some new barrages on Kharsua, Tantighai , Naunai and Kani at locations as shown in Fig 9.6. On the basis of available bathymetry data of Tantighi/Kani in the reach from Sujanpur to Padanipal feasibility of this proposal was studied. In addition to navigation locks at Jokadia and Sujanpur two more navigation locks will be necessary for this proposal.

Reconstruction of Jokadia Barrage with a Navigation lock and Jenapur weir to maintain FRL at EL 20.0 m as recommended by WAPCOS will ensure required LAD in the reach from Pankapal to Jokadia. Reconstruction of Sujanpur weir as barrage with navigation lock on Tantighai river and construction of a new barrage on Kharsua river at about 500 m downstream of Burhi river confluence to maintain water level of EL 15m/16 m will ensure 3m LAD in the upstream reach up to Jokadia weir (Fig 9.6).The Sujanpur weir will have to be reconstructed as barrage with the original design crest level of EL10.28 m along with provision of Nanigation locks on both banks.The pond level of 15 m to 16 m (preferably 16 m) may not pose submergence problem along Kharsua river reach upstream of Rishipur (where Kharsua bifurcates create Tantighai river branch) as the bank levels are higher in most of reach. Marginal raising of embankments (by about 1 to 1.5 m) may be necessary in some small stretches upstream of Rishipur. Along Tantighai bank levels are of the order of EL 15.5 m. In order to take advantage of lean season flow available from Burhi river joining Kharsua at about 4.5 km downstream of bifurcation location,WRD Odisha has suggested construction of Barrage at abou 500 m downstream of confluence. In this reach from barrage location to Kharsua bifurcation at Rishipur on upstream natural high bank levels on both banks vary from 14.5 m to 15.5 m. In order to keep pond level of 16 m the embankment of 1.5 to 3 m height may be necessary considering 1.2 m freeboard suggested by WRD. In absence of survey data along Burhi river embankment requirement could not be assessed. It is necessary to collect these survey data which will also be necessary for model studies.The crest level of barrage may be kept at about EL 10m i.e.about 1 m above river bed level.

From Kharsua bifurcation at Rishipur it is proposed to take Navigation route through Tantighai, Bhongara (name as per SOI toposheet) ,Dahikhai and Kani rivers as could be seen from Fig 9.6. The reason for avoiding Tantighai/Kani river reach from Erada to Bajapada/Angeishpur was four bridges (completed or in advance stage of construction) in this reach with inadequate vertical clearance.The locations of all existing/under construction are indicated in Fig 9.6. The bridge on downstream of Sujanpur Barrage and near Manpur have relatively better vertical clearance Construction of one bridge on downstream of Angeishpur/Bajapada has been abandoned by state government. Therefore, on proposed route through Tantighai/Dahikhai/Kani there will be only two bridges with better vertical clearance. At about 10 km downstream of the Sujanpur weir, near Erada village the Tantighi river bifurcates in to Bhongara and Tantighai as could be seen from SOI topo map vide Fig 9.7. At 2 km downstream of bifurcation at Erada the Bhongara river bifurcates in to Naunai and Dahikhai rivers (Fig 9.7). These two branches again join after flowing for 6.7 km and ultimately again outfall in to Tantighai river at village Bajapada near Angeishpur (Fig 9.6 and 9.7). In order to divert flow through proposed route along Bhongara –Dahikhai- Kani barrages on Tantighai, Naunai and Kani are proposed by WRD at locations shown in Fig 9.6. Fig 9.8 shows detail view of Tantighai, Dahikhai and Naunai rivers along withproposed barrage location on Google image.

Study of bathymetry data of Tantighai/Kani river indicate that the bed levels are of the order of EL 9 m at Sujanpur, EL 8 m near bifurcation at Erada, EL 5.0 m near confluence with Dahikhai and 0.0 m near Padanipal. River bank levels along the reach are EL 15.5m at Sujanpur, EL 13 m at Erada. EL 9.0 m at Bajapada and EL 5.5m near Padanipal/Manpur.Dahikhai survey data isnot available, Considering the bed levels and bank levels alon Tantighai/Kani it is concluded that Pond level of Barrage at Padanipal cannot be kept more than EL 5.0 m. Therefore, one more barrage on Dahikhai river upstream of its confluence with Naunai will be necessary as shown in Fig 9.9 The pond level of this barrage on Dahikhai could be kept at EL 11 m. The crest level of this barrage could be kept at EL 6.0 m. A navigation lock will be essential at this barrage. After availability of detail survey of Dahikhai and Naunai rivers extent of embankments required could be assessed. If topographical conditions permit construction of Dahikhai barrage with minimum submergence along the banks of these two rivers then this barrage could be constructed after Naunai & Dahikhai confluence but just upstream of confluence with Tantighai as shown in Fig 9.9 If conditions permit construction of barrage at this location then the Barrage on Naunai will not be essential.

For the Barrage at downstream end of river Kani near Padanipal pond level of 5.0 m ,and weir crest level of EL 1.0 m is proposed. It is necessary to confirm that the vertical clearance at Manpur bridge at about 1.5 km upstream of Kani outfall in to Kharsua at Padanipal will be will be adequate for proposed navigation for pond level of 5.0 m. If vertical clearance is inadequate then this barrage need to be shifted about 1 km upstream of the bridge as shown in Fig 9.10. The river portion of about 5 km upstream of bridge experience good tidal flow and flow depths of 3m and above were reported during survey period. Hence with some maintenance dredging , required LAD could be maintained in the downstream reach from proposed weir at Manpur to Padanipal. On downstream of Padanipal up to Dhamra and Paradip adequatw flow depths will be available even during lean season as discussed. With the pond level of 5.0 m the embankment raising will be practically minimum to provide required free board since the bank levels are 5 m to 9m from Padanipal to Bajapada. Navigation locks will be necessary at this barrage. It may be mentioned that apart from barrages at Jokadia, Jenapur and Sujanpur all other barrages all other barrages are exclusively for creating required LAD and will be constructed for full bank to bank width and with weir crest level close to bed level. This is essentially to pass flood discharges without any obstruction.

Summary of salient features of various barrages from Pankapal to Padanipal

Sl. no	Barrage Name	River	Bed RL (m)	Pond RL (m)	Weir-crest RL (m)	Navigation lock	Bank RL (m) (existing)
1	Jokadia barrage	Kharsua	13.0	20.0	14.78	Required	22.0
2	Jenapur barrage	Brhmani	17.0	20.02	20.0	Nil	23.0
3	Sujanpur	Tantighai	9.0	16 or 15	10.28	Required	15.5
4	Barrage d/s of Burhi confluence	Kharsua	9.0	16 or 15	10.0	Nil	14.5
5	Tantighi barrage at Erada	Tantighai	8.0	11.0	9.0	Nil	13.0
6	Barrage at mouth of Naunai	Naunai	Data NA	11.0		Nil	Data NA
7	Bajapada Barrage	Dahikhai	5.0 Appr	11.0	6.0	Required	9 to10
8	Padanipal/Manpur	Kani	0.00	5.0	1.0	Required	5 to 5.5

All the pond levels and weir crest levels given above are based on available topographic data and these are required to be confirmed,refined and finalized on the basis of mathematical model studies for channel network of Brahmani river delta from Pankapal to Mangalgadi- Dhamara and Hansua river mouth in Bay of Bengal. The topographical/bathymetry data of all river channel including Burhi, Bhongara, Naunai and Dahikhai rivers will be essential and need to be collected.These studies may be carried out with and without proposed barrages to asses design adequacy and also impact of these structures on flow conditions in upstream and downstream reaches. The flow conditions predicted from these studies will be useful for assessing need of raising embankments/banks as well as detail planning and design of bank protection works. These studies should be carried out for flood conditions as well as lean season flows. Predicted water levels for lean season flows will be useful to assess dredging requirements in some critical reaches. However, with proposed ponds, capital dredging is likely to be reduced.

Need of integrated operation of all barrages:

Keeping in view the prime objective of maintaining required water levels in four ponds for almost entire year and also efficiently discharging high floods during monsoon will need integrated operation of these 7 or 8 barrages. With efficient integrated operation of these structures navigation will be feasible for maximum number of days in a year without aggravating flooding situation. The WRD Odisha will have to take care of this crucial aspect efficient functioning of this project to satisfy navigational as well as irrigation needs.

Measures for immediate operation of 500 DWT vessels:

The IWAI has urgency of starting immediate operation of 500 DWT vessels from Jokadia to Dhamra & Paradip till the time Jokadia barrage is reconstructed. A temporary terminal is proposed for this purpose. The WRD has denied dismantling of Sujanpur and has decided to convert into barrage. Therefore, vessels will not be able to cross Sujanpur weir and go to Jokadia till Sujanpur barrage is constructed with navigation locks. Therefore Addl. Secretary Ministry of surface transport has suggested to locate temporary terminal downstream of Sujanpur weir to start operations of 500 DWT vessels through Tantighai/Kani and Kharsua. As suggested by the Additional Secretary, MoST, this location is to be suggested by Port Authorities in consultation with State Government Officials. However, the suggested location for setting up of Temporary Terminal at downstream side of Sujanpur weir have been shown on a Google image (Refer Figure 11 – 1b) and included in the Report.

Details of proposed Cross structures in the modified route from Sujanpur to Padanipal via., Kani/Tantighai River:

Four Cross Structures have been proposed along the waterway in the modified route at Burah River confluence, Erada, Nua nai and Padanipal (Refer Fig.9.6), as there are number of low level bridges in the earlier route of Kani river for which the survey has been completed. The details of these four cross structures are as follows:

Sl.No.	Name of River	Width of River (m)
1	Burah River confluence	320 m to 350 m
2	Erada	130 m to 150 m
3	Nau Nai	80 m to 100 m
4	Padanipal	150 m to 180 m

These cross structures have been proposed along with gates and bridges and their location shall be finalised subject to mathematical model studies, detailed designs, investigations, etc., The cross structure / Barrage for Bajapada (Refer Fig.9.6) can be concluded only after conducting the mathematical model studies and hence the same has not been included in the Report

Fig- 9.6 Proposed cross structures in Tantighai-Kani river system

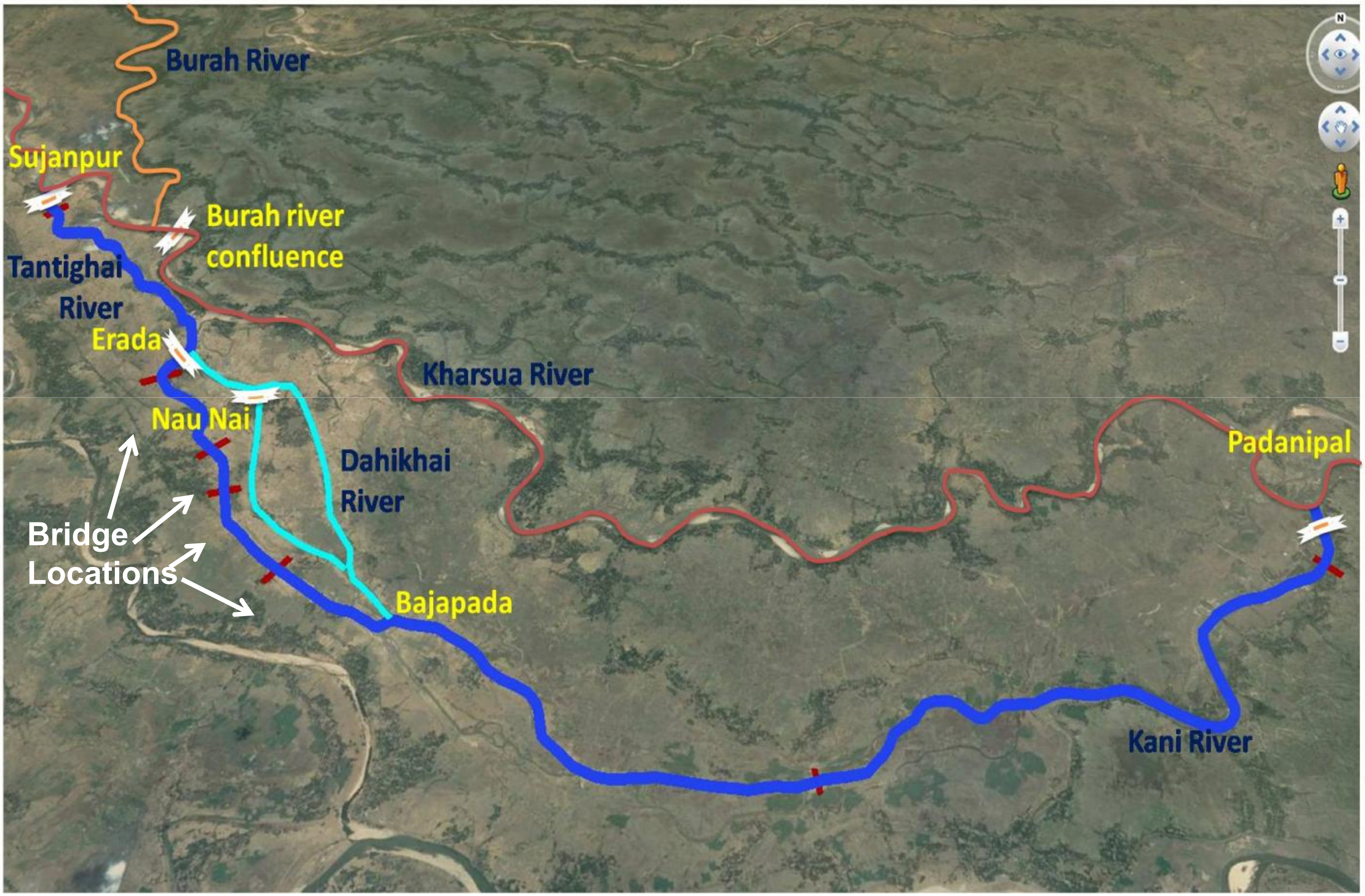
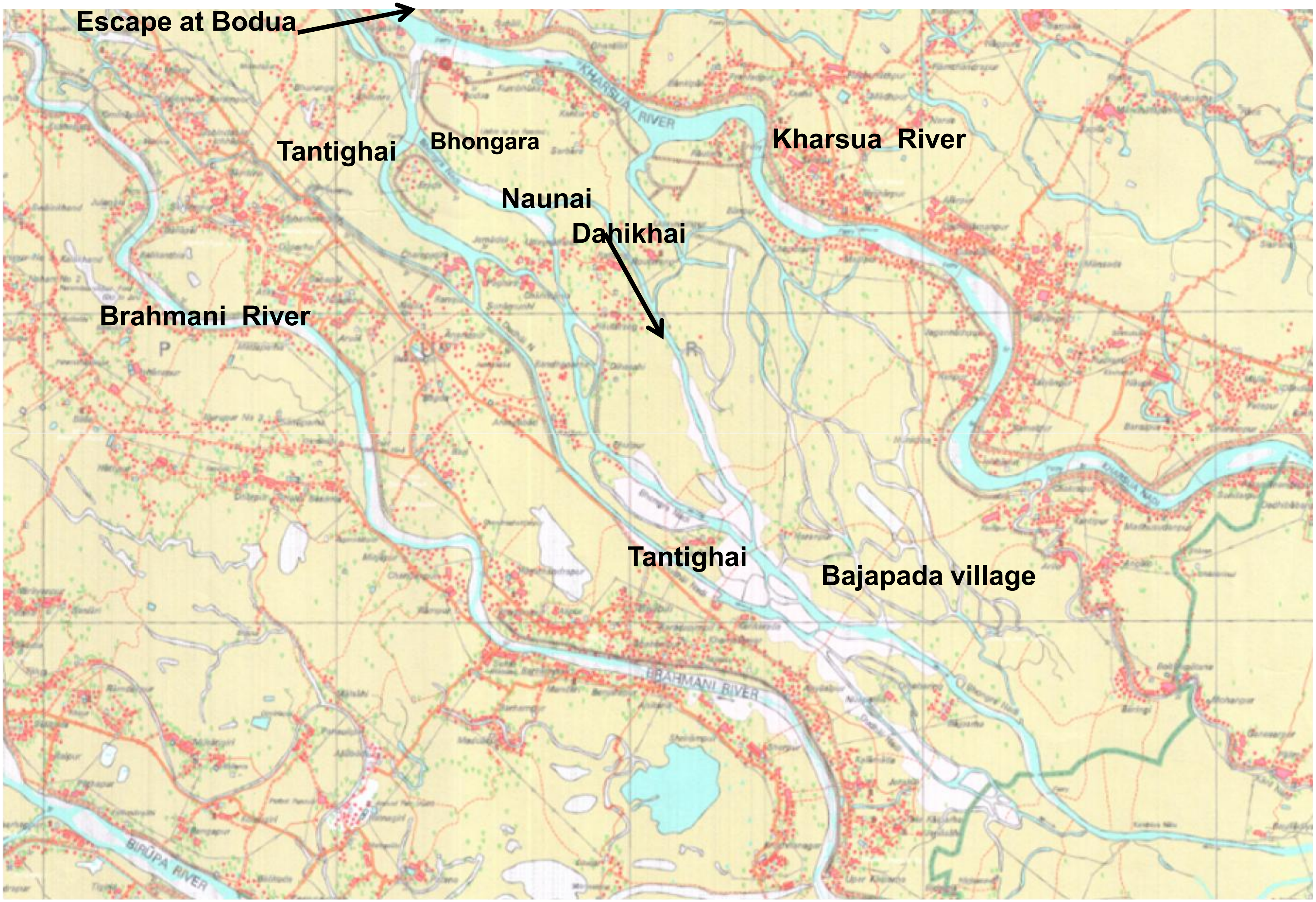


Fig 9.7- Tantighai , Naunai, Dahikhali and Kharsua Reach Downstream of Bodua



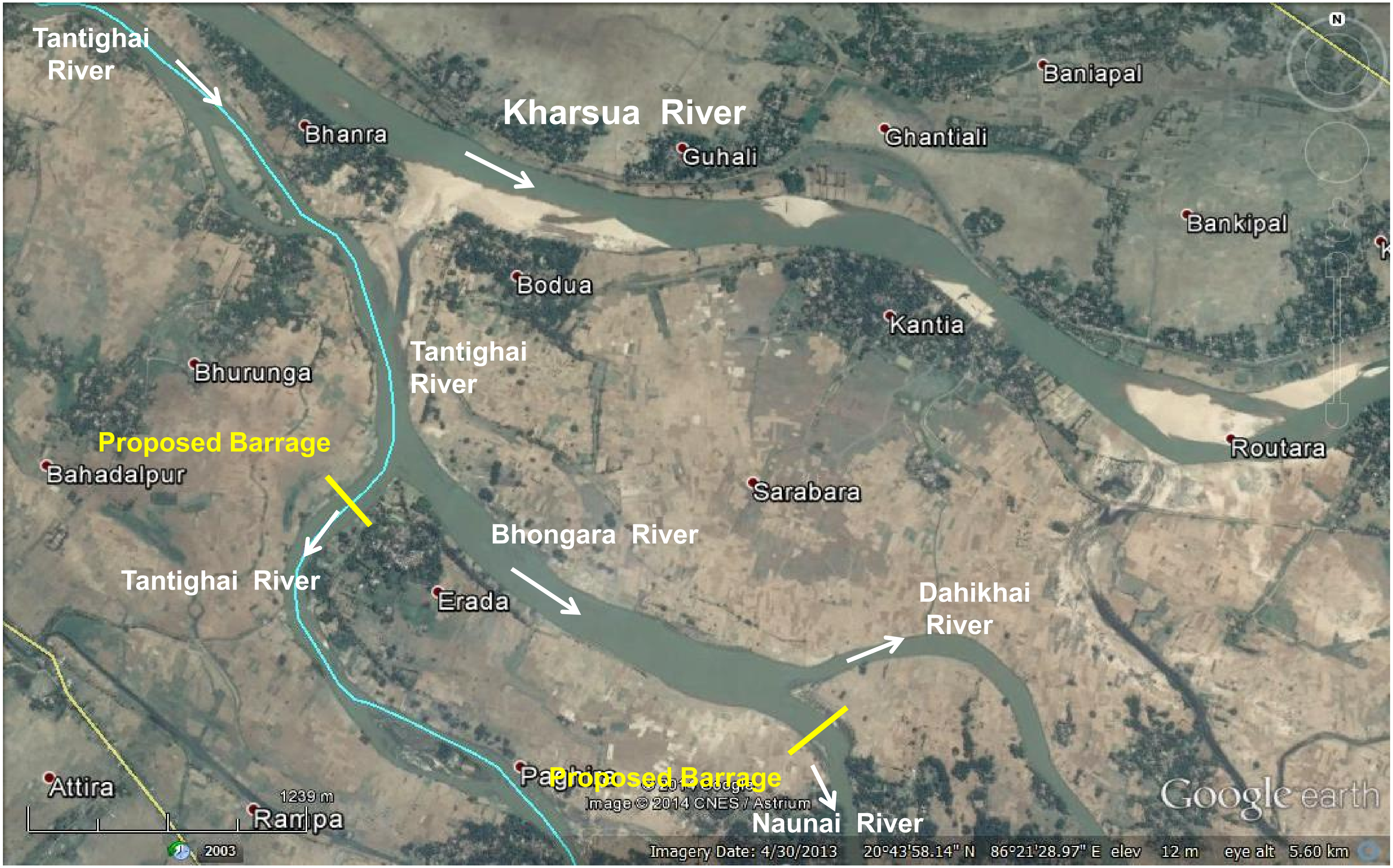


Fig 9.8 Tantighai, Bhongara, Naunai and Dahikhai rivers and proposed barrage locations on Tantighai and Naunai

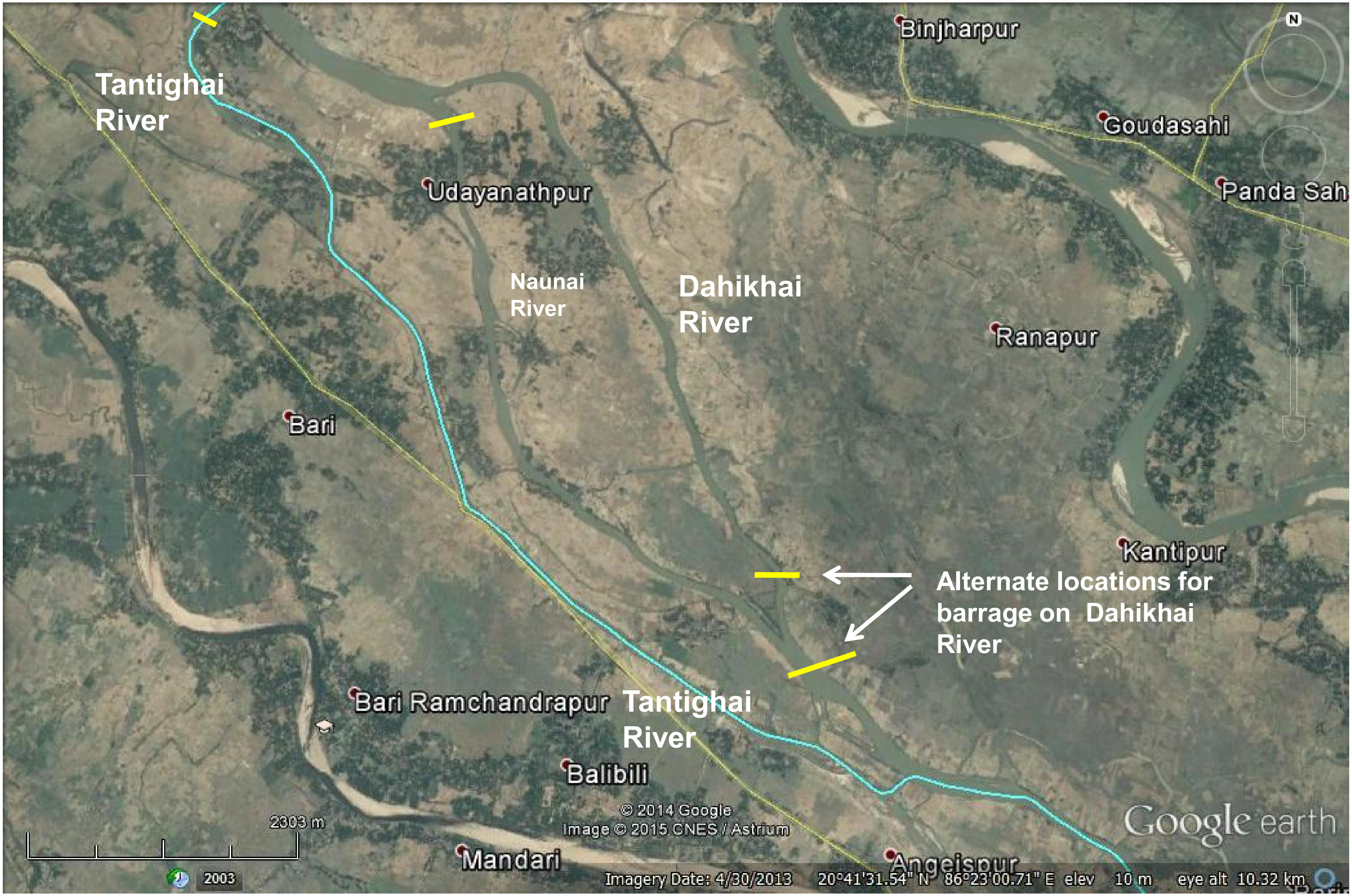


Fig 9.9 – Tantighai, Dahikhai and Naunai river reach and proposed locations for Barrages

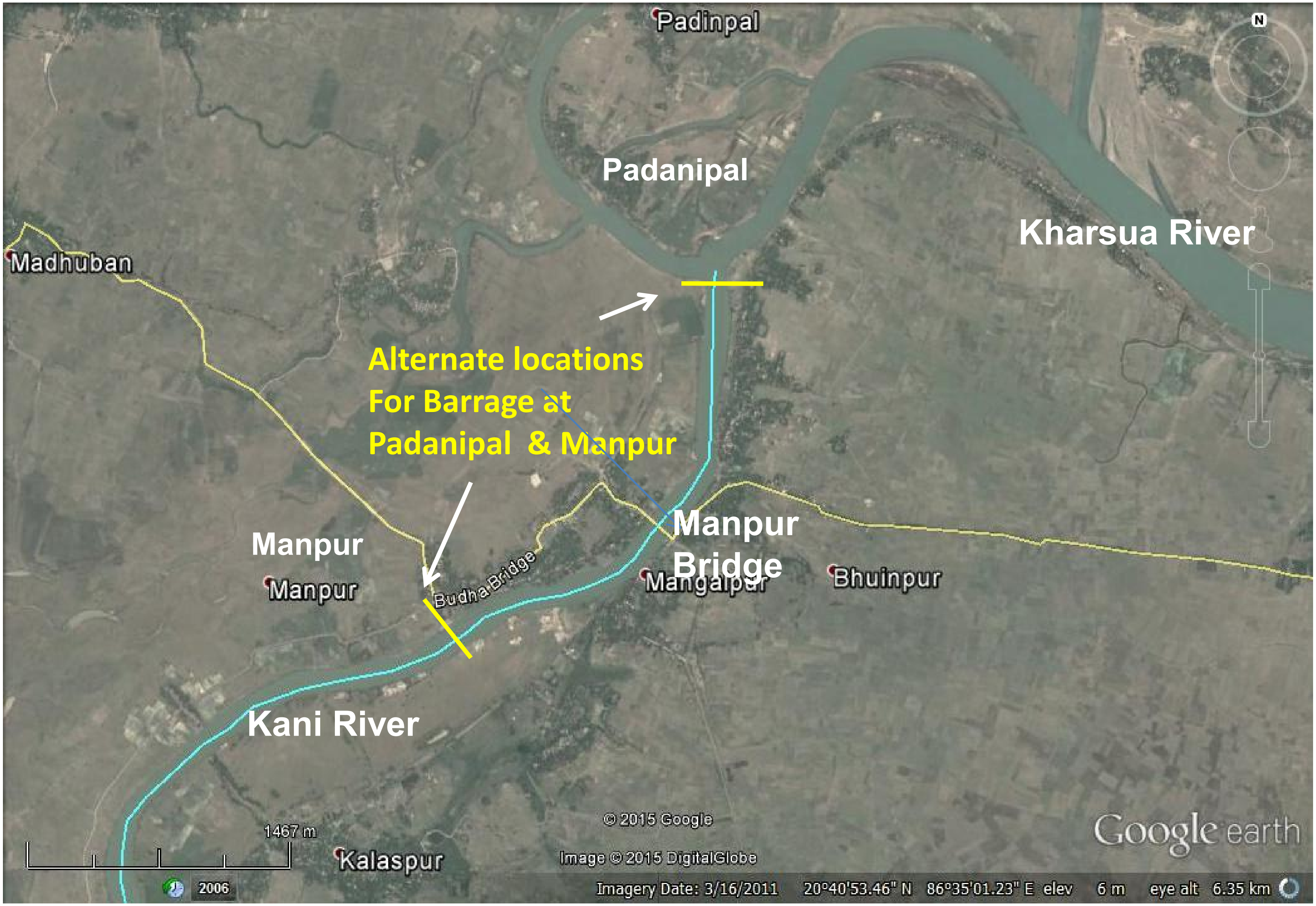


Fig 9.10 Kani River reach Near Padanipal/Manpur & proposed alternate Barrage locations

Chapter 10

Cargo and Traffic Details

Chapter 10 - Cargo and Traffic Details

10.1 General

An attempt was made to collect the traffic & cargo details from the industries at Kalingangar, DPCL and Paradip Port Trust. In this connection a meeting was held at Jajpur with all the officials of the Industries of Kalinganagar Industrial Association in the Jindal Conference hall on July 5th 2014 for appraising them of the waterway development and seeking their inputs on type and volumes of cargo including the forecasting.

10.2 Kalinganagar Industries

The cargo details from the Kalinganagar Industries were received on August 16th 2014. They have indicated a cargo movement of 4.34 Million Ton Per Annual (MTPA) of onward cargo and 1.66 MTPA of return cargo which comprises of Coal, Iron ore, Dolomite/lime, chrome ore, MS shredded scrap, SS scarp, finished coke. These details are attached as **Annexure – 10 A** for ready reference. The same are given in Table 10-1.

Table 10-1 Cargo Projection Details of Kalinganagar Industries for year 2030

Sr. No.	Type of Cargo	Upstream (u/s) cargo in MTPA	Downstream (D/s) cargo in MTPA
1.	Iron ore	1.20	-
2.	Chrome ore	0.40	-
3.	MS sheered scrap	0.17	-
4.	SS scrap (Containerized)	0.10	-
5.	Coke	-	0.76
6.	SS finished (Coil / Plate)	-	0.9
	Total Cargo (MTPA)	**1.87 ***	**1.66**

* A cargo by 1.87 MTPA has been only considered, as some of the cargo like Coal, Chrome and Lime Stone has been considered in DPCL cargo data as given below.

10.3 Dhamra Port Company Limited (DPCL / ADANI)

WAPCOS had also contacted DPCL during July 2014 for their cargo details / volumes and projects for our planning of the Pankapal terminal facility. DPCL (Adani) have indicated only two type of cargo i.e. coaking coal and limestone for movement towards Kalinganagar and they are not contemplating any return cargo. The volumes indicated by DPCL (Adani) is about 1.30 MTPA (coal & limestone) in the first (1) year raising up to 4.55 MTPA at the year 2020-2021. Assuming the same rate of growth, we can achieve cargo volumes of 10.40 MTPA in the year 2029-30 (i.e. 2.40 MTPA of lime stone and 8.0 MTPA of coaking coal). The basis of the assumption is 5% of the total volumes that can be handled by DPCL for Kalinganagar industries in next six years (i.e. 26 MTPA), has been considered for the first year in 2015 and there by gradually ramping up to 17.5% up to the year 2020-21 and further up to 40% by the year 2029-2030. There is no return cargo projected by DPCL. The details received from DPCL (Adani) on July 25th 2014 are enclosed at **Annexure – 10 B** for ready reference. The same are tabulated in 10-2.

Table 10-2 Cargo Details and Projections of DPCL (Adani) upto year 2030

Sr. No.	Type of Cargo (in MTPA) / Ramping up (in %)	Year														
		2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
		5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	22.50%	25.00%	27.50%	30.00%	32.50%	35.00%	37.50%	40.00%
1.	Coking coal	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00
2.	Lime stone	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.65	1.80	1.95	2.10	2.25	2.40
** Total Cargo (MTPA)																**10.40**

**Basis of above projection of DPCL (Adani) cargo is as follows:

- Cargo potential for coking coal in Kalinganagar region in the next six (6) year is in vicinity of 20 MTPA
- Cargo potential for lime stone in Kalinganagar region in the next six (6) year is in the vicinity of 6 MTPA
- Assumed 5% of the total volume to be handled through waterway in the first year and gradually ramping up to 40% @2.5 % per year for the year 2030.
- There is no return cargo projected by DPCL (Adani)

10.4 Paradip Port Trust (PPT)

We had also approached Paradip Port Trust for their present type of cargo movement (Import / Export) for assessing the cargo movement towards Kalinganagar Industrial area and their future cargo forecast, if any. The cargo details being presently handled by PPT from 2004 to 2014 were received on September 3rd 2014. The commodity wise cargo handled by PPT from year 2004 - 2005 to 2014-2015 and party wise details were forwarded to us. These details are enclosed as **Annexure – 10 C.** Cargo potential of Paradip Port Trust (PPT) for the year 2013 -14 are given in following tables 10-3 (a) & (b) as per industries and type of cargo. Part of this cargo has been considered to move through the waterway. Details of the same are given in Table 11-3 (a) & (b).

Table 10-3 (a) Industries wise Cargo Details of PPT for year 2013 - 14

Sr. No.	Party	Type of Cargo	Upstream (u/s) cargo in TPA (Import)	Downstream (d/s) cargo in TPA (Export)
1.	Jindal Stainless Ltd	Coking Coal	206,510	0
2.		Lam Coke	9,090	0
3.	Jindal Stainless Ltd	Steam Coal	490,746	0

4.	Jindal Steel & Power Ltd	Anthracite Coal	185,163	0
5.		Coke Breeze	28,379	0
6.		Coking Coal	84,069	0
7.		Iron Pallets	0	162,341
8.		Lime And Limestone	417,522	0
9.		Metrological Coke	33,000	0
10.	Neelachal Ispat Ni Ltd	Coking Coal	735,369	0
11.	Tata Steel Ltd	Chrome Concentr	0	171,380
12.		Coking Coal	430,272	0
13.		Ferro Chrome	0	27,375
14.		Lam Coke	27,500	0
15.		Lime And Limestone	840,249	0
16.		Low Ash PCL Coal	110,402	0
17.		Metrological Coke	77,411	0
18.	Visa Steel Limited	Lam Coke	11,550	0
19.		Metrological Coke	17,805	0
20.		Non-Coking Coal	33,000	0
21.		Steam Coal	41,700	0
22.	Visa Suncoke Limited	Coking Coal	467,337	0
		Total Cargo (TPA)	**4,247,074**	**361,096**

Table 10-3 (b) Cargo wise Details of PPT for year 2013 - 14

Sr. No.	Type of Cargo	Upstream (u/s) cargo in TPA	Downstream (d/s) cargo in TPA
1.	Iron Ore	0	5593444
2.	Anthracite Coal	337393	8157

3.	Coke Breeze	84864	0
4.	Coking Coal	6337432	30173
5.	Lam Coke	105798	0
6.	Hard Coal	159447	0
7.	Non-Coking Coal	206404	0
8.	Thermal Coal	0	18836119
9.	Met Coke	502199	0
10.	Lime Stone	2103314	0
11.	Chrome	0	181380
12.	Chrome Ore	0	15000
	*****Total Cargo (TPA)**	**9836851**	**24664273**

*** Assumptions of cargo projections for this waterway from the PPT cargo data is given below:

- A total cargo of **9.836 MTPA (Upstream (u/s) cargo)** has been handled n the year 2013 – 14 by PPT. 1% of this cargo has been assumed to move though the waterway initially in the first year, as most of the cargo is moving directly from Talcher mines to Paradip Port through dedicated rail lines. Probably when Phase II of waterway is taken up this cargo movement through waterway may increase, as it will be directly transported from Talcher mines to Paradip Port. With ramping of 1% of cargo every year it is expected, that a cargo of **1.48 MTPA** may move through Pankapal terminal by the year 2030.
- A total cargo of **24.66 MTPA (Downstream (D/s) cargo)** has been handled in the year 2013 – 14 by PPT. With the same assumption as indicated above a total cargo of **3.70 MTPA** is expected to move through this Waterway by the year 2030.

10.5 Cargo and Traffic Analysis

The cargo details received from major industries of Kalinganagar, DPCL (Adani) and Paradip Port Trust as given above were analyzed and it is observed that there is a cargo potential of 13.75 MTPA for onward cargo (towards Pankapal i.e. upstream (u/s) cargo) and a return cargo of 5.36 MTPA. The consolidated details of cargo potential are all given in this Table 11-4.

Table 10-4 Details of cargo projections / forecast for year 2030

Sr. No.	Source of Cargo	Upstream (u/s) cargo in MTPA	Downstream (d/s) cargo in MTPA
1.	Kalinganagar Industries	1.87*	1.66
2.	DPCL (Adani)	10.40	-
3.	Paradip Port Trust	1.48	3.70
	Total Cargo (MTPA)	**13.75**	**5.36**

* A cargo of 1.87 MTPA has been considered after deducting some of the cargo like coal, chrome and limestone which have been already considered in DPCL (Adani) cargo data.

10.6 Scenarios of Cargo Potentials:

This total traffic potential is further shown in three different scenarios. Low case i.e. considering 10% conversion rate, medium case i.e. considering 30% conversion rate and high case i.e. considering 60% conversion rate. The rationale behind giving these three scenarios is that these percentage levels are suitably distributed over the 100% potential. It covers the entire range of possible future scenarios, from pessimistic to optimistic scenarios. The traffic of pessimistic scenario provides an understanding of minimum guaranteed traffic that can be expected, whereas the optimistic or the high case scenario gives the maximum potential that can be generated giving us an understanding on the upper mark of the feasible investments that can be made in developing the transportation system. The moderate scenario is the average scenario which provides a safer option where the risk is low. The annual cargo traffic as per low case, medium case & high case are given in Table 10-5 below.

Table 10-5 Scenarios Annual Cargo (Low, Medium, High Cases)

Sr. No.	Source of Cargo	Ultimate cargo for year 2030 (MTPA)	Low case (10%) (MTPA	Medium case (30%) (MTPA)	High case (60%) (MTPA)
1.	Kalinganagar Industries	3.53	0.353	1.059	2.118
2.	DPCL (Adani)	10.40	1.040	3.120	6.240
3.	Paradip Port Trust	5.18	0.518	1.554	3.108
	Total Cargo (MTPA)	**19.11**	**1.911**	**5.733**	**11.466**

The Pankapal terminal is being planned for considering high case i.e. say 10 MTPA with a backup land area of 100 acres, keeping in view of the future requirements.

10.7 Temporary Cargo Movement

Inland Waterways Authority of India (IWAI) has desired that a temporary terminal be set up downstream (d/s) of Jakodia barrage to commence the initial movement of cargo immediately, as the permanent terminal of Pankapal, navigational locks at Jakodia and Sujanpur weir may take around 2 to 3 years of time.

With regard to this temporary terminal at Jakodia, d/s of existing Jakodia barrage, with berthing of two barges of 500 DWT at a time and four hours of operational cycle, 20 hours working in a day with 330 working days in a year, a maximum cargo of 1.65 MTPA can be handled. The material handling equipment required for handling such cargo are mentioned in the subsequent chapter.

Chapter 11

Terminal Planning

Chapter 11 – Terminal Planning

11.1 General

Terminal is a place where a particular type of cargo is handled. Terminals can be classified as general cargo terminal and bulk cargo terminals. Inland water terminals are different from sea terminals in the sense that water levels during flood and dry season varies considerably.

11.2 Planning Considerations

The economic and commercial considerations are the fundamentals considerations and decision making is straight forward i.e minimizing cost of transportation. Commercial consideration is maximizing profitability of the terminal. Beyond these there are technical considerations as given below.

- Water related
- Land related
- Transportation
- Traffic related
- Cargo related

11.2.1 Water Related

Due to seasonal precipitation there are fluctuations in river flow and the rapid changes in water flow causes shifts in the location of the deep channel and also results in erosion of banks and siltation in access channel. A basic requirement of an inland terminal is to ensure a permanent access to the navigational channel through out the waterway. An ideal site for terminal should be located on following area:

- A deeper portion of river where channel shifting, sedimentation is less severe

- On a concave, high bank where the deeper channel is closer to the shore line.

The quay structure should be economical. While choosing the Pankapal terminal site, above considerations were kept in mind.

Water Level Variations

It is also necessary to know variation of water levels in river over the year. The danger level at Pankapal during floods is 23.00 m MSL (Mean Sea Level). Keeping a freeboard of 1.5 m above the danger level the terminal will be designed with deck level of 24.5 m MSL to ensure safe operation of terminal. For the new proposed barrage at Jokadia, water level will be maintained at 19.50 m MSL or 20.00 m MSL to enable navigation upto Pankapal.

11.2.2 Land Related

For terminal planning land related considerations are as follows:

- Availability of water front land
- Soil conditions and elevation
- Utilities connections
- Environmental and social Impacts

Availability of water front land

Generally, lands adjacent to river banks are under cultivation due to availability of sweet water for crops. Acquisition of land for the inland terminal has to be done, if Government land is not available. In order to locate the terminal, a conceptual plan of terminal requiring minimum linear water frontage area along with storage area and area required for future expansion is to be planned.

Soil conditions and elevation

For designing and planning of inland terminals soil strata and its elevation from water levels are very essential. Geotechnical investigations are required to be carried out at terminal location as it can substantially affect construction costs. Land areas for loading / unloading and stacking of materials in the terminal are subjected to high dynamic and static loads due to movement of heavy lifting equipment along with stacking of heavy cargoes. In case of weak soil strata at the site then it will have to be properly strengthened by proper treatment.

Land elevation is a very important consideration as low lying land is exposed to periodical flooding and may need adequate protection. Another important factor is distance between navigation channel and high flood line as this will decide size of shore structure and cargo handling machinery.

Utilities connections

Utilities such as fresh water connection, sewerage facilities, effluent treatment plant, electricity and telephone connections etc. shall be provided at terminal for efficiently coordinating all activities.

Environmental and social impacts

The environmental impacts arising during the dredging and construction activities will be mitigated using required mitigation measures. Both direct and indirect employment potential is anticipated during construction and operations of inland terminal.

11.2.3 Transportation

The terminal should have good road and rail access for efficient connection between the water and land modes of transportation.

11.2.4 Traffic

To undertake planning of terminal it is necessary to know the volume and type of cargo that is required to be handled. The expected cargo data from Kalinganagar industrial area has been collected. Similarly cargo projections from DPCL have also been collected. The present traffic data of Paradip port has been collected from which suitable projections have been made. The data from all three places have been compiled in Chapter 10 and the traffic potential of 10.00 MTPA for the year 2030 have been estimated for designing the Pankapal terminal.

11.2.5 Cargo Related

In the present case the main cargo is bulk in nature such as

- Coal granular
- Coke
- Ores such as iron, chrome, lime
- Scrap Steel
- S. S Plates

11.3 Types of Terminal

- Passenger terminal
- General Cargo terminal
- Bulk Cargo Terminal

Passenger Terminals

Generally in rivers the passenger terminal is of two types, piled quay and the other is pontoon and access bridge type.

General Cargo

There are two basic types of general cargo terminals, one is the floating pontoon type and the other is reinforced concrete structure or piled structure.

The floating pontoon type consists of pontoon, gangway, storage yard, lift cranes fixed on pontoon and a lift crane in storage yard or forklift.

In RCC structure lift cranes move on solid / piled quay and the barge is berthed alongside quay and loading and unloading is carried out by cranes. In this case cargo handling efficiency is high.

Bulk Cargo Terminal

In the present case majority of the cargo is of bulk in nature. The bulk cargo terminal is of two types one is the loading terminal i.e. the bulk cargo is outbound from land to water, another is the unloading terminal where cargo is from water to land. The transportation on land is done by means of belt conveyor / tipper / trailers on quay by ship loader or unloader and in storage yard by stacker or reclaimer. The ship loaders are of various types as follows:

- Ship loader is fixed in position on piled quay but it can be rotated and the boom can be extended to load cargo into the hatch of the ship
- Ship loader is fixed on the pontoon and it is floating in water area
- Ship loader moves on rails mounted on piled quay and can move along the alignment of barge hatch

11.4 Terminal Design

Based on the data collected on planning parameters and analysis in above sections, a design for terminal has been prepared. IWAI desired to have a permanent terminal at Pankapal but the construction of the terminal may take some time as it involves rehabilitation of Jokadia barrage and in order to start the cargo handling operations, IWAI wanted to have Temporary / Floating terminal facilities downstream (d/s) of the Jokadia barrage. Hence the design of terminal is split into two parts as follows:

- Temporary / Floating terminal at downstream (d/s) of Jakodia Barrage & Sujanpur Weir
- Permanent terminal at Pankapal

11.5 Temporary / Floating terminal at downstream (d/s) of Jakodia Barrage & Sujanpur weir

IWAI has urgency of starting immediate operation of 500 DWT vessels from Jokadia to Dhamra & Paradip till the time Jokadia barrage is reconstructed. Hence a temporary terminal has been proposed at Jokadia for this purpose.

WRD, Odisha has denied dismantling of Sujanpur weir and has decided to reconstruct this weir. Therefore, vessels will not be able to cross Sujanpur weir and go to Jokadia till Sujanpur weir is re-constructed with navigation locks. Since Sujanpur weir is to be retained and reconstructed as Barrage with Navigation locks, immediate operations of 500 DWT vessels upto Jokadia through Kharsua/Tantighai/Kani via Sujanpur will not be feasible. Bypass through Kharsua for stretch Bodua to Sujanpur is also not feasible. Addl. Secretary Ministry of Surface Transport has suggested to locate a temporary terminal at downstream of Sujanpur weir to start operations of 500 DWT vessels through Tantighai/Kani and Kharsua. Therefore, to start immediate operations for 500 DWT vessels, a suitable location for temporary terminal shall have to be identified on downstream of Sujanpur weir.

As per the minutes of meeting taken by Principal Secretary, WRD with IWAI, WAPCOS & Officials of Water Resource Department (WRD), Govt. of Odisha on 12.12.2014 for resolving the technical issues pertaining to developing a viable fairway in the Sujanpur to Padnipal of NW5, it was suggested that the Sujanpur weir needs to be reconstructed with original design crest level along with gates and navigational locks so as to facilitate creation of reservoir in the upstream to provide required LAD for navigation and also regulate water during flood.

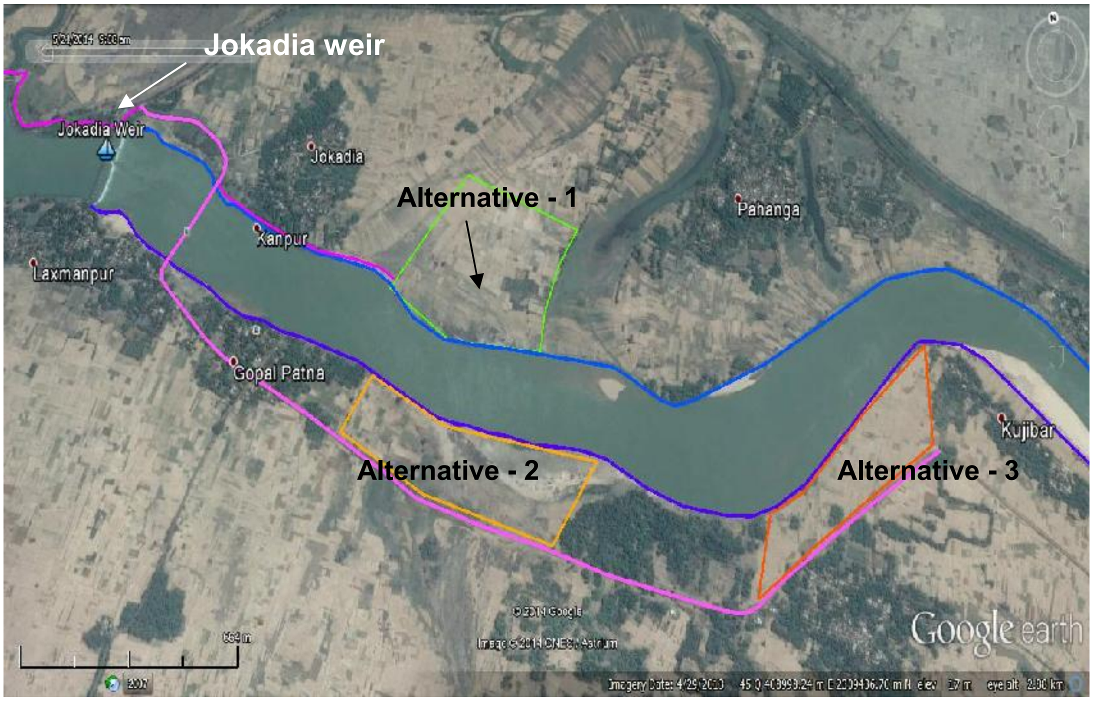
In view of above mentioned reasons and to start with immediate operations of 500 DWT vessels from Dhamra and Paradip to downstream of Sujanpur weir through Tantighai/Kani and Kharsua, a suitable location for temporary terminal have been identified on the downstream area of Sujanpur weir. This floating / temporary terminal has been proposed as same type as that of Jokadia floating terminal for transportation of cargoes, etc.,

The temporary / floating terminal at d/s of Jakodia barrage / Sujanpur weir consists of pontoon, gangway, storage yard and lift cranes fixed on pontoon and cargoes are stacked on the platforms in the storage yard or moved manually between the pontoon and the yard. This is simple and its investment is low and the pontoon can go up or down depending on water levels.

11.5.1 Alternative Locations

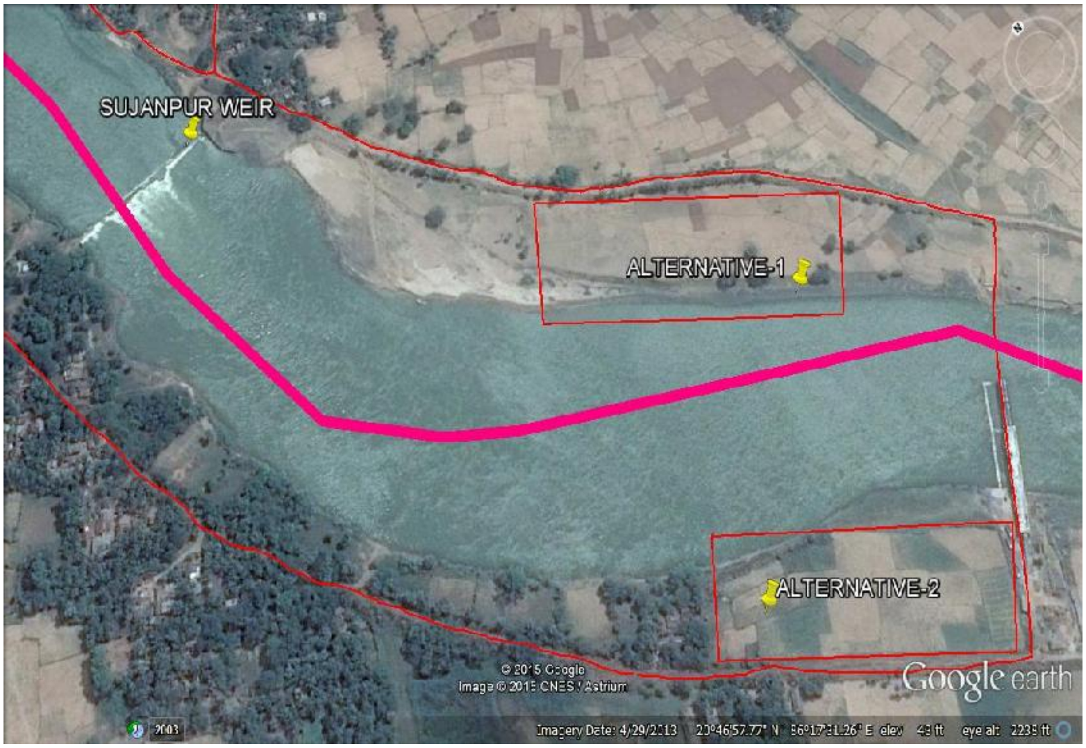
Three sites have been identified on the river stretch d/s of the Jakodia barrage as shown in the Figure No.11-1a and Two sites have been identified on the river stretch d/s of the Sujanpur Weir as shown in the Figure No. 11-1b.

Figure 11 – 1a. Alternative Locations of Temporary / Floating terminal at d/s of Jokadia Barrage



One of the alternate locations is on the left bank of the river (Alternative - I) which is at d/s of state road bridge while the remaining two sites (Alternative - II & III) are on the right bank of the river d/s of the road bridge. The sites on the right bank have a good road access for transportation of cargo but needs to cross the bridge. After crossing the bridge the road runs approx. parallel to the river bank. The first site on the right bank (Alternative - II) is not found suitable as it is located near to the villages/ habitation. The second site on the right bank (Alternative - III) is suitable for locating the temporary terminal (Fig 11 – 2) as it has adequate space for stacking of materials between the road and the river bank. The river bank takes a concave turn at this location and normally the depths on the outer curve are more and hence it is ideally suited for locating a temporary / floating terminal.

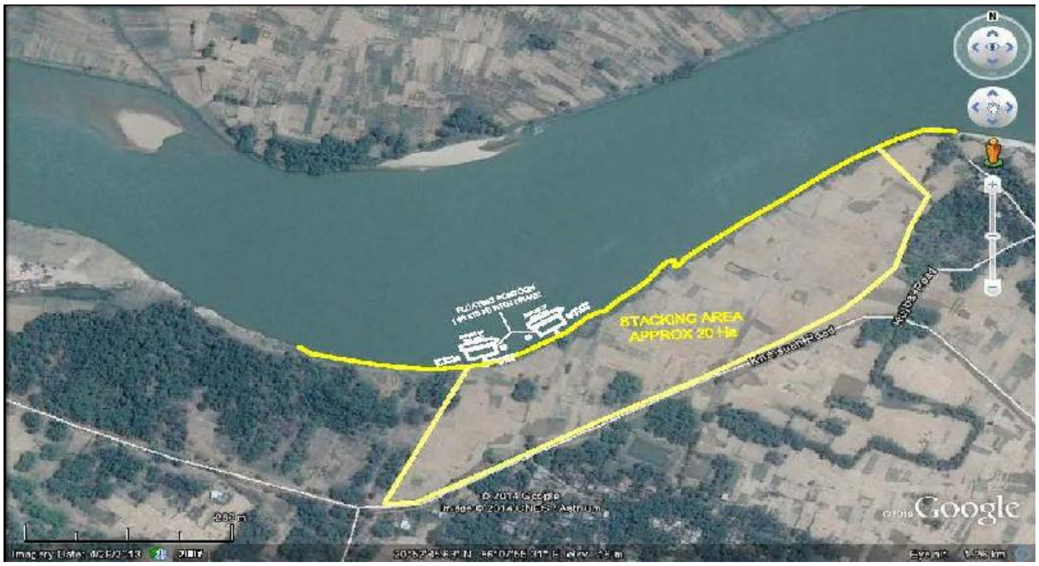
Figure 11 – 1b. Alternative Locations of Temporary / Floating terminal at d/s of Sujanpur weir



One of the alternate location is on the left bank of the river (Alternative - 1) while Alternative - 2 is on the right bank of the river at the d/s of Sujanpur weir. Alternative – 2 site which is on the right bank have road access for transportation of cargo but needs to cross the new bridge, which is very near to this location and constructed recently. After crossing the bridge the road runs approx. parallel to the river bank. Apart from this, there is also a road existing on the right bank near Alternative-2 location. Alternative -1 is suitable for locating the temporary terminal at Sujanpur, as it has adequate space for stacking of materials between the road and the river bank and as well there is no need to cross the bridge for movement of cargo, since it is located on the left bank and away from newly constructed bridge.

Based on the suggested two Alternatives (Refer Figure 11-1b) and depending upon the land availability and approval from State Government Authorities, the desired best location from these two alternative locations shall be selected for the floating / temporary terminal at Sujanpur.

Figure 11 – 2 Details of Temporary terminal



11.5.2 Details of Temporary Terminal

The terminal is meant for 500 DWT self propelled vessels having length of 58m x beam of 9m and a draft of 1.5m. Two numbers of floating pontoons and gangway of adequate size, mechanical equipment, adequate storage and dumping area, approaches etc. are envisaged for this purpose. Each pontoon will be of size 40 m x 15 m and a gangway with a width of 2 m. The hinged gangway will rest on the piled support on the river bank while the other end will rest on the pontoon. The pontoon will be suitably anchored. The pontoons will be separated by a distance of 50 m. The gangway will have suitable railings on the sides. Each pontoon will have a crane mounted on it for loading and unloading of barges. An area of approximately 20 Ha has been kept as stacking area. On the shore a retaining wall to be built to hold the landmass.

11.6 Permanent terminal at Pankapal

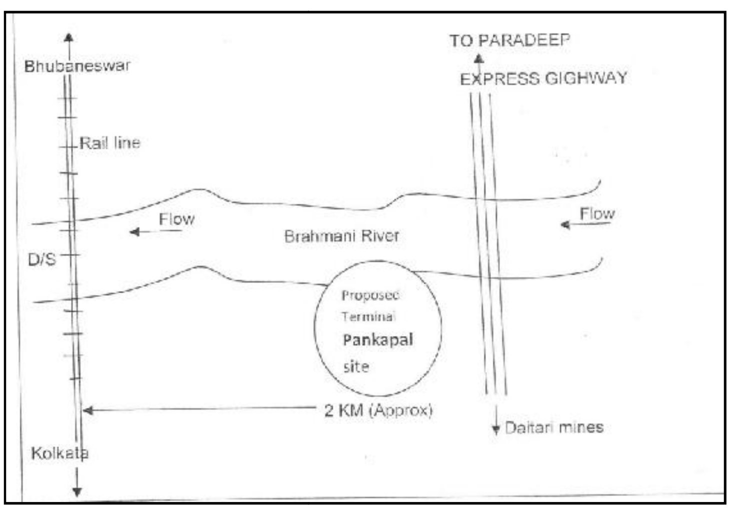
IWAI have taken a decision to establish a permanent terminal at Pankapal in view of the facts that it is nearer to Kalinganagar industries estate where the raw materials coming from Dhamra and Paradip Port will be loaded / unloaded. Pankapal is nearer to iron ore mines, chrome mines and these ores will be transported to Paradip Port for export.

11.6.1 Selection of Site

In order to finalize the location of permanent terminal the areas on both banks of the Brahmani River between the road bridge (SH 200) and the railway bridge were examined. The general observations are given below.

The Brahmani river has length of 4.50 Km between the bridges and the river hugs left bank and after a distance of approx. 1.50 Km from road bridge takes a turn to the right bank and touches right bank at a distance of 2 km d/s and hugs the right bank of the river.

On the right bank of the river of Pankapal terminal site of the river, habitations are seen, while the left bank is free from habitations. The river course is stable for years and hence all the intake wells for the on located on this right bank.



Also adequate land between flood embankments can be reclaimed. The terminal area is close to Road Bridge and hence road connectivity will be possible. An intake was seen on left bank near the road bridge (SH 200). By locating the Pankapal terminal face in the reach from 200m downstream of Road Bridge to 800 m i.e. a waterfront space of 600 m will be available for construction of the terminal. Location of permanent terminal is shown in Figure No. 11 – 3 and 11- 4 as below.

Figure No. 11 – 3 Location of Permanent terminal at Pankapal

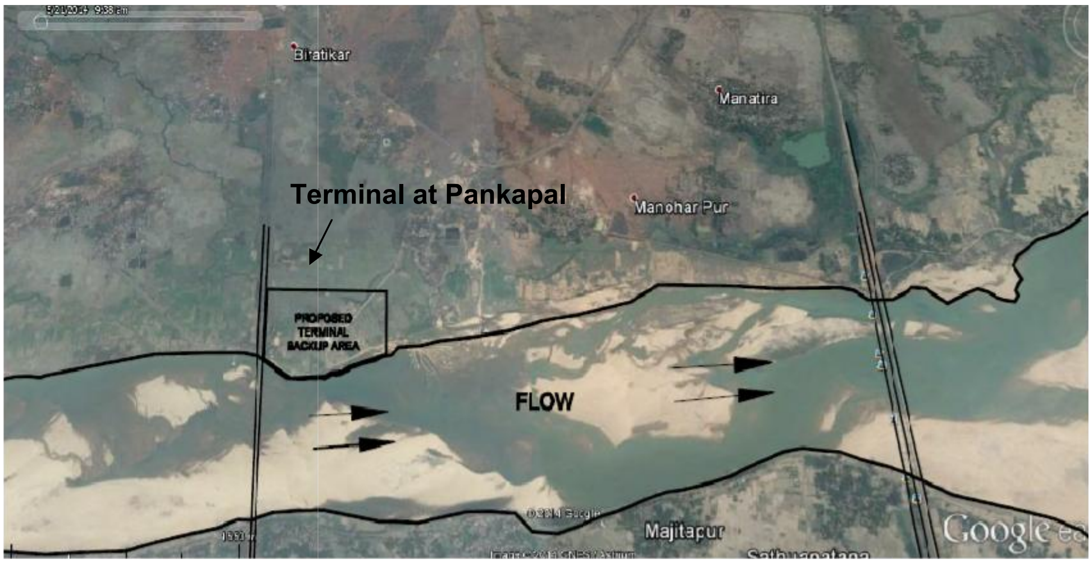
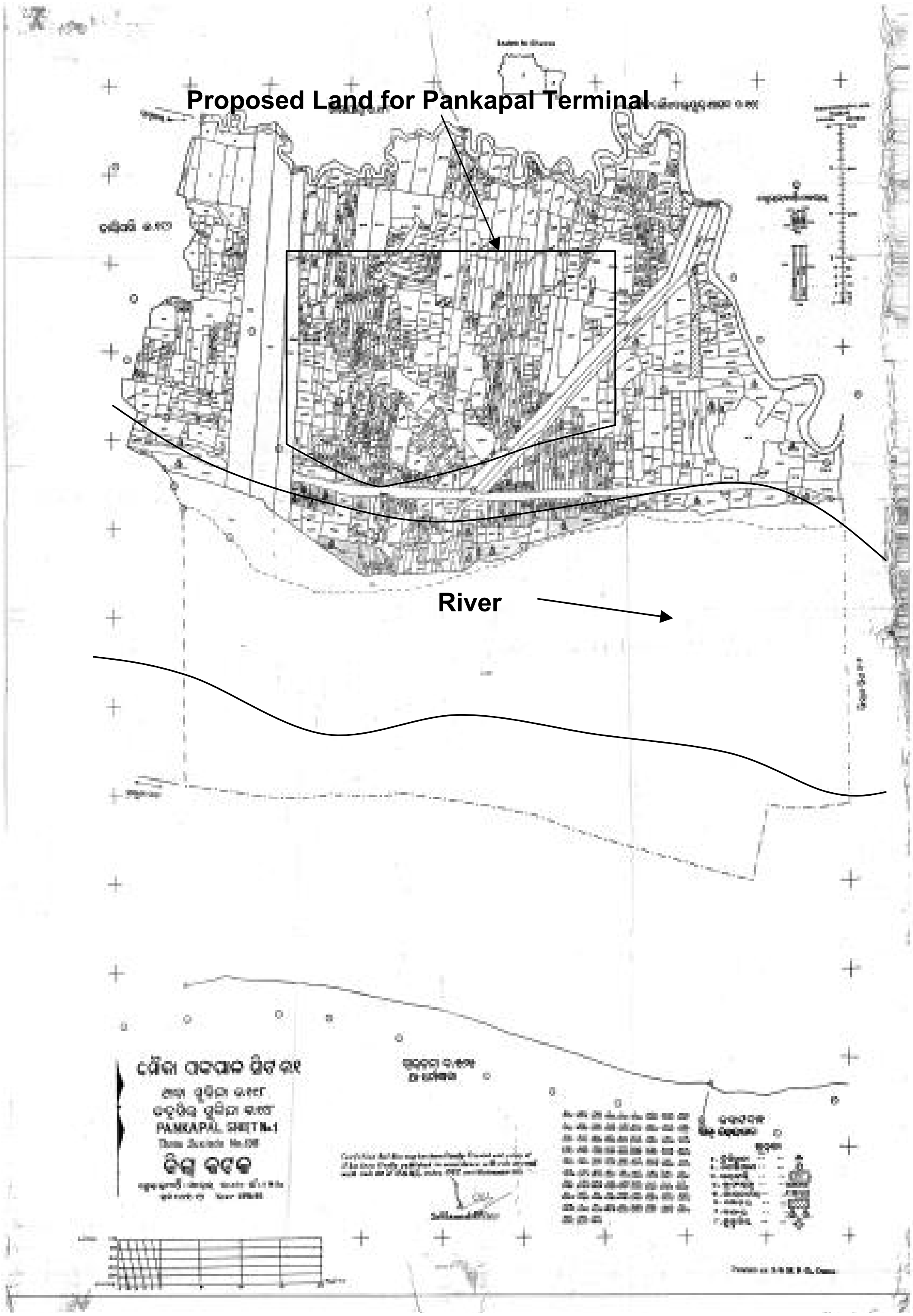


Figure No. 11 – 4 Details of Permanent terminal at Pankapal

For the terminal Government land available will be utilized and the remaining land required will have to be acquired. The information about land was taken from revenue department. Given below is map (Figure No. 11-5) of Pankapal, Thana Sukinda No 198 sheet no 1 year 1991-1992 has been collected from local land Tashi. The details of land records of Pankapal Village are enclosed as **Annexure-11**. The total backup land required for the Pankapal terminal is approx.100 Acres.

Figure No. 11 – 5 Revenue Map of Pankapal



11.6.2 Details of Permanent terminal

IWAI wanted to use 2000 DWT self propelled barge for transportation of the cargoes. The dimensions of the barge are 86 m length X 14 m beam and 2.50 m loaded draft. The length of terminal can be computed from the traffic forecast. Before arriving at the length of the terminal it is necessary to compute the number of barges required to handle the proposed traffic. After that numbers berths can be computed from which the length of the terminal will be determine. In order to compute numbers of barges required following assumptions has been made

- Total cargo to be handled – 10 million tones per annum (MPTA)
- Barges of 2000 tonnes are assumed
- Speed at barges 10 km/hr
- Available days for transport in a year – 330 days
- Loading / unloading rate assumed – 500 TPH
- Distance between Pankapal to Dhamra ≅ 145 Km
- Distance between Pankapal to Paradip ≅ 162 Km

The details of number of barges required to handle 10.00 MPTA cargoes for this stretch of waterway are given below Table No.11 -1.

Table No. 11 – 1 Computation of Number of Barges

Sr. No.	Description	Unit
1	Loading / unloading rate	500 TPH
2	Loading time of 2000 T barge	4 hr
3	Unloading time of 2000 T barge	4 hr

4	Maneuvering time at both places	1 hr
5	Fueling and supplies at both places	1hr
6	Travel time for one round trip (assuming 160 Km one way and speed of 10 km /hour))	33 hr
7	Total time for one round trip	43 hr say 48 hr (2 days)
8	No. of trips of a barge in one month	15 trips
9	Barge size	2000 T
10	Total transport of a barge in one month (15x 2000T)	30000 T
11	Transport to be made in one month (10 million/11 months)	0.9 million T
12	No. of barges required 0.9 million/ 30000 T	30 barges
13	Barges as stand by units	3 barges
14	**Total nos. of barges required**	**33 barges**

The number of berths required to handle 10 MTPA and accommodate 30 barges per month for handling this cargo is given below Table No.11 -2.

Table No. 11 – 2 Computation of Number of Berths

Sr. No.	Description	Unit
1	Number of working hours in a day	20 hrs
2	Time for loading / unloading of a barge	5 hrs
3	One berth can handle in a day	4 barges
4	Number of barges to be handled	15 nos.
5	**Number of berths required**	15 barges/4 barge per berth = 3.75 berths , **Say 4 berths**

The self propelled barge of 2000 tons has a length of 86 m. Hence four barges will need 344 m of berthing length (86m X 4 barges) and keeping a gap of 10 m between the barges, the total length works out to 384 m. Hence a terminal of 400m length is being planned. The width of the terminal will be 22 m to accommodate rail mounted equipment as and when necessary. The electrical cabling, pipe line for water, oil products and fuel supply would be embedded in the berths so that the movement of mobile equipment is not affected. Adequate Fenders will have to be provided to absorb impact load of barges. Bollards of adequate capacity need to be provided for mooring the barges.

The terminal will be in the form of piled structure with bored cast in-situ piles of 1m dia. The piles are proposed at 8 m interval in the longitudinal direction and 6.5 m across the berth.

From the survey map it is seen that in front of the proposed terminal the width of the river is 200 to 250 m. The terminal face is taken close to the water edge to avoid any excessive dredging. There has to be adequate space for waiting of barges, also for turning of barges, turning circle of 180 m diameter is essential.

Behind the jetty structure a diaphragm wall / sheet pile wall will have to be constructed to hold the backfill material. The terminal will be 1 m above high flood level of Brahmani River. As the area of the terminal is low lying area the area behind the terminal has to be reclaimed with suitable material and some area will be required for stacking of material.

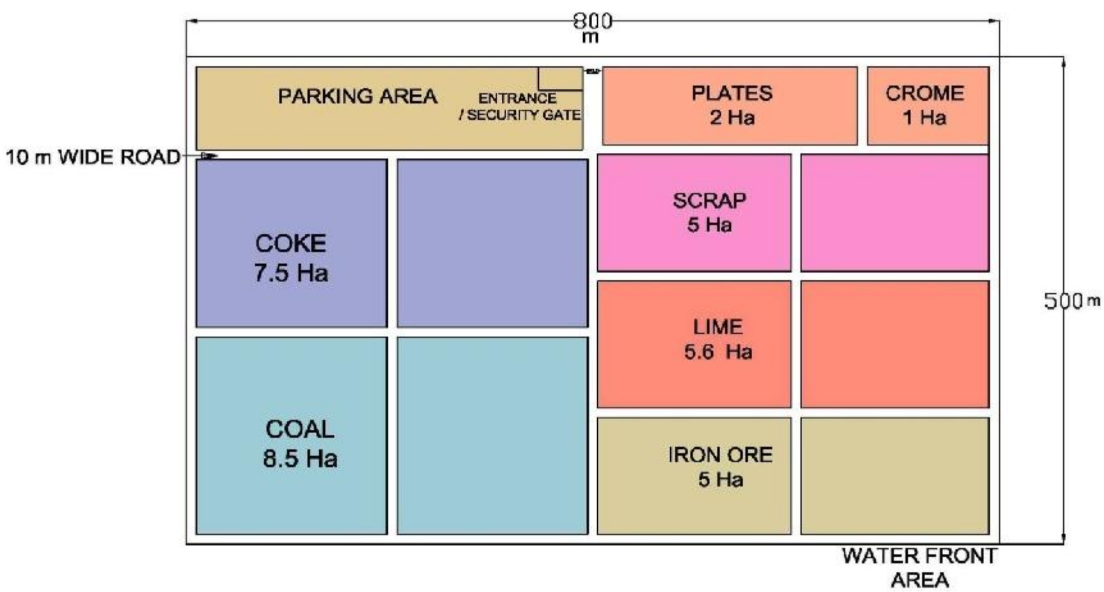
Stacking Area

Stacking area (in 40 hector) required for various cargoes for the ultimate cargo of 10 MTPA for the year 2030 have been computed and shown below Table No.11 - 3 (with stacking height of 3 m) and line sketch of details of storage yard is shown in Figure No. 11 – 6.

Table No. 11 – 3 Computation of stacking area

Sr. No.	Material	Year 2030	
1	Coke + cocking coal	400 m x 400 m	16 hectares
2	Iron Ore	400 m x 125 m	5 hectares
3	Lime	400 m x 140 m	5.6 hectares
4	Chrome	100 m x 100 m	1 hectare
5	Scrap	100 m x 500 m	5 hectares
6	Plate	100 m x 200 m	2 hectares
7	Add 10% for Road	-	3.4 hectares
8	Truck Parking	-	2 hectares
		Total	**40 hectares (100 acres)**

Figure No. 11 – 6 Details of Storage Yard



Stacking Area for temporary terminal

Stacking area (in 20 hector) is required for various cargoes of 1.60 MTPA for the temporary terminal for initial years of operation of the same till the permanent terminal is made operation (with stacking height of 3 m).

11.7 Terminal Facilities

These can be grouped into 3 main categories.

- Mooring Structures
- Storage Yard
- Gate and land Transport Access

Mooring Structures

The main function is to secure the vessels / barges in place and to restrain her water related movements. The most common provision of mooring is tie in dolphins or tie in can also be provided by anchors buried on bank or in the river. On the piled quay bollards are provided for mooring of barges. A series of fenders are provided both on pontoon as well as on piled quay to protect them from impact loads. In case of floating pontoon, the pontoon is anchored or can be secured by means of spuds.

Storage Yard

The main function of terminal yard includes.

a. Storage of cargo before and after loading or unloading.
b. Parking of trucks.
c. Provision of general services such as equipment maintenance, administrative offices, amenities for labour etc.

Gate and transport access

The main function of the gate and related facilities can be divided into.

a. Cargo and equipment exchange
b. Traffic control
c. Parking
d. General Security.

The gate activities are security check, cargo check, equipment check etc. The gate and the terminal entrance should include a two lane road (in/out) with traffic bumps to slow down the terminal traffic. There must be parking lot for trucks and passenger cars.

Water Supply Requirement

It is assumed that 125 liter per capita per day (LPCD) will be required. A total of 400 nos. of personnel consisting of barge operators, crane operators, truck operators and maintenance operators are assumed to be working on the terminal every day. Hence the total water requirement works to be 50,000 liters per day. Ground storage reservoir (GSR) and over head tank of suitable size needs to be provided for taking care of this requirement.

Power requirement

There will be three cranes on the terminal at Pankapal, each crane will require a power of 125 kW, and hence three cranes will require 375 kW of power. The general lighting on jetties, offices and stacking yard will require 60 kW of power. The sewage treatment plant, water treatment plant and water supply will require 65 kW of power. Thus a total of approx. 500 kW of power will be required at this terminal. The facilities provided above at permanent terminal shall also be provided at temporary terminal at Jokadia. The power connection of 300 KW shall be provided at temporary terminal.

Maintenance Workshop

A maintenance workshop may be provided at both the terminals in order to facilitate maintenance of minor nature of material handling equipment and other miscellaneous machines. The workshop may be equipped with following machines.

Sr. No.	Name of Machine	Capacity	Quantity
1	Centre Lathe	250 mm dia job & 1.5 m long lathe	1 No.

2	Radial Drilling Machine	25 mm capacity	1 No.
3	Shaping Machine	300 mm x 300 mm x 300 mm	1 No.
4	Milling Machine	300 mm x 1000 m stroke	1 No.
5	Welding Transformer	300 mm stroke	1 No.
6	Cutting Machine (Hack Saw)	-	1 No.
7	Sawing Machine (Band Saw)	Band length 2000 mm	1 No.

11.8 Cargo Handling Equipments

Cargo handling equipments are characterized by

- Capacity – Size and type of cargo.
- Distance or reach – the distance (horizontal and vertical) between loading and unloading points.
- Speed – the travelling, swinging and hoisting speeds of the various moving components and the resulting overall rate or productivity.

Cargo can be moved in following three principle ways –

- Trucking – rolling of cargoes on wheels
- Lifting – picking up and moving
- Conveying – carrying cargoes continuously

Each cargo handling machine includes combination of the above mentioned principle methods.

The configuration of portal cranes is based on pedestal support structure and elevated turn table. In some designs, the support structures comes with four sets of steel wheels which move on rail tracks mounted on the quay. The driver cab in most of the cranes is elevated to enable an unobstructed view of the entire vessel. The pedestal configuration allows the crane to stand closer to the vessel and use shorter boom and smaller swinging radius.

In the present case a portal mounted crawling crane is proposed. The crane has better reach and swinging ability.

One more option is level luffing crane, is based on an articulated boom which allows through counter movements of the two boom segments for leveled traverse travelling because the level movement is more energy efficient and allows the use of less hoisting cable and accuracy is better when working in small ranges.

Trailers or tippers

The cranes handle cargo vertically. In cargo transportation on land, trailers or tippers will be used.

11.9 General Cargo Handling Process

General cargo will involve different sizes and weights, so it is difficult to handle the cargoes efficiently and quickly they must be unitized and palletized. The dispersive units of cargo will be unitized in larger units say 5-10 tons depending on the capacity of the crane. For the forklift to pick it up, the cargo should be mounted on pallets or skids. When General cargo is unitized, cranes or forklifts can be used and transportation by trucks or wagons can be used.

11.10 Bulk Cargo Handling Process

The bulk cargo handling process at bulk terminals involves two systems, one is land-to-water, and another is water-to-land. The land-to-water system is for the unloading of the trucks to storage or direct shipment, and this system is in the use at most inland terminals. The water-to-land system is unloading the vessel to storage and then loading the trucks or railcars.

11.11 Cargo Handling Equipment

Cargo handling equipment is the most basic handling equipment at the inland waterway terminals. The equipment will load or unload barges / vessels directly from the truck, or another vessel. The cargo is first transferred between the vessel and dock, held or stored for short period and taken by trucks to the final destination. For cargo handling rubber tyre gantry crane, level luffing crane, fixed crane and forklift etc. are used. Details of cargo handling equipment are given below:

11.11.1 Rubber Tyre Gantry Crane

A rubber tyre gantry crane (Figure No. 11-7) is a multipurpose machine and is widely used in inland ports. The crane is not limited to vessel handling but can be used for handling trucks as well. The carriage system is on rubber tyres. The tyre cranes are equipped with outriggers. The capacity of these cranes is 5 to 25 tons in most cases. The crane can move to any place easily and fast which is a merit but operation is slow and lift capacity is lower than level luffing crane. However, during hoisting the tyres can not bear the load of the crane and has to be jacked for sustaining the load hence these are inferior to RMG for speedy loading and unloading.

Fig 11– 7 Rubber Tyre Gantry Crane

11.11.2 Level Luffing Crane

These level luffing cranes (Figure No. 11-8) are used on small inland ports whose throughput is small. It has got four sets of wheels at each corner of structures which enables the crane to move on tracks along the dock. The pedestal configuration allows the cranes to stand closer to the vessel and use smaller boom. Improved boom design called level luffing is based on an articulated boom, which allows through counter movement of the two boom segments for leveled traverse traveling which is more energy efficient and has better maneuverability. These cranes have higher productivity and better reach than tyre cranes. These cranes are operated by electricity thus reducing operational cost.

Figure No. 11-8 Level Luffing Crane

11.11.3 Grab Type Level Luffing Crane

All general cargo cranes, almost all these cranes can be fitted for handling bulk cargoes. The conversion to bulk cargo handling is quite simple: replacing the hook by a clam-shell or grab attachment and installing additional power (mechanical or electrical). The grab can be attached to any crane system but most commonly it is used with crawler and portal or gantry cranes. Usually, crawler cranes fitted with grabs are very versatile machines; they can both load and unload vessels, and can also load and unload trucks and trains. However, portal and Grab Type Level Luffing Crane (Figure No. 11-9) are usually limited to vessel operation.

The productivity of a grab crane in handling bulk cargo is determined by the capacity (tonnage) of the shell, the path it has to cover and the speed of hoisting, swinging and opening / closing the grabs.

The size of the grab itself is a function of the density of the material it carries; smaller grabs are used with denser and heavier materials on common inland ports. Many ports have been equipped with portal or gantry cranes fitted with grabs to unload the vessels. At present, it is the main method to unload the bulk cargo from vessels.

Figure No. 11- 9 Grab Type Level Luffing Crane

11.11.4 Fixed Crane

The fixed cranes (Figure No. 11-10) as name suggests can't move on the dock because it has no traveling gear and as such is cheaper and lighter than traveling crane. These cranes are cheaper and are used on small inland ports and can be located on pontoon or on the dock. In the throughput is small fixed cranes are preferable.

Figure No. 11- 10 Fixed Crane

11.11.5 Crawler Crane

The crawler cranes (Figure No. 11-11) are very versatile and can move on tracks and can both load and unload barges. They can also load and unload trucks. They can crawl on the jetty and take a position wherever loading and unloading is required to be done. This movement of the crane prevents moving of barges/ vessels thus reducing the time of loading / unloading.

Figure No. 11- 11 Crawler Crane

11.11.6 Forklift

The forklift (Figure No. 11-12) combines trucking and lifting of cargo units. The inland ports use 3-5 ton capacity forklift and for larger terminals it may use 10 tons. All terminals forklifts are use for loading / unloading or storage in yard or warehouse. These are not used for transport the cargo over large distance. For large capacity transport trailers can be used over a large distance.

Forklifts are probably the most common cargo handling and moving machine. Their versatility is achieved through various attachments which either go over the forks or simple replace them.

These are generally used for handling general cargo such as steel plates, paper bales, coils etc.

Figure No. 11- 12 Forklift

11.11.7 Belt Conveyor

The belt conveyor is probably the most common piece of equipment in material handling. The main advantage of the conveyor is that it usually offers the lowest cost alternative for horizontal movement of cargo. This is an important property in inland areas. The main disadvantage of conveyor stems from the fact that it provides only a point-to-point connection and requires fixed support structures, unlike dump trucks and loader, which can move anywhere.

The belt conveyor consists of a belt and idlers, or rollers, which support the belt. The idlers and the belt are usually arranged either "flat" or "troughed", depending on the properties of the material to be conveyed. Flat belts fit materials which have a steep repose angle (e.g. damp sand) while troughed belts fit lumpy materials (e.g. coal and ore). In addition to the belt and idlers, each conveyor has a support structure, a feeder and discharge device (for loading and unloading), and a tension-maintaining arrangement.

The capacity of the conveyor is the function of the belt width, speed and of course, the specific weight of the conveyed material. The speed is mainly determined by the size of the particles. The speed is adjusted to avoid dust in powdery material and spillage in bulky material. Energy consumption, is a function of both density and speed, and is another consideration.

It is important to note that the conveyer is only a means to move materials between machines. Therefore, the conveyer capacity is not only a function of its speed but also a function of the endpoint capacities where the material is fed onto / from the belt.

11.11.8 Gantry Stacker and Reclaimer

The gantry stacker and reclaimer (Figure No. 11-13) and boom stacker and reclaimer are handling and transfer machines in the inland ports, their characteristics and operations are the same, but the configuration is different. The gantry type is more efficient and economical than the boom type.

The gantry stacker and reclaimer is composed of the main gantry and conveyer beam, two legs mounted at the two ends of the top beam, under which the truck can move, and two gears of the bucket wheel mounted on the conveyer beam, it is powered by electricity. The two bucket wheels can move along the conveyer beam to discharge the bulk cargo from the stockpile.

Figure No. 11- 13 Gantry Stacker and Reclaimer

11.12 Handling Attachments

In handling the cargo, cranes or forklifts, from the hatch of the vessel or truck, special tools – Handing attachments such as,

- Crane attachments
- Forklift attachment is required.

The crane attachments are very simple. They hook on to the hook of the crane, and can pick up the cargo. They are of different sizes and types for different cargoes.

The most popular of them include a side shifter for better positioning; clamps handle baled cargo, paper reels or large carton, grip and backrest devices to handle drums; hanging beam for handling cargoes with hooks; centrally mounted ram for handling reels.

- Bucket Type Grab (Figure No. 11-14)

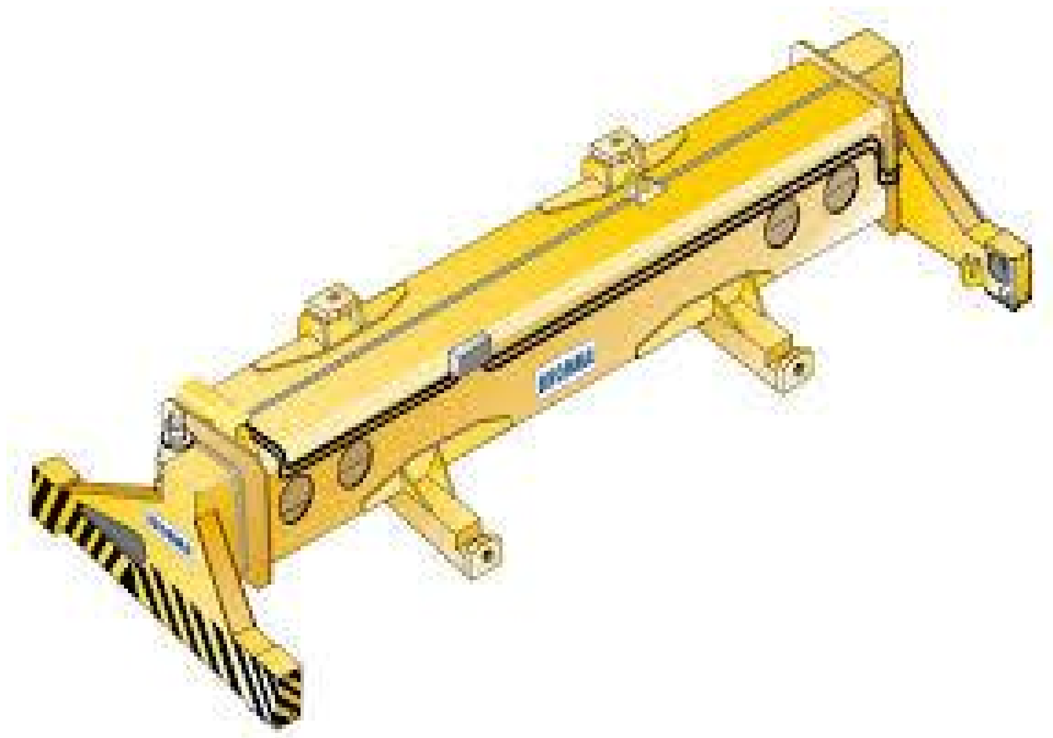
- Palfinger type grab (Figure No. 11-15)
- Tong (Figure No. 11-16)
- Spreader (Figure No. 11-17)

Figure No. 11- 14 Bucket Grab Type

Figure No. 11- 15 Palfinger type grab

Figure No. 11- 16 Tong

Figure No. 11- 17 Spreader



11.13 Equipment at Terminals

Though there are many material handling equipment for general cargo and bulk cargo, following equipment are recommended at Temporary terminal at Jokadia and Permanent terminal at Pankapal in view of the quantity and nature of the cargo to be handled at both there terminals.

(a) Temporary Terminal

Name of the Equipment	Capacity	Quantity (No.)
Fixed Cranes on Pontoon for loading as well as unloading of trucks/ dumpers or barges 10 T	125 TPH	2
Forklifts for transporting general cargo such as steel plates, scraps etc to stack		2

yard for stacking 5 T		
Mobile crane 5T		1
Handling attachments such as 1. Bucket type Grab 2. Palfinger Type Grab 3. Tong 4. Spreader	 5 T 5 T 5 T 5 T	 1 1 1 1

(b) Permanent Terminal

Name of the Equipment	Capacity	Quantity (No.)
Grab level luffing cranes (rail mounted) 20 T	500 TPH	3
Forklifts for transporting general cargo such as steel plates, scraps etc to stack yard for stacking 5 T		3
Gantry stacker and reclaimer 10T capacity		2
Handling attachments such as 1. Bucket type Grab 2. Palfinger Type Grab 3. Tong 4. Spreader	 5 T 5 T 5 T 5 T	 2 2 2 2

The above equipment are recommended which are generally used in inland ports, however following alternative may also be considered for providing at both the terminals.

(c) Temporary Terminal

Crawler crane of 10 T capacities (2 Nos.) can be also considered, in place, since it is more efficient than pontoon mounted cranes.

(d) Permanent Terminal

Crawler cranes of 10 T capacities, 3 Nos. may be considered instead of grab type level luffing crane since these are more versatile than above one.

11.14 Navigational Aids

For day navigation, channel is demarcated by conventional bamboo marks but when frequency of IWT mode increases it becomes essential to provide night navigation facilities.

11.14.1 Night Navigation Facilities

Light Mounted on Country Boat:

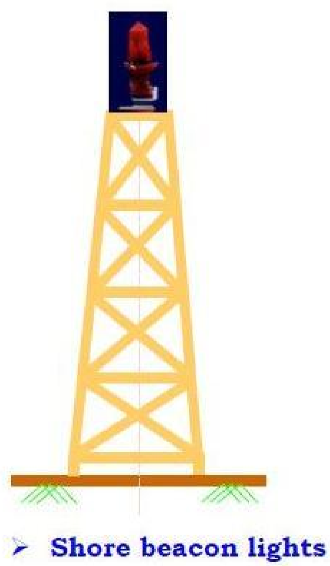
3 km range (Light Emitting Devices) LED lights on 2 m elevated platforms are put on country boats in locations when channel is not defined and banks are not firm necessitating frequent dislocation and deployment of aids.

Lighted Buoys:

Lighted buoys with suitable day mark to be installed on FRP buoys as per IALA (International Association of Lighthouses Authority) system ‘A’ guidelines and appropriate mooring arrangement in the stretches where channel remains firm over a period one year.

Beacon Lights – 7NM (Nautical Miles)

Range beam lights on 15/20 m lattice structure on firm banks, are to be installed as shown below.



Differential Global Position System (DGPS):

The inland water transport vessels are required to travel through narrow and meandering channels and the vessels captain is required to know speed and position of the vessels very accurately.

There are large numbers of satellite aided navigation systems where margin of error is as high as five meters which is not suitable as the signals are of low quality and not highly accurate in nature and there is possibility of the vessel running aground. Hence, a Differential Global Positioning System (DGPS) is recommended. This is also satellite aided system but in this raw signals get refined through a complex process of correction which helps in accurately defining the vessels position.

The DGPS station is established at a location where its position is already known with respect to latitude and longitude. The station receives signals from the satellite systems stationed in the geostationary orbit and calculates the correction in position with respect to its actual position. The correction is continuously transmitted by the established DGPS station which is received by the mobile DGPS receiver installed onboard of the vessel and that gives its accurate position during navigation on real time basis. Hence mobile unit also gives submeter accuracy in position which enables the vessel to navigate along the exact route / channel.

For using DGPS technique certain hardware is also required on the vessel. The vessel is required to be fitted with desktop computer with required configuration / software, one digital echo sounder, one DGPS receiver and the real time navigational display software with preloaded digital charts of the respective waterway. With this the vessel can navigate safely by following the latest navigational route pre loaded in the computer. Accuracy of ±1 m can easily be achieved.

Chapter 12

Preliminary Designs for Engineering Structures

Chapter 12 – Preliminary Designs for Engineering Structures

12.1 General

The main objective of preliminary engineering is to ascertain quantitatively the feasibility of engineering works. Preliminary engineering is carried out to arrive at the preliminary sizing of all major facilities required at the terminal. The preliminary sizing, design and engineering and alternate options of the following facilities presented below:

- Dredging
- Berthing Structures
- Navigational Locks

12.2 Dredging

Generally dredging works in river areas are carried out to create depth in case of new developments and to maintain the dredged depths in the already existing developments for the safe movement of barges / vessels. In the current project since the jetty is located at around EL +24.50 m level and 2000 DWT vessels will be calling on at the jetty, it necessitates the need for dredging for the safe operation of these barges / vessels. Dredging will have to be carried out in the waterway (river), manoeuvring area and berth pocket to maintain the requisite depth. Dredging is classified as:

- Capital dredging
- Maintenance dredging

When dredging of waterway (river) is done for the first time, it is termed as capital dredging. When the dredging process is carried out for removing siltation in the existing waterways, it is termed as maintenance dredging. Hence it can be said that capital dredging is one time dredging whereas maintenance dredging is of recurring nature. However, in rivers the maintenance dredging quantities are very high to the order of 50% or even above.

12.2.1 Dredging Process

Dredging is usually carried out in the following four stages

- Excavation, comprising of loosening, fragmentation or cutting of the soil / rock.
- Raising the excavated materials to the surface by hydraulic or mechanical methods.
- Transport of the excavated materials to a reclamation or disposal area.
- Disposal or reuse of the dredged material.

Each stage of the process is significantly affected by the nature of the materials being dredged. Hence before designing a dredging project the soil characteristics are to be investigated.

12.2.2 Soil Investigations

The type and behaviour of the materials during dredging is of high importance in the selection of equipment, understanding the environmental effects and the characteristics of material. Hence it has become an accepted practice to carry out adequate soil investigations to obtain data for permanent works design, such as slope stability, suitability of materials for reuse etc.

12.2.3 Capital Dredging

A Capital dredging of 16.04 M cum is proposed for the facilities planned in the Pankapal to Dhamra / Paradip Port route

12.2.4 Dredging Equipments

The choice of equipment depends primarily on dredge material, disposal methodology and distance of disposal location. The dredgers are mainly classified as below:

- Mechanical
- Hydraulic

- Pneumatic

Mechanical dredgers use mechanical power for excavation. The various types of mechanical dredgers are

- Grab dredger
- Dipper dredger
- Bucket dredger

The hydraulic dredgers employ suction techniques in which the soil is drawn up by a centrifugal pump. The soil water mixture is transported through a pipeline. The various types of hydraulic dredgers are

- Plain Suction Dredger
- Cutter Suction Dredger
- Wheel Dredger
- Barge Unloading Dredger
- Trailer Suction Hopper Dredger

The dredger in this category is known as the 'Pneumatic System' and works on compressed air. The system can be used for dredging sand, clay, silt, gravel, etc. The system has been tried up to a depth of about 50 m.

12.2.5 Selection of Dredging Equipment

The selection of equipment mainly depends on the following:

- Size of the Project (quantity in cum)
- Nature of the material (hard rock, sandy or clay)
- Volume of the material
- Topography of the area with reference to accessibility etc.

- Distance of disposal ground from the dredging area
- Environmental factors at the site and also other environmental aspects like MoEF stipulations.
- Accuracy of the work required
- Availability of equipment

Besides the contract conditions, the available time and the equipment available in the market play an important role in selecting the dredging equipment.

12.3 Berthing Structure

Berthing structures are to be designed such that they provide safe berthing of barges / vessels without damaging the barges / vessels as well as the structure. These structures should also cater to the requirements of the various equipments to be used for loading/ unloading of vessels. The requirements of the berth differ depending on the nature of cargo being handled at the berth. The size of the structure depends on the largest vessel likely to use the berth and the type of handling equipment to be used on the deck. The berth should be designed for all possible loads that are likely to act on the structure. The total number of berths required for the proposed terminal and their arrangement was fixed based on the nature of cargo, traffic, alignment of contours and predominant wind, water levels. The berth is planned for handling 4 Nos. barges / vessels of 2000 DWT at time.

12.3.1 Deck Level

The first step towards the development of a berthing structure is to arrive at the deck level. The deck level is decided based on the following aspects:

- Considering the optimum position of the cargo transfer equipment to cater for two extreme conditions, viz., the largest vessel in light displacement condition at highest water and the smallest vessel fully laden at lowest water

- On consideration to prevent overtopping of the deck during extreme conditions based on codes like IS 4651 (or) other guidelines.
- By comparing with the deck level at the nearby jetty terminals

As per IS 4651 (Part V)-1980

The top of deck level arrived as per Clause 3.6.7 of IS 4651 (Part V)-1980 is as below:

Deck level is calculated by considering following parameters:

Danger flood water level = EL 23.00 m MSL

Free board = 1.50 m

The deck level for the jetty is worked out to be + EL 24.50 m MSL.

12.3.2 Deck Dimension

The dimensions of the Wharf are decided on the basis of the dimension of the largest vessel that is likely to use the terminal facilities in the final phase. The design of berth requires special considerations, as they are governed by the type of unloading facilities provided. The dimensions chosen for the berth should allow for safe and efficient flow of materials between vessels/ barges and river banks.

Length of Berth

The length of the berthing structure is to be decided based on overall length of barge / vessel to cater the requirement of cargo loading and unloading. The required berth length is given in following Table No. 12-1.

Table No. 12-1 Berth Length

Nos. of Berths	Design Vessel (DWT)	LoA of Design Vessel (m)	Length of Berth (m)
4	2000	86	400
		Total Length of berth	**400**

Width of Deck Structure

The width of the berths depends on the type of commodity and the relevant type of handling system as well as the location of the berths within the harbour. The rail gauge length of the unloader and their out reach and back-reach play a vital role in determining the dimensions of the berth. The width required at berths is 22.0 m as per requirement, for operating gantry mouthed crane.

12.3.3 Structural System

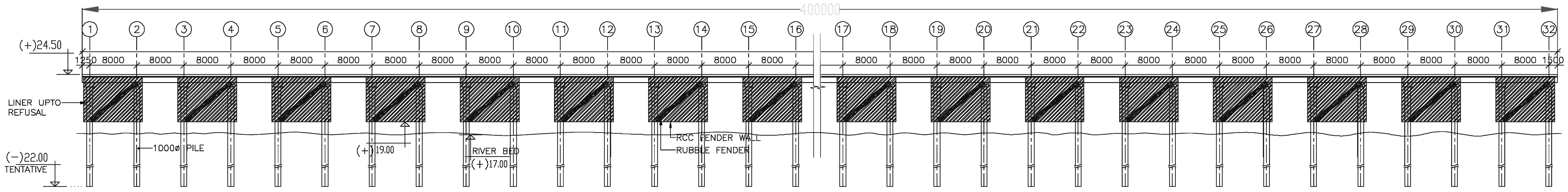
The width of the jetty is 22.0 m and the length calculated is 400 m. It is proposed to use level luffing crane for unloading coal from vessel to stacking yard / tipper. The deck system has to be designed suitably for handling the system. Expansion joints are provided at regular intervals to reduce thermal stresses and thus the entire length of the jetty is made up of 5 to 6 Jetty Units. The structural system comprises of bored cast-in-situ piles and deck. The deck system is made up of a combination of pre-cast elements with in-situ topping to provide the required diaphragm action to the structure. The design dredge depth at the face of the berth is (+) 16.00 m MSL and a minimum dredge slope of 1:3 are to be maintained behind the berth face. General Arrangement drawing of the berth structure and typical cross-section of the berth is presented in **Fig.12.1**

12.4 Navigational Locks

To navigate the barrages and weirs in the stretch, navigational locks are essential. Based on the vessel dimensions it is proposed to have two navigational locks each of length 110 m and width 18 m is proposed to cater to the need of 2000 DWT vessel of 86 m x 14 m one for upstream vessels and other one for downstream vessels. General arrangement of the navigational locks is presented in **Fig.12.2**.

12.5 Diaphragm Wall

It is proposed to construct Diaphragm wall on the landward side of the berthing structure to avoid sliding of land mass into the river during high floods / monsoon.



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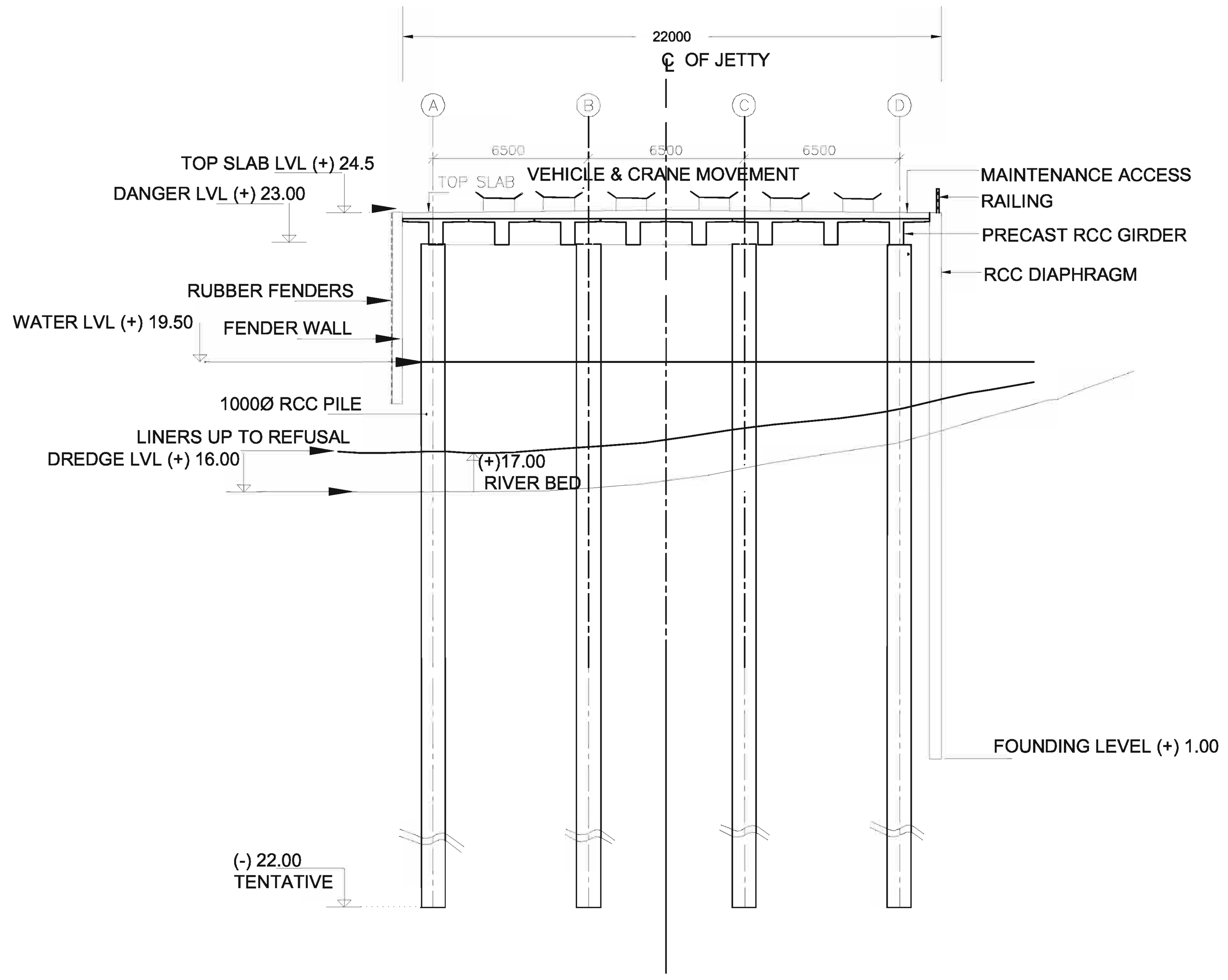
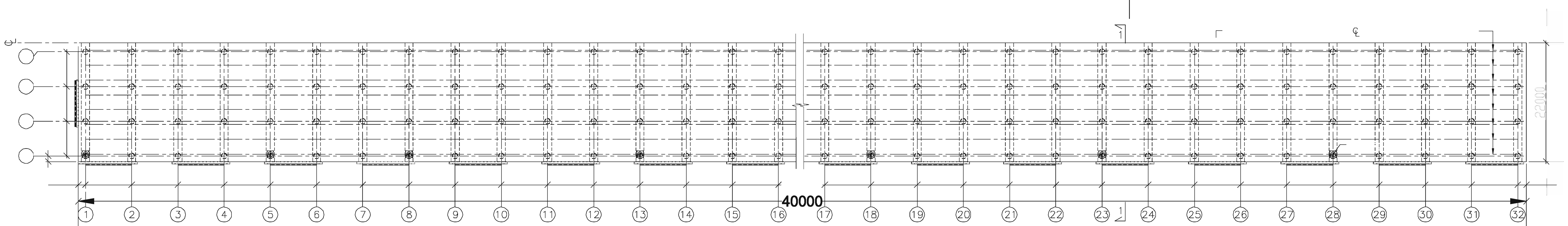
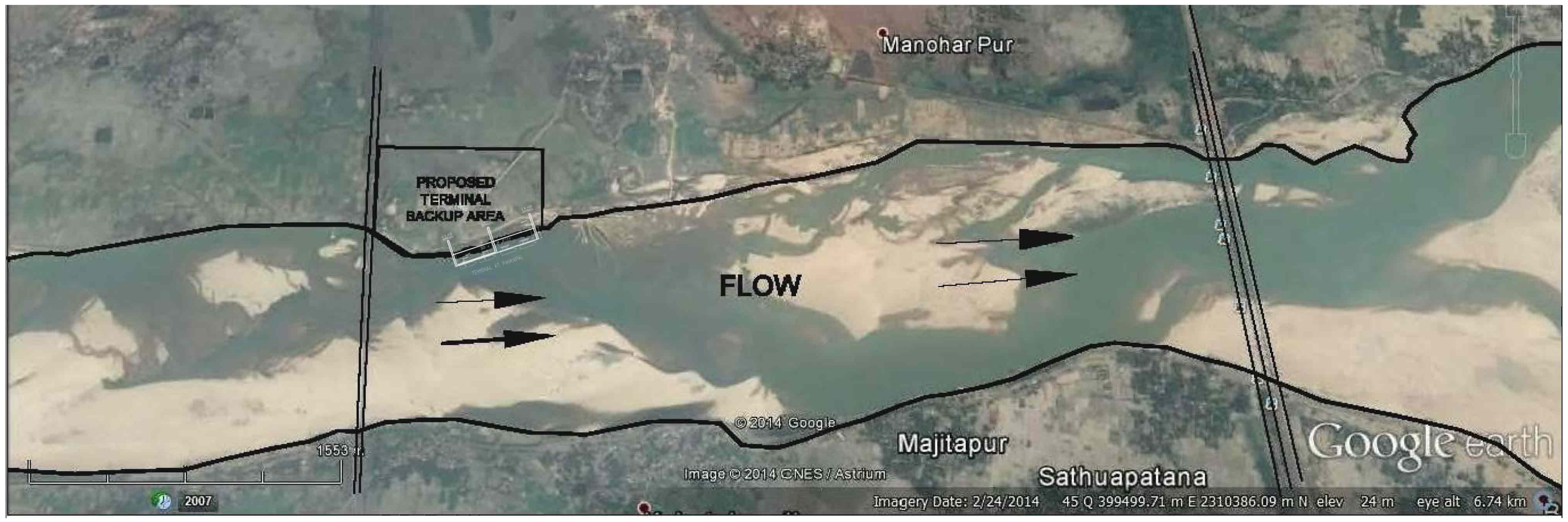




P L A N

MOORING DOLPHIN NOT SHOWN



NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS.
2. DIMENSIONS AND THICKNESS SHOWN ARE TENTATIVE AND SUBJECT TO CHANGE DURING DETAIL DESIGN.
3. MATERIALS :
   CONCRETE M40
   MINIMUM W/C RATIO ≤ 0.40
4. DURABILITY MEASURES :
   PILE LINERS WITH COALTAR EPOXY PAINT.
   ALL SURFACES EXPOSED TO ALTERNATE DRYING & WETTING (ABOVE LTL) COALTAR EPOXY PAINT.
5. LEVELS INDICATED ARE TENTATIVE W.R.T. MSL.
6. EPOXY COATED STEEL TO BE USED.
7. SULPHATE RESISTANT CEMENT TO BE USED.
8. FOLLOW WRITTEN DIMENSIONS ONLY

LEGEND :

UN : UNLESS NOTED
TYP : TYPICAL
THK : THICK
LVL : LEVEL

BERTHING DATA :

APPROACH ANGLE ≤ 10°
DWT OF VESSEL LIGHT CONDITION: 2000 DWT

CLIENT:

INLAND WATERWAYS AUTHORITY OF INDIA

CONSULTANT:

वाप्कोस लिमिटेड WAPCOS LIMITED

WAPCOS LIMITED

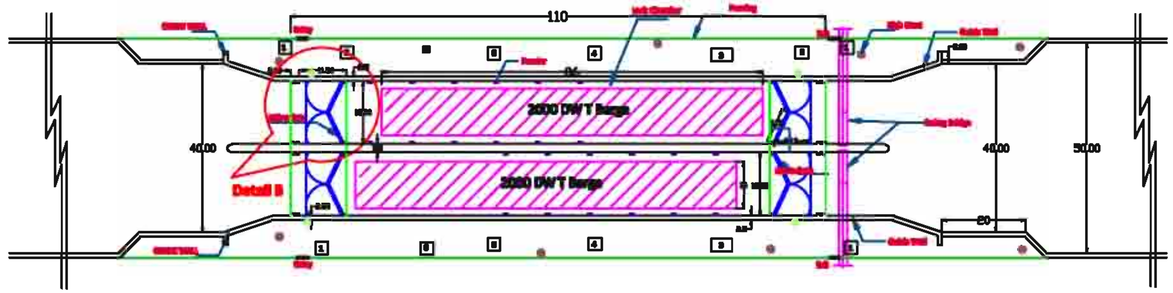
PROJECT TITLE:

CONSULTANCY SERVICES FOR THE STUDY FOR REVISING THE DPR OF NATIONAL WATERWAY - 5 FOR DEVELOPING THE STRETCH BETWEEN PANKAPAL / JOKADIA TO DHAMRA & PARADIP IN ODISHA

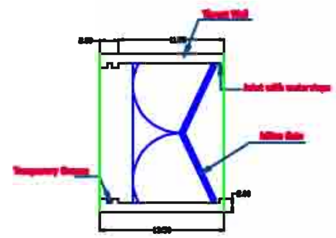
DRAWING TITLE:

PLAN & SECTION OF BERTHING STRUCTURE AT PANKAPAL

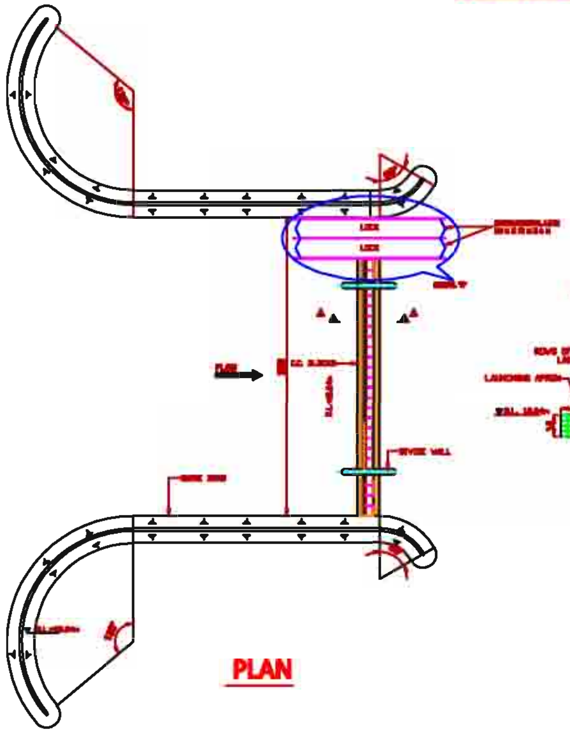
DRAWING No. FIG.12.1



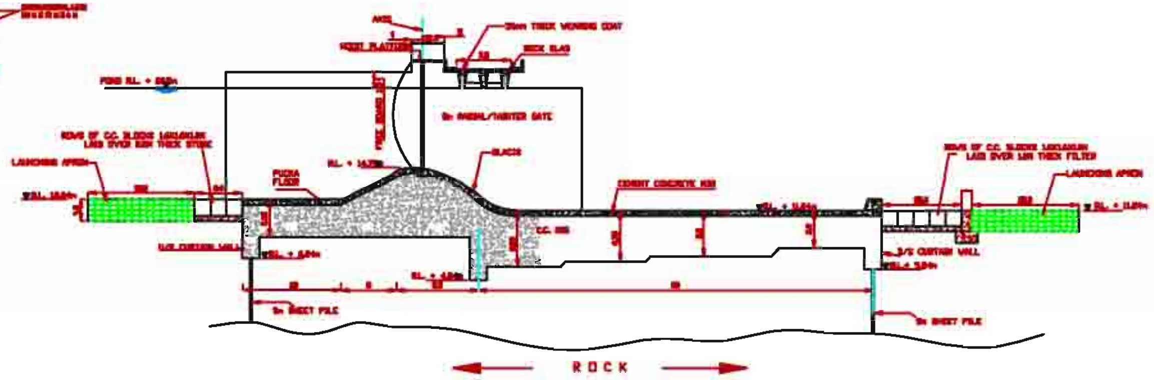
PLAN OF NAVIGATIONAL LOCK



Detail B (Gate Block)



PLAN



SECTION A -A

DETAILS OF PROPOSED COMPONENTS OF LOCK:

Sl.No	COMPONENTS
1.	Security Room
2.	Lock Operating Room
3.	Power Room
4.	Standby Generator Room
5.	Store Room
6.	Wash Room

LEGEND
- High Mast
- Bollard
- Fender

CLIENT:

INLAND WATERWAYS AUTHORITY OF INDIA

CONSULTANT:

WAPCOS LIMITED

PROJECT TITLE:

DRAWING TITLE:

DRAWING No.

FIG.3.12.2

Chapter 13

Bank Protections

Chapter 13 – Bank Protections

13.1 General

The entire river bed in stretch from Pankapal to Dhamra and Paradip to Mangaldagi falls under alluvial category. The natural river bed is 250 to 500 m wide in river Kharsua and about 100 to 125 m in non tidal reach of Tantighai / Kani River. The deep channel keeps meandering in the wide river bed forming shoals along convex banks and deep pools near concave banks. Adequate Bank protection needs to be provided along the reach where the deep channel hugs the river banks. The type and extent of bank protection provided will depend on design discharge and corresponding water levels, velocities and river bed and bank material properties such as grain size distribution, cohesion and angle of internal friction. Based on study of these parameters along the reach, appropriate type of protection could be designed and provided. It is suggested that mathematical model studies for prediction of flows for different discharges will be of great help to get required flow parameters. Base on flow parameters various types of protections could be proposed such as nominal protection with dry rubble pitching for low velocities to stone filled GI wire Gabions etc. Use of appropriate type of Filter (natural or synthetic geo-fabric) is necessary in these protection works. The criteria for design of geo-fabric filter as proposed in IS8408 (1994) and IS14262 (1995) should be followed. The following BIS Codes may also be referred for planning, construction and maintenance of the bank protection / embankment works:

- IS14262 : 1995 “Planning and design of revetment – guidelines”
- IS11532 : 1995 (Reaffirmed 1997) “Construction and maintenance of river embankments (levees) – guidelines (First revision)”
- IS8408: 1994 “Planning and design of groynes in alluvial river – guidelines (First revision)”
- IS12094: 2000 “Guidelines for planning and design of river embankments (levees) (First revision)”

The maintenance of river banks / flood embankments is subject of state WRD. The state government has already carried out bank protection works on river Kharsua and Tantighai / Kani. Photographs of these protection works along Kani river right bank in the reach between Dandishai to Padanipal are given below. The bank protection works by State Govt. are without any filter below dry rubber pitching and hence it is damaged on slope and may get washed during high floods. Therefore, IWAI may restrict the protection works to the reaches where active erosion is seen and at locations of bends where navigation channel is hugging the main river bank. The works similar to those carried out by state government but with provision of appropriate filter below may be carried out at vulnerable locations. Some Such locations are on river Tantighai / Kani where protection will be needed.

Photograph No. 13-1 Bank Protection

Photograph No. 13-2 Bank Protection along the river

Photograph No. 13-3 Bank Protection along the river

Photograph No. 13-4 Bank Protection along the river

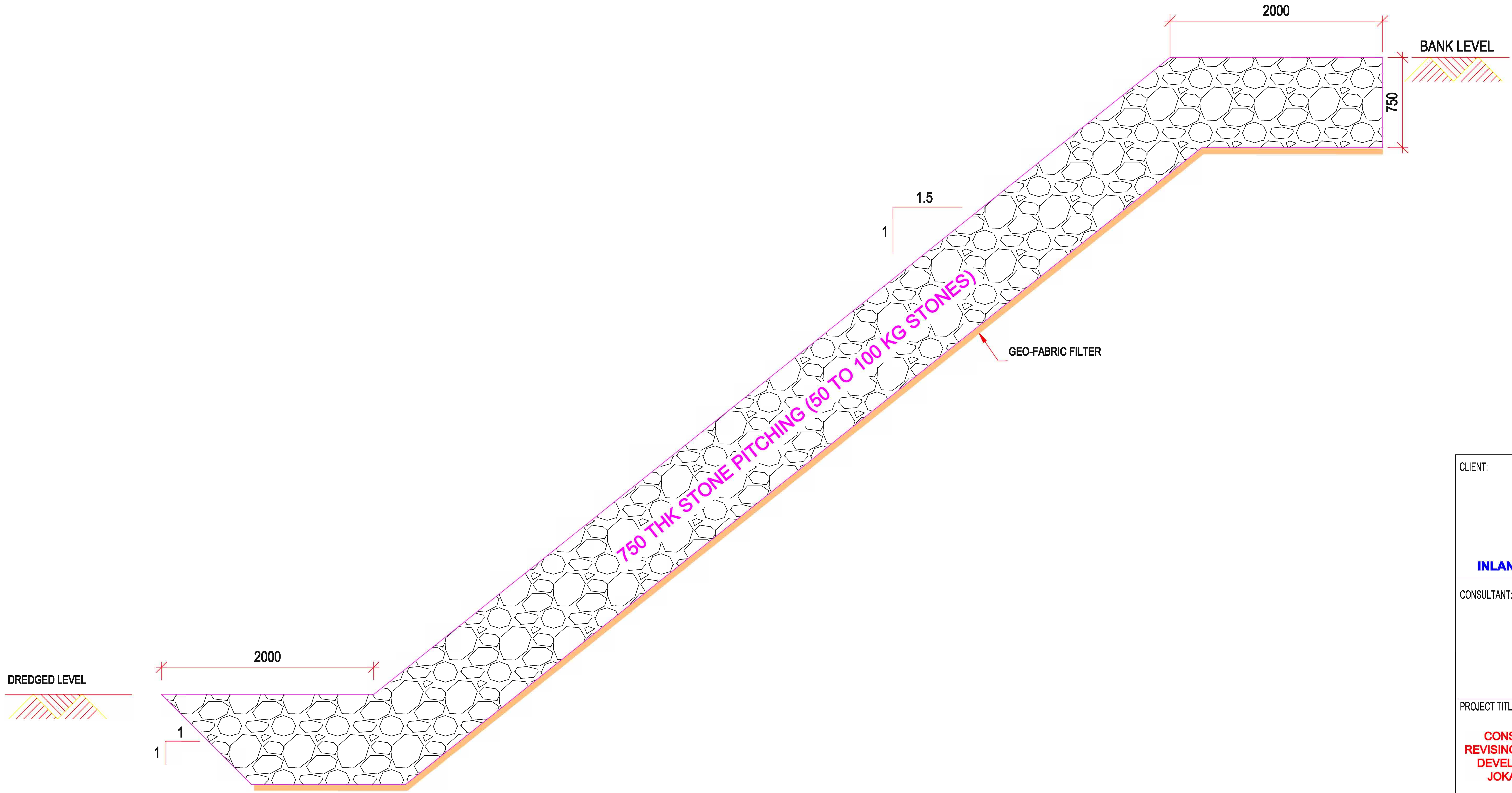
Photograph No. 13-5 Bank Protection along the river

Photograph No. 13-6 Bank Protection along the river

The details of location, chainage and length of Bank Protection Works which are required in the stretches has been identified and the same are shown in Table No.-13.1.

Table No.13.1 Details of Bank Protection works

Sl.No.	Location	Chainage (Km)	IWAI Chart Number	Total length (Km)
1	Dhamra to Bandhamala	6 Km to 7 Km	2013/NW5/DT/01/29	1.00
2	Jarimul to Balachandrapur	31 Km to 35 Km	2013/NW5/DT/03/29	4.00
3	Near Mahua	45 Km to 47 Km	2013/NW5/DT/04/29	2.00
4	Bhuinpur	57 Km to 59 Km	2013/NW5/DT/05/29	2.00
5	Confluence of Kani River	59.5 Km to 60.5 Km	2013/NW5/DT/05/29	1.00
			Total length	**10.00**



SECTIONAL VIEW OF BANK PROTECTION WORK

CLIENT:

INLAND WATERWAYS AUTHORITY OF INDIA

CONSULTANT:

WAPCOS LIMITED

PROJECT TITLE:

CONSULTANCY SERVICES FOR THE STUDY FOR REVISING THE DPR FOR NATIONAL WATERWAY - 5 FOR DEVELOPING THE STRETCH BETWEEN PANKAPAL/ JOKADIA TO DHAMRA AND PARADIP IN ODISHA

DRAWING TITLE:

SECTIONAL VIEW OF BANK PROTECTION WORK

DRAWING No.

FIG.13.1

Chapter 14

Cost Estimates

Chapter 14 – Cost Estimates

14.1 Basis of Cost Estimates

An estimate of the capital cost of various facilities for the proposed jetty is made. The cost arrived at are based on the budgetary quotes and the in house database available on cost estimates. The rates for various items of work have been prepared on the basis of current rates for various items of work prevailing in the region.

The items and costs have been arrived at broadly on the following:

- Rates taken from current works of similar nature
- Updated rates of work of similar nature completed in the recent past.
- Consultant's in house data bank of cost estimates and budgetary quotations.
- These are tentative cost for indicating the total project cost which are subject to verification/ discussion.

14.2 Capital Cost Estimates – Permanent Terminal at Pankapal

The estimate of capital cost is made for the various items of civil, mechanical, electrical and utilities works for the development of permanent terminal at Pankapal (Pankapal to Dhamra / Paradip route), cost estimate is presented in Table 14-1.

1. The capital cost worked out is excluding land cost for construction of terminals, navigational locks and cost of reconstruction of Jenapur & Jokadia Barrages and reconstruction of Sujanpur weir / barrages.
2. It is assumed that the Barrages at Jokadia, Sujanpur and Jenapur will be constructed by State Government. In case if these Barrages are to be constructed by IWAI, then cost for these Barrages are to be considered which may be in the range of Rs.350 to Rs.450 Crores per Barrage

(including Bridge, Gates, etc.,) depending upon the design foundation etc., and subject to mathematical model studies, detailed designs, investigations, etc., and accordingly provision has been kept for construction of navigational locks in the cost estimate. This is only for indicative purpose.

3. The tentative cost for the four Control Structures proposed along the water way at Burah River conflunece, Erada, Nua nai and Padanipal, subject to mathematical model studies, detailed designs, investigations, etc., would be in the range of Rs.150 Crore to Rs.200 Crore per Cross Structure (Barrage including gates and bridge). This is only for indicative purpose.

4. The necessity of Bajapada Barrage can be concluded only after conducting the mathematical model studies and hence the cost for the same is not included in the estimate.

14.3 Capital Cost Estimates – Temporary Terminal

For immediate temporary operation of the waterway through Kharsua, Tantighai / Kani River system, by passing Sujanpur weir for the stretch Jakodia to Paradip / Dhamra, the estimate of capital cost is made for the various items of civil, mechanical, electrical and utilities works cost estimate is presented in Table 14-2.

1. The capital cost worked out is excluding land cost for temporary terminal and back up land for terminal at Sujanpur weir

2. Cost of Control Structures as indicated in the drawing (Fig.9.6) are not included in the estimate.

14.4 Operational and Maintenance Cost

The annual operation and maintenance cost on different components of the project will be dependant on a number of variables such as the life of the component, repair and maintenance requirements, wages of crew of consumables, etc. Hence, accurate assessment of cost is not possible. Further even if all the variables are fixed such as the maintenance schedules for each structure and equipment is determined, crew strength is fixed, requirement of consumables quantified, etc., the estimation of O&M costs cannot be precise because of unpredictable breakdowns incurring considerable expenditure on repairs and replacement. The only practicable approach in this scenario is to fix the annual repair expenditure as a percentage of capital cost of project. This percentage is to be fixed on the basis of the past performance of similar structures and equipment functioning in the project or else where under similar marine conditions.

Based on above criteria, the annual maintenance cost is estimated as a percentage and is presented in Table 14-3.

14.5 Detailed Bill of Quantities and Abstract of Cost Estimate:

The detailed Bill of Quantities and Abstract of Cost estimates for the proposed components viz., Jetty, Diaphragm wall, Navigational locks and Bank protection works are given in Annexure-14 as Annexure-14.1, 14.2, 14.3 and 14.4.

Table 14-1 Abstract Cost Estimates for Permanent Terminal at Pankapal (2000 DWT Barges)

Sl. No.	Particulars / Items	Unit	Quantity	Rate (Rs.)	Amount (Rs. In Lakhs)
A. Civil and Structures					
1	Reclamation & Land preparation	LS	100 Acres	10,000,000.00	100.00
2	Jetty (400 x 22 m) – 4 nos. berths	Rmt	400	3,200,000.00	12,800.00
3	Approach Road	Rmt	1,500	150,000.00	2,250.00
4	Stacking area (30 Hectare)	Sqm	300,000	15,000.00	45,000.00
Sub Total Civil and Structures (In Lakhs)					**60,150.00**
B. Capital Dredging of Waterway					
5	Entire stretch (-3.00 m CD, Slope 1 : 3)				
	a) Pankapal to Jokadia	Cum	1,650,000	300.00	4,950.00
	b) Jokadia to Sujanpur	Cum	2,890,000	300.00	8,670.00
	c) Sujanpur to Padanipal	Cum	7,170,000	300.00	21,510.00
	d) Padanipal to Mangalagadi	Cum	210,000	300.00	630.00
	e) Mangalagadi to Paradip Port	Cum	4,120,000	300.00	12,360.00
		Cum	**16,040,000**		**48,120.00**
Sub Total Captial Dredging (In Lakhs)					**48,120.00**
The dredging rate is around Rs.175 to Rs.185 per Cum. However, considering lead and other rates, the proposed dredging rate for this study is adopted as Rs.300/- per Cum					
C. Mechanical / Handling Equipments					
6	Level Luffing Crane - 500 TPH	Nos.	3	180,000,000.00	5,400.00
7	Crawler Crane - 1000 TPH	Nos.	3	40,000,000.00	1,200.00
8	Crane Attachments	LS		50,000,000.00	500.00
9	Backhoe	Nos.	2	3,000,000.00	60.00
10	Forklift - 10 Ton	Nos.	4	1,000,000.00	40.00
Sub Total Mechanical / Handling Equipments (In Lakhs)					**7,200.00**
D. Utilities					
11	Building	LS		20,000,000.00	200.00
12	Electrical	LS		50,000,000.00	500.00
13	Water Supply, Pipelines & OHT	LS		15,000,000.00	150.00
14	Fire Figthing	LS		5,000,000.00	50.00
15	Communcations	LS		5,000,000.00	50.00
16	STP / ETP	LS		20,000,000.00	200.00
Sub Total Utilities (In Lakhs)					**1,150.00**
E. Marine					
17	Navigational Aids (DGPS/Buoys/Beacons)	LS		150,000,000.00	1,500.00
Sub Total Marine (In Lakhs)					**1,500.00**
F. Navigational Locks					
18 a.	Jokadia Barrage & Sujanpur weir (110 m x 18 m)	Nos.	2	630,000,000.00	12,600.00
18 b.	Padanipal (110 m x 18 m)	Nos.	1	630,000,000.00	6,300.00

Sub Total Navigational Locks (In Lakhs)					**18,900.00**
G. Bank Protection Works					
19	Bank Protection				
a.	Dhamra to Bandhamala (Ch.6 Km to 7 Km)	Rmt	1,000	50,000.00	500.00
b.	Jarimul to Balachandrapur (Ch.33 Km to 35 Km)	Rmt	2,000	50,000.00	1,000.00
c.	Near Mahua (Ch.45 Km to 47 Km)	Rmt	2,000	50,000.00	1,000.00
d.	Bhuinpur (Ch.57 Km to 59 Km)	Rmt	2,000	50,000.00	1,000.00
e.	Kani River end (Ch.59.5 Km to 60.5 Km)	Rmt	1,000	50,000.00	500.00
f.	Padanipal (61 Km to 63 Km)	Rmt	2,000	50,000.00	1,000.00
		Rmt	**10,000**		**5,000.00**
Sub Total Bank Protection Works (In Lakhs)					**5,000.00**
H. Diaphragm wall					
20	Diaphragm Wall (to prevent the land behind the terminal from sliding)	Rmt	650	643,000.00	4,180.00
Sub Total Retaining Wall (In Lakhs)					**4,180.00**
Grand Total A to H (In Lakhs)					**146,200.00**
Grand Total A to H (In Crore)					**1,462.00**

NOTE:

1. The above cost is excluding land cost for construction of terminals, navigational locks & land cost of reconstruction of Jenapur & Jokadia Barrages & reconstruction of Sujanpur wier / Barrages.

2. It is assumed that the Barrages at Jokadia, Sujanpur and Jenapur will be constructed by State Government. In case if these Barrages are to be constructed by IWAI, then cost for these Barrages are to be considered which may be in the range of Rs.350 to Rs.450 Crores per Barrage (including Bridge, Gates, etc.,) depending upon the design foundation etc., and subject to mathematical model studies, detailed designs, investigations, etc., and accordingly provision has been kept for construction of navigational locks in the cost estimate. This is only for indicative purpose.

3. The tentative cost for the four Control Structures proposed along the water way at Burah River confluence, Erada, Nua nai and Padanipal, subject to mathematical model studies, detailed designs, investigations, etc., would be in the range of Rs.150 Crore to Rs.200 Crore per Cross Structure (Barrage includging gates and bridge). This is only for indicative purpose.

4. The necessity of Bajapada Barrage can be concluded only after conducting the mathematical model studies and hence the cost for the same is not included in the estimate.

Table 14-2 Abstract Cost Estimates for Temporary Terminal (500 DWT Barges) at downstream of Sujanpur weir

Sl. No.	Particulars / Items	Unit	Quantity	Rate (Rs.)	Amount (Rs. In Lakhs)
A. Civil and Structures					
1	Reclamation & Land preparation	LS		5,000,000.00	50.00
2	Approach Road	Rmt	6,000	150,000.00	9,000.00
3	Stacking area	Sqm	200,000	15,000.00	30,000.00
				Sub Total Civil and Structures (In Lakhs)	**39,050.00**
B. Capital Dredging of Waterway					
4	Stretch between downstream of Sujanpur weir to Dhamra and Paradip Port (-2.00 m CD, Slope 1 : 2)				
	a) Sujanpur to Padanipal	Cum	4,290,000	300.00	12,870.00
	b) Padanipal to Mangalagadi	Cum	40,000	300.00	120.00
	c) Mangalagadi to Paradip Port	Cum	2,490,000	300.00	7,470.00
			6,820,000		**20,460.00**
				Sub Total Captial Dredging (In Lakhs)	**20,460.00**
The dredging rate is around Rs.175 to Rs.185 per Cum. However, considering lead and other rates, the proposed dredging rate for this study is adopted as Rs.300/- per Cum					
C. Mechanical / Handling Equipments					
5	Crawler Crane - 500 TPH	Nos.	2	30,000,000.00	600.00
6	Crane Attachments	LS		30,000,000.00	300.00
7	Pontoon Crane	Nos.	2	20,000,000.00	400.00
8	Pontoon	Nos.	2	50,000,000.00	1,000.00
9	Backhoe	Nos.	1	3,000,000.00	30.00
10	Forklift - 10 Ton	Nos.	2	1,000,000.00	20.00
				Sub Total Mechanical/ Handling Equipments (In Lakhs)	**2,350.00**
D. Utilities					
11	Building	LS		20,000,000.00	200.00
12	Electrical	LS		50,000,000.00	500.00
13	Water Supply and Pipelines	LS		15,000,000.00	150.00
14	Fire Figthing	LS		5,000,000.00	50.00
15	Communcations	LS		5,000,000.00	50.00
				Sub Total Utilities (In Lakhs)	**950.00**
E. Marine Aids					
16	Navigational Aids	LS		50,000,000.00	500.00
				Sub Total Marine Aids (In Lakhs)	**500.00**
F. Bank Protection Works					
17	Bank Protection				

a.	Dhamra to Bandhamala (Ch.6 Km to 7 Km)	Rmt	1,000	50,000.00	500.00
b.	Jarimul to Balachandrapur (Ch.33 Km to 35 Km)	Rmt	2,000	50,000.00	1,000.00
c.	Near Mahua (Ch.45 Km to 47 Km)	Rmt	2,000	50,000.00	1,000.00
d.	Bhuinpur (Ch.57 Km to 59 Km)	Rmt	2,000	50,000.00	1,000.00
e.	Kani River end (Ch.59.5 Km to 60.5 Km)	Rmt	1,000	50,000.00	500.00
f.	Padanipal (61 Km to 63 Km)	Rmt	2,000	50,000.00	1,000.00
		Rmt	**10,000**		**5,000.00**
				Sub Total Bank Protection Works (In Lakhs)	**5,000.00**
G. Diaphragm Wall					
18	Diaphragm wall	Rmt	162	643,000.00	1,040.00
				Sub Total Retaining Wall (In Lakhs)	**1,040.00**
				Grand Total A to G (In Lakhs)	**69,350.00**
				Grand Total A to G (In Crore)	**693.50**

NOTE :

1. The above cost is excluding land cost for temporary terminal and back up land for terminal at Sujanpur weir

2. Cost of Control Structures as indicated in the drawing (Fig.9.6) are not included in the estimate.

Table 14-3
Operation and Maintenance Cost for Permanent Terminal at Pankapal

Sl. No.	Particulars / Items	Unit	Quantity	Rate (Rs. In Lakhs)	Amount (Rs. In Lakhs)
1	Civil and Structures	%	1	60,150.00	601.50
2	Capital Dredging of Waterway	%	50	48,120.00	24,060.00
3	Mechanical / Handling Equipments	%	7	7,200.00	504.00
4	Utilities	%	1	1,150.00	11.50
5	Marine	%	2	1,500.00	30.00
6	Navigational Locks	%	2	18,900.00	378.00
7	Bank Protection Works	%	1	5,000.00	50.00
Grand Total Maintenance Cost (In Lakhs)					**25,635.00**

Operation and Maintenance Cost for Temporary Terminal (Downstream of Sujanpur weir)

Sl. No.	Particulars / Items	Unit	Quantity	Rate (Rs. In Lakhs)	Amount (Rs. In Lakhs)
1	Civil and Structures	%	1	39,050.00	390.50
2	Capital Dredging of Waterway	%	50	20,460.00	10,230.00
3	Mechanical / Handling Equipments	%	7	2,350.00	164.50
4	Utilities	%	1	950.00	9.50
5	Marine	%	2	500.00	10.00
6	Bank Protection Works	%	1	5,000.00	50.00
Grand Total Maintenance Cost (In Lakhs)					**10,854.50**

Chapter 15

Conclusions and Recommendations

Chapter 15 – Conclusions and Recommendations

15.1 General

Based on analysis of results / outcome of various studies carried out and as well as analyses of various data, following conclusions are drawn:

15.2 Brahmani / Kharsua river hydrology, Navigation channel & Dredging

i) Navigation through Brahmani, Kharsua, Tantighai / Kani from Pankapal to Dhamra and Paradip will be feasible with 2 m LAD for about 330 days in a year as per 1986 to 2000 year flow data, when the discharge of 100 m^3/sec or more will be available in Brahmani River at Jenapur. Flow data of period from 2001 to 2012; however indicate that the navigation with 2 m LAD will be feasible for 270 to 300 days in a year. For 3 m LAD, discharge requirement at Jenapur will be 150 m^3/sec or more and feasibility of navigation with 3 m LAD will be for 180 to 240 days, as per 2001 to 2012 flow data. For remaining days navigation may not be possible either due to low flows below 50 cum/sec for few days in lean season or due to high floods during monsoon. WRD, Government of Odisha has intimated that it will not be possible to maintain 150 m^3/sec discharge at Jenapur during lean season for navigation purpose due to demand of water for power, irrigation, industry and urban/rural water supply.

ii) On an average (based on 1986 to 2012 data), flow less than 50 m^3/sec may occur in Brahmani River at Jenapur for 7 to 15 days in a year. Flows more than 100 m^3/sec will occur for about 84 % of days in a year. During lean season almost 80 to 90 % of flow in Brahmani at the head of delta will pass through Kharsua river after bifurcation.

iii) Apart from basic requirement of availability of 100 / 150 m^3/sec discharge at Jenapur for 2m / 3m LAD, the major challenge in developing the navigation channel of 50 m width (base width 45m) and 2/3 m depth in alluvial river bed (of width 100m to 250m or more) will be to maintain the required width and depth. This dredged channel will tend to be wider and shallower due to sediment movement, since it is not possible to provide any permanent protection to the banks of dredged deep channel of 50 m width. Any protection provided will get washed during floods. The natural deep channel keeps meandering on Alluvial river bed.

iv) The Highest flood discharge at Jenapur in Pre - Rengali period was 24246 m^3/sec in August 1975 when HFL at Pankapal was EL 24.78 m. i.e. above the danger level of EL 23.0 m at SH 200 bridge at Pankapal. In Post - Rengali period (1985 -2012) peak flood discharges were close to or slightly higher than 10,000 m^3/sec. (1984: 9707 cum/sec, 1991: 9151 m^3/sec, 2001: 10076 m^3/sec, 2005 : 10313 m^3/sec, 2006: 9804 m^3/sec, 2011: 10372 m^3/sec). The Odisha WRD has recommended the design flood as 11326 m^3/sec at the head of the delta. As per statistical analysis , this value is of 25 year return period. The 100 year return period flood discharge will be 14275 m^3/sec.

v) Considering the fact that discharge of 150 m^3/sec at Jenapur for maintaining 3 m LAD will not be feasible during lean season, the navigation from Pankapal to Dhamra and Paradip along the route through Brahmani / Kharsua / Tantighai / Bhongara / Dahikai / Kani will be feasible only by creating series of pools by reconstructing existing barrages as well as constructing 4 (four) new control structures as discussed in Chapter 9. Thus navigation from Pankapal to Dhamra and Paradip with 3m LAD will be feasible, subject to following conditions.

(a) Reconstruction of Jokadia weir as per design proposed by Odisha WRD (as detailed in Chapter 9) with gates to maintain FRL of EL 19.50 m. WAPCOS recommends FRL as EL 20.0 m to enable navigation upto Pankapal along with two Navigational locks of 110 m length and 18 m width in two spans of left bank of Jokadia barrage to cater the navigational needs of 2000 DWT barge1s.

(b) Raising crest level of defunct Jenapur weir from existing EL 17.41 m to EL 20.0 m to enable ponding in Jokadia to Panpakal and upstream stretch.

(c) Reconstruction of Sujanpur weir, as a barrage with crest level EL 10.28 along with construction of two navigation locks preferably on right bank of Tantighai river at Sujanpur weir, as already agreed by WRD Odisha.

(d) Construction of new barrages at the following locations:

1) On river Kharsua at about 500 m downstream of Burhi river confluence as shown in Fig 9.6.

2) On Tantighai river near village Erada at about 500 m downstream of bifurcation into Tantighi and Bhongara rivers as shown in Fig 9.6 and 9.8.

3) On river Naunai river just after bifurcation of Bhongara into Naunai and Dahikhai rivers as shown in Fig 9.8.

4) Barrage with Navigation locks on river Kani on upstream of Manpur bridge as shown in Fig 9.10.

5) Depending on outcome survey of Dahikhai river and detail model studies, additional barrage with navigation lock on Dahikhai river may be necessary

(e) Capital dredging of about 16.00 Mm^3 was envisaged for the waterway route from Pankapal to Dhamra/Paradip Port along Kharsua / Tantighai / Kani to develop a navigation channel of 50 m width (base width of 45 m) with slope of 1:3 and 3 m depth with respect to CD based on the survey charts given by IWAI (i.e., survey was carried out by GMI during the year 2013). These estimates of dredging were without consideration of control structures for pools/barrages as discussed in Chapter 9. With consideration of pools, the dredging quantities are likely to be reduced and will have to be reviewed after finalization of FRL/operating levels of pools / control structures.

vi) The dredging quantities have been computed for 3 m depth and 2 m depth with respect to chart datum from the survey charts. The calculations for dredging quantities have been carried out for side slopes 1:2 and 1:3, keeping the bottom base width as 45 m.

For operating the waterway from Jokadia to Paradip Port / Dhamra Port by setting up a temporary terminal at downstream Jokadia barrage for plying 500 Tonne Barges, we can go in for 2 m depth of dredging with side slopes 1:3. Since Sujanpur weir is to be retained and reconstructed as Barrage with Navigation locks, immediate operations of 500 DWT vessels upto Jokadia through Kharsua/Tantighai/Kani via Sujanpur will not be feasible. Bypass through Kharsua for stretch Bodua to Sujanpur is also not feasible. Therefore, to start immediate operations, a suitable location for temporary terminal have to be identified on downstream of Sujanpur weir. As suggested by the Additional Secretary, MoST, this location is to be suggested by Port Authorities in consultation with State Government Officials. However, the suggested location for setting up of Temporary Terminal at downstream side of Sujanpur weir have been shown on a Google image (Refer Figure 11 – 1b) and included in the Report.

For immediate operations of 500 DWT from Dhamra and Paradip to downstream of Sujanpur, the dredging for channel of 2 m depth will be restricted to the reach downstream of Sujanpur. These dredging quantities mentioned above are for a total reach upto Pankapal and are based on surveys carried out by M/s.GMI during the year 2013 for IWAI, which were forwarded to WAPCOS. These quantities are likely to undergo changes, especially due to change in bed profile during floods in August 2014 and reduction in the length of dredging reach. Therefore, these quantities can be taken as tentative quantities for tendering purpose after making appropriate deductions for reduction in dredging reach.

Actual quantities can be arrived during pre-dredging surveys, before the actual commencement of dredging work and the dredging quantities can be finalized based on pre-dredging surveys and post-dredging surveys. These dredging works need to be synchronized with development of temporary terminal at Jokadia and downstream side of Sujanpur weir and permanent terminal on Pankapal.

The dredging quantities furnished in the Report have been estimated for the surveyed stretch of Tantighai / Kani River stretch. Based on the recent discussions with State Government on 12th December 2014, the waterway route from Tantighai/Kani River has been modified via. enroute through Erada, Nau Nai, Dahikhai, Bajapada and Padanipal (Refer Fig.9.6), as there are number of low level bridges in this stretch.

The dredging quantities in this modified route can be assessed only after completion of detailed surveys. However, the dredging quantity shall be comparatively more in this stretch, as this is not in the course of main river and the river is relatively shallow.

vii) It is recommended that dredging programme may be synchronized with development of terminals at Jokadia/Pankapal/Sujanpur so that by the time dredging is completed, the terminal facilities will be ready to handle cargo intended. If this is not done and dredging is completed much ahead of completion of terminal facilities then the dredged channel may get silted up. Maintenance dredging may be necessary.

viii) The disposal of dredged material is an important issue. This dredged material can be used for strengthening / extending the existing flood embankment on both the sides of the river, constructing new embankment, used for reclaiming land in low lying areas, in construction of roads etc. The unused material can be dumped in adjoining Government lands, or land under the control of Water resources department, especially in the flood plains of the river.

ix) In view of urgency of IWAI to make the route operational based on the requirements of industries, it is suggested that till the time navigation locks are constructed at Sujanpur weir , operations of 500 DWT vessels may be commenced from downstream of Sujanpur weir to Dhamra and Paradip Port through the Tantighani / Kani and Kharsua river reach as mentioned earlier. A temporary / floating terminal needs to be located on downstream of Sujanpur weir along with navigational locks.

x) The navigation from Sujanpur to Padanipal through Tantighai//Kani will be possible mostly throughout the year except during high flows in monsoon when gates of barrages will be open and high flow velocities will prevail.

xi) The navigation route from Mangalgadi to Paradip , as per the revised alignment passing through Hansua, Kharnasi and Mahanadi rivers and a bay between Haunsua and Kharnasi river mouth, appears to be most appropriate due to various reasons such as reduced length, practically no land acquisition, reduced dredging, no reconstruction/dismantling of structures involved, adequate vertical clearance at the only bridge (at Rajnagar) enroute etc. thereby leading to reduced cost.

xii) It is recommended that as discussed in Chapter 10, IWAI may take review of certain provisions in section IV of IWAI notification such as navigable discharge, vertical clearance and radius of bend on navigation route, in light of constraints on proposed navigation route through Kharsua and Tantighai/ Kani.

xiii) It is recommended that IWAI may carry out the following hydraulic/ mathematical model studies from CWPRS, Pune / WAPCOS to investigate various issues /aspects related to this navigation project.

(a) To develop a mathematical model for river channel network of Brahmani Delta comprising major river channels such as Kharsua, Tantighai / Kani, Hansua, Baitarani etc for the reach from 10 km upstream of Pankapal to Dhamra and Hansua river mouth to predict the flood levels/velocities/discharges along different river channels for range of discharges including high flood discharges, as well as lean season discharges. These studies will be useful to study flow distribution in different channels, flow conditions along waterways and design bank protection works. These studies may be conducted with and without the proposed new barrages, to assess the flow condition in view of proposed navigation

(b) Mathematical model studies to assess impact of raising crest level of Jenapur weir from EL 17.41 to EL 20.0 m on flood levels in the upstream reach. Also to assess discharge distribution in Kharsua and Brahmani river for range of flood discharges upto 100 year flood. These studies could be carried out with the model developed for Brahmani delta network which includes both Jenapur and Jokadia weir.

(c) Mathematical model studies to assess hydrodynamic and morphological impact of barrages proposed to be reconstructed and newly constructed on the upstream and downstream reach of river Kharsua and Tantighai / Kani river.

xiv) Based on the traffic data supplied by Kalinganagar industries, Dhamra Port Company Ltd. (DPCL), Paradip Port Trust (PPT) and assuming that a small percent of total cargo will be diverted through inland water transport in the initial stage. The cargo for next 15 years projected by linear increase works out to 10 MTPA for the permanent terminal at Pankapal at the ultimate stage.

xv) The location for the Permanent Terminal at Pankapal was selected at about 200 m downstream of SH200 road bridge on the left bank of the Brahmani river. This location is at the nodal point where the deep channel will always hug the left bank of the river. This has been confirmed from the SOI toposheet of 1974 and Google images for different years. For the same reason CWPRS has earlier proposed location for JSW intake just upstream of SH200 bridge.

xvi) The total area required for the Permanent Terminal is approximately 40 Ha. Adequate open land without habitation is available along the river bank near proposed terminal site. Hence, it will be possible to develop terminal at this location. The safe grade elevation for the Pankapal terminal and backup area has been proposed at EL 24.5 m assuming free board of 1.50 m above the danger level of EL 23.0 m at SH200. Land details of the proposed permanent Pankapal Terminal have also been included in the Report.

xvii) IWAI has proposed to use 2000 DWT self propelled Vessels of size 86 m x 14 m x 2.5 m draft. Assuming feasibility of transport for 330 days in a year and loading/unloading rate of 500 TPH, the number of Barges required were estimated as 30. Further assuming number of working hours per day as 20, the number of berths required worked out to 4.

xviii) Considering the vessel length of 86 m, the length of terminal works out to 400m. The width of terminal is proposed as 22 m. It is proposed as RCC piled structure with 1 m diameter piles.

xix) IWAI is contemplating to ply 2000 DWT Barges in this stretch of waterway between Pankapal to Dhamra / Paradip. But the water availability i.e. depths available during lean season, the presence of number of bends along this waterway stretch (approx 24 bends in Kani

River) needs to borne in mind. The terminal planning, dredging, backup land for terminal have been planned for 2000 DWT barges, but WAPCOS would recommend and advise to ply this 2000 DWT barges at 1000-1500 Tons pay load initially.

xx) Two numbers of navigational locks are required to be constructed for the Phase-I stretch of the waterway between Pankapal and Dhamra/Paradip stretch at Jokadia Barrage and at Sujanpur weir, for development of waterway through Kharsua, Tantighai / Kani river system. These navigational locks will be of sizes 110 m length and 18 m width to accommodate 2000 DWT size barges. One more navigational locks of 110 m length and 18 m width have been proposed near Padanipal in the modified route (Refer Fig.9.6). There will be two set of navigational locks at each location one for upstream vessels and other for downstream vessels. The depth of pounding in these navigational locks will be 4 m. These navigational locks can be along the main alignment of the barrage nearer to the left bank of the river. Alternatively if these navigational locks can also be located on the diversion channel, in case they cannot be accommodated on the main body of the weir especially at Sujanpur weir.

xxi) The Bhitarkanika sanctuary near Dhamra and marine wild life Gahirmathe enroute to Paradip port needs to take care in the Environment studies. The mangroves between Mangalgadi and Paradip stretch needs to be also taken care in the EIA studies. The disposal of dredged material in tidal stretch, change in turbidity during dredging in the tidal stretch needs to be included in the EIA report apart from other issues.

xxii) The total cost of the inland navigation project for phase I i.e Pankapal to Dhamra and Paradip has been estimated as **Rs.1462 Crore** for the Permanent Terminal at Pankapal (excluding land cost for construction of terminals, navigational locks & land cost of reconstruction of Jenapur & Jokadia Barrages & reconstruction of Sujanpur wier / Barrages) and

Rs.693.50 Crore for Temporary Terminal at Sujanpur (excluding land cost for temporary terminal and back up land for terminal at Sujanpur weir).

xxiii) It is assumed that the Barrages at Jokadia, Sujanpur and Jenapur will be constructed by State Government. In case if these Barrages are to be constructed by IWAI, then cost for these Barrages are to be considered which may be in the range of Rs.350 to Rs.450 Crores per Barrage (including Bridge, Gates, etc.,) depending upon the design foundation etc., and subject to mathematical model studies, detailed designs, investigations, etc., and accordingly provision has been kept for construction of navigational locks in the cost estimate. This is only for indicative purpose.

xxiv) The tentative cost for the four Control Structures proposed along the waterway at Burah River confluence, Erada, Nua nai and Padanipal, subject to mathematical model studies, detailed designs, investigations, etc., would be in the range of Rs.150 Crore to Rs.200 Crore per Cross Structure (Barrage including gates and bridge). This is only for indicative purpose.

xxv) The necessity of Bajapada Barrage can be concluded only after conducting the mathematical model studies and hence the cost for the same has not been furnished in the estimate.

Annexure

Annexure -1

Executive Summary of Earlier Report Submitted During March 2010

ANNEXURE-1

INLAND WATERWAYS AUTHORITY OF INDIA
(MINISTRY OF SHIPPING, GOVERNMENT OF INDIA)

DETAILED PROJECT REPORT

for

DEVELOPMENT OF INLAND WATER TRANSPORT ALONG ECC AND BRAHMANI / KHARSUA RIVER SYSTEM

FINAL REPORT

VOLUME I : EXECUTIVE SUMMARY

लघु रत्न - MINI RATNA

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EXECUTIVE SUMMARY

1 INTRODUCTION

In order to give a boost to inter state movement of various products, a canal system was planned in the late 19th century. The canal system running between Paradip in the state of Orissa to Haldia in the state of West Bengal was looked upon as one of the greatest link in the total area from Paradip to Calcutta. The canal portion in Orissa was called Orissa Coast Canal and the portion in Bengal was named as Hijli tidal canal. The canal was opened to traffic during 1883 AD, but due to simultaneous development of railways and road network the canal system could not be utilised to the extent envisaged. Moreover, it is recorded that it was unable to pay for its own upkeep and maintenance and started silting up badly and slowly went out of use. Obvious reasons for this condition can be traced out to then newly created alternative mode of transport, infrastructure and technology available on IWT, which was basically old. Though certain stretches of this canal are still being used by people for movement of agricultural and other cargo by country boats, most part of the canal and its control structures are commonly found out of use and need upgradation /modification if the system is required to be put back in use. Presently the renamed East - Coast Canal (ECC) running between Paradip and Haldia consists of 120 km of natural river/creek portion between Paradip, Dhamra and Charbatia and 217 km of canal between Charbatia & Geonkhali including the intervening rivers and creeks.

The Brahmani/Kharasua/Mahanadi river system, which flows along the Talcher coal deposits and iron ore mines at Daiteri, can be made navigable round the year after taking proper regulatory measures.

2 THE WATERWAY

The waterway comprises the canal section and the river section. " The canal section" is the combination of the old Hijli Tidal Canal and the Orissa Coast Canal , together called the East Coast Canal (ECC). The ECC runs from Geonkhali on the right bank of the river Hooghly (approx. 34 nautical miles or 68 km downstream from Calcutta Port) to the Charbatia lock, where the canal joins to the river Matai and thereafter through the river section to the port of Paradip. The lengthwise distribution of the proposed waterway is given below:

➢ Geonkhali to Charbatia	217 km
➢ Charbatia to Dhamra	39 km
➢ Dhamra to Mangalgadi	28 km
➢ Mangalgadi to Paradip	67 km
➢ Talcher to Jokadia	131 km
➢ Jokadia to Mangalgadi	106 km
TOTAL	**588 Km**

The proposed waterway has been classified into the following three stretches as given below:

(i) Stretch I : Talcher to Mangalgadi (237km)

(ii) Stretch II : Dhamra to Paradip (95km)

(iii) Stretch III : Dhamra to Geonkhali (256km)

The stretches as defined above have been shown in **Figure No. 1 to 3** respectively.

A detailed topographic and hydrographic survey was carried out for the entire length of the waterway i.e. from Charbatia to Geonkahli in canal section and from Talcher to Paradip - Dhamra in river section.

The salient features of canal and river sections as revealed from the field surveys and investigations are given below : -

Brahmani- Kharsua-Mahanadi river system :

The Brahmani, Kharsua and Mahanadi river system mainly constitutes the river portion to be developed for proposed waterway and described in various sub-stretches as given below:

Talcher to Jokadia

River Brahamani from Talcher to Jokadia has a length of 131 kms and average slope of 35cm/km with maximum discharge of 9701 m^3 /s. The width varies from 137.5 to 2050m. It is a tropical alluvial river with braiding and meandering characteristics and bed and bank erosion. The lean season depth varies from 0.20 m to 0.6m.

Jokadia to Singhpur

The discharge flows d/s through the weir at Jokadia along the Kharsua river. Its width varies from 90m to 880m. From Jokadia to Singhpur for a distance of 60 kms the average slope is 16cm/km. This stretch is not influenced by the tidal effect and the present depth is dependent on the discharge from Jokadia weir. The lean season depth varies from 1.5m to 6m.

Singhpur to Mangalagadi

The waterway from Singhpur to Mangalagadi for a distance of 44km is a mixed zone influenced both by river discharge and the tides. The width varies from 100m to 800m and depth varies from 1.6m to 10m.

Mangalgadi to Dhamra

The waterway from Mangalgadi to Dhamra for a distance of 28 km follows the rivers Brahamani, Dhamra and influenced by tidal effect. The present depth varies from 2m to 12m and width from 350m to 1500m.

Mangalgadi to Paradip

The stretch of 67 km from Mangalgadi to Paradip passes through Hansua Nadi, Babar Creek, Nuna Nadi, Gobri Nadi, Ramchandi Galia Nadi, Kharnasi Nadi and Mahanadi river and shown in **Fig. 4**.

The entire stretch is tidal. The width of waterway varies from 16m to 20m in Babar Creek and 10m to 25m in Ramchandi Galia Nadi, whereas the average width is more than 45m in other nadis and rivers. The length of entire stretch is detailed below :

S.No.	Name of Nadi / River	Length (in km)
1	Hansua Nadi	13.5
2	Babar Creek	12
3	Nuna Nadi	13
4	Gobri Nadi	7
5	Ramchandi Galia Nadi	13
6	Kharnasi Nadi	3.5
7	Mahanadi River	5
	Total	67 km

As regards depth in the internal route of Gobri Nadi etc, the depth becomes almost zero during low tides. However, during high tides, it becomes around 1m.

Canal Section

The East Coast Canal (ECC) connects the Rupnarayan river through a lock at Geonkhali in Distt. Midnapore, West Bengal, to river Matai through a lock at Charbatia in Bhadrak District, Orissa. The total distance from Geonkhali to Charbatia is 217 km of which 91 km is in the State of West Bengal and the rest in Orissa. The canal has a broadly N-S orientation and runs more or less parallel to and roughly 5 km from the east coast.

The construction of the canal started in 1880 and the canal was opened in 1885 for navigation. As the rivers in this part of West Bengal and Orissa follow easterly course and fall into the Bay of Bengal, the ECC crosses several rivers such as Haldi, Rasulpur, Subarnarekha, Panchapada, Budhabalanga. Crossing of all these rivers is done by means of `locks', one on each bank of the river to be crossed. These locks (on left and right banks of each river) are not always at exactly opposite points across the river but are located as per navigational and other considerations at the time of construction

In entire length of ECC,there are 62 no. of wooden and 31 no. of RCC bridges. Most of these bridges have clearances (Vertical and Horizontal) which are insufficient for all but the smallest boats. In many sections the canal is cut off completely by earthen bunds being built right across the water course. These bunds have been built as pedestrian - ways or kutcha roads across the canal perhaps by local enterprise and self help.

Since the canal remained out of use for a long time not only for navigation but also for irrigation, it has got silted up at many places. Despite this however, it does carry water at many sections & the depth varies from 0m to 1.5m & width varies from 10m to 25m.

3 TRAFFIC STUDIES

The proposed waterway passes through the major towns like Talcher, Paradip, Dhamra in the river section and Bhadrak, Balasore, Jaleswar and Haldia in the canal section. The river section of waterway is basically rich in minerals viz. coal, iron ore and industrial products such as Ferro-chrome, steel alloys, tyres, granites and forest products The canal section of waterway carries mainly agriculture production, handicrafts, textiles etc. Moreover, the waterway provide passage for movement of these cargo to consumer centers located along the coastline and to north/north– eastern through NW – 1 / NW – 2.

The likely commodities to use the proposed IWT mode are divided into the following groups :

i. Minerals : Coal, Iron Ore

ii. Agricultural products : Paddy, Rice, Straw, Animal fodder, Jute, Coconut and manure, consumables, fish products.

iii. Finished goods/Manufactured products : Fertiliser, cement, sugar, salt, building materials (sand, bricks, metals, tiles, Asbestos sheets and fabricated steel items), textiles etc.

The potential cargo movement in the entire stretch of waterway projected for next 25 years with a period interval of 5 years and starting with base year 2009 is summarized in the following tables:

ORIGIN - DESTINATION OF CARGO MOVEMENT (2014-2019) IN 5 YEARS

Sl. No.	Commodity	Quantity (in tonne)	Purpose/Agency	From	To
1	**Coal**	2,000,000	For Fertilizer Plant	Talcher	Paradip
		3,000,000	Thermal Power Plant in U.P, Bihar	Talcher	Geonkhali
		5,000,000	For Coastal Thermal Power Station onward dispatch by sea.	Talcher	Paradip
2	**Finished Goods**	130,000	For Marketing and Distribution by manufacturers	Balasore	Paradip
3	**Manufactured Products**	800000	Retailers	Balasore	Paradip
4	**Agricultural Products**	140000	Retailers	Dhamra	Geonkhali
	Total	**11,070,200**	**11.07mtpa**		

ORIGIN - DESTINATION OF CARGO MOVEMENT (2019 - 2024) IN 10 YEARS

Sl. No.	Commodity	Quantity (in tonne)	Purpose/Agency	From	To
1	**Coal**	2,000,000	For Fertilizer Plant	Talcher	Paradip
		3,000,000	Thermal Power Plant in U.P, Bihar	Talcher	Geonkhali
		5,000,000 2,500,000	For Coastal Thermal Power Station onward dispatch by sea.	Talcher Talcher	Paradip Dhamra
2	**Finished Goods**	160,000	For Marketing and Distribution	Balasore	Paradip
3	**Manufactured Products**	950,000	Retailers	Balasore	Paradip
4	**Agricultural Products**	150,000	Retailers	Dhamra	Geonkhali
	Total	**13,760,000**	**13.76mtpa**		

ORIGIN - DESTINATION OF CARGO MOVEMENT (2024 - 2029) IN 15 YEARS

Sl. No.	Commodity	Quantity (in tonne)	Purpose/Agency	From	To
1	**Coal**	2,000,000	For Fertilizer Plant	Talcher	Paradip
		3,000,000	Thermal Power Plant	Talcher	Geonkhali
		5,000,000 5,000,000	For Coastal Thermal Power Station onward dispatch by sea.	Talcher Talcher	Paradip Dhamra
2	**Finished Goods**	1,830,000	For Marketing and Distribution	Balasore	Paradip
3	**Manufactured Products**	1,080,250	Retailers	Balasore	Paradip
4	**Agricultural Products**	170,000	Retailers	Dhamra	Geonkhali
Total		**18,080,000**	**18.08mtpa**		

ORIGIN - DESTINATION OF CARGO MOVEMENT (2029 - 2034) IN 20 YEARS

Sl. No.	Commodity	Quantity (in tonne)	Purpose/Agency	From	To
1	**Coal**	2,000,000	For Fertilizer Plant	Talcher	Paradip
		3,000,000	Thermal Power Plant	Talcher	Geonkhali
		5,000,000 10,000,000	For Coastal Thermal Power Station onward dispatch by sea.	Talcher Talcher	Paradip Dhamra
2	**Finished Goods**	2,100,000	For Marketing and Distribution	Balasore	Paradip
3	**Manufactured Products**	1,120,000	Retailers	Balasore	Paradip
4	**Agricultural Products**	200,000	Retailers	Dhamra	Geonkhali
Total		**23,420,000**	**23.42mtpa**		

ORIGIN - DESTINATION OF CARGO MOVEMENT (2034 - 2039) IN 25 YEARS

S. No.	Commodity	Quantity (in tonne)	Purpose/Agency	From	To
1	**Coal**	2,000,000	For Fertilizer Plant	Talcher	Paradip
		3,000,000	Thermal Power Plant	Talcher	Geonkhali
		5,000,000	For Coastal Thermal Power	Talcher	Paradip
		10,000,000	Station onward dispatch by sea.	Talcher	Dhamra
2	**Finished Goods**	2,110,000	For Marketing and Distribution	Balasore	Paradip
3	**Manufactured Products**	1,120,000	Retailers	Balasore	Paradip
4	**Agricultural Products**	200,000	Retailers	Dhamra	Geonkhali
Total		**23,420,000**	**23.42mtpa**		

4 VESSEL DIMENSIONS PROPOSED

The design vessel size for two way navigation in canal portion and river portion has been worked out and given below:

Parameters	River portion	Canal portion	
	45m wide & 2.0m deep channel	**Alternative I** 32m wide & 2.0m deep channel	**Alternative II** 45m wide & 2.0m deep channel
Length	50m	40m	50m
B	11.0m	9.0m	11.0m
D	1.8m	1.6m	1.8m
DWT	500t	300t	500t

5 WATERWAY HYDRAULICS

The requirement of navigable depth of 2 m for a channel of 45m bed width in river portion and 32m/45m bed width in canal portion has been analyzed stretch wise.

a) Stretch I : Talcher to Mangalgadi (237km)

It is observed that discharge available in river Brahmani from Talcher to Jokadia works out to be 55 cumecs during lean season and discharge of 110 cumecs is required to ensure a navigable depth of 2 m in a channel of 45 m bed width. It is therefore proposed to provide a Nos. of barrages from Talcher to Jokadia to ensure 2m depth of water.

From Talcher to Jakodia, a total no. of 5 barrages have been proposed at the locations as given below.

S.NO.	Name of Barrage	Distance from Samal barrage in km	Location (Name of Village/Town/District)
1	Barrage – 1	52	Near Village Renthapat
2	Barrage – 2	78	Near Village Indrajit
3	Barrage – 3	104	Near Village Gobindapur
4	Barrage – 4	130	Near Village Bartanda
5	Barrage – 5	148.5	Near Village Matila

The stretch from Jokadia to Singhpur for a distance of 60 km is non-tidal and water available depends on discharge passing through Jokadia weir.It has been found that a navigable depth of 2m would be maintained downstream of Jokadia.

The stretch from Singhpur to Mangalgadi for a distance of 42 km is a mixed zone influenced by river discharge and tidal effect. The navigable depth of 2 m is available for movement of barges by dredging the bed.

b) Stretch II : Dhamra to Paradip (95 km)

The stretch constitutes the waterway from Dhamra to Paradip. In this stretch, the navigable depth is available as it lies in natural creeks and tidal zones and intercepted by rivers and delta regions

c) Stretch III : Dhamra to Geonkhali (256km)

The ECC crosses several rivers such as Haldi, Rasulpur, Subarnarekha, Panchapada, Budhabalanga in its entire length and it has been proposed to provide a total no. of 23 locks to provide a passage for movement of barge from one level to other.

The navigable depth of 2 m can be maintained in canal by passing water from contributing river into the canal through locks and providing a bed slope of 1 in 5000 to the canal.

6 LAND ACQUISITION/RIGHT OF WAY

The land to be acquired to develop the proposed waterway has been determined for both alternatives and summarized below:

a) Alternative I : 32 m Wide Canal

It would be required to acquire land of 35 ha for terminals and 2018 ha to maintain section of canal for 32m bed width of canal.

b) Alternative II : 45m Wide Canal

It would be required to acquire land of 35 ha for terminals and 2344 ha to maintain section of canal for 45m bed width of canal.

7 ENGINEERING WORKS

There are various engineering works proposed to be carried out to make the waterway navigable for movement of barges and briefly described below:

a) Dredging

In order to maintain the required slope, the dredging has been proposed in river and canal section of the waterway. The stretchwise quantity is summarized below.

Sl. No.	Name of Stretch	Quantity of Dredging (in Mm^3)
1	Stretch I : Talcher to Mangalgadi	4.22
2	Stretch II : Dhamra to Paradip	5.85
3	Stretch III : Dhamra to Geonkhali	
a	Alternative I – 32m wide canal	44.76
b	Alternative II – 45m wide canal	62.76

b) Barrages

To maintain a navigable depth of 2m in between Talcher to Jokadia, total no. of 5 barrages with navigation lock have been proposed at the locations as already discussed.

c) Raising of Bank

The construction of barrages would ensure the availability of water depth of 2 m for a distance of 26 km on its upstream side. It is proposed that the existing bank levels would be raised by 1.5 m above the required water level in order to store water on upstream side of barrage and to prevent submergence of land beyond existing banks. The quantity of filling required for raising left and right bank on upstream of barrages have been worked out as 23.815 Mm^3

d) Protection measures

On the basis of topographic and hydrographic survey, it is observed that there are various bends and curves in the river section of waterway. To prevent the banks from meandering action of river, it is therefore proposed to provide stone pitching on banks for a suitable distance in these bends and curves. The quantity of protection measures has been worked out as 0.804 Mm^3.

e) Bridges

It is observed that there are five bridges existing in stretch I from Talcher to Mangalgadi. As per the Classification of Inland Waterways in India, the minimum horizontal and vertical clearance required for structures across river is as given below:

Class of Waterway	Minimum Horizontal Clearance between piers	Minimum Vertical Clearance above HTL/FSL
	(in m)	(in m)
III*	50	7

* Class III waterway refers to navigable channel with minimum of 1.7m depth, 50m bottom width, 700m bend radius in river.

On the basis of salient details of these bridges (Refer Table 2.9),it is understood that the horizontal clearance between piers under these bridges varies from 33m to 52m and the requirement is to maintain 50m horizontal clearance for Class III waterway to enable movement of 500t barge. It is observed that there is no necessity to construct new bridges in place of exiting bridges where the length varies from 912m to 1420m and thus involves huge expenditure. It is therefore proposed to maintain these existing bridges with the condition that barge would pass cautiously through bridges with reduced speed.

It is observed that existing bridges across ECC lack either having minimum horizontal clearance or vertical clearance or both. It is therefore suggested to provide new foot bridges and road bridges in place of existing ones at these locations so that un-interrupted navigation of barges can take place.

f) Navigation lock

For movement of barges from high level to low level in river portion from Talcher to Jokadia, navigation locks have been proposed in the five barrages itself.

The ECC running between Charbatia to Geonkhali is intercepted by various rivers and it is observed that all the existing locks lack minimum clearance of 9m required for entry and exit of 300 tonne barge. It is therefore proposed to construct 23 nos. of new navigation locks in place of existing old ones, in the entire length of ECC so as to provide a mode of transportation of barges from one level to another.

g) Pipe sluices

In order to drain off storm water from adjoining catchment area along the entire length of ECC, pipe sluices in the form of non pressure NP2 RCC pipe of diameter 600mm with sump well, have been proposed at an interval of 500m throughout the entire length of ECC.

h) Navigational Aids

For safe navigation of barges round the clock, it is necessary to provide navigational aids in the developed waterway. A combination of country boats, buoy, lighted marks and shore beacons has been proposed in waterway as navigational aids for movement of barges round the clock. The estimated quantity of these navigational aids are given below :

Sl.No.	Item Description	Unit	Quantity
1	Country boats	No.	190
1.	FRP buoys	No.	220
2.	Lighted marks	No.	500
3.	Shore beacon	No.	105

8 TERMINALS

The terminals are the gateway for the cargo and therefore should be strategically placed near high traffic concentration points in order to allow smooth and uninterrupted traffic between canal/river and hinterland. The following terminals have been proposed in different stretches :

a. **River Section** :

i. **Stretch I : Talcher to Mangalgadi**

Talcher terminal

Jenapur terminal

ii. **Stretch II : Dhamra to Paradip**

Dhamra terminal

Paradip termninal(Port facilities)

b. **Canal Section :**

Stretch III : Dhamra to Geonkhali

Balasore terminal

Nasirabad terminal

Geonkhali terminal

The salient features of theses terminals are briefly described below:

Talcher : The terminal at Talcher is proposed to load coal from the Talcher coal fields 10-15 km away. In the initial phase, operation to be carried out through feeder road traffic, but in the second phase conveyor systems are proposed to transport coal to the terminal.

Jenapur: The Jenapur terminal is specifically oriented to cater iron ores from Japur mines.

Dhamra : Only offshore loading facilities using ship's gear for coal and iron ore, is proposed. As a new Port is on the anvil same may be used for transshipment in future

Paradip : No new facilities to use the Port handling facilities in the initial operation. However, fully mechanical bulk handling facilities are proposed as the traffic increases. Additional facilities to handle the industrial cargo traffic in containers are also proposed.

Balasore : Probably the most important terminal on the canal is proposed to be equipped with both bulk and general cargo facilities.

Nasirabad : Feeder terminal for agro products and finished goods

Geonkhali: The terminating point of ECC and connecting terminal to carry cargo to the north/north eastern portion through NW -1.

9 ENVIRONMENTAL ASPECTS

Certain environment and environmental problems arise as a result of the development, exploitation and management of water resources projects.

Due to execution of the dredging activity, certain effects may occur to the water, however as it would be carried out at identified isolated locations, the resultant effect on river water quality will not be significant. In order to keep the environment free from pollution by dumping of dredged spoil, it is proposed that the spoil be disposed off in the low lying area adjoining the river course, without creating environmental degradation. A detailed environment study is being prepared by M/s CES Ltd., consultant to IWAI on environmental aspects.

The terminals are expected to handle materials like coal, iron ore, food grains, fertilizers, sand, bricks etc. Necessary care would be taken to minimize the adverse effect on the environment due to spillage/ handling of materials while loading/ unloading the same at terminal points. Effects on air and noise pollution shall be negligible. Overall, any significant negative impact on environment is not expected due to the implementation of IWT development in Kolkata - Paradip stretch of East Coast Canal integrated with Mahanadi - Brahmani river system. The advantages are:-

(1) Considerable reduction in vehicular traffic when major portion of road traffic is diverted to IWT.
(2) Savings in cost of fuel, and energy savings.
(3) More employment generation
(4) Development of tourism.

10 COST OF ENGINEERING WORKS

The Delhi Schedule of Rate, 2007 published by CPWD has been followed and escalated by 7% per annum to arrive at for year 2009 to arrive at the cost of the project. On the basis of survey & enquiries with land acquisition officer, the cost for land acquisition has been considered as Rs. 7.5 lakhs per hectare.

10.1 COST ESTIMATE FOR STRETCH I : TALCHER TO MANGALGADI

To arrive at the total cost for the year 2009, an escalation of 7% p.a. has been assumed w.r.t. base year 2007. Accordingly, a summary of cost involved in various above mentioned items for development of waterway in Stretch I from Talcher to Mangalgadi for the year 2007 and 2009 is given below:

Sl. No.	Item Description	Cost for year 2007 (in lakhs)	Cost for year 2009 (in lakhs)
1	Land Acquisition	90	103
2	Dredging	6543	7491
3	Barrages with navigation lock	139593	159820
4	Raising banks	21435	24541
5	Protection measures	3200	3664
6	Fenders	90	103
7	Terminals	3489	3995
8	Navigation Aids	865	990
9	Facilities to local people for ferry service etc	1000	1000
	Total	**176305**	**201707**

10.2 COST ESTIMATE FOR STRETCH II : DHAMRA TO PARADIP

To arrive at the total cost for the year 2009, an escalation of 7% p.a. has been assumed w.r.t. base year 2007. Accordingly, a summary of cost involved in various above mentioned items for development of waterway in Stretch II from Dhamra and Paradip for the year 2007 and 2009 is given below:

Sl. No.	Item Description	Cost for year 2007 (in lakhs)	Cost for year 2009 (in lakhs)
1	Land Acquisition	85	97
2	Dredging	9654	11053
3	Protection measures	203	232
4	Terminals	2788	3192
5	Navigation Locks	3918	4486
6	Bridges	1234	1413
7	Navigation Aids	108	124
8	Facilities to local people for ferry service etc	500	500
	Total	**18490**	**21097**

10.3 COST ESTIMATE FOR STRETCH III : DHAMRA TO GEONKHALI

The cost estimate has been worked out for the following two alternatives in developing the waterway from Dhamra to Geonkhali :

a. Alternative I : 32 m Wide Canal

b. Alternative II : 45 m Wide Canal

10.3.1 Cost estimate for Alternative I : 32m wide canal

To arrive at the total cost for the year 2009, an escalation of 7% p.a. has been assumed w.r.t. base year 2007. Accordingly, a summary of cost involved in various above mentioned items for development of waterway in Stretch III from Dhamra and Geonkhali for Alternative I : 32m wide canal for the year 2007 and 2009 is given below:

Sl. No.	Item Description	Cost for year 2007 (in lakhs)	Cost for year 2009 (in lakhs)
1	Land Acquisition	15225	17431
2	Dredging	111191	127303
3	Navigation Locks	31970	36602
4	Pipe Sluices	415	475
5	Protection measures	215	246
6	Bridges	9226	10563
7	Terminals	2700	3091
8	Navigation Aids	230	263
9	Facilities to local people for ferry service etc	1000	1000
	Total	**172172**	**196974**

In addition to cost mentioned in all the stretches , the cost for implementing EMP works has been determined as Rs. 1000 lakhs for base year 2007 as discussed in Chapter 9 and the same has been divided into two parts i.e. Rs.500 lakhs in cost estimate for Stretch I and Rs.500 lakhs in cost estimate for Stretch III.

Taking into account of all the three stretches, total cost involved in developing the entire waterway for 32m bed width in canal portion and 45m bed width in river portion is worked out to Rs. **4210 Crore** as summarized below:

Sl. No.	Item Description	Cost for year 2007 (in lakhs)	Cost for year 2009 (in lakhs)
1	Stretch I: Talcher to Mangalgadi	176805	202279
2	Stretch II : Dhamra to Paradip	18490	21097
3	Stretch III : Dhamra to Geonkhali	172672	197547
	Total	**365467**	**420923**

Say 4210Crore

10.3.2 Cost estimate for Alternative II : 45m wide canal

To arrive at the total cost for the year 2009, an escalation of 7% p.a. has been assumed w.r.t. base year 2007. Accordingly, a summary of cost involved in various above mentioned items for development of waterway in Stretch III from Dhamra and Geonkhali for Alternative II : 45m wide canal for the year 2007 and 2009 is given below:

Sl. No.	**Item Description**	**Cost for year 2007 (in lakhs)**	**Cost for year 2009 (in lakhs)**
1	Land Acquisition	17670	20230
2	Dredging	156191	178823
3	Navigation Locks	45057	51586
4	Pipe Sluices	415	475
5	Protection measures	215	246
6	Bridges	13640	15616
7	Terminals	2700	3091
8	Navigation Aids	230	263
9	Facilities to local people for ferry service etc	1000	1000
	Total	**237118**	**271330**

In addition to cost mentioned in all the stretches , the cost for implementing EMP works has been determined as Rs. 1000 lakhs for base year 2007 as discussed in Chapter 9 and the same has been divided into two parts i.e. Rs.500 lakhs in cost estimate for Stretch I and Rs.500 lakhs in cost estimate for Stretch III.

Taking into account of all the three stretches, total cost involved in developing the entire waterway for 45m bed width in canal portion and 45m bed width in river portion is worked out to Rs. **4953 Crore** as summarized below:

Sl. No.	Item Description	Cost for year 2007 (in lakhs)	Cost for year 2009 (in lakhs)
1	Stretch I : Talcher to Mangalgadi	176805	202279
2	Stretch II : Dhamra to Paradip	18490	21097
3	Stretch III : Dhamra to Geonkhali	237618	271904
	Total	**430413**	**495280**

Say 4953 Crore

11 ECONOMIC AND FINANCIAL EVALUATION

Economic analysis attempts to measure the overall impact of the project on improving the economic welfare of the citizens of the country. The major benefits of the IWT stretch under consideration relates to the development of Talcher coalfields. Since the existing rail lines are choked, transportation of bulk commodity like coal is only possible through IWT. The waterways has enormous cargo potential for transportation of non-coking coal from Talcher through Brahmani-Kharsua river system to Paradip port for subsequent coastal transportation to thermal power plants. In addition these coals could be transported to Geonkhali using East Coast Canal and then further upstream to thermal power plants in the states of Bihar and Jharkhand. In addition benefits accrue due to setting up of cement plants due to fly ash availability from the thermal plants.

Taking into account the traffic projections carried out for the entire stretch of waterway and cost of development works associated, two options have been broadly identified for economic and financial analysis; one being the river portion consisting of stretch I (Talcher to Mangalgadi) and stretch II (Dhamra to Paradip) and the other being canal portion with Alternative I : 32m wide consisting of stretch III (Dhamra to Geonkhali). Finally, the economic and financial analysis have also been carried out for the combined river and canal portion. The results of EIRR for various options are given below :

S.No.	Options	EIRR
1.	River Portion	31.76%
2.	Canal Portion with Alternative I : 32m wide	12.74%
3.	River and canal with Alternative I : 32m wide	26.09%

For the development of present waterway involving heavy investments, it becomes very important to analyse the benefits of the owner i.e. IWT/Govt. and the users i.e. barge operator who would use such IWT facility when compared to road. The FIRR has therefore been evaluated for IWT/Government and Users/Barge operator. The results of FIRR for Government/IWAI for all the options are summarised as follows.

S.No.	Weighted cost of capital	3%	6%	12%
	Options	**Levy charges (paise per Tonne - km) to earn an IRR equivalent to the weighted cost of capital**		
1.	River Portion	39	53	95
2.	Canal Portion with Alternative I : 32m wide	224	271	399
3.	River and canal with Alternative I : 32m wide	55	72	120

The results of FIRR for User/Barge Operator for all the options are summarized as follows :

S. No.	Options	Levy Charge (Rs. per Tonne - km) to earn an IRR of 12%
1.	River Portion	0.79
2.	Canal Portion with Alternative I : 32m wide	1.14
3.	River & canal with Alternative I : 32m wide	0.79

12 CONCLUSIONS AND RECOMMENDATIONS

The following conclusion are drawn from the above table as given below :

a. To earn FIRR of 3% by Govt./IWT, the levy charges work out to be minimum as 39 Paise per Tonne - km for river portion and maximum as Rs. 2.24 per Tonne - km for canal portion with Alternative I : 32 m wide.

b. To earn FIRR of 6% by Govt./IWT, the levy charges work out to be minimum as 53 Paise per Tonne - km for river portion and maximum as Rs. 2.71 per Tonne - km for canal portion with Alternative I : 32 m wide.

c. To earn FIRR of 12% by Govt./IWT, the levy charges work out to be minimum as 95 Paise per Tonne - km for river portion and maximum as Rs. 3.99 per Tonne - km for canal portion with Alternative I : 32 m wide.

d. For user/barge operator, the cargo fare to be charged for earning 12% FIRR works out to be minimum as 79 paise per Tonne - km for river portion and maximum as Rs. 1.14 per Tonne - km for canal portion with Alternative I : 32 m wide.

e. Taking into view of highly favorable EIRR for Govt./IWAI and levy charges in the range of 79 paise to Rs. 1.14 per Tonne-km for all the Options to earn an IRR of 12% by barge operator, it is concluded that the charges for using terminal and other infrastructural facilities may be absorbed so as to attract users to avail IWT facility.

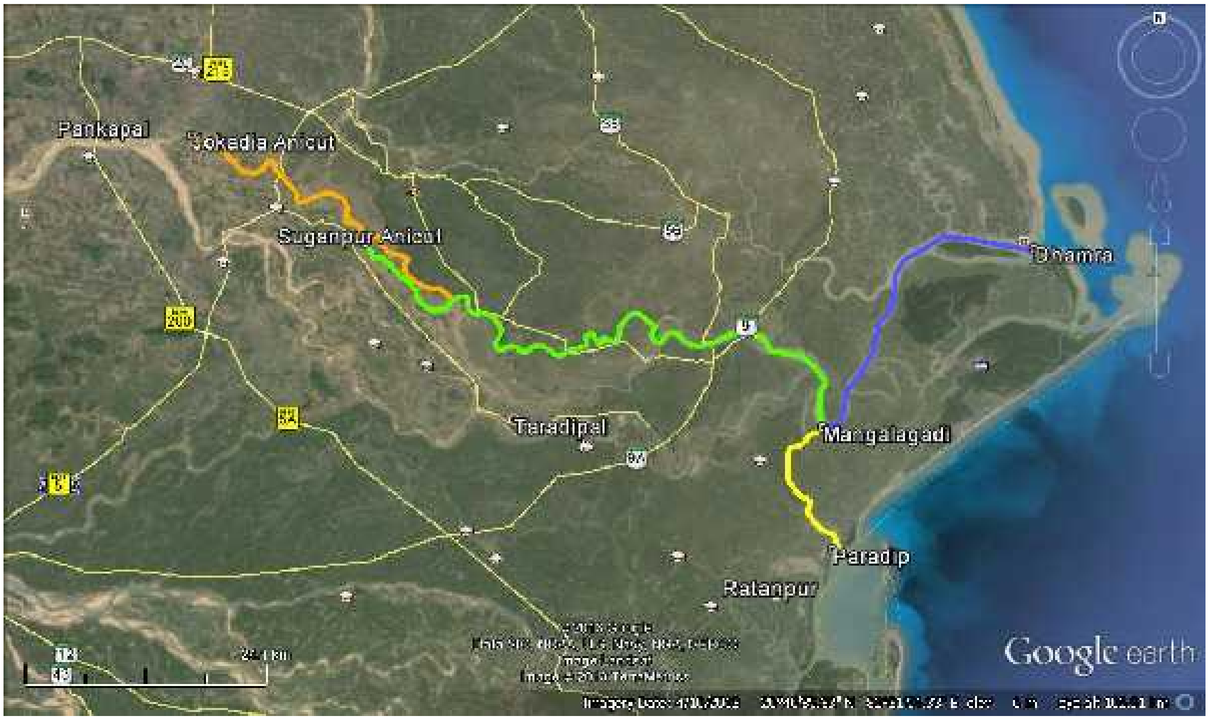
f. Taking overview of all the activities associated with the development of proposed waterway, it is understood that the barge building facility is the activity that can be taken up under private sector participation/BOT/JV basis.

On the basis of conclusions discussed in previous para, it is understood and recommended that the river portion connecting Talcher to Dhamra and Paradip is economically viable and most attractive as it is commanding an EIRR of 31.76% thus contributing to valuable national upgradation. Moreover, the user/barge operator has sufficient scope to use the river portion of present waterway by charging 79 paise per Tonne - km in comparison to road. Taking into account the past experience of IWAI for not taking levy charges from barge operator in NW I and NW 2, it may be proposed that IWAI may not charge or charge on a nominal basis such as 5 paise per Tonne - km so as to attract the barge operator to use the proposed IWT facility.

Annexure -3

Site Inspection Report

INLAND WATERWAYS AUTHORITY OF INDIA



Consultancy Studies for Revising the Detailed Project Report of NW-5 for developing the stretch between Pankapal/Jakodia to Dhamra and Paradip in the State of Odisha

SITE INSPECTION REPORT

WAPCOS LIMITED

(A Government of India Undertaking)
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Tel: 044-24710477/ Tel Fax: 044-24714424
E-mail: chennai@wapcos.gov.in

March 2014

Subject: Consultancy Studies for revising the DPR of NW-5 for developing the stretch between Pankapal/Jakodia to Dhamra and Paradip in the state of Odisha – Site Inspection report

1. Team comprising the following officials visited the site from 19th Feb 2014 to 25th Feb. 2014 for the inspection of site and discussions with the Govt. of Odisha officials and Paradip Port authorities.

1. Sh. D V S Murthy, Regional Manager (SR-II), WAPCOS, Chennai
2. Sh. D N Deshmukh, Hydrology Expert, WAPCOS, Pune
3. Sh. P.K. Khare, Terminal Planning Expert, WAPCOS, Pune

The entire reach of study area from Pankapal to Mangalgadi via Kani River and further up to Paradip on the south and Dharma on the North were inspected mainly for the reviewing the fairway conditions, road /rail connectivity, exiting structures such as bridges, terminal locations and land availability, shoal formations, requirement and feasibility of providing the navigational locks, water intakes for industries, anicuts, weirs, etc. Fig1(a) & Fig1(b) shows route of site visit (path indicated as per GPS carried during site visit) in google map.

2. Pankapal to Jakodia Barrage stretch

Fig 2 and Fig 3 show Brahmani and Kharsua river reach from Pankpal to Jokadia weir as per SOI Topo sheets and Google image respectively. There are existing road and railway bridges (Photo 3 and 4) in this stretch which do not pose a problem to navigation. There are some water intake structures for industries viz. for M/s.NINL, M/s.TSL, M/s.JSW, M/s.VISA upstream of Jakodia in this stretch (Fig 4 and Photos 1, 2, and 5 to 7). The main Brahmani river downstream of Railway bridge bifurcates into Brahmani (on right bank) and Kharsua (on left bank). The Jakodia barrage on the Kharsua river(Fig 3, Fig 4 and Photo 8, 9 and 11) helps in maintaining the water level for these intake structures. Hence it is advisable not to disturb the present Jakodia barrage. Further it is understood that the Jakodia barrage was initially having gates which, if restored would help in raising the water level upstream of Jakodia barrage. This would be beneficial both for the intake structures of industries and for navigation purpose in the upstream reaches of Jakodia barrage.

Hence, a navigational lock needs to be provided at the Jakodia barrage for enabling navigation. The land on both banks of Jakodia barrage was inspected and it was observed that there were small habitations with some shops, buildings houses, temple etc. which need to be acquired for the construction of navigational lock on the left bank.

As a navigational lock needs to be invariably provided for the reasons explained above which would eventually help the navigation in the upstream stretches, it is advisable to have the inland terminal at Pankapal area (D/s of the road bridge of SH 200 as shown in Fig 2 and Fig 3) where the backup land is available and has proximity to the Kalinganagar industries and for having better hinterland connectivity. However, the maneuvering of cargo barges through the railway bridges needs to be undertaken carefully as the bridge piers of the three railway bridge may not be in one line. The possibility of locating the terminal downstream of the Jakodia barrage appears difficult, as the road connectivity to the Kalinganagar area becomes lengthier and this road has to cross the existing railway lines, which will necessitate the constructions of over bridges for crossing the railway lines for evacuation of the cargo.

3. Kharsua River Reach from Jakodia to Suajanpur wier and Tantighai (Kani) River reach

Fig 5 to Fig 8 show the above reach of Kharsua and Kani river. This reach of Kharsua river up to bifurcation at Sujanpur is about 28 km long. The average channel width in this reach is 150 m. There are three road bridges (one on down stream of Jokadia weir (Photo-10) and on NH5 and one at 3 km upstream of Kharsua bifurcation). The spans of these bridges are minimum 30. The average bed slope of this reach is 1/6200 which is nearly two times flatter than upstream reach. At about 0.50 km upstream of Sujanpur weir, the Kharsua river is bifurcated in branches namely Kharsua and Tantighai(which is further referred as Bhongra and Kani, as seen from Fig 6 to Fig 8). There is an old anicut on Tantighai river at about 600 m downstream of bifurcation location. It was observed that the major flow was passing through Kantighai river and only small flow was seen in Kharsua branch. It was also observed that the weir is damaged and not maintained (Photo 14 and 16). The purpose of this weir was to protect low lying areas downstream of bifurcation. However, in course of time the river bed along Kharsua has aggraded and major flow now passes through Kantighai. As a result the flow depths along Kharsua branch are less as compared to water depths along Tantighai. The Tantighai joins Kharsua river again at about 45 km downstream near Padnipal(Fig 8). Due to more depths in Tantighai the tidal flow has also increased. These conditions are favorable for navigation along Tantighai. However, there are two bridges existing and four bridges under construction and some more under consideration along Tantighai/ Bhongra /Kani/Dudhia rivers(Photos 15 and 17 to 22). The minimum horizontal clearance for the navigable span of these bridges is around 20 to 25 m. This issue regarding vertical and horizontal clearance of bridges and possibility of dismantling Sujanpur anicut needs to be discussed with State authorities. In case Sujanpur anicut is to be retained, it will have to be reconstructed. In that case the provision of one navigational lock will be essential at Sujanpur anicut location and space for the lock is available on right bank.

4. River / tidal reaches from Padanipal to Dhamra/Paradip via Manglagadi

The river / tidal reach from Padnipal to Dhamra Port via Manglagadi of about 50 km length is comparatively good for navigation and has sufficient widths and depths.The Kharsua river reach from Padnipal to confluence with Brahmani near Mangalgadi is shown in Fig 9.

The stretch from Mangalagadi to Rajnagar and further up to Koilipur in Hansua river on Mangalgadi to Paradip route is navigable(Fig 10). Further, a narrow channel of width 10 to 15 m and length of about 9 km (Photo 29) connects the Hansua river to Babar creek (Fig 11). A steel bridge and a Barrage(Photo 30 to 32)with Navigational lock is present at about 1.7 km from off-take of this narrow channel on Hansua river. The Barrage has 8 spans of about 4 m each with gates and one more span is for Navigational lock. This narrow channel was inspected at number of locations along the reach (Photos 30 to 34). It was found that there are habitations and agricultural land along the banks. The channel has sharp bends along the reach. Also there are number of bridges with narrow spans and low vertical clearance(Photos 33, 34 and 36). The above factors would pose difficulties in planning the waterway. Apart from this narrow reach, remaining reach through Babar creek and Gobri creek have adequate widths but some curved reaches(Fig 11). On downstream of ferry terminal near Jumbu

Dweep, the Kharnasi channel takes off from Gobri creek and meets Mahanadi after traversing about 12 km near fishing harbour at Kharnasi village(Fig 12 and Photos 37,38,39,40 and 41). In view of the hurdles in narrow stretch between Hansua and Babar creek,it is felt that feasibility of a navigation channel between Hansua and Kharnasi along the coast of Jambu Dweep as shown in Fig 13 and 14 need to be explored. A separate letter has been written to Paradip Port Trust in this regard on 03/03/2014.

5. Barge Sizes

The fairway channel of width of 50 m and 3 m depth (LAD) for enabling movement of barge size of 2000 tonne capacity in this stretch, as contemplated in the work order looks to be difficult as the clear horizontal span at many of the bridges which are under construction along the Kani river is less than 25 m at some places and the vertical clearances for the new bridges under construction is not known. Moreover, the minimum beam for 2000 tonne capacity barges would be approx 18m which will necessitate a fairway channel width of more than 50m for two way navigation . The fairway width of approx 70m and LAD of 4m will be required for 2000 tonnes barge capacity . The required depth and width cannot be achieved in non tidal reaches for the lean season discharges. Hence the barge sizes needs to be restricted as contemplated in the earlier DPR of WAPCOS for enabling safe and uninterrupted navigation.

6. Issues which need to be discussed with State Govt.

Keeping in view various aspects/issues discussed above, discussions with state government authorities on following issues will be necessary.

1. Construction of bridges in this waterway as per the norms contemplated by IWAI
2. The feasibility of dismantling of Sujanpur weir after reviewing it requirement.
3. The land availability at Pankapal for terminal, at Jakodia and Sujanpur weir for constructing navigational locks.
4. The issue of introducing gates at Jakodia barrage for increasing the water availability for navigation in the up stream reaches and repair/ maintanence of the existing barrage.

7. Meeting with Commisioner-cum-Secretary, Commerce & Transport Department and Commissioner, Rail Co-ordination,Spl.Secretary to Govt.,Govt. of Odisha on 24 th Feb 2014

On afternoon of 24th Feb 2014 meeting was held with Hon.Commissioner cum Secretary,Commerce & Transport Department to apprise them various issues which needs interaction with state authorities. The Secretary kindly agreed to call two meetings at an early date, one with state authorities including Engineering departments such as depts.of water resources,buildings & communication and Rural development and other meeting with representatives of various industries at Kalinganagar and Port authorities.

It was explained to the secretary and commissioner the following main issues will be discussed in the meeting with the various Engineering departments.

(a) The original design considerations, details and requirement of Sujanpur weir and the possibility of dismantling this weir, as this would avoid the construction of one new Navigational lock. Alternatively, the availability of land for construction of Navigational lock, if this weir cannot be dismantled.

(b) The renovation Jakodia barrage including the installation of gates at this barrage / anicut. This would help the industries to draw water, as there are many intake wells upstreams of this barrage. This would also help in ponding water upstream of the barrage there by maintaining more depths which would help in the navigation of barges.

(c) The possibility of construction of IWT terminal downstream of the Jakodia barrage may not be feasible as it is far from the industrial hub and also the road length increases and more over this road connectivity has to cross the existing railway lines which would necessitate the construction of flyover for crossing the railway lines. Hence, the land availability for construction of Navigational lock at Jakodia barrage, especially, as both the banks are habited needs to be ascertained.

(d) The availability of land for construction of IWT terminal at Pankapal area (on the left Bank) and the Ownership details of the land needs to be discussed.

(e) Minimum discharge in Brahmni river at Pankpal during lean season and discharge requirements of various intakes between Pankpal and Jokadia weir.

(f) Vertical and horizontal clearance at bridges, which are under Construction.

Further, the secretary was also briefed about the issues which will be discussed with the industries of Kalinganagar area as detailed below:

(a) The barge sizes that is being contemplated for plying in this route together with the probable number of barges.

(b) The type of barges & volume of cargo that is being contemplated for both ways i.e., onward & return cargo.

(c) The type of equipment that is being contemplated on the Terminal for loading / unloading the cargo from barges & further mode of transport from this IWT terminal to / from industries.

A detailed letter dated 03/03/2014 in this regard was written to Commisioner-cum-Secretary, Commerce & Transport Department with copies to Commisioner, Rail Coodination, Special Secretary to Govt.,Commerce & Transport Department; Engineer-In-Chief(Works), Department of Works, Govt.of Odisha; Engineer-In-Chief, Department of Water Resources, Govt. of Odisha; Chief Engineer,Department of Rural Development, Govt. of Odisha; Director, Inland Water Transport & Port, Govt.of Odisha and Chief Engineer(P&M), IWAI-NOIDA mentioning these issues for arranging the meeting with State Authorities for effective & meaningful discussions.

8. Meeting with Superintending Engineer Paradip Port Trust on evening of 24th Feb 2014

On 24th evening a meeting was held SE, Paradip Port Trust to communicate findings of tour of WAPCOS team from Mangalgadi to Paradip via Babar ,Gobri and Kharnasi creeks and discuss various issues related to this route. Apart from these discussions an alternative route avoiding Babar and Gobri creek was also discussed. This route has adequate widths and probably do not have any bridges / Cross Structures and appear to be more viable. The Google maps showing alternative route (Fig 13 and 14) were given to SE(Civil), Paradip Port Trust, with a request to conduct detail survey along this route and send the survey details to WAPCOS.

A detailed Email in this regard has been sent to Paradip Port Trust for enabling them to take further actions in thiss regard.

9. Summary of findings from site inspection

- The terminal location at downstream of SH 200 bridge near Pankapal appears to be appropriate from various considerations such as proximity to Kalinganagar industries, better connectivity to highway and railway, availability of land. As far as possible it should be located immediately on downstream of SH 200 bridge where nodal point of Brahmani river channel is located thus with minimum dredging the channel with adequate depth will be maintained near terminal.
- It is necessary to ensure minimum flow in Brahmani river at SH 22 bridge during lean season from Odisha Water resources department..
- The Jakodia Barrage need to be maintained along with provision of gates which will facilitate to maintain appropriate water levels to benefit navigation as well as the intakes of number of industries.
- Provision of Navigational lock at Jakodia weir will be essential since weir is required to be maintained. The land for Navigational lock will have to be acquired in view of present habitations on both banks.
- The Kharsua river channel has been silted after bifurcation on upstream of Sujanpur and therefore carries less discharge with reduced depths as compared to other branch Tantighai on which Sujanpur weir is located.
- Utility of Sujanpur weir in present scenario and possibility of its dismantling need to be discussed with state authorities. If it is to be maintained then Navigational lock will be essential for which land is available.
- Avoiding silted channel of Kharsua, planning of navigation route through rivers Tantighai, Bhongra, and Kani up to Padanipal where Kharsua river joins Kani appears to be more suitable. The adequate river widths, depths and intrusion of tidal flow in Kani over longer reach are favorable factors. However, inadequate vertical and horizontal clearance at some of existing, under construction and proposed bridges along this stretch may pose problems. This issue need to be discussed with state authorities.

- Further reach up to Mangalgadi is tidal and will be Navigable with dredging in some reaches. In Mangalgadi to Dhamara stretch (Fig 14 and Photo 41) adequate widths and depths are available.
- On Mangalgadi to Paradip route, up to Rajnagar and further south up to Tamulia/Tantalia adequate widths are available. Further route through Babar, Nuna and Gbari creeks up to Jambu Dweep has many hurdles especially in the Babar creek reach from Tamulia to Babar village due to inadequate widths, depths, bridges without clearance and habitation and agricultural land along banks. Further route from Jambu to Mahanadi through Karnasi appears to be Navigable.
- It is necessary to investigate an alternative route in the stretch from Tamulia to Jumbu Dweep and Kharnasi mouth along Jumbu coast as already suggested to Paradip Port Trust Authorities.

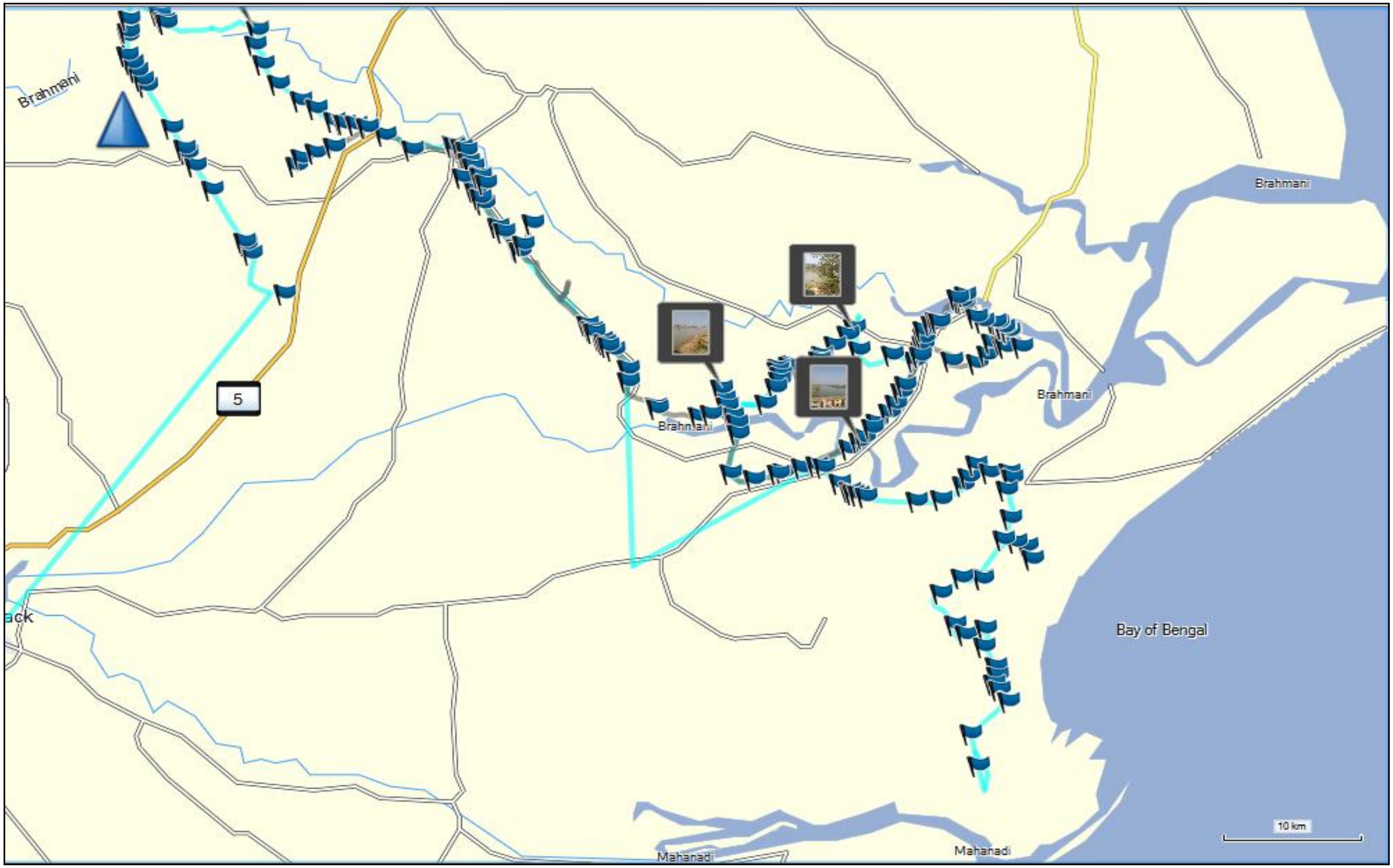

Fig 1 (a) - Route of site Inspection

Fig 1 (b) - Route of site Inspection

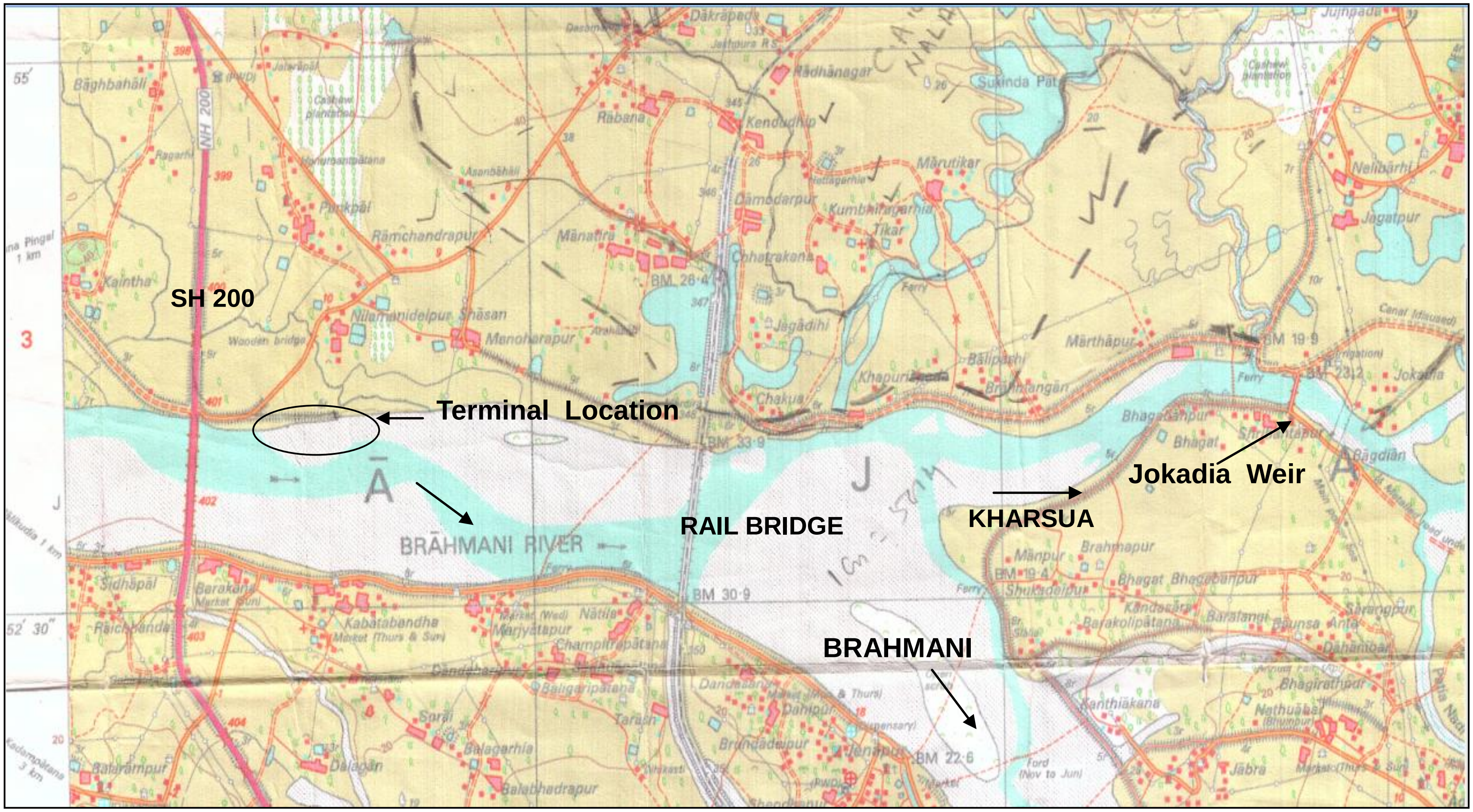

Fig 2 -Brahmani and Kharsua river reach from SH-200 road bridge(Existing) to Existing Jokadia weir and proposed IWT Terminal location at Pankapal

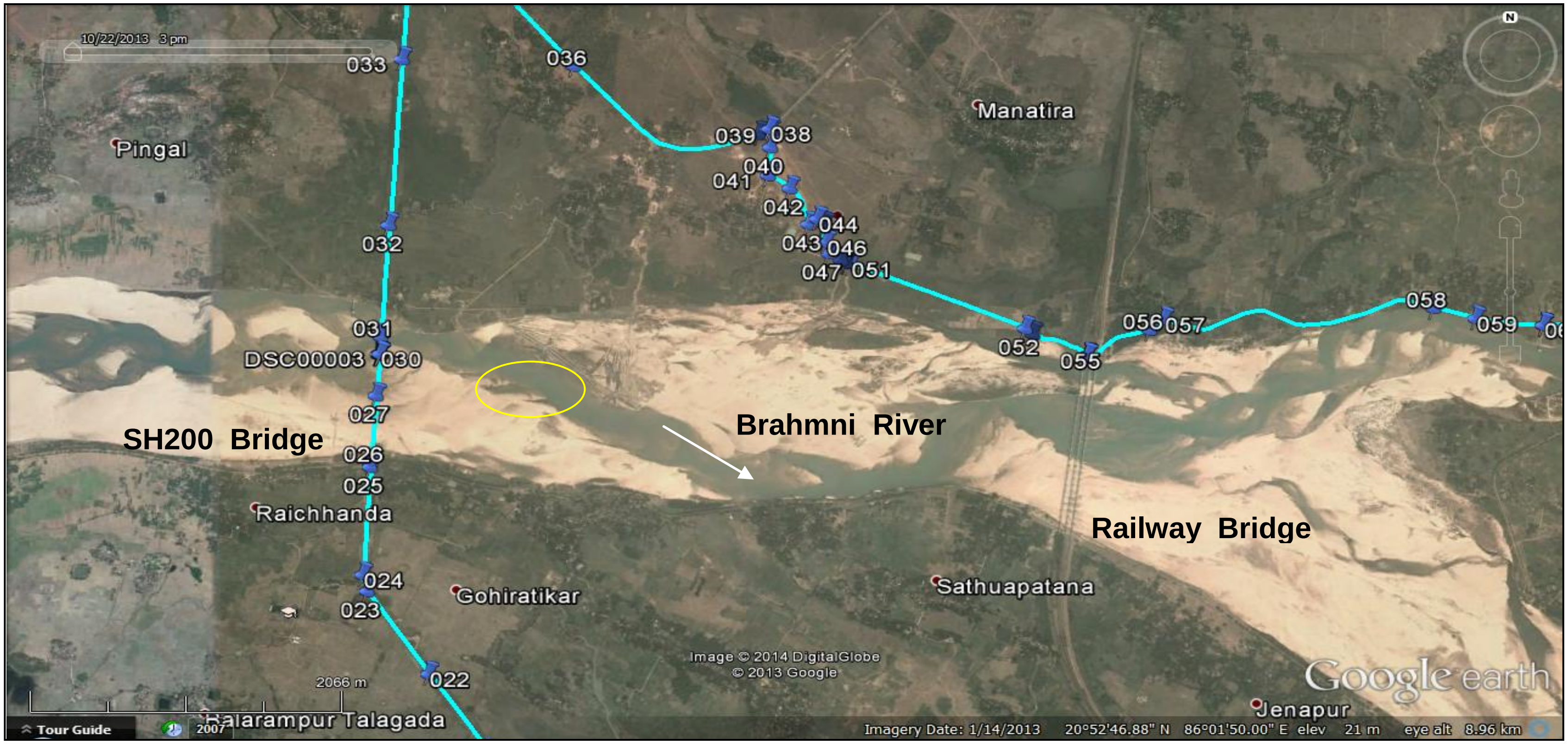

Fig 3 - Tentative Location of proposed IWT Terminal at Pankapal on Google Map

Fig 4- Google image showing Existing Jokadia weir and existing River water Intakes of M/s.VISA, M/s. NINL and M/s.TSL

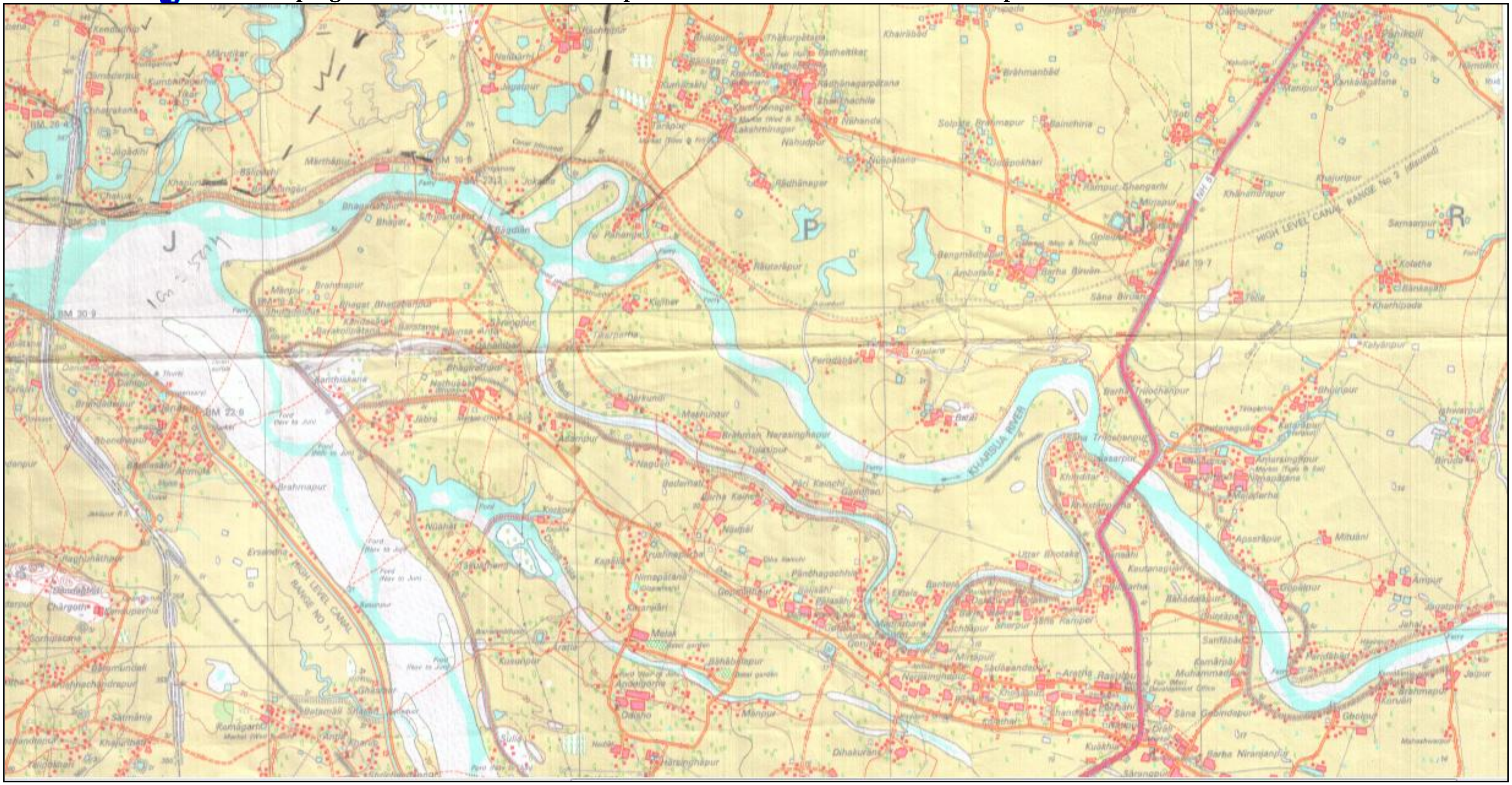

Fig 5- Kharsua river reach from Existing Jokadia weir to upstream of bifurcation near Sujanpur

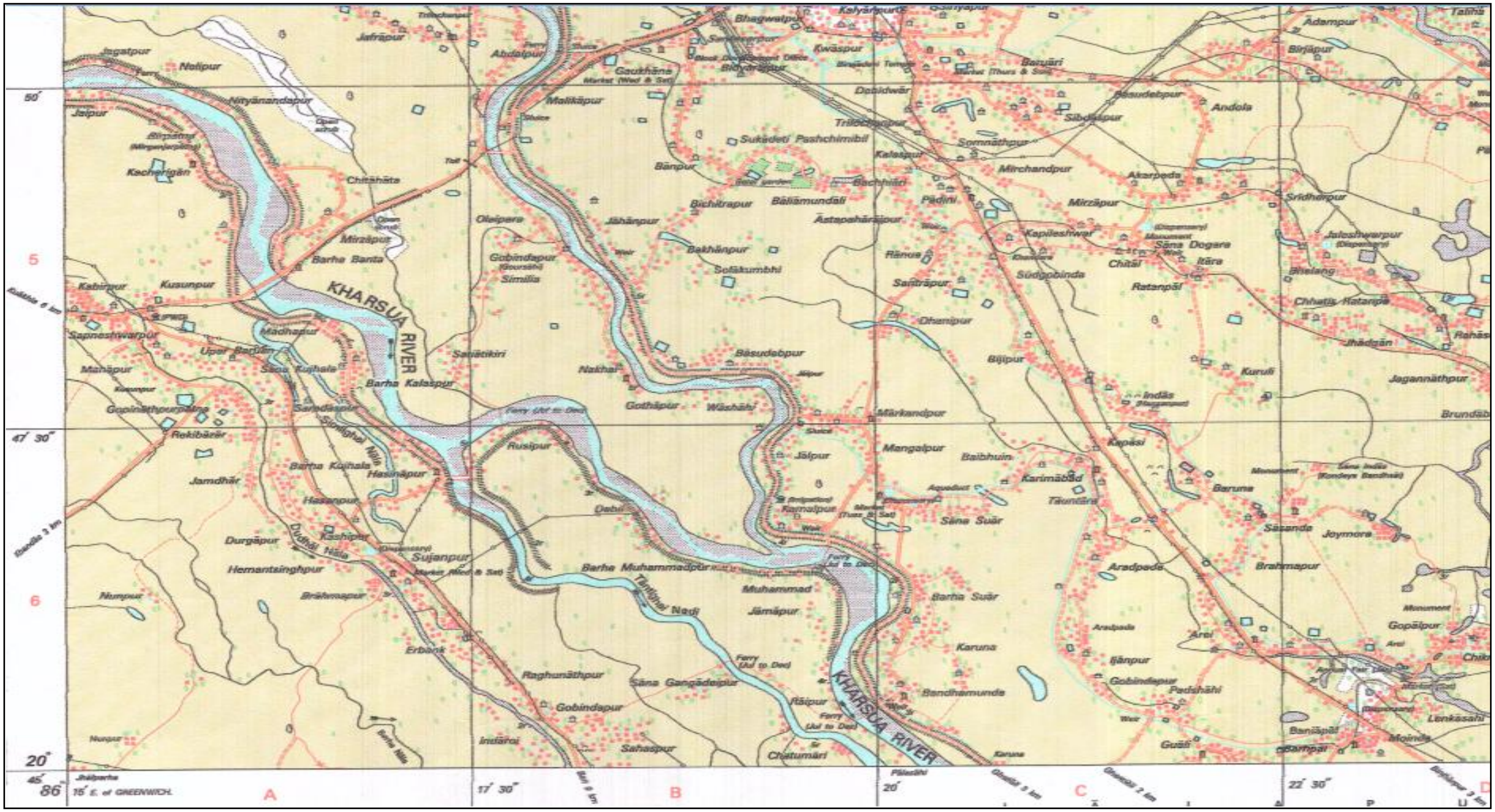

Fig 6- Bifurcation of Kharsua river near Risipur in Kharsua and Tantighai branches. Sujanpur weir on Tantighai at 500 m downstream of bifurcation.

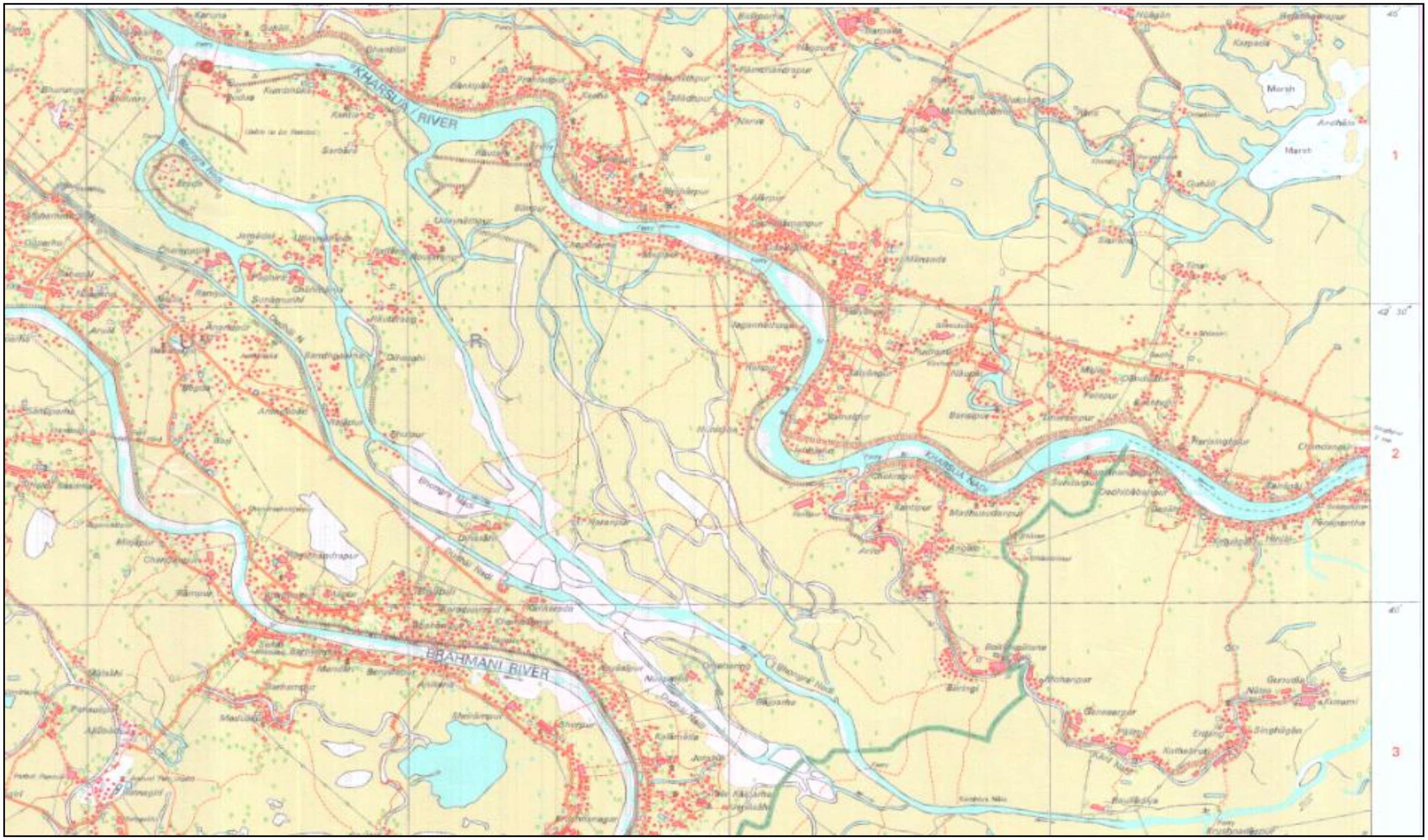

Fig 7- Kantighai river bifurcated and main branch continues as Bhongra river which further downstream is called as Kani river

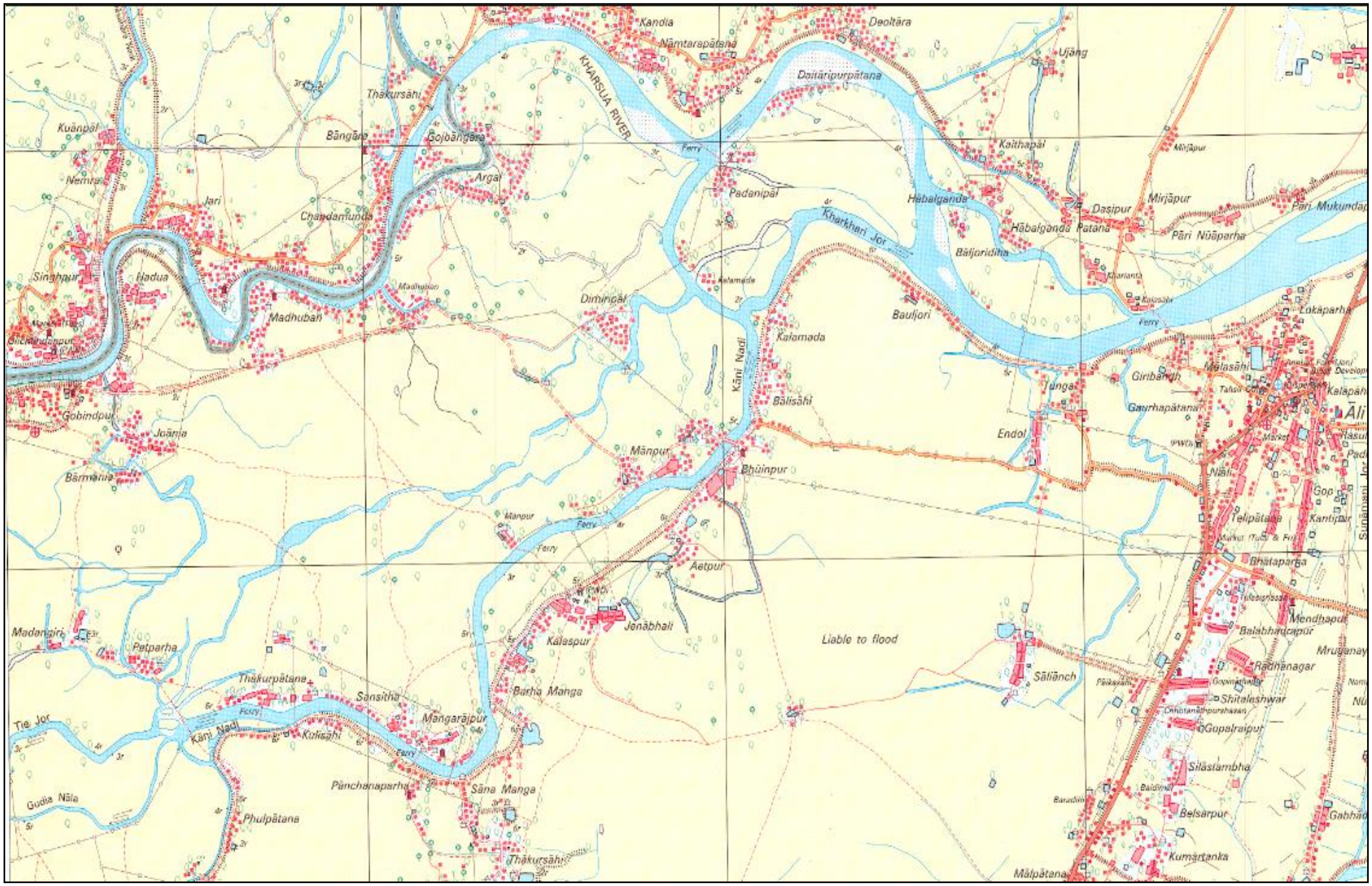

Fig 8- Kani river reach downstream of Dandishia village to confluence with Kharsua near Padnipal

Fig 9- Brahmani River– Kharsua River Confluence point

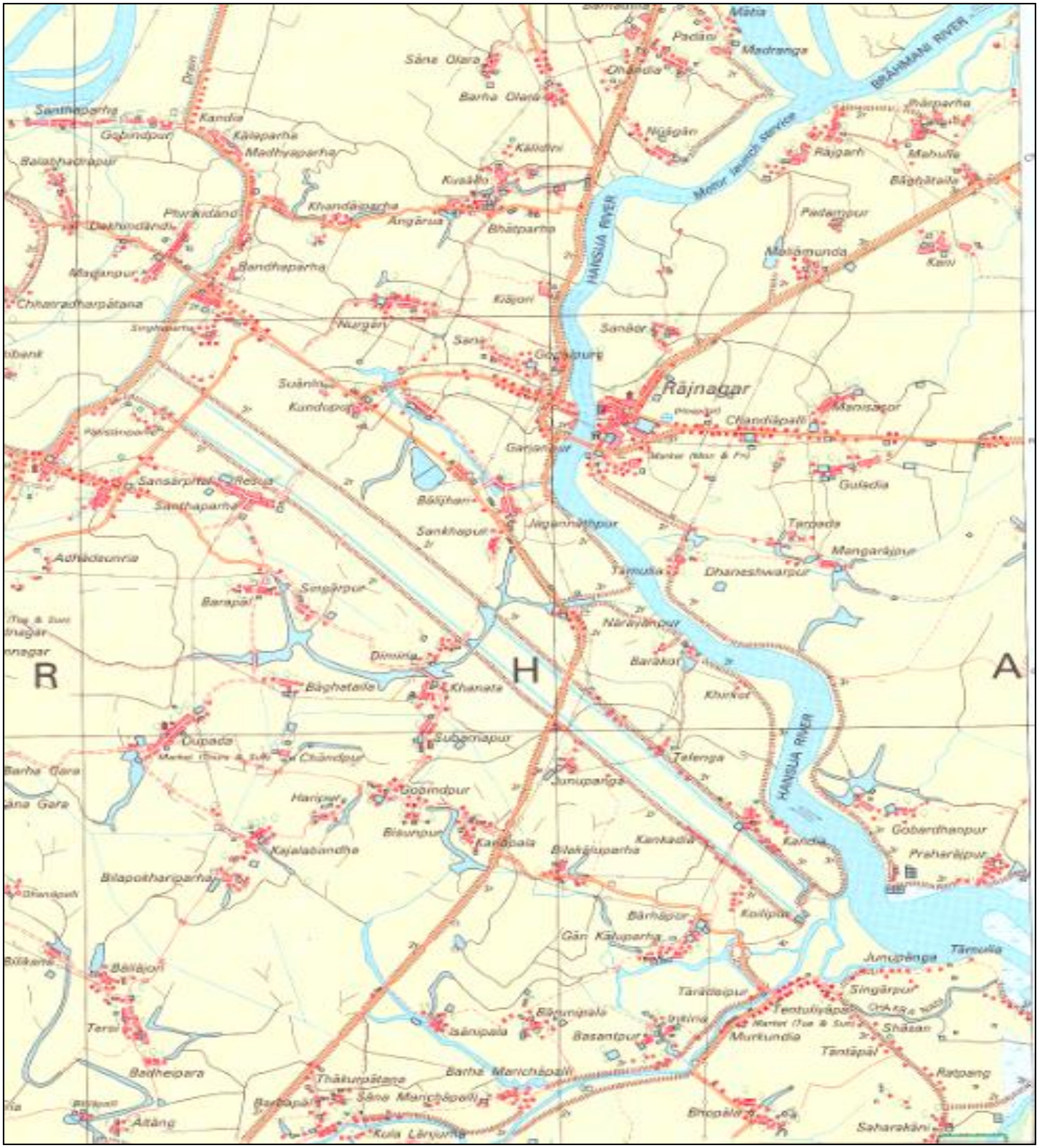

Fig 10. Hansua river reach from Rajnagar to Tamulia

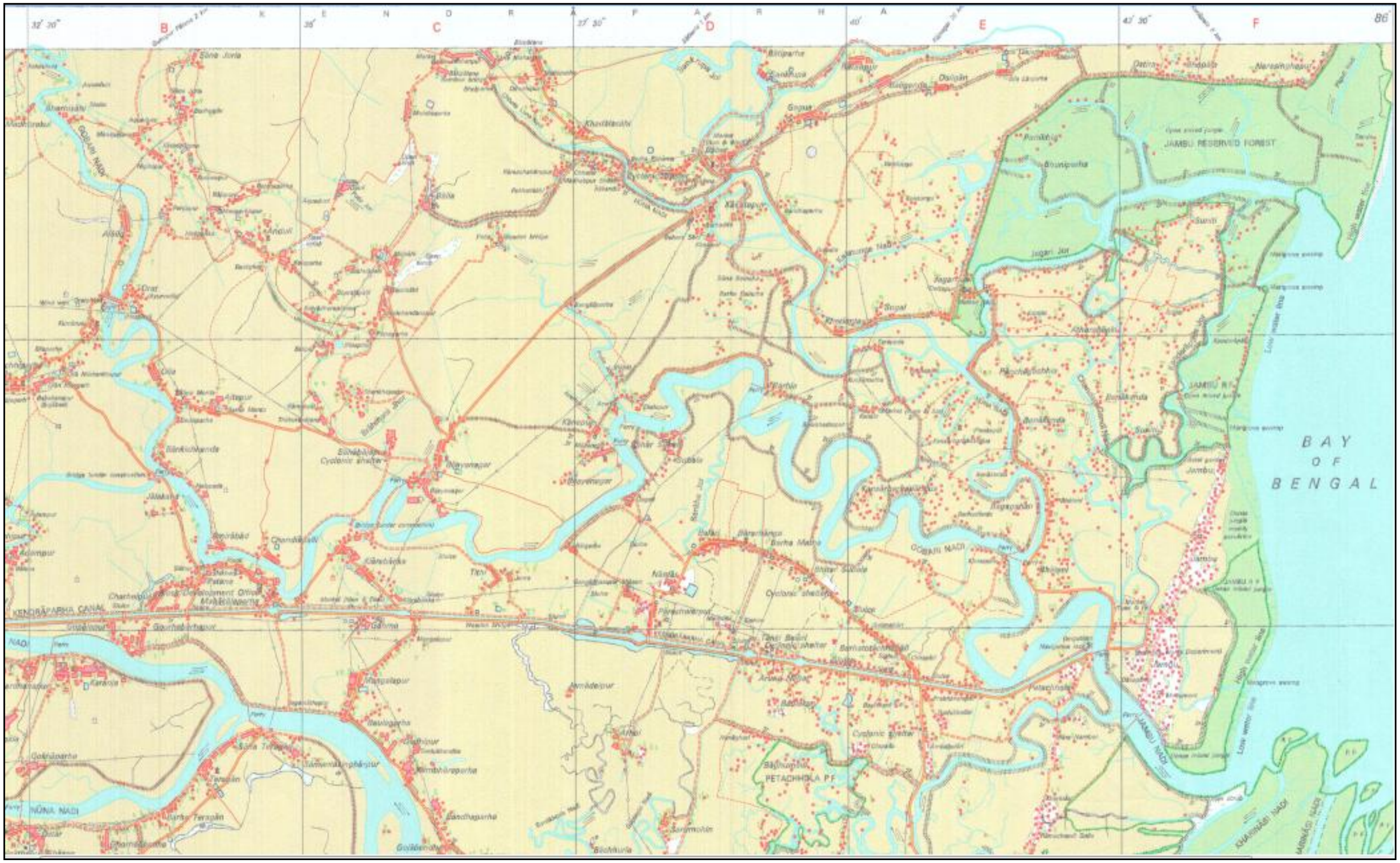

Fig 11. Babar, Nuna and Gobari Creek near Jambu Dweep on the paradip Stretch

Fig 12. Kharnasi Creek connecting Jambu creek and Mahanadi River in the Paradip Stretch

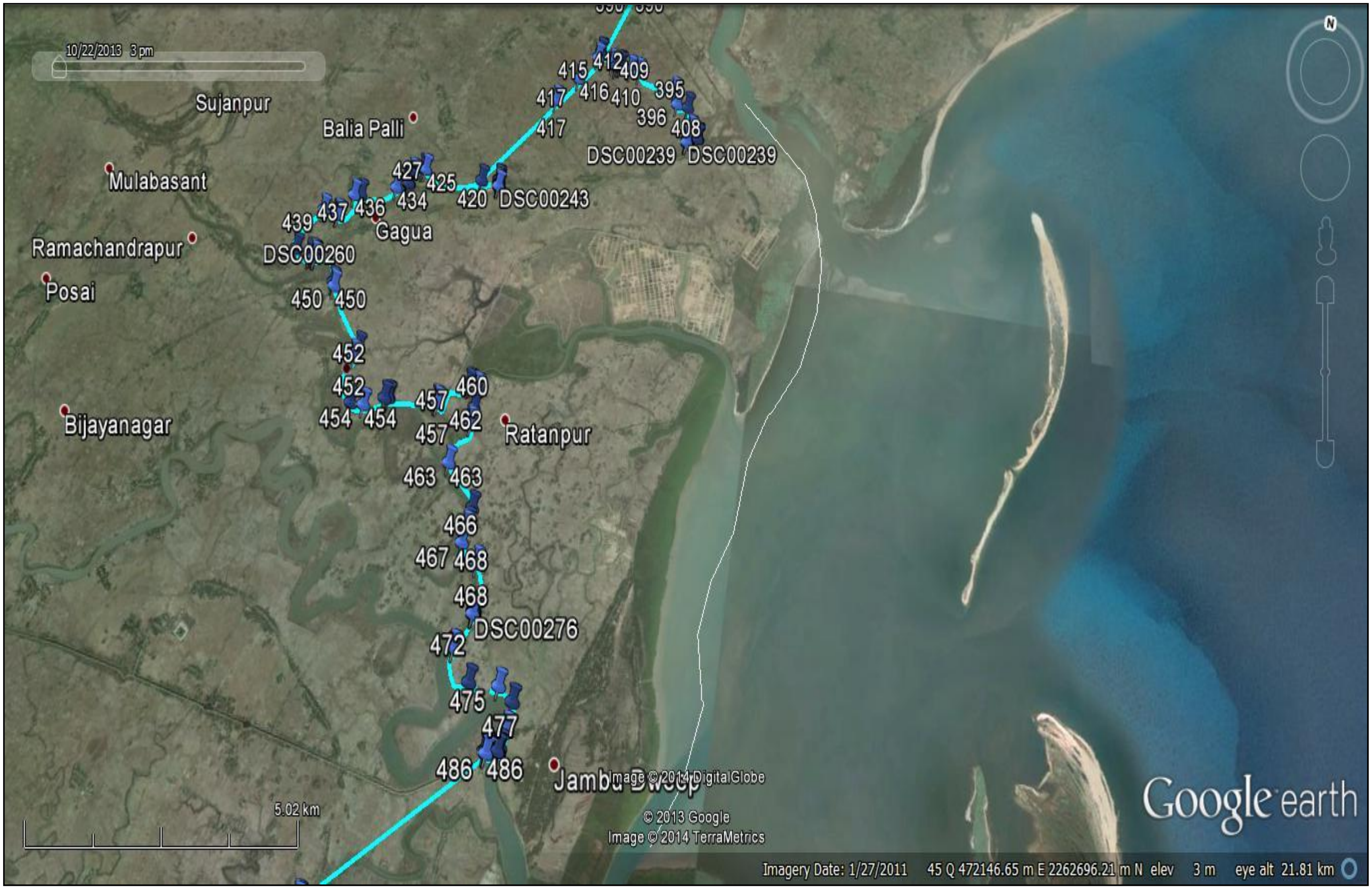

Fig 13. Alternative route from Baruni to Jumbo

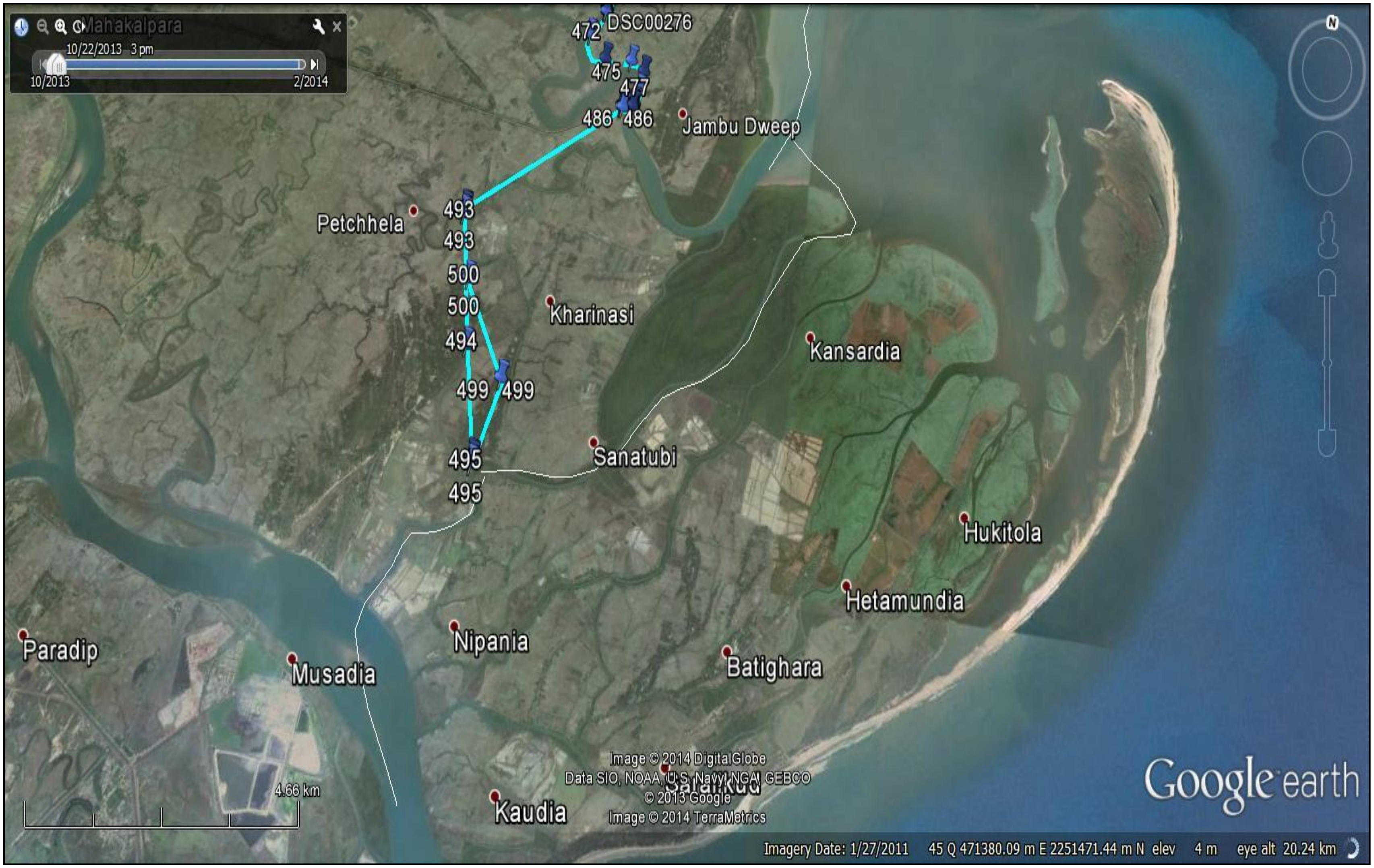

Fig 14. Alternative route from Jumbo to Kharnasi Fishing Harbour

PHOTOGRAPHS

Photo 1 : SH 200 Bridge on River Brahmani near Pankpal

Photo 2 : Intake on Downstream of SH 200 Bridge on River Brahmani near Pankpal

Photo 3 : Railway Bridge on River Brahmani near Jenapur/Pankpal

Photo 4 : Railway Bridge on River Brahmani near Jenapur /Pankpal

Photo 5 : Intake of VISA on River Kharsua

Photo 6 : Intake of NINL on River Kharsua

Photo 7 : Intake of TSL on River Kharsua

Photo 8 : View of Jokadia Barrage from Upstream

Photo 9 : View of Jokadia Barrage from Downstream

Photo 10 : Road Bridge on Downstream of Jokadia Barrage

Photo 11 : View of Jokadia Barrage from Downstream

Photo 12 : Bridge on River Brahmani about 3 km Upstream of Sujanpur

Photo 13 : Bridge on River Brahmani near Jalpur about 3 kmUpstream of Sujanpur

Photo 14 : Sujanpur Weir on Tantighai River

Photo 15 : Under Construction Road Bridge Downstream of Sujanpur Weir

Photo 16 : Another View of Sujanpur Weir

Photo 17 : Under Construction Road Bridge on Dudhia River at Aurangabad (Bari)

Photo 18 : Under Construction Road Bridge on Dudhia River near Bari

Photo 19- Bridge under construction on Dudhia river near Bari

Photo 20- Bridge on Dudhia river near Rajapur

Photo 21 : Under Construction Bridge on Tantighai / Bhongra River near Erada

Photo 22 : Under Construction Bridge on Tantighai / Bhongra River at Raula/Aurangabad

Photo 23 : Road Bridge on Kani River at Mangalpur

Photo 24 : Confluence of Kani River with Kharsua at Padanipal

Photo 25 : Kani River at 5km Upstream of Mangalpur

Photo 26 : Bank Protection Works along Right Bank of Kani River

Photo 27 : Under Construction Bridge at Dandisia Village

Photo 28 : Bridge on River Hansua at Rajnagar

Photo 29 : Channel Connecting Hansua River and Babar Creek near Tantipal

Photo 30 : Steel Bridge at Tantipal

Photo 31 : Gated Weir with Navigational Lock at Tantipal

Photo 32 : Gated Weir with Navigational Lock at Tantipal

Photo 33 : Bridge at Ratanpur

Photo 34 : Wooden Bridge with Concrete Pillars

Photo 35 : Confluence of Babar Creek with Nuna Creek

Photo 36 : Damaged Bridge on Nuna Creek

Photo 37 : Confluence on Nuna Creek with Gobri Creek

Photo 38 : Gobri Creek at Jambu Dweep Ferry Terminal

Photo 39 : Narrow Creek at Ramnagar

Photo 40 : Fisheries Harbour on Kharnasi River near Ramnagar

Photo 41 : View of Kharnasi Creek from Fisheries Harbour looking towards Paradip

Annexure – 10 A

Cargo Details From Kalinganagar Industries

ANNEXURE - 10 A

CARGO DETAILS FROM KALINGANAGAR INDUSTRIES

Sl. No	Particulars	Quantity in Million Tonne Per Annum			
		Year			
		2015	2020	2025	2030
1	**Type of Cargo proposed to be handled**				
	IMPORTED NC COAL	0.57	1.14	1.14	1.14
	COKING COAL	0.36	0.54	0.72	1.08
	IRON ORE	0.00	1.20	1.20	1.20
	DOLOMITE/LIME	0.14	0.25	0.25	0.25
	CHROME ORE	0.36	0.36	0.40	0.40
	MS SHEREDED SCRAP	0.12	0.17	0.17	0.17
	SS SCRAP (CONTAINERISED)	0.10	0.10	0.10	0.10
	COKE	0.25	0.15	0.20	0.76
	SS FINISGED (COIL/ PLATE)	0.90	0.90	0.90	0.90
2	**Volume of Cargo proposed to be handled**				
	Onward	1.65	3.76	3.98	4.34
	Return Cargo	1.15	1.05	1.10	1.66
3	MECHANICAL FACILITIES ANTICIPATED AT THE TERMINAL FOR HANDLING CARGO	MECHANIZED UNLOADING LIKE HMC/ GRAB CRANE TO BE INSTALLED WITH BOTH BERTH FACILITY AND PLOT FOR STOCK YARD WITH 4 LANE ROUTE TO BE DEVELOPED	RAILWAY LINE TO BE CONNECTED ALONG WITH EXPRESS HIGHWAY OF 6 LANE TO BE PLANNED FOR SAFE /SMOOTH MOVEMENT FOR CARGO LOADED TRUCKS , ALSO EXPANTION BERTH FROM 2 TO 6. SPECIAL CONTAINER HUB TO BE MADE		
4	TYPE AND SIZE OF BARGES PROPOSED TO BE HANDLED	5000 MT SELF PROPILE BARGES TO BE HANDELLED	7000 MT SELF PROPILED BARGES TO BE HANDELLED	10000 MT SELF PROPILED BARGES TO BE HANDELLED	10000 MT SELF PROPILED BARGES TO BE HANDELLED
5	PRESENT MODE OF OPERATION AND TYPE OF CARGO HANDLED	ROAD/RAIL MODE OF OPERATION FOR RAW MATERIAL LIKE COAL/QUARTZITE /CHROME/DOLOMITE /COKE MOVEMENT			

Annexure – 10 B

Cargo Details From Dhamra Port Company Limited/ Adani

ANNEXURE – 10 B

National Waterway-5

25 July 2014

APSEZ Business Development

The Group- Adani Ports & SEZ

- APSEZ currently operates 6 ports across the length of the Indian coast:
  - Mundra
  - Dahej
  - Hazira
  - Marmugao coal terminal
  - Vishakhapatnam coal terminal
  - Dhamra
- In addition to the above there are 2 more ports under commissioning:
  - Tuna bulk terminal near Kandla- FY’16
  - Ennore Container Terminal near Chennai- FY’17

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The Dhamra Port Company Ltd

- Dhamra Port is fully operational with 2 berths which has handled over 14 million MT of bulk cargo in the last fiscal
- Cargo mix includes 10.23 million MT of imported coal and limestone and 4.07 million MT of exported iron-ore and coastal thermal coal
- In FY’15, the port is expected to handle about 11 million MT of imported coal and limestone out of a total projected cargo of 16 million MT
- In May 2014, there has been a change in the management at Dhamra Port with the exit of the earlier promoters – Tata Steel and L&T and the entry of Adani Ports and SEZ (APSEZ) as the new owner
- APSEZ is currently running the largest port in the country at Mundra, Gujarat, and is very keen to begin expansion work at the newly acquired Dhamra Port at the earliest

COMPONENTS OF NW - 5

National Waterway 5 (NW 5) covers the following:

1.	Rivers Brahmani-Kharsuan- Dhamra (Talcher- Dhamra) –		265 km
2.	Matai river (Charbatia- Dhamra)	-	39 km
3.	Mahanadi delta rivers (Mangalgadi- Paradeep)	-	67 km
4.	East Coast Canal (Geonkhali- Charbatia)	-	217 km

- Total: 588km of which 91 km of waterway is in West Bengal and the rest in Odisha

DEVELOPMENT

For a phase-wise development NW-5 has been divided into 2 phases, namely:

Phase 1 – Development of the waterway between Dhamra/Paradip and Kalinganagar. This phase consists of 2 parts:

- Phase 1A - Development of Kharsuan/Kani/Dhamra rivers between Dhamra and Jakodia (Kalinganagar)
- Phase 1B - Development of Mangalgadi - Paradip stretch of the Mahanadi River Delta

Phase 2 - Development of waterway rivers between Kalinganagar and Talcher

- This phase consists of developing the Brahmini river between Jakodia and Talcher

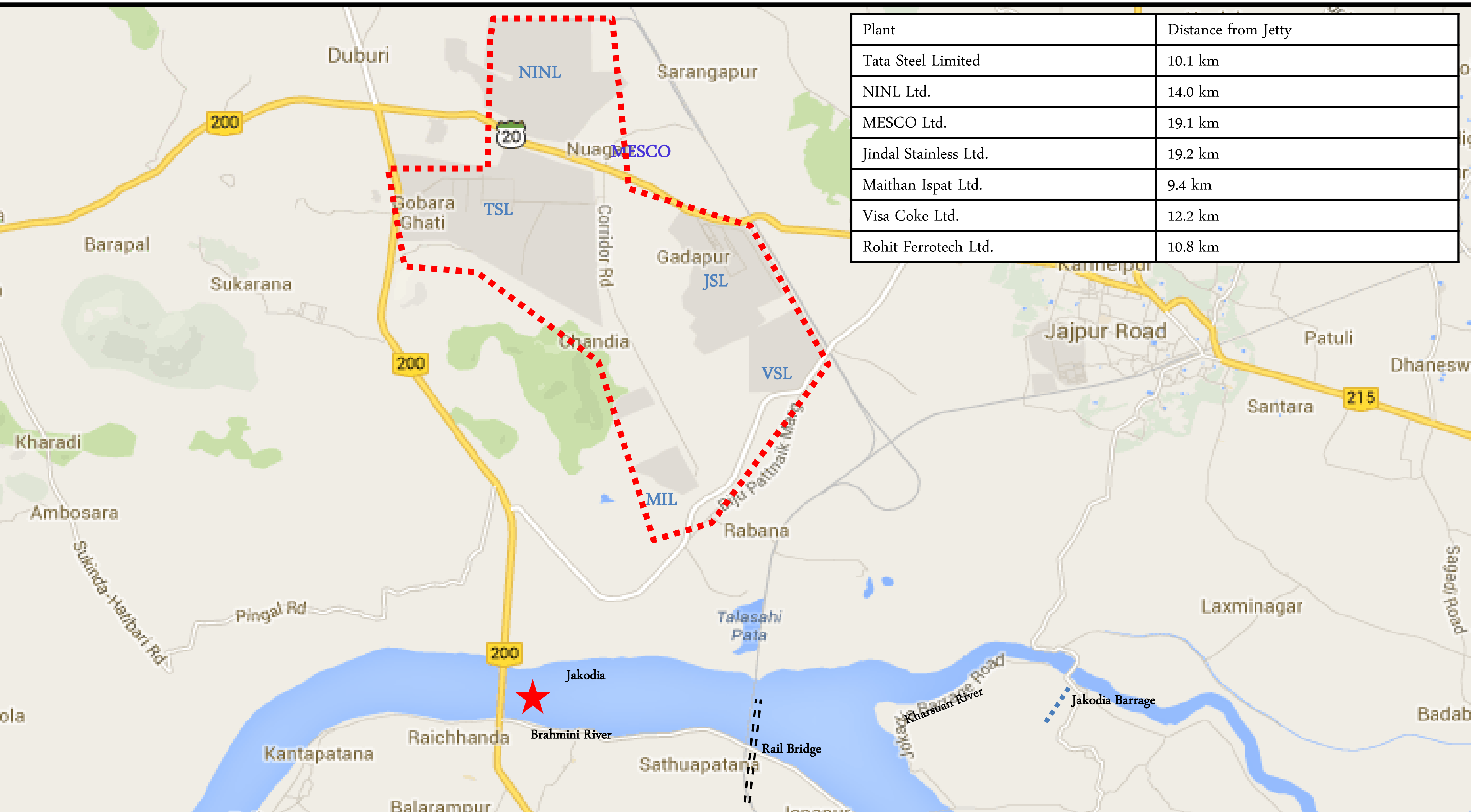
NW - 5

PHASE 1

- Phase 1 consists of a total of 138 km shared by 3 river systems - Dhamra River, Kharsuan River and Kani River.
- Phase - 1 will establish a navigable fairway between Dhamra and Jakodia including cargo handling facilities at both ends

LOCATION OF INDUSTRIES

Plant	Distance from Jetty
Tata Steel Limited	10.1 km
NINL Ltd.	14.0 km
MESCO Ltd.	19.1 km
Jindal Stainless Ltd.	19.2 km
Maithan Ispat Ltd.	9.4 km
Visa Coke Ltd.	12.2 km
Rohit Ferrotech Ltd.	10.8 km



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Cargo Potential

With annual ramp-up schedule

Coking Coal

- India imports about 60% of its coking coal requirement due to insufficient domestic production
- Coal is imported mainly from Australia and proximity with the supply source makes east coast a favorable destination for the import
- Cargo potential in Kalinganagar region that Dhamra can handle in the next 6 years is in the vicinity of 20 MMTPA
- We have assumed that 5% of the total volume can be handled through the waterway mode from the 1st year onwards and gradually ramping upto 17.5%
- The Capesize freight and rail combination from Dhamra will always be cheapest while the waterways route will always remain a strategic mode that will supplement the rail mode

Ramp-up	**5%**	**7.5%**	**10.0%**	**12.5%**	**15.0%**	**17.5%**
Plant	**FY 15-16**	**FY 16-17**	**FY 17-18**	**FY 18-19**	**FY 19-20**	**FY 20-21**
Tata Steel Limited	1.0	1.0	1.0	1.5	2.0	2.5
JSL Limited	-	0.25	0.25	0.25	0.25	0.25
Visa Coke Limited	-	0.25	0.25	0.25	0.25	0.25
MESCO	-	-	0.25	0.25	0.25	0.25
NINL Limited	-	-	0.15	0.15	0.15	0.15
Maithan Ispat Limited	-	-	0.10	0.10	0.10	0.10
TOTAL	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**

Limestone

- Though India has good quantity of total limestone but low silica steel grade limestone is scarce
- Cheaper options available thru imports from Gulf countries
- Cargo potential in Kalinganagar region that Dhamra can handle in the next 6 years is in the vicinity of 6.0 MMTPA
- We have assumed that 5% of the total volume can be handled through the waterway mode from the 1st year onwards and gradually ramping upto 17.5%
- The Panamax freight and rail combination from Dhamra will always be cheapest while the waterways route will always remain a strategic mode that will supplement the rail mode

Ramp-up	5%	7.5%	10.0%	12.5%	15.0%	17.5%
Plant	**FY 15-16**	**FY 16-17**	**FY 17-18**	**FY 18-19**	**FY 19-20**	**FY 20-21**
Tata Steel Phase-I	0.10	0.15	0.15	0.20	0.20	0.20
Tata Steel Phase-II	-	-	-	-	0.15	0.15
Visa Steel	0.10	0.10	0.10	0.15	0.15	0.10
Bhushan Steel & Power	0.05	0.10	0.13	0.13	0.13	0.12
JSPL Phase-I	0.05	0.10	0.12	0.12	0.12	0.12
JSPL Phase-II	-	-	0.10	0.15	0.15	0.12
JSPL Phase-III	-	-	-	-	-	0.15
TOTAL	**0.30**	**0.45**	**0.60**	**0.75**	**0.90**	**1.05**

Total Potential

Cargo Type	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Coking Coal	1.00	1.50	2.00	2.50	3.00	3.50
Limestone	0.30	0.45	0.60	0.75	0.90	1.05
Total Cargo	**1.30**	**1.95**	**2.60**	**3.25**	**3.90**	**4.55**

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Resources Logistics Energy

Annexure – 10 C

Cargo Details From Paradip Port

ANNEXURE - 10 C

COMMODITYWISE CARGO HANDLED DURING 2004-05 TO 2014-15 (upto 25-Aug-2014)

COMMODITY	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010			2010-2011			2011-2012			2012-2013			2013-2014			2014-2015			Total
	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	
AMMONIA	0	412,859	412,859	0	352,825	352,825	0	470,539	470,539	0	485,537	485,537	0	487,340	487,340	0	624,909	624,909	0	666,316	666,316	0	666,057	666,057	0	548,143	548,143	0	571,016	571,016	0	246,697	246,697	5,532,238
AMMONIUM NITRATE	0	33,477	33,477	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,477
ANTHRACITE COAL	0	0	0	0	0	0	0	62,356	62,356	0	125,745	125,745	0	91,432	91,432	0	123,486	123,486	0	187,855	187,855	0	147,374	147,374	8,771	179,958	188,729	8,157	337,393	345,550	0	160,517	160,517	1,433,044
BENTONITE LUMPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	13,000	13,000	0	0	0	0	0	0	23,000
C.R. COILS	0	0	0	0	0	0	0	0	0	0	0	0	3,301	0	3,301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,301
CALCINATED PETRO COKE	10,311	0	10,311	25,200	0	25,200	31,943	11,368	43,311	38,980	25,450	64,430	30,555	0	30,555	30,072	2,500	32,572	10,185	0	10,185	30,870	0	30,870	5,185	0	5,185	10,185	0	10,185	0	0	0	262,804
CEMENT CLINKER	0	0	0	0	0	0	0	196,722	196,722	0	99,680	99,680	0	144,800	144,800	0	1,125,977	1,125,977	0	78,954	78,954	0	130,187	130,187	0	173,382	173,382	0	79,790	79,790	0	0	0	2,029,492
CHROME CONCENTRATE	739,035	0	739,035	919,249	0	919,249	935,582	0	935,582	694,362	0	694,362	362,956	0	362,956	445,976	0	445,976	453,321	0	453,321	370,400	0	370,400	196,600	0	196,600	181,380	0	181,380	17,550	0	17,550	5,316,411
CHROME ORE	455,081	0	455,081	436,403	0	436,403	396,526	0	396,526	188,936	16,988	205,924	42,950	0	42,950	92,774	0	92,774	34,500	0	34,500	0	0	0	15,000	0	15,000	15,000	0	15,000	0	0	0	1,694,158
COAL TAR PITCH	0	9,612	9,612	0	0	0	0	2,049	2,049	461	0	461	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,122
COKE BREEZE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,732	49,732	0	84,864	84,864	0	41,563	41,563	176,159
COKING COAL	0	3,266,870	3,266,870	0	3,758,357	3,758,357	27,027	4,057,247	4,084,274	7,645	4,599,161	4,606,806	5,000	5,285,470	5,290,470	8,361	4,871,254	4,879,615	114,653	5,757,503	5,872,156	58,356	4,953,351	5,011,707	104,012	4,123,727	4,227,739	30,173	6,337,432	6,367,605	25,100	2,946,759	2,971,859	50,337,458
CONTAINER	31,357	0	31,357	44,231	610	44,841	31,512	0	31,512	52,907	836	53,743	31,354	48	31,402	44,209	0	44,209	61,361	0	61,361	98,941	8,450	107,391	156,169	15,218	171,387	86,091	12,950	99,041	19,881	1,889	21,770	698,014
CWC PIPES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	147,889	147,889	1,454	0	1,454	0	0	0	0	0	0	0	0	0	149,343
DEAD BURNT MAGNESITE	0	4,012	4,012	0	0	0	0	9,067	9,067	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,079
DI AMMONIUM PHOSPHATE	0	0	0	0	0	0	0	0	0	0	7,394	7,394	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,394
DIRECT REDUCED IRON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,091	23,091	0	0	0	0	0	0	23,091
DOLOMITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91,924	91,924	0	149,405	149,405	0	141,118	141,118	0	196,209	196,209	0	80,661	80,661	659,317
DREAD MATERIALS	0	0	0	0	0	0	0	209	209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209
DRILLING MATERIALS	11,175	3,437	14,612	6,883	2,436	9,319	2,439	1,866	4,305	3,386	1,162	4,548	789	311	1,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,884
ED. OIL	0	17,500	17,500	0	43,228	43,228	0	68,095	68,095	0	11,851	11,851	0	31,528	31,528	0	38,408	38,408	0	77,793	77,793	0	65,694	65,694	0	69,845	69,845	0	63,628	63,628	0	13,000	13,000	500,570
FERRO CHROME	158,188	0	158,188	153,650	0	153,650	153,846	0	153,846	191,744	0	191,744	137,060	0	137,060	97,861	0	97,861	135,638	0	135,638	114,291	0	114,291	105,572	0	105,572	107,375	0	107,375	32,129	0	32,129	1,387,354
FERRO MANGANESE ORE	0	0	0	4,000	0	4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,000
G.SLAG	27,606	0	27,606	0	0	0	0	0	0	0	0	0	0	16,600	16,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44,206
GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000	12,000	0	10,750	10,750	0	0	0	0	147,100	147,100	0	174,002	174,002	0	350,776	350,776	0	242,100	242,100	936,728
H.R. COILS	7,051	0	7,051	1,137	0	1,137	8,757	0	8,757	0	0	0	60,710	0	60,710	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77,655
HARD COAL	0	0	0	0	0	0	0	68,185	68,185	0	0	0	29,386	53,072	82,458	0	0	0	0	0	0	0	0	0	9,430	276,415	285,845	0	159,447	159,447	0	80,639	80,639	676,574
HARD COKE	0	432,570	432,570	0	589,559	589,559	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,022,129
HOT BRIQUETTED IRON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	372,258	372,258	0	544,577	544,577	0	187,609	187,609	0	0	0	1,104,444
IRON ORE	9,050,922	0	9,050,922	10,273,044	0	10,273,044	11,880,030	0	11,880,030	12,942,194	17,500	12,959,694	14,155,975	116,000	14,271,975	16,137,321	21,173	16,158,494	13,849,676	0	13,849,676	6,551,360	0	6,551,360	1,832,384	1,404	1,833,788	5,593,444	0	5,593,444	668,123	212,848	880,971	103,303,398
IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31,500	0	31,500	0	136,395	136,395	905,781	353,921	1,259,702	1,602,997	296	1,603,293	206,842	0	206,842	3,237,732
LAM COKE	0	0	0	0	0	0	0	770,657	770,657	0	834,415	834,415	0	539,202	539,202	0	241,185	241,185	0	467,736	467,736	22,500	61,283	83,783	0	149,163	149,163	0	105,798	105,798	0	62,854	62,854	3,254,793
LIME AND LIMESTONES	0	200,365	200,365	0	255,217	255,217	0	410,754	410,754	33,512	743,987	777,499	87,000	766,682	853,682	0	825,885	825,885	18,026	920,739	938,765	20,655	954,286	974,941	0	1,925,879	1,925,879	0	2,103,314	2,103,314	0	1,270,551	1,270,551	10,536,852
LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	135,216	135,216	34,171	280,915	315,086	11,430	198,694	210,124	11,640	157,720	169,360	0	203,989	203,989	1,033,775
MANGANESE ORE	64,966	0	64,966	64,462	0	64,462	30,000	36,218	66,218	10,000	362,254	372,254	6,600	532,120	538,720	0	219,369	219,369	3,350	235,910	239,260	0	139,662	139,662	0	78,184	78,184	0	185,963	185,963	0	43,200	43,200	2,012,258
METALOGICAL COAL	0	0	0	0	0	0	0	54,977	54,977	0	0	0	0	0	0	0	0	0	0	0	0	0	33,583	33,583	0	0	0	0	0	0	0	0	0	88,560
METROLOGICAL COKE	0	0	0	0	0	0	0	142,270	142,270	0	269,356	269,356	0	221,103	221,103	0	272,118	272,118	9,780	274,946	284,726	0	318,875	318,875	0	390,218	390,218	0	502,199	502,199	0	344,795	344,795	2,745,660
MILL SCALE	0	0	0	0	0	0	0	0	0	9,882	0	9,882	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,882
MOP	0	73,353	73,353	0	160,491	160,491	0	175,613	175,613	0	178,588	178,588	0	310,023	310,023	0	157,722	157,722	0	227,251	227,251	0	100,838	100,838	0	94,100	94,100	0	207,426	207,426	0	134,703	134,703	1,820,108
MURATE OF POTASH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47,434	47,434	0	20,000	20,000	0	0	0	0	0	0	0	0	0	67,434
NITRO PHOSPHATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,501	22,501	0	0	0	0	0	0	0	0	0	22,501
NON-COKING COAL	0	0	0	0	0	0	0	1,814,028	1,814,028	0	2,580,695	2,580,695	0	3,828,615	3,828,615	0	4,860,413	4,860,413	0	4,360,360	4,360,360	0	6,072,385	6,072,385	0	687,746	687,746	0	206,404	206,404	0	33,312	33,312	24,443,958
OLIFLUX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103,866	103,866	0	113,922	113,922	0	13,000	13,000	230,788
OTHERS	5,676	1,400	7,076	0	0	0	432	432	864	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,940
P O L	279,978	559,536	839,514	201,710	707,796	909,506	256,742	1,118,890	1,375,632	350,822	1,396,309	1,747,131	312,671	2,920,836	3,233,507	723,799	10,923,366	11,647,165	598,911	12,247,059	12,845,970	234,848	14,856,232	15,091,080	253,491	16,212,739	16,466,230	259,358	17,443,232	17,702,590	108,583	7,173,250	7,281,833	89,140,158
P.ACID	0	380,904	380,904	0	477,352	477,352	0	405,344	405,344	0	467,211	467,211	0	258,920	258,920	74,510	463,020	537,530	143,637	339,696	483,333	194,682	308,110	502,792	0	169,171	169,171	37,318	178,979	216,297	0	97,498	97,498	3,996,352
PETROLEUM COKE	0	89,153	89,153	0	213,316	213,316	0	360,145	360,145	0	470,720	470,720	0	235,461	235,461	0	135,057	135,057	0	95,894	95,894	0	151,593	151,593	0	133,648	133,648	0	147,460	147,460	0	69,650	69,650	2,102,097
PIG IRON	278,250	0	278,250	326,381	0	326,381	577,573	0	577,573	397,308	0	397,308	301,493	0	301,493	317,050	0	317,050	412,970	0	412,970	398,750	0	398,750	123,575	0	123,575	481,871	0	481,871	137,415	0	137,415	3,752,636
PROJECT MATERIAL	0	2,608	2,608	35,458	10,392	45,850	7,555	68,694	76,249	690	200,990	201,680	945	132,554	133,499	100	122,174	122,274	150	65,996	66,146	1,541	240,062	241,603	6,390	147,215	153,605	492	47,024	47,516	0	26,195	26,195	1,117,225
PYROXENITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69,500	69,500	0	119,017	119,017	0	321,680	321,680	0	98,565	98,565	608,762
RAW SUGAR	0	0	0	0	0	0	0	0	0	0	0	0	61,597	78,795	140,392	23,691	123,456	147,147	14,129	0	14,129	0	0	0	6,108	6,108	12,216	0	0	0	0	0	0	313,884
ROCK PHOS	0	1,966,861	1,966,861	0	1,040,638	1,040,638	0	2,148,875	2,148,875	0	2,576,829	2,576,829	0	2,523,156	2,523,156	0	2,631,280	2,631,280	0	3,146,983	3,146,983	0	3,595,386	3,595,386	0	3,287,391	3,287,391	0	3,033,201	3,033,201	0	1,371,490	1,371,490	27,322,090
SILICA MOTAR	0	0	0	0	10,312	10,312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,312
STEAM COAL	0	0	0	0	0	0	0	145,972	145,972	0	107,152	107,152	0	26,500	26,500	0	132,553	132,553	0	89,812	89,812	0	275,020	275,020	9,450	7,092,301	7,101,751	15,470	5,984,648	6,000,118	0	2,615,405	2,615,405	16,494,283
STEEL BILLETS	0	2,688	2,688	0	0	0	0	0	0	0	0	0	21,758	0	21,758	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,446
STEEL COIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,400	0	6,400	6,400
STEEL PIPES	1,110	0	1,110	0	0	0	0	0	0	0	0	0	0	52,642	52,642	0	3,607	3,607	0	0	0	0	10,924	10,924	0	0	0	0	0	0	0	0	0	68,283
STEEL PLATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,296	10,296	0	17,494	17,494	0	0	0	0	0	0	0	0	0	0	0	0	27,790
STEEL SLABS	0	0	0	0	0	0	0	0	0	0	0	0	26,620	0	26,620	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,620
SUL.ACID	0	19,698	19,698	0	98,567	98,567	0	433,581	433,581	0	465,254	465,254	0	471,847	471,847	0	458,761	458,761	0	551,321	551,321	0	603,337	603,337	0	865,652	865,652	0	738,799	738,799	0	215,540	215,540	4,922,357
SULPHER	0	564,482	564,482	0	366,548	366,548	0	531,198	531,198	0	664,257	664,257	0	563,400	563,400	0	696,832	696,832	0	852,150	852,150	0	850,926	850,926	0	622,752	622,752	0	691,178	691,178	0	312,675	312,675	6,716,398
SURVEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SWEET SAND	0	0	0	0	0	0	0	0	0	0	0	0	11,171	0	11,171	14,530	0	14,530	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,701
THERMAL COAL	10,545,112	396,456	10,941,568	9,193,436	3,335,875	12,529,311	10,514,944	0	10,514,944	10,660,117	0	10,660,117	10,831,996	10,734	10,842,730	9,824,773	0	9,824,773	8,829,775	0	8,829,775	10,057,364	0	10,057,364	13,613,560	0	13,613,560	18,836,119	0	18,836,119	8,043,580	30,646	8,074,226	124,724,487
UREA	0	0	0	0	0	0	0	88,577	88,577	0	128,154	128,154	0	172,519	172,519	0	80,816	80,816	0	136,223	136,223	0	236,183	236,183	0	141,703	141,703	0	121,678	121,678	0	50,756	50,756	1,156,609
Total	21,665,818	8,437,841	30,103,659	21,685,244	11,423,519	33,108,763	24,854,908	13,653,928	38,508,836	25,582,946	16,837,475	42,420,421	26,521,887	19,883,710	46,405,597	27,835,027	29,176,367	57,011,394	24,721,562	31,220,454	55,942,016	18,190,183	35,987,872	54,178,055	17,362,908	39,113,080	56,475,988	27,277,070	40,672,035	67,949,105	9,265,603	18,194,747	27,460,350	509,564,184

Annexure 10.C

COMMODITYWISE CARGO HANDLED DURING 2004-05 TO 2014-15 (upto 25-Aug-2014)

PARTY	COMMODITY	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010			2010-2011			2011-2012			2012-2013			2013-2014			2014-2015			Total
		EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	EXPORT	IMPORT	Total	
A.B.MINERALS & EXPORTS	IRON ORE	0	0	0	67,541	0	67,541	84,394	0	84,394	1,01,339	0	1,01,339	87,560	0	87,560	1,50,675	0	1,50,675	86,362	0	86,362	0	0	0	5,500	0	5,500	0	0	0	0	0	0	5,83,371
AARTI STEEL LIMITED.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,871	56,871	0	0	0	0	0	0	56,871
	THERMAL COAL	0	0	0	0	18,152	18,152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,152
AARTI STEELS LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,780	3,780	3,780
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63,524	63,524	0	0	0	0	28,000	28,000	91,524
ABG HEAVY INDUSTRIES LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	468	468	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	468
ABG INFRA LOGISTIC LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	492	0	492	0	0	0	492
ABHISHEK EXPORT	IRON ORE	0	0	0	0	0	0	29,692	0	29,692	9,000	0	9,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38,692
ABIR INFRASTRUCTURE PRIVATE LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,338	6,338	0	7,270	7,270	0	5,755	5,755	19,363
ACB (INDIA) LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	627	627	0	0	0	0	0	0	627
ACC LIMITED BARGARH CEMENT WORKS	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19,765	19,765	0	0	0	0	0	0	19,765
ACC LIMITED CHAIBASA CEMENT WORKS	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,376	14,376	0	0	0	0	0	0	14,376
ACC LIMITED DAMODHAR CEMENT WORKS	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,859	11,859	0	0	0	0	0	0	11,859
ACC LIMITED JAMUL CEMENT WORKS	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,906	7,906	0	0	0	0	0	0	7,906
ACC LIMITED KYMORE CEMENT WORKS	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19,765	19,765	0	0	0	0	0	0	19,765
ACC LIMITED SINDRI CEMENT WORKS	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,812	15,812	0	0	0	0	0	0	15,812
ACC LIMITED TIKARIA CEMENT WORKS	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27,651	27,651	0	0	0	0	0	0	27,651
ACC LTD C/O TISCO	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000
ADANI A/C NTPC	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,21,134	4,21,134	0	21,00,335	21,00,335	0	19,95,582	19,95,582	0	0	0	0	0	0	0	0	0	45,17,051
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58,812	58,812	0	0	0	0	0	0	0	0	0	0	0	0	58,812
ADANI ENTERPRISES LTD	IRON ORE	0	0	0	0	0	0	72,769	0	72,769	1,52,182	0	1,52,182	66,010	0	66,010	16,000	0	16,000	2,000	0	2,000	0	0	0	0	0	0	0	0	0	0	0	0	3,08,961
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	51,401	51,401	0	6,81,574	6,81,574	0	3,97,557	3,97,557	0	9,37,406	9,37,406	0	34,409	34,409	0	0	0	0	0	0	21,02,347
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,29,184	28,29,184	0	9,08,153	9,08,153	0	9,50,783	9,50,783	46,88,120
ADANI EXPORTS LIMITED.	CHROME CONCENTR	0	0	0	0	0	0	0	0	0	6,848	0	6,848	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,848
	IRON ORE	76,788	0	76,788	1,04,199	0	1,04,199	1,50,788	0	1,50,788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,31,775
ADANI GLOBAL PTE. LTD.	IRON ORE	24,615	0	24,615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,615
ADANI POWER LIMITED	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48,370	0	48,370	13,50,407	0	13,50,407	18,54,878	0	18,54,878	10,21,846	0	10,21,846	42,75,501
ADANI WILMAR LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	142	142	0	0	0	0	0	0	142
ADHUNIK ALLOYS & POWER LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,200	14,200	0	0	0	0	12,000	12,000	0	3,700	3,700	29,900
ADHUNIK METALIKS LTD	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,49,406	1,49,406	0	1,86,777	1,86,777	0	1,45,432	1,45,432	0	56,026	56,026	0	0	0	0	0	0	5,37,641
	HARD COKE	0	0	0	0	49,498	49,498	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,498
	LAM COKE	0	0	0	0	0	0	0	1,12,774	1,12,774	0	97,859	97,859	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,10,633
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,225	28,225	0	18,710	18,710	0	11,805	11,805	58,740
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	35,199	35,199	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,199
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,650	10,650	0	0	0	0	12,000	12,000	0	3,700	3,700	26,350
ADHUNIK POWER & NATURAL RESOURCES LTD.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32,000	32,000	0	0	0	32,000
ADHUNIK STEEL LTD	IRON ORE	0	0	0	10,733	0	10,733	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,733
ADMIRAL SHIPPING LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	13	0	0	0	0	0	0	13
AGARMIN COALWASHERY PRIVATE LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,89,961	2,89,961	2,89,961
AGARWAL COAL CORP PVT LTD	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,965	10,965	0	20,993	20,993	0	0	0	0	0	0	31,958
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,63,048	1,63,048	0	37,100	37,100	0	46,325	46,325	2,46,473
AGARWAL COAL CORP PVT LTD	THERMAL COAL	0	0	0	0	54,365	54,365	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54,365
AHULUWAL	IRON ORE	29,800	0	29,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,800
AIC RESOURCES (P) LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	0	10,000	0	0	0	0	0	0	0	0	0	10,000
ALIZA INTERNATIONAL PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	70,777	0	70,777	0	0	0	93,300	0	93,300	24,000	0	24,000	26,550	0	26,550	27,974	0	27,974	38,700	0	38,700	20,000	0	20,000	3,01,301
ALSTOM PROJECTS INDIA LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	98	0	0	0	0	0	0	0	0	0	0	0	0	98
ALTRADE MINERALS PVT LTD	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	3,02,733	0	3,02,733	3,05,773	0	3,05,773	2,16,300	0	2,16,300	84,100	0	84,100	0	0	0	81,637	0	81,637	0	0	0	9,90,543
AMBUJA CEMENTS LIMITED	CEMENT CLINKER	0	0	0	0	0	0	0	0	0	0	0	0	0	56,706	56,706	0	5,34,344	5,34,344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,91,050
	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,859	11,859	0	23,718	23,718	0	19,765	19,765	55,342
AMBUJA CEMENTS LIMITED (UNIT-BHATAPARA)	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,906	7,906	0	0	0	0	0	0	7,906
AMBUJA CEMENTS LIMITED (UNIT-MARATHA	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,953	3,953	0	0	0	0	0	0	3,953
AML STEEL & POWER LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,500	14,500	0	0	0	0	0	0	14,500
AMRITESH INDUSTRIES PRIVATE LIMITED	CALCINATED PETRO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,500	2,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,500
ANAND CARBO PRIVATE LTD.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,600	7,600	0	0	0	0	0	0	7,600
ANDAGRO SERVICES PVT LTD.	IRON ORE	40,620	0	40,620	66,352	0	66,352	85,982	0	85,982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,92,954
ANDRITZ HYDRO PVT LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
ANI MARBLE	CONTAINER	48	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48
ANJANEY FERRO ALLOYS LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	2,500	2,500	0	10,878	10,878	0	5,900	5,900	0	0	0	0	0	0	0	0	0	0	0	0	19,278
ANTAI BALAJI LTD.	HARD COKE	0	0	0	0	7,895	7,895	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,895
ANURAG OVERSEAS	IRON ORE	0	0	0	65,726	0	65,726	1,11,457	0	1,11,457	93,759	0	93,759	1,05,075	0	1,05,075	1,00,720	0	1,00,720	80,930	0	80,930	83,500	0	83,500	0	0	0	0	0	0	0	0	0	6,41,167
APEX ENERGY RESOURCES LTD.	CEMENT CLINKER	0	0	0	0	0	0	0	51,003	51,003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51,003
	COKING COAL	0	0	0	0	58,596	58,596	0	68,335	68,335	0	44,629	44,629	0	87,687	87,687	0	13,500	13,500	0	35,000	35,000	0	0	0	0	0	0	0	0	0	0	0	0	3,07,747
	HARD COKE	0	26,230	26,230	0	31,227	31,227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57,457
	LAM COKE	0	0	0	0	0	0	0	13,282	13,282	0	10,192	10,192	0	74,075	74,075	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97,549
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	2,750	2,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,750
	METALOGICAL COAL	0	0	0	0	0	0	0	44,977	44,977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44,977
	METROLOGICAL COK	0	0	0	0	0	0	0	14,322	14,322	0	41,000	41,000	0	34,378	34,378	0	0	0	0	45,292	45,292	0	0	0	0	0	0	0	0	0	0	0	0	1,34,992
	NON-COKING COAL	0	0	0	0	0	0	0	22,000	22,000	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42,000
	STEAM COAL	0	0	0	0	0	0	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
APEX ENERGY RESOURCES PVT. LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,001	20,001	0	0	0	0	0	0	0	0	0	0	0	0	20,001
APEX TRADING COMPANY	COKING COAL	0	51,011	51,011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51,011
	HARD COKE	0	6,438	6,438	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,438
	METROLOGICAL COK	0	0	0	0	0	0	0	1,300	1,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,300
	THERMAL COAL	0	0	0	0	81,879	81,879	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81,879
APGENCO A/C CHETTINAD LOGISTICS	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,62,402	0	3,62,402	10,90,331	0	10,90,331	12,09,579	0	12,09,579	4,14,780	0	4,14,780	30,77,092
APGENCO A/C GLOBAL COAL & MINING PVT. LTD.	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89,780	0	89,780	0	0	0	89,780
APGENCO A/C KARAM CHAND THAPAR & BROS.	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,24,125	0	1,24,125	5,32,578	0	5,32,578	5,03,509	0	5,03,509	2,99,370	0	2,99,370	14,59,582
APGENCO A/C SARAT CHATTERJEE & CO.	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,12,656	0	3,12,656	3,82,774	0	3,82,774	6,77,698	0	6,77,698	8,63,090	0	8,63,090	8,65,327	0	8,65,327	3,05,415	0	3,05,415	34,06,960
APGENCO A/C SICL	THERMAL COAL	4,98,744	0	4,98,744	50,718	0	50,718	0	0	0	0	0	0	3,94,338	0	3,94,338	7,11,696	0	7,11,696	6,57,302	0	6,57,302	4,08,117	0	4,08,117	0	0	0	0	0	0	0	0	0	27,20,915
ARDENT STEEL LIMITED	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,30,350	0	1,30,350	0	0	0	1,30,350
ARYA IRON AND STEEL CO PVT. LTD.	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	15,000	0	8,395	8,395	0	28,456	28,456	0	15,512	15,512	0	32,250	32,250	0	27,498	27,498	0	15,750	15,750	1,42,861
	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,998	0	34,998	0	0	0	34,998
ARYAN ENERGY PRIVATE LIMITED	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,12,510	0	2,12,510	3,11,365	0	3,11,365	1,14,680	0	1,14,680	6,38,555
ATHA MINES PRIVATE LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	1,08,701	0	1,08,701	46,300	0	46,300	1,07,595	0	1,07,595	4,45,429	0	4,45,429	3,66,797	0	3,66,797	38,500	0	38,500	10,000	0	10,000	0	0	0	11,23,322
ATHENA CHHATTISGARH POWER LTD	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,068	23,068	0	11,668	11,668	0	13,674	13,674	48,410
ATIBIR INDUSTRIES CO. LTD.	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,775	7,775	0	10,000	10,000	0	30,874	30,874	48,649
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000	30,000	30,000
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,075	20,075	0	23,000	23,000	0	0	0	43,075
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52,656	52,656	0	0	0	0	0	0	52,656
AUROGLOBAL COMTRADE PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,607	0	29,607	0	0	0	0	0	0	29,607
AWIN MENERAL AND METAL	CONTAINER	0	0	0	0	0	0	0	0	0	74	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74
B.C.MOHANTY & SONS PVT. LTD.	CHROME CONCENTR	5,391	0	5,391	6,138	0	6,138	15,200	0	15,200	19,100	0	19,100	6,000	0	6,000	20,000	0	20,000	8,521	0	8,521	0	0	0	0	0	0	0	0	0	0	0	0	80,350
	CHROME ORE	10,800	0	10,800	12,150	0	12,150	10,870	0	10,870	19,200	0	19,200	6,950	0	6,950	9,500	0	9,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69,470
B.R. SPONGE & POWER LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,000	21,000	0	0	0	0	0	0	21,000
B.S. INDUSTRIES	CHROME CONCENTR	0	0	0	3,256	0	3,256	4,951	0	4,951	2,200	0	2,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,407
BAGADIYA BROTHERS. PVT. LTD.	IRON ORE	91,061	0	91,061	1,79,503	0	1,79,503	4,08,938	0	4,08,938	9,67,066	0	9,67,066	14,46,605	0	14,46,605	11,95,160	0	11,95,160	11,51,573	0	11,51,573	4,67,948	0	4,67,948	31,618	0	31,618	4,40,805	0	4,40,805	62,999	0	62,999	64,43,276
BALAJI ELECTROSTEELS LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,000	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,000
BALAJI INDUSTRIAL ENGINEERING LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,880	11,880	0	0	0	0	0	0	11,880
BALASORE ALLOYS LTD.	ANTHRACITE COAL	0	0	0	0	0	0	0	29,669	29,669	0	22,458	22,458	0	12,995	12,995	0	18,231	18,231	0	25,807	25,807	0	6,590	6,590	0	12,743	12,743	0	7,700	7,700	0	11,000	11,000	1,47,193
	COKING COAL	0	19,002	19,002	0	6,025	6,025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,027
	HARD COKE	0	0	0	0	10,500	10,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,500
	LAM COKE	0	0	0	0	0	0	0	8,925	8,925	0	0	0	0	18,091	18,091	0	3,850	3,850	0	18,603	18,603	0	0	0	0	0	0	0	8,761	8,761	0	6,600	6,600	64,830
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	8,400	8,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	17,600	17,600	36,000
BDG METAL & POWER LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,855	3,855	0	0	0	3,855
BENGAL ENERGY LIMITED	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,000	25,000	0	0	0	0	0	0	0	0	0	0	0	0	25,000
	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,961	80,276	82,237	0	3,02,765	3,02,765	0	2,15,926	2,15,926	0	3,77,514	3,77,514	0	4,03,466	4,03,466	0	3,59,359	3,59,359	17,41,267
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,605	15,605	0	0	0	0	0	0	0	0	0	0	0	0	15,605
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	15,000	0	0	0	15,000
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,576	8,576	0	0	0	0	0	0	8,576
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416	416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416

BGH EXIM LIMITED	COKING COAL	0	8,681	8,681	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,681
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,446	6,446	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,446
BHAGWATI SPONGE (P) LTD.	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,000	4,000	0	0	0	0	0	0	4,000
BHARAT ALUMINIUM COMPANY LTD.	PROJECT MATERIAL	0	1,524	1,524	0	1,423	1,423	0	28	28	0	0	0	0	10,563	10,563	0	24,477	24,477	0	4,722	4,722	0	0	0	0	393	393	0	0	0	0	0	0	43,130
BHARAT COAL CHEMICALS LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,169	1,169	0	0	0	0	0	0	0	0	0	1,169
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,076	4,076	0	0	0	0	0	0	0	0	0	4,076
BHARAT MINMENT CORPORATION	THERMAL COAL	0	0	0	0	1,16,074	1,16,074	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,16,074
BHARAT PETROLEUM CORP LTD	P O L	78,608	60,117	1,38,725	46,833	66,470	1,13,303	22,794	86,473	1,09,267	0	1,39,257	1,39,257	9,093	1,89,171	1,98,264	7,570	2,61,681	2,69,251	0	2,60,951	2,60,951	0	2,82,706	2,82,706	0	2,60,968	2,60,968	0	2,53,693	2,53,693	0	69,479	69,479	20,95,864
BHASKAR SHRACHI ALLOYS LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,716	3,716	0	0	0	0	0	0	0	0	0	3,716
BHASKAR STEEL & FERRO ALLOY LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	10,000
BHATIA A/C NATIONAL SAIL POWER	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57,800	57,800	0	0	0	0	0	0	0	0	0	57,800
BHATIA INTERNATIONAL LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	45,803	45,803	0	31,897	31,897	6,400	0	6,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84,100
	NON-COKING COAL	0	0	0	0	0	0	0	99,526	99,526	0	36,298	36,298	0	0	0	0	1,77,738	1,77,738	0	4,827	4,827	0	80,991	80,991	0	0	0	0	0	0	0	0	0	3,99,380
	THERMAL COAL	0	0	0	0	1,28,437	1,28,437	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,28,437
BHATIA INTERNATIONAL LTD. A/C NTPC	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,99,222	1,99,222	0	10,38,551	10,38,551	0	5,94,433	5,94,433	0	0	0	0	0	0	0	0	0	18,32,206
BHUSAN POWER & STEEL LTD	PROJECT MATERIAL	0	0	0	0	0	0	0	417	417	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	417
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,029	8,029	0	0	0	0	0	0	8,029
BHUSHAN ENERGY LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	50,063	50,063	0	48,251	48,251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98,314
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	192	192	0	0	0	0	0	0	192
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,100	53,100	0	0	0	0	0	0	53,100
BHUSHAN LIMITED.	PROJECT MATERIAL	0	0	0	0	185	185	0	387	387	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	572
	THERMAL COAL	0	0	0	0	1,79,703	1,79,703	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,79,703
BHUSHAN STEEL & STRIPES LTD	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	43,478	43,478	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43,478
BHUSHAN STEEL LIMITED	COKE BREEZE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39,280	39,280	0	0	0	39,280
	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,53,275	3,53,275	0	4,55,833	4,55,833	0	3,80,336	3,80,336	0	7,76,177	7,76,177	0	6,22,546	6,22,546	25,88,167
	DIRECT REDUCED IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,091	23,091	0	0	0	0	0	0	23,091
	DOLOMITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91,924	91,924	0	1,49,405	1,49,405	0	1,41,118	1,41,118	0	1,57,709	1,57,709	0	80,661	80,661	6,20,817
	HARD COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,100	14,100	0	0	0	14,100
	HOT BRIQUETTED IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,000	33,000	0	2,19,805	2,19,805	0	0	0	0	0	0	2,52,805
	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,13,468	2,13,468	0	0	0	0	0	0	2,13,468
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,29,805	2,29,805	0	0	0	0	0	0	0	0	0	0	0	0	2,29,805
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,83,106	1,83,106	0	2,47,698	2,47,698	0	1,66,395	1,66,395	0	2,28,946	2,28,946	0	1,73,417	1,73,417	9,99,562
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,49,885	1,49,885	0	1,54,022	1,54,022	0	1,07,225	1,07,225	0	0	0	0	36,875	36,875	0	45,441	45,441	4,93,448
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97,056	97,056	0	53,086	53,086	0	1,05,370	1,05,370	0	0	0	0	0	0	0	0	0	2,55,512
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	116	116	0	188	188	0	270	270	0	0	0	0	0	0	574
	STEEL COIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,400	0	6,400	6,400
	STEEL PLATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,296	10,296	0	17,494	17,494	0	0	0	0	0	0	0	0	0	0	0	0	27,790
BHUVEE PROFILES & STAINLESS PRIVATE LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,963	5,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,963
BIHAR FOUNDRY & CASTINGS LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,000	7,000	0	0	0	0	0	0	7,000
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,500	11,500	0	0	0	0	0	0	11,500
BIRLA CORPORATION LIMITED	CEMENT CLINKER	0	0	0	0	0	0	0	25,030	25,030	0	67,250	67,250	0	0	0	0	2,44,625	2,44,625	0	78,954	78,954	0	0	0	0	14,500	14,500	0	0	0	0	0	0	4,30,359
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,250	26,250	26,250
BOKARO POWER SUPPLY CO (P) LTD	THERMAL COAL	0	0	0	0	45,973	45,973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45,973
BONAI INDUSTRIAL CO. LTD.	IRON ORE	0	0	0	23,522	0	23,522	57,638	0	57,638	1,70,570	0	1,70,570	2,19,208	0	2,19,208	1,92,805	0	1,92,805	7,41,999	0	7,41,999	6,62,060	0	6,62,060	0	0	0	0	0	0	0	0	0	20,67,802
BRAHMANI RIVER PELLETS LIMITED	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,08,222	0	2,08,222	1,01,656	0	1,01,656	3,09,878
	STEEL PIPES	0	0	0	0	0	0	0	0	0	0	0	0	0	10,910	10,910	0	3,607	3,607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,517
BRAHMAPUTRA METALLICS LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,500	23,500	0	0	0	0	0	0	23,500
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,500	11,500	0	0	0	0	0	0	11,500
BRG IRON & STEEL CO. PVT. LTD.	STEEL BILLETS	0	0	0	0	0	0	0	0	0	0	0	0	9,500	0	9,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,500
BTM EXPORTS LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82,570	0	82,570	56,970	0	56,970	1,39,540
C.E.S.C LTD. CALCUTTA	NON-COKING COAL	0	0	0	0	0	0	0	1,90,478	1,90,478	0	2,46,329	2,46,329	0	1,39,307	1,39,307	0	2,51,088	2,51,088	0	1,79,818	1,79,818	0	1,58,585	1,58,585	0	34,740	34,740	0	31,201	31,201	0	0	0	12,31,546
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	26,500	26,500	0	0	0	0	31,000	31,000	0	35,261	35,261	0	1,75,943	1,75,943	0	2,02,203	2,02,203	0	98,662	98,662	5,69,569
	THERMAL COAL	0	1,84,521	1,84,521	0	1,83,230	1,83,230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,67,751
C.L.C. CORPORATION	FERRO CHROME	0	0	0	1,050	0	1,050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,050
CARE	CONTAINER	0	0	0	164	578	742	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	742
CARGILL INDIA PVT. LTD.	ED. OIL	0	17,500	17,500	0	43,228	43,228	0	66,638	66,638	0	11,851	11,851	0	3,500	3,500	0	38,408	38,408	0	77,793	77,793	0	65,694	65,694	0	69,845	69,845	0	63,628	63,628	0	13,000	13,000	4,71,085
	IRON ORE	30,404	0	30,404	8,500	0	8,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38,904
CARGO LINERS PVT. LTD.	IRON ORE	2,316	0	2,316	0	0	0	45,086	0	45,086	44,346	0	44,346	15,415	0	15,415	33,428	0	33,428	22,000	0	22,000	0	0	0	0	0	0	0	0	0	0	0	0	1,62,591
CASTRON TECHNOLOGIES LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	750	750	0	0	0	0	0	0	0	0	0	0	4,600	4,600	0	0	0	5,350
CENTOM STEELS AND FERRO ALLOYS LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,000	1,000	0	4,500	4,500	0	0	0	0	0	0	0	0	0	0	0	0	5,500
CHAITANYA MAN BENIFICAT PLANT	CHROME CONCENTR	8,508	0	8,508	9,000	0	9,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,508
CHAITANYA MINERALS	CHROME CONCENTR	1,700	0	1,700	7,062	0	7,062	13,000	0	13,000	6,500	0	6,500	2,000	0	2,000	2,200	0	2,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32,462
CHENNAI RADHA ENGINEERING WORKS (P)	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	416	416	0	0	0	0	0	0	0	443	443	0	3	3	0	0	0	0	0	0	862
COASTAL ENERGY PVT LTD.	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	97,742	97,742	0	0	0	0	0	0	0	0	0	0	2,500	2,500	0	0	0	0	0	0	0	0	0	1,00,242
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,000	35,000	0	5,48,184	5,48,184	0	0	0	5,83,184
	THERMAL COAL	0	0	0	0	3,078	3,078	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,078
CONCAST BENGAL INDUSTRIES LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000	11,000	0	0	0	0	0	0	11,000
CONCAST STEEL & POWER LTD.	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000	12,000	0	0	0	12,000
CORE MINERALS	IRON ORE	2,31,361	0	2,31,361	3,02,030	0	3,02,030	4,03,798	0	4,03,798	2,43,829	0	2,43,829	3,60,503	0	3,60,503	2,41,879	0	2,41,879	3,48,512	0	3,48,512	74,500	0	74,500	0	0	0	0	0	0	0	0	0	22,06,412
CORPORATE ISPAT ALLOYS LTD.	COKING COAL	0	5,250	5,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,250
	FERRO CHROME	4,425	0	4,425	1,574	0	1,574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,999
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	51,439	51,439	0	56,737	56,737	0	0	0	0	0	0	0	6,131	6,131	0	0	0	0	3,220	3,220	0	0	0	1,17,527
COSMIC FERRO ALLOYS LTD	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	21,537	21,537	0	26,469	26,469	0	13,000	13,000	0	9,625	9,625	0	3,716	3,716	0	0	0	0	3,900	3,900	0	0	0	78,247
CRACKERS INDIA(ALLOYS) LTD.	IRON ORE	0	0	0	47,100	0	47,100	45,129	0	45,129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92,229
DEEPAK FERT. & PETRO. COR. LTD	PROJECT MATERIAL	0	0	0	0	611	611	0	0	0	552	803	1,355	737	0	737	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,703
DEPAK STEEL & POWER LTD.	IRON ORE	0	0	0	20,972	0	20,972	32,769	0	32,769	1,23,197	0	1,23,197	1,29,662	0	1,29,662	1,98,122	0	1,98,122	3,64,757	0	3,64,757	69,000	0	69,000	0	0	0	0	0	0	0	0	0	9,38,479
DEVANSH EXPORTS	IRON ORE	0	0	0	0	0	0	93,860	0	93,860	30,282	0	30,282	21,500	0	21,500	3,750	0	3,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,49,392
DHARTI DREDGING AND INFRASTUCTURE LTD.	DRILLING MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	96	0	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	514	0	514	0	0	0	0	0	0	0	0	0	514
DHARTI DREDGING&CONST. LTD	DREAD MATERIALS	0	0	0	0	0	0	0	209	209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209
DIMENSION STEEL & ALLOYS PVT. LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,780	3,780	0	0	0	3,780
DR. SAROJINI PRADHAN	IRON ORE	0	0	0	26,110	0	26,110	8,000	0	8,000	1,35,037	0	1,35,037	17,000	0	17,000	58,255	0	58,255	50,400	0	50,400	51,870	0	51,870	0	0	0	0	0	0	0	0	0	3,46,672
DURGA EXPORTS	CHROME CONCENTR	2,200	0	2,200	38,888	0	38,888	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41,088
	CHROME ORE	0	0	0	1,275	0	1,275	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,275
	CONTAINER	0	0	0	0	0	0	42	0	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
DURGAPUR PROJECTS LTD.	COKING COAL	0	75,925	75,925	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75,925
ELECTRO STEEL CASTING LTD.	COKING COAL	0	35,637	35,637	0	21,444	21,444	27,027	52,105	79,132	7,645	0	7,645	0	29,386	29,386	0	34,140	34,140	45,183	89,180	1,34,363	12,240	26,530	38,770	83,207	1,01,910	1,85,117	7,000	18,640	25,640	0	0	0	5,91,274
	HARD COAL	0	0	0	0	0	0	0	0	0	0	0	0	29,386	0	29,386	0	0	0	0	0	0	0	0	0	9,430	0	9,430	0	0	0	0	0	0	38,816
	LAM COKE	0	0	0	0	0	0	0	0	0	0	11,418	11,418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,418
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,530	0	11,530	8,430	0	8,430	11,640	0	11,640	0	0	0	31,600
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105
ELECTROSTEEL INTEGRATED LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,883	11,883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,883
ELECTROSTEEL STEELS LIMITED	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19,311	19,311	19,311
	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60,901	60,901	9,322	1,21,414	1,30,736	0	1,49,251	1,49,251	0	1,32,622	1,32,622	4,73,510
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,315	56,315	56,315
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31,323	31,323	31,323
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,077	7,077	0	0	0	0	0	0	0	0	0	0	0	0	7,077
EMARS MINING & CONSTRUCTION PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	70,637	0	70,637	1,71,892	0	1,71,892	1,37,900	0	1,37,900	2,460	0	2,460	0	0	0	0	0	0	0	0	0	11,000	0	11,000	3,93,889
ENERGY TRADING CO (P) LTD	COKING COAL	0	1,12,494	1,12,494	0	9,240	9,240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,21,734
	IRON ORE	10,048	0	10,048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,048
	THERMAL COAL	0	14,104	14,104	0	9,500	9,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,604
ENNORE COKE LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	27,000	27,000	0	25,000	25,000	8,500	61,001	69,501	23,173	93,345	1,16,518	0	10,000	10,000	2,58,019
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	30,623	30,623	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,623
ESSAR BULK TERMINAL PARADIP LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	424	424	0	0	0	0	0	0	0	0	0	0	0	0	424
ESSAR POWER M.P. LTD	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,838	8,838	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,838
ESSAR PROJECTS (INDIA) LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	146	146	0	0	0	0	0	0	0	0	0	0	0	0	146
ESSAR STEEL INDIA LIMITED (PARADEEP)	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,157	32,000	40,157	0	0	0	40,157
	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,62,869	0	8,62,869	10,67,086	296	10,67,382	70,186	0	70,186	20,00,437
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,000	40,000	0	18,550	18,550	0	0	0	58,550
ESSAR STEEL LIMITED	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,036	20,036	0	0	0	0	0	0	0	0	0	20,036
	BENTONITE LUMPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	13,000	13,000	0	0	0	0	0	0	23,000
	IRON ORE	1,14,185	0	1,14,185	1,38,402	0	1,38,402	53,246	0	53,246	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,05,833
	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,661	4,661	42,912	0	42,912	0	0	0	0	0	0	47,573
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	0	0	0	0	0	0	0	0	10,000
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,009	2,009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,009

ESSAR STEEL ORISSA LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	4,996	4,996	0	0	0	0	531	531	0	1,416	1,416	0	194	194	0	0	0	0	0	0	0	0	0	7,137
	STEEL PIPES	0	0	0	0	0	0	0	0	0	0	0	0	0	41,732	41,732	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41,732
ESSEL MINING & INDUSTRIES LTD	IRON ORE	8,33,839	0	8,33,839	16,64,217	0	16,64,217	17,06,818	0	17,06,818	10,45,858	17,500	10,63,358	15,85,280	1,16,000	17,01,280	15,96,133	0	15,96,133	6,81,199	0	6,81,199	3,50,955	0	3,50,955	2,70,525	1,404	2,71,929	45,002	0	45,002	0	0	0	99,14,730
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	2,500	0	2,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,500
EXFIN INDIA MINERAL ORE P.LTD.	IRON ORE	78,030	0	78,030	12,971	0	12,971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91,001
EXFIN SHIPPING (INDIA) LIMITED	IRON ORE	1,58,576	0	1,58,576	22,093	0	22,093	13,558	0	13,558	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,94,227
F. SERAJUDDIN EXPORTS PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	32,914	0	32,914	0	0	0	1,36,750	0	1,36,750	1,30,300	0	1,30,300	20,900	0	20,900	0	0	0	0	0	0	0	0	0	3,20,864
FACOR POWER LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45,000	45,000	0	1,17,590	1,17,590	0	15,000	15,000	1,77,590
FAHMIDA INTERNATIONAL PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	33,400	0	33,400	36,998	0	36,998	56,330	0	56,330	0	0	0	0	0	0	0	0	0	0	0	0	1,26,728
FAIR DEAL SUPPLIES (P) LTD.	COKING COAL	0	0	0	0	0	0	0	23,902	23,902	0	87,023	87,023	5,000	27,500	32,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,43,425
	LAM COKE	0	0	0	0	0	0	0	0	0	0	16,098	16,098	0	39,295	39,295	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55,393
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000
FAIR DEAL SUPPLIES LTD.	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,072	10,072	0	0	0	0	0	0	0	0	0	0	0	0	10,072
FEEGRADE & CO. PVT. LTD.	IRON ORE	37,553	0	37,553	0	0	0	10,800	0	10,800	99,250	0	99,250	2,90,344	0	2,90,344	1,88,168	0	1,88,168	4,14,643	0	4,14,643	1,93,384	0	1,93,384	59,615	0	59,615	3,05,222	0	3,05,222	72,275	0	72,275	16,71,254
FERRO ALLOYS CORPORATION LTD.	CHROME CONCENTR	64,845	0	64,845	79,957	0	79,957	78,540	0	78,540	72,100	0	72,100	5,500	0	5,500	0	0	0	1,000	0	1,000	1,050	0	1,050	0	0	0	0	0	0	0	0	0	3,02,992
	CHROME ORE	43,153	0	43,153	36,450	0	36,450	43,800	0	43,800	19,800	0	19,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,43,203
	FERRO CHROME	0	0	0	0	0	0	0	0	0	0	0	0	4,010	0	4,010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,010
	LAM COKE	0	0	0	0	0	0	0	5,000	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	314	0	314	0	0	0	0	0	0	0	0	0	314
FLEMINGO DUTYFREE SHOP PVT.LTD	CONTAINER	0	0	0	0	0	0	0	0	0	0	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35
FORTUNE ASSOCIATES PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,950	0	86,950	0	0	0	86,950
FRIMEX FOODS	CONTAINER	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
FRONTLINE CORPORATION LTD	COKING COAL	0	0	0	0	30,000	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000
FROST INTERNATIONAL LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	0	0	0	0	0	0	0	0	10,000
FUEL SOURCES (INDIA) PRIVATE LIMITED.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	15,000	15,000
GAC SHIPPING (INDIA) PVT. LTD.	ED. OIL	0	0	0	0	0	0	0	1,457	1,457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,457
GALLANTT ISPAT LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	15,000	0	0	0	0	0	0	15,000
GANDHAR COALS & MINES	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38,052	38,052	0	0	0	0	0	0	0	22,312	22,312	60,364
GANDHAR OIL REFINERY INDIA LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50,539	50,539	50,539
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,000	33,000	0	0	0	33,000
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,27,047	1,27,047	0	81,945	81,945	0	51,350	51,350	2,60,342
GANGA ELECTROCAST LTD.	IRON ORE	0	0	0	21,200	0	21,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,200
GASCROM	DRILLING MATERIAL	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
GAYSON & COMPANY PVT. LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,050	4,050	0	0	0	0	0	0	0	0	0	0	0	0	4,050
GIMPEX LIMITED.	IRON ORE	1,34,149	0	1,34,149	88,280	0	88,280	1,05,202	0	1,05,202	70,250	0	70,250	2,20,187	0	2,20,187	5,40,886	0	5,40,886	2,74,223	0	2,74,223	2,26,003	0	2,26,003	44,164	0	44,164	86,500	0	86,500	54,078	0	54,078	18,43,922
	MILL SCALE	0	0	0	0	0	0	0	0	0	9,882	0	9,882	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,882
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,596	30,596	0	0	0	0	0	0	0	0	0	30,596
GITA RANI MOHANTY	IRON ORE	0	0	0	86,840	0	86,840	1,22,426	0	1,22,426	62,852	0	62,852	69,116	0	69,116	97,446	0	97,446	1,10,823	0	1,10,823	25,100	0	25,100	18,000	0	18,000	0	0	0	0	0	0	5,92,603
GITA SALES CORPORATION	IRON ORE	42,735	0	42,735	11,965	0	11,965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54,700
GLOBAL ASSOCIATES	IRON ORE	0	0	0	87,090	0	87,090	16,800	0	16,800	1,04,380	0	1,04,380	2,05,696	0	2,05,696	2,18,567	0	2,18,567	2,60,901	0	2,60,901	34,650	0	34,650	0	0	0	1,06,790	0	1,06,790	49,130	0	49,130	10,84,004
GLOBAL COAL & MINING (P) LTD.	THERMAL COAL	0	0	0	2,77,246	0	2,77,246	4,35,684	0	4,35,684	5,58,770	0	5,58,770	8,58,402	0	8,58,402	8,40,163	0	8,40,163	8,76,293	0	8,76,293	8,30,511	0	8,30,511	9,70,905	0	9,70,905	9,31,685	0	9,31,685	3,67,550	0	3,67,550	69,47,209
GLOBAL TRADING SOLUTIONS LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,000	0	14,000	27,500	0	27,500	0	0	0	0	0	0	41,500
GMR INDUSTRIES LTD	COKING COAL	0	25,066	25,066	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,066
	FERRO CHROME	1,998	0	1,998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,998
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,870	12,870	0	0	0	0	0	0	0	0	0	12,870
GMR KAMALANGA ENERGY LIMITED	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	24	0	0	0	0	0	0	24
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,494	17,494	0	80,386	80,386	0	7,171	7,171	0	140	140	0	0	0	1,05,191
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,10,000	1,10,000	0	0	0	1,10,000
GMR KAMALANGA ENERGY LTD. (COAL DIVISION)	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,64,301	1,64,301	1,64,301
GNG EXPORTS	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,600	0	30,600	0	0	0	0	0	0	0	0	0	0	0	0	30,600
GNG EXPORTS LTD.	IRON ORE	0	0	0	0	0	0	39,567	0	39,567	1,69,705	0	1,69,705	52,221	0	52,221	1,31,832	0	1,31,832	1,14,191	0	1,14,191	0	0	0	0	0	0	0	0	0	0	0	0	5,07,516
GOA CARBON LTD.	CALCINATED PETRO	0	0	0	0	0	0	10,185	0	10,185	38,980	25,450	64,430	30,555	0	30,555	30,072	0	30,072	10,185	0	10,185	30,870	0	30,870	5,185	0	5,185	10,185	0	10,185	0	0	0	1,91,667
	PETROLEUM COKE	0	6,078	6,078	0	0	0	0	20,660	20,660	0	1,60,176	1,60,176	0	1,67,842	1,67,842	0	1,35,057	1,35,057	0	95,894	95,894	0	1,51,593	1,51,593	0	1,17,993	1,17,993	0	1,47,460	1,47,460	0	69,650	69,650	10,72,403
GODAVARI COMMODITIES LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,88,770	1,88,770	0	0	0	0	22,365	22,365	2,11,135
GRAN OVERSEAS LTD	IRON ORE	22,902	0	22,902	20,516	0	20,516	9,925	0	9,925	66,375	0	66,375	96,980	0	96,980	2,30,384	0	2,30,384	42,684	0	42,684	10,000	0	10,000	0	0	0	0	0	0	0	0	0	4,99,766
GTS INDUSTRIES (P) LTD.	IRON ORE	0	0	0	0	0	0	48,848	0	48,848	99,400	0	99,400	30,979	0	30,979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,79,227
GUPTA COAL INDIA LIMITED	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,785	9,785	0	0	0	0	0	0	0	0	0	9,785
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51,121	51,121	0	56,956	56,956	0	0	0	0	0	0	1,08,077
H.L.TRADERS & SUPPLIERS P.LTD.	IRON ORE	22,000	0	22,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,000
HAMTEK TECHNOLOGIES INDIA PVT. LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	920	920	0	0	0	0	0	0	920
HIMADRI CHEMICALS & IND. LTD.	COAL TAR PITCH	0	9,612	9,612	0	0	0	0	2,049	2,049	461	0	461	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,122
HIND ENERGY AND COAL BENEFICATION (INDIA)	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51,963	51,963	0	0	0	0	0	0	51,963
HIND METALS & INDUSTRIES P.LTD	IRON ORE	0	0	0	20,050	0	20,050	70,330	0	70,330	49,545	0	49,545	15,699	0	15,699	31,700	0	31,700	98,949	0	98,949	40,225	0	40,225	0	0	0	0	0	0	0	0	0	3,26,498
HINDALCO INDUSTRIES LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	4,022	4,022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,022
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39,145	39,145	39,145
HINDUSTAN PETROLEUM CORP.	P O L	15,340	56,157	71,497	23,162	96,511	1,19,673	54,314	1,10,527	1,64,841	0	1,57,772	1,57,772	809	1,54,124	1,54,933	0	1,74,655	1,74,655	0	1,65,058	1,65,058	0	1,43,351	1,43,351	0	1,34,461	1,34,461	0	2,23,037	2,23,037	0	2,20,140	2,20,140	17,29,418
HYUNDAI HEAVY INDUSTRIES CO. LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35	0	0	0	0	0	0	35
IDCOL FERRO CHROME &ALLOYS LTD	CHROME CONCENTR	0	0	0	2,500	0	2,500	22,280	0	22,280	37,350	0	37,350	36,000	0	36,000	28,100	0	28,100	6,500	0	6,500	0	0	0	0	0	0	0	0	0	0	0	0	1,32,730
	CHROME ORE	0	0	0	5,000	0	5,000	8,000	0	8,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,000
IDCOL KALINGA IRON WORKS LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	21,174	21,174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,174
	HARD COKE	0	29,399	29,399	0	32,793	32,793	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62,192
	LAM COKE	0	0	0	0	0	0	0	46,520	46,520	0	62,541	62,541	0	30,788	30,788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,39,849
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	29,815	29,815	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,815
IMPEX FERRO TECH LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,500	20,500	0	0	0	0	5,400	5,400	0	12,600	12,600	0	11,435	11,435	0	0	0	49,935
IMPEX METAL&FERRO ALLOYS P LTD	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	15,117	15,117	0	10,641	10,641	0	6,598	6,598	0	0	0	0	0	0	0	0	0	0	3,842	3,842	0	0	0	36,198
	COKING COAL	0	0	0	0	0	0	0	0	0	0	3,200	3,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,200
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	49,867	49,867	0	15,000	15,000	0	6,000	6,000	0	5,400	5,400	0	9,130	9,130	0	7,200	7,200	0	0	0	92,597
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,300	3,300	3,300
IMPEX STEEL LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,600	1,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,600
IND AGRO SYNERGY LTD.	STEAM COAL	0	0	0	0	0	0	0	21,635	21,635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,635
	THERMAL COAL	0	0	0	0	1,00,046	1,00,046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,00,046
IND SYNERGY LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,029	21,029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,029
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	52,843	52,843	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52,843
IND-BARATH ENERGY (UTKAL) LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,122	1,122	0	0	0	0	0	0	0	0	0	0	0	0	1,122
INDIA COKE & POWER PVT LTD.	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,711	5,711	0	0	0	5,711
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,200	4,200	4,200
INDIAN CHARGE CHROME LTD.	ANTHRACITE COAL	0	0	0	0	0	0	0	10,100	10,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,100
	COKING COAL	0	20,350	20,350	0	5,000	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,350
	CONTAINER	0	0	0	2,994	0	2,994	2,000	0	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,994
	FERRO CHROME	69,859	0	69,859	62,026	0	62,026	37,907	0	37,907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,69,792
	HARD COKE	0	16,626	16,626	0	45,227	45,227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61,853
	LAM COKE	0	0	0	0	0	0	0	14,160	14,160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,160
INDIAN EXPLOSIVE LIMITED	AMMONIUM NITRA	0	33,477	33,477	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,477
INDIAN FARMERS FERTI. CO. LTD	AMMONIA	0	0	0	0	0	0	0	1,81,126	1,81,126	0	1,96,824	1,96,824	0	2,86,775	2,86,775	0	3,69,857	3,69,857	0	3,95,535	3,95,535	0	4,35,981	4,35,981	0	3,32,393	3,32,393	0	3,47,186	3,47,186	0	1,28,323	1,28,323	26,74,000
	CONTAINER	0	0	0	0	0	0	0	0	0	2,500	0	2,500	0	0	0	6,575	0	6,575	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,075
	MOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,600	2,600	0	1,30,420	1,30,420	0	97,857	97,857	2,30,877
	P.ACID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74,510	0	74,510	1,43,637	0	1,43,637	1,94,682	0	1,94,682	0	0	0	37,318	0	37,318	0	0	0	4,50,147
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	807	807	0	0	0	0	0	0	807
	ROCK PHOS	0	0	0	0	0	0	0	11,86,512	11,86,512	0	17,32,361	17,32,361	0	17,32,780	17,32,780	0	18,18,958	18,18,958	0	22,87,998	22,87,998	0	28,20,620	28,20,620	0	25,41,120	25,41,120	0	21,85,439	21,85,439	0	10,68,122	10,68,122	1,73,73,910
	SUL.ACID	0	0	0	0	0	0	0	2,53,855	2,53,855	0	2,79,505	2,79,505	0	3,51,909	3,51,909	0	3,26,086	3,26,086	0	3,13,451	3,13,451	0	4,67,827	4,67,827	0	6,60,632	6,60,632	0	5,38,201	5,38,201	0	1,15,049	1,15,049	33,06,515
	SULPHER	0	0	0	0	0	0	0	2,96,227	2,96,227	0	4,14,009	4,14,009	0	3,70,433	3,70,433	0	5,04,932	5,04,932	0	6,29,228	6,29,228	0	6,11,822	6,11,822	0	4,30,931	4,30,931	0	4,87,602	4,87,602	0	2,17,909	2,17,909	39,63,093
	UREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,157	14,157	0	0	0	14,157
INDIAN METALS FERRO ALLOYS LTD	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	23,849	23,849	0	12,976	12,976	0	19,797	19,797	0	18,819	18,819	0	31,718	31,718	0	22,038	22,038	0	32,389	32,389	0	13,200	13,200	1,74,786
	CONTAINER	0	0	0	0	0	0	0	0	0	6,745	0	6,745	7,500	0	7,500	0	0	0	0	0	0	0	0	0	2,799	0	2,799	2,920	0	2,920	1,953	0	1,953	21,917
	FERRO CHROME	0	0	0	0	0	0	33,239	0	33,239	82,186	0	82,186	57,253	0	57,253	56,024	0	56,024	86,830	0	86,830	87,160	0	87,160	77,047	0	77,047	80,000	0	80,000	23,995	0	23,995	5,83,734
	LAM COKE	0	0	0	0	0	0	0	30,042	30,042	0	65,775	65,775	0	33,613	33,613	0	9,056	9,056	0	69,567	69,567	0	20,577	20,577	0	36,756	36,756	0	3,266	3,266	0	0	0	2,68,652
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32,750	32,750	0	39,050	39,050	0	61,660	61,660	0	40,005	40,005	1,73,465
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	571	571	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	571
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,000	17,000	17,000
INDIAN OIL CORP. LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	305	305	0	0	0	0	0	0	0	0	0	305
	CWC PIPES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,47,889	1,47,889	1,454	0	1,454	0	0	0	0	0	0	0	0	0	1,49,343
	P O L	1,86,030	4,43,262	6,29,292	1,31,715	5,44,815	6,76,530	1,79,634	9,21,890	11,01,524	3,50,822	10,99,280	14,50,102	3,02,769	10,01,699	13,04,468	7,16,229	15,05,423	22,21,652	5,98,911	16,33,329	22,32,240	2,34,848	11,34,704	13,69,552	2,53,491	11,83,527	14,37,018	2,59,358	10,97,569	13,56,927	1,08,583	3,52,029	4,60,612	1,42,39,917
	PROJECT MATERIAL	0	0	0	0	1,346	1,346	0	0	0	138	191	329	101	24	125	0	0	0	0	178	178	418	4,828	5,246	0	9,757	9,757	0	0	0	0	0	0	16,981
INDIAN POTASH LIMITED	DI AMMONIUM PHO	0	0	0	0	0	0	0	0	0	0	7,394	7,394	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,394
	MURATE OF POTASH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47,434	47,434	0	20,000	20,000	0	0	0	0	0	0	0	0	0	67,434

	NITRO PHOSPHATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,501	22,501	0	0	0	0	0	0	0	0	0	22,501
	UREA	0	0	0	0	0	0	0	88,577	88,577	0	1,28,154	1,28,154	0	1,72,519	1,72,519	0	80,816	80,816	0	1,36,223	1,36,223	0	2,36,183	2,36,183	0	0	0	0	0	0	0	0	0	8,42,472
INDO GULF FERTILIZERS	UREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,41,703	1,41,703	0	1,07,521	1,07,521	0	50,756	50,756	2,99,980
INDRANI PATNAIK	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,49,055	0	2,49,055	0	0	0	0	0	0	0	0	0	0	0	0	2,49,055
INDSIL ENERGY ELECTRO CHEM LTD	HARD COKE	0	4,387	4,387	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,387
	LAM COKE	0	0	0	0	0	0	0	3,000	3,000	0	5,748	5,748	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,748
INDUSTRIAL DEVELOPMENT CORPN.	CHROME CONCENTR	0	0	0	5,000	0	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000
	CHROME ORE	20,500	0	20,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,500
INLAND POWER LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	611	611	0	0	0	611
INTERLINK PVT. LTD.	IRON ORE	0	0	0	0	0	0	2,000	0	2,000	78,266	0	78,266	23,663	0	23,663	75,078	0	75,078	72,129	0	72,129	51,112	0	51,112	6,000	0	6,000	0	0	0	0	0	0	3,08,248
INTERNATIONAL MINERALS .	CHROME CONCENTR	1,380	0	1,380	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,380
INTEROCEAN SHIPPING INDIA P LT	CONTAINER	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
IOCL A/C JINDAL SAW LTD.	STEEL PIPES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,924	10,924	0	0	0	0	0	0	0	0	0	10,924
IOCL PARADIP REFINERY PROJECT	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	247	22,639	22,886	80	4,250	4,330	0	1,396	1,396	0	0	0	28,612
IOCL PIPELINES DIVISION	P O L	0	0	0	0	0	0	0	0	0	0	0	0	0	15,75,842	15,75,842	0	89,81,607	89,81,607	0	1,01,87,721	1,01,87,721	0	1,32,95,471	1,32,95,471	0	1,46,33,783	1,46,33,783	0	1,58,68,933	1,58,68,933	0	65,31,602	65,31,602	7,10,74,959
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
IRANIAN OFFSHORE ENG.&CON.COM.	PROJECT MATERIAL	0	0	0	35,458	92	35,550	7,555	259	7,814	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43,364
ISHA ORES AND EXPORTS (P) LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,100	0	22,100	32,344	0	32,344	58,190	0	58,190	0	0	0	0	0	0	0	0	0	1,12,634
ISPAT DAMODAR LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,675	3,675	0	0	0	0	0	0	3,675
ISPAT INDUSTRIES LTD.	IRON ORE	62,566	0	62,566	0	0	0	41,622	0	41,622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,04,188
J.M.BAXI &CO.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	24	0	0	0	0	0	0	24
	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,968	0	2,968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,968
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	254	254	0	131	131	0	0	0	0	0	0	0	0	0	0	0	0	385
JAGUAR OVERSEAS LTD.	IRON ORE	0	0	0	0	0	0	12,132	0	12,132	1,09,898	0	1,09,898	31,334	0	31,334	27,084	0	27,084	48,400	0	48,400	0	0	0	0	0	0	0	0	0	0	0	0	2,28,848
JAGWANI PROJECTS (P) LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,43,500	0	1,43,500	35,536	0	35,536	1,79,036
JAI BALAJI INDUSTRIES LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000	30,000	0	71,125	71,125	0	0	0	1,01,125
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	24,500	24,500	0	9,200	9,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,700
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48,500	48,500	0	10,000	10,000	0	0	0	58,500
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	41,445	41,445	0	33,240	33,240	0	0	0	0	6,420	6,420	0	3,717	3,717	0	0	0	0	0	0	0	0	0	84,822
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	17,500	17,500	0	0	0	0	0	0	0	0	0	0	5,280	5,280	0	0	0	0	0	0	22,780
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58,202	58,202	0	0	0	0	0	0	0	0	0	58,202
	PIG IRON	0	0	0	0	0	0	0	0	0	0	0	0	4,902	0	4,902	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,902
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,341	7,341	0	0	0	0	0	0	0	75,951	75,951	0	0	0	0	0	0	83,292
JAI BALAJI JYOTI STEELS LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,000	16,000	0	0	0	0	0	0	0	0	0	0	3,000	3,000	0	0	0	19,000
JAIN INTERNATIONAL	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209	209	0	376	376	585
JINDAL STAINLESS LTD.	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	5,980	5,980	0	6,600	6,600	0	0	0	0	2,100	2,100	0	0	0	0	0	0	0	0	0	0	0	0	14,680
	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	99,462	99,462	0	0	0	0	0	0	0	0	0	0	0	0	0	2,06,510	2,06,510	0	75,900	75,900	3,81,872
	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,251	0	10,251	4,368	0	4,368	0	0	0	14,619
	FERRO CHROME	0	0	0	0	0	0	0	0	0	3,992	0	3,992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,992
	HARD COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55,000	55,000	55,000
	HARD COKE	0	6,594	6,594	0	8,250	8,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,844
	HOT BRIQUETTED IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	0	0	0	5,000
	LAM COKE	0	0	0	0	0	0	0	20,595	20,595	0	17,993	17,993	0	47,622	47,622	0	0	0	0	0	0	0	0	0	0	0	0	0	9,090	9,090	0	0	0	95,300
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	19,981	19,981	0	79,534	79,534	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99,515
	METROLOGICAL COK	0	0	0	0	0	0	0	4,002	4,002	0	29,579	29,579	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,581
JINDAL STAINLESS LTD.	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	1,06,604	1,06,604	0	0	0	0	0	0	0	1,60,276	1,60,276	0	1,56,302	1,56,302	0	0	0	0	0	0	4,23,182
	PETROLEUM COKE	0	0	0	0	11,000	11,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000
	PROJECT MATERIAL	0	1,084	1,084	0	0	0	0	2,991	2,991	0	0	0	0	784	784	0	1,807	1,807	0	984	984	0	582	582	0	0	0	0	19	19	0	0	0	8,251
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,67,079	4,67,079	0	4,90,746	4,90,746	0	2,14,726	2,14,726	11,72,551
JINDAL STEEL & POWER LTD.	ANTHRACITE COAL	0	0	0	0	0	0	0	10,499	10,499	0	10,675	10,675	0	0	0	0	0	0	0	0	0	0	0	0	0	74,177	74,177	0	1,85,163	1,85,163	0	28,569	28,569	3,09,083
	COKE BREEZE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,732	49,732	0	28,379	28,379	0	41,563	41,563	1,19,674
	COKING COAL	0	66,291	66,291	0	1,77,851	1,77,851	0	3,88,540	3,88,540	0	11,29,406	11,29,406	0	9,36,595	9,36,595	0	8,52,383	8,52,383	0	9,02,204	9,02,204	0	9,03,474	9,03,474	2,983	3,69,489	3,72,472	0	84,069	84,069	0	64,445	64,445	58,77,730
	HARD COAL	0	0	0	0	0	0	0	49,500	49,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,500
	HARD COKE	0	87,246	87,246	0	43,797	43,797	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,31,043
	HOT BRIQUETTED IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,39,258	3,39,258	0	3,24,772	3,24,772	0	1,82,609	1,82,609	0	0	0	8,46,639
	IRON ORE	11,47,876	0	11,47,876	15,09,397	0	15,09,397	14,19,304	0	14,19,304	7,67,021	0	7,67,021	7,94,510	0	7,94,510	6,93,463	0	6,93,463	8,42,066	0	8,42,066	2,24,700	0	2,24,700	51,080	0	51,080	0	0	0	0	0	0	74,49,417
	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31,500	0	31,500	0	0	0	0	0	0	1,62,341	0	1,62,341	0	0	0	1,93,841
	LAM COKE	0	0	0	0	0	0	0	98,656	98,656	0	77,000	77,000	0	0	0	0	0	0	0	0	0	0	19,921	19,921	0	25,027	25,027	0	0	0	0	0	0	2,20,604
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	2,17,845	2,17,845	0	1,49,879	1,49,879	0	75,056	75,056	0	71,498	71,498	0	1,52,517	1,52,517	0	3,19,642	3,19,642	0	4,17,522	4,17,522	0	3,34,430	3,34,430	17,38,389
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39,132	39,132	0	62,518	62,518	0	1,23,881	1,23,881	0	0	0	0	0	0	2,25,531
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,214	20,214	0	16,072	16,072	0	0	0	0	0	0	0	0	0	36,286
	METROLOGICAL COK	0	0	0	0	0	0	0	78,029	78,029	0	8,300	8,300	0	0	0	0	0	0	0	41,946	41,946	0	71,502	71,502	0	0	0	0	33,000	33,000	0	0	0	2,32,777
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,069	53,069	0	23,539	23,539	0	0	0	0	0	0	76,608
	PROJECT MATERIAL	0	0	0	0	0	0	0	1,023	1,023	0	1,116	1,116	0	820	820	0	1,940	1,940	0	0	0	0	214	214	0	1,056	1,056	0	0	0	0	0	0	6,169
	SILICA MOTAR	0	0	0	0	10,312	10,312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,312
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,07,500	1,07,500	0	0	0	0	0	0	1,07,500
	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,646	30,646	30,646
JSL LTD.	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,773	26,773	0	16,500	16,500	0	0	0	0	0	0	0	0	0	0	0	0	43,273
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52,831	52,831	0	53,100	53,100	0	0	0	0	0	0	0	0	0	0	0	0	1,05,931
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,030	16,030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,030
JSW ISPAT STEEL LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,16,751	0	1,16,751	0	0	0	0	0	0	1,16,751
JSW STEEL LIMITED, DOLVI WORKS	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,900	0	12,900	0	0	0	12,900
JSW STEEL LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,53,934	1,53,934	0	3,10,644	3,10,644	0	60,189	60,189	0	0	0	0	0	0	5,24,767
	HARD COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,094	35,094	0	0	0	0	0	0	35,094
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,500	0	22,500	0	0	0	0	0	0	0	0	0	22,500
KABRA BROTHERS	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,500	29,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,500
	LAM COKE	0	0	0	0	0	0	0	0	0	0	15,500	15,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,500
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,511	24,511	0	21,994	21,994	0	0	0	0	0	0	0	0	0	0	0	0	46,505
KALIKA CEMENT LIMITED.	CEMENT CLINKER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64,200	64,200	0	0	0	0	0	0	64,200
KALINGA ALLIED INDUSTRIES	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,23,750	0	1,23,750	5,92,057	0	5,92,057	0	0	0	7,15,807
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,000	29,000	0	0	0	0	0	0	29,000
KALINGA CALCINER LIMITED	PETROLEUM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,655	15,655	0	0	0	0	0	0	15,655
KAMALJEET SINGH AHLUWALIA	IRON ORE	29,497	0	29,497	69,333	0	69,333	82,400	0	82,400	82,008	0	82,008	1,16,451	0	1,16,451	91,595	0	91,595	63,500	0	63,500	27,500	0	27,500	0	0	0	0	0	0	0	0	0	5,62,284
KARMA ELECTROCAST PVT. LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48
KARNATAK POWER COR. LTD.	THERMAL COAL	13,01,944	0	13,01,944	14,38,627	0	14,38,627	14,87,829	0	14,87,829	11,87,010	0	11,87,010	12,94,623	0	12,94,623	1,14,451	0	1,14,451	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68,24,484
KASHVI POWER & STEEL PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,19,000	0	1,19,000	1,63,140	0	1,63,140	25,000	0	25,000	10,85,259	0	10,85,259	51,530	0	51,530	14,43,929
KELVIN TRUST CORPORATION LLC.	LAM COKE	0	0	0	0	0	0	0	0	0	0	14,000	14,000	0	3,974	3,974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,974
KHATAU NARBHERAM & CO.	IRON ORE	0	0	0	0	0	0	1,61,895	0	1,61,895	1,73,067	0	1,73,067	1,47,719	0	1,47,719	75,758	0	75,758	1,37,400	0	1,37,400	27,600	0	27,600	0	0	0	43,400	0	43,400	0	0	0	7,66,839
KIC METALIKS LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,92,585	2,92,585	10,000	52,304	62,304	0	0	0	0	0	0	0	14,707	14,707	0	0	0	3,69,596
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	10,000
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54,200	54,200	0	58,655	58,655	0	76,750	76,750	0	0	0	1,89,605
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,000	8,000	0	0	0	0	0	0	8,000
KJS CEMENT LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,000	4,000	4,000
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,500	7,500	7,500
KK RESOURCES PRIVATE LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60,550	0	60,550	1,39,945	0	1,39,945	1,84,483	0	1,84,483	0	0	0	0	0	0	20,500	0	20,500	4,05,478
KNOWLEDGE INFRASTRUCTURE SYSTEMS	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	0	0	0	0	0	0	5,000
KONARK MET COKE LTD	COKING COAL	0	4,07,059	4,07,059	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,07,059
KORP GEMS(INDIA) PVT.LTD.	IRON ORE	10,732	0	10,732	16,320	0	16,320	21,527	0	21,527	26,682	0	26,682	42,686	0	42,686	82,900	0	82,900	51,452	0	51,452	25,305	0	25,305	0	0	0	0	0	0	0	0	0	2,77,604
KPCL A/C KCT & BROS LTD.	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,30,840	0	3,30,840	18,58,962	0	18,58,962	7,61,541	0	7,61,541	29,51,343
KRISHNA COKE(INDIA) PVT LTD.	COKING COAL	0	0	0	0	20,000	20,000	0	0	0	0	9,000	9,000	0	33,000	33,000	0	36,000	36,000	0	48,106	48,106	0	0	0	0	11,000	11,000	0	0	0	0	0	0	1,57,106
KSK MAHANADI POWER COMPANY LIMITED	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	2
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,123	28,123	0	57,776	57,776	0	51,264	51,264	0	0	0	0	0	0	1,37,163
KTC FERRO ALLOYS PVT. LTD.	LAM COKE	0	0	0	0	0	0	0	0	0	0	9,954	9,954	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,954
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	13,086	13,086	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,086
KVK NILACHAL POWER PVT LTD	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,250	1,250	0	1,580	1,580	0	0	0	0	0	0	2,830
KYORI OREMIN LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59,750	59,750	0	0	0	0	0	0	59,750
LAFARGE INDIA PVT. LTD.	CEMENT CLINKER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,447	53,447	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,447
	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47,500	47,500	47,500
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,000	4,000	4,000
LALWANI FERRO ALLOYS LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,250	10,250	0	0	0	0	0	0	0	0	0	0	3,900	3,900	0	0	0	14,150
LANCO AMARKANTAK POWER PVT LTD	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	603	603	0	0	0	100	0	100	0	0	0	0	6,859	6,859	0	0	0	0	0	0	0	0	0	7,562
LANCO BABANDH POWER LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,136	40,136	0	17,029	17,029	0	0	0	0	0	0	57,165
LANCO INFRATECH LTD	PROJECT MATERIAL	0	0	0	0	0	0	0	1,832	1,832	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,832
LAXMI GRANITE INDIA PVT. LTD.	CONTAINER	42	0	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
LG MINERALS	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,214	0	86,214	60,306	0	60,306	25,000	0	25,000	89,800	0	89,800	1,24,600	0	1,24,600	0	0	0	3,85,920

LMJ INTERNATIONAL LTD.	IRON ORE	1,49,985	0	1,49,985	81,719	0	81,719	1,47,528	0	1,47,528	1,12,159	0	1,12,159	38,874	0	38,874	64,432	0	64,432	52,191	0	52,191	10,500	0	10,500	0	0	0	0	0	0	0	0	0	6,57,388
MAA DURGA RICE PRO & EXP P LTD	CONTAINER	0	0	0	44	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
MAA SAMALESWARI IRON & STEEL COMPANY PVT. LTD.	DOLOMITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38,500	38,500	0	0	0	38,500
	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,44,089	0	2,44,089	0	0	0	2,44,089
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69,122	69,122	0	54,400	54,400	0	0	0	1,23,522
MAHALAXMI & CO.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000	0	12,000	96,838	0	96,838	31,340	0	31,340	0	0	0	0	0	0	0	0	0	1,40,178
MAHANADI COAL FIELDS LTD.	THERMAL COAL	1,32,835	0	1,32,835	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,32,835
MAHARAJA MINERALS PVT. LTD.	CHROME CONCENTR	7,485	0	7,485	2,200	0	2,200	15,430	0	15,430	14,880	0	14,880	776	0	776	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,771
MAHAVIR CARBON LTD	COKING COAL	0	0	0	0	12,000	12,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000
	HARD COKE	0	2,900	2,900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,900
MAHESWARI BROTHERS	LAM COKE	0	0	0	0	0	0	0	0	0	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000
	NON-COKING COAL	0	0	0	0	0	0	0	25,465	25,465	0	0	0	0	71,252	71,252	0	2,08,646	2,08,646	0	0	0	0	0	0	0	29,433	29,433	0	0	0	0	0	0	3,34,796
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64,555	64,555	0	0	0	0	0	0	64,555
	THERMAL COAL	0	51,259	51,259	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51,259
MAHESWARI BROTHERS COAL LTD.	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,83,260	1,83,260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,83,260
MAHESWARI COAL SERVICES LTD	NON-COKING COAL	0	0	0	0	0	0	0	61,323	61,323	0	95,429	95,429	0	1,14,289	1,14,289	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,71,041
MAHESWARI COAL SERVICES LTD	STEAM COAL	0	0	0	0	0	0	0	52,400	52,400	0	54,309	54,309	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,06,709
	THERMAL COAL	0	0	0	0	1,32,465	1,32,465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,32,465
MAITHAN ISPAT LTD	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,100	23,100	23,100
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	26,085	26,085	0	0	0	0	15,900	15,900	0	0	0	0	0	0	0	0	0	0	0	0	41,985
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	60,694	60,694	0	53,000	53,000	0	30,000	30,000	0	0	0	0	32,500	32,500	0	32,000	32,000	0	0	0	0	0	0	2,08,194
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	1,118	1,118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,118
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,000	35,000	0	0	0	0	0	0	0	34,500	34,500	0	14,400	14,400	0	0	0	83,900
	THERMAL COAL	0	0	0	0	30,000	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000
MAITHON POWER LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,000	40,000	0	1,28,488	1,28,488	0	0	0	1,68,488
MAMMOET (INDIA) PVT LTD	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,809	2,809	2,649	0	2,649	0	0	0	0	0	0	5,458
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,993	5,993	6,213	0	6,213	0	0	0	0	0	0	12,206
MANGILAL RUNGTA	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	5,796	5,796	0	3,000	3,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,796
MARINE DREDGING PVT LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	520	520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	520
MARUTI CLEAN COAL AND POWER LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,073	2,073	0	282	282	0	0	0	2,355
MARUTI EXPORTS & ALLOYS	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	43	43
MATHER AND PLATT PUMPS LTD	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187	187	0	0	0	0	0	0	187
MAYAR INDIA LTD.	IRON ORE	29,284	0	29,284	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,284
MECHEL SOMANI CARBON PRIVATE LIMITED	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,500	5,500	0	0	0	0	0	0	5,500
MELCON [VIZAG] PVT. LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,780	3,780	0	0	0	3,780
MESCO STEELS LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,000	13,000	0	3,400	3,400	0	0	0	0	0	0	16,400
METROCHEM INDUSTRIES LTD.	IRON ORE	33,000	0	33,000	4,658	0	4,658	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37,658
MIDEAST INTEGRATED STEEL LTD.	CONTAINER	0	0	0	1,500	0	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,500
	HARD COKE	0	21,000	21,000	0	1,02,405	1,02,405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,23,405
	IRON ORE	0	0	0	0	0	0	0	0	0	84,145	0	84,145	2,85,054	0	2,85,054	1,27,980	0	1,27,980	1,02,472	0	1,02,472	38,800	0	38,800	0	0	0	0	0	0	0	0	0	6,38,451
	LAM COKE	0	0	0	0	0	0	0	1,41,744	1,41,744	0	1,41,164	1,41,164	0	64,165	64,165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,47,073
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	35,932	35,932	0	0	0	0	19,863	19,863	0	0	0	0	15,000	15,000	0	53,736	53,736	0	1,32,297	1,32,297	0	72,514	72,514	3,29,342
	PIG IRON	0	0	0	51,620	0	51,620	92,673	0	92,673	78,284	0	78,284	20,200	0	20,200	0	0	0	0	0	0	0	0	0	0	0	0	16,787	0	16,787	5,500	0	5,500	2,65,064
	PROJECT MATERIAL	0	0	0	0	0	0	0	137	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137
MILAN DEVELOPERS&BUILDERS	IRON ORE	0	0	0	0	0	0	45,912	0	45,912	48,072	0	48,072	43,217	0	43,217	25,640	0	25,640	1,09,800	0	1,09,800	5,500	0	5,500	9,500	0	9,500	79,750	0	79,750	0	0	0	3,67,391
MINCORE RESOURCES PRIVATE LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	1,02,802	0	1,02,802	74,213	0	74,213	24,060	0	24,060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,01,075
MINERAL METAL TRADING CO.LTD.	CHROME CONCENTR	0	0	0	0	0	0	0	0	0	0	0	0	5,500	0	5,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,500
	COKING COAL	0	0	0	0	1,03,940	1,03,940	0	46,956	46,956	0	0	0	0	60,634	60,634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,11,530
	ED. OIL	0	0	0	0	0	0	0	0	0	0	0	0	0	10,021	10,021	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,021
	G.SLAG	27,606	0	27,606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27,606
	IRON ORE	8,00,248	0	8,00,248	3,83,368	0	3,83,368	4,29,371	0	4,29,371	2,91,535	0	2,91,535	2,04,072	0	2,04,072	2,29,874	0	2,29,874	1,06,250	0	1,06,250	16,500	0	16,500	19,036	0	19,036	0	0	0	0	0	0	24,80,254
	MANGANESE ORE	53,290	0	53,290	4,700	0	4,700	30,000	0	30,000	10,000	0	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97,990
	PIG IRON	2,78,250	0	2,78,250	2,74,761	0	2,74,761	4,31,750	0	4,31,750	3,19,024	0	3,19,024	2,41,691	0	2,41,691	3,17,050	0	3,17,050	4,12,970	0	4,12,970	3,98,750	0	3,98,750	1,23,575	0	1,23,575	4,65,084	0	4,65,084	1,31,915	0	1,31,915	33,94,820
MINERAL METAL TRADING CO.LTD. (A/C NTPC)	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,41,223	3,41,223	0	7,734	7,734	0	0	0	0	0	0	0	0	0	0	0	0	3,48,957
MINERAL OVERSEAS PVT. LTD.	IRON ORE	0	0	0	0	0	0	60,730	0	60,730	97,569	0	97,569	32,300	0	32,300	1,43,800	0	1,43,800	98,900	0	98,900	1,01,900	0	1,01,900	0	0	0	4,400	0	4,400	0	0	0	5,39,599
MISHRILAL MINES PVT LTD.	CHROME CONCENTR	18,000	0	18,000	18,500	0	18,500	21,000	0	21,000	11,000	0	11,000	12,850	0	12,850	10,000	0	10,000	9,600	0	9,600	0	0	0	10,000	0	10,000	10,000	0	10,000	0	0	0	1,20,950
	CHROME ORE	47,227	0	47,227	47,500	0	47,500	29,900	0	29,900	62,086	0	62,086	36,000	0	36,000	51,000	0	51,000	34,500	0	34,500	0	0	0	10,000	0	10,000	15,000	0	15,000	0	0	0	3,33,213
	IRON ORE	71,910	0	71,910	70,547	0	70,547	53,122	0	53,122	33,000	0	33,000	30,000	0	30,000	28,866	0	28,866	20,000	0	20,000	51,700	0	51,700	0	0	0	0	0	0	0	0	0	3,59,145
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,470	10,470	0	0	0	10,470
MMTC LIMITED A/C COASTAL ENERGY PVT. LTD.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,34,061	3,34,061	0	16,02,621	16,02,621	0	0	0	19,36,682
MMTC LTD A/C KNOWLEDGE INFRASTRUCTURE	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,70,508	2,70,508	0	8,95,960	8,95,960	0	0	0	11,66,468
MMTC LTD. A/C ADANI ENTERPRISES LTD.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,56,852	8,56,852	0	2,26,554	2,26,554	0	0	0	10,83,406
MODERN INDIA CON-CAST LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	37,960	37,960	0	41,605	41,605	0	22,171	22,171	3,350	11,198	14,548	0	0	0	0	0	0	0	3,220	3,220	0	0	0	1,19,504
MODERN MINING PRIVATE LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,00,450	0	2,00,450	22,000	0	22,000	0	0	0	0	0	0	0	0	0	2,22,450
MONNET ISPAT & ENERGY LIMITED	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,500	5,500	5,500
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	8,300	8,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,300
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60,581	60,581	0	1,11,886	1,11,886	1,72,467
MONNET POWER COMPANY LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,988	13,988	0	7,414	7,414	0	0	0	21,402
MSP METALLICS LIMITED	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,550	5,550	0	0	0	5,550
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,728	53,728	0	12,100	12,100	0	0	0	65,828
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,250	8,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,250
MSP SPONGE IRON LIMITED	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,550	5,550	0	0	0	5,550
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,500	3,500	0	0	0	0	0	0	0	0	0	0	0	0	3,500
MSP STEEL & POWER LIMITED	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,800	3,800	0	0	0	3,800
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,250	8,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,250
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,800	3,800	0	20,000	20,000	0	0	0	0	0	0	23,800
MSPL LIMITED	IRON ORE	0	0	0	30,800	0	30,800	0	0	0	0	0	0	0	0	0	0	0	0	1,25,330	0	1,25,330	12,000	0	12,000	0	0	0	0	0	0	0	0	0	1,68,130
MULTIPLE RESOURCES	CHROME CONCENTR	0	0	0	0	0	0	920	0	920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	920
N.R. INTERNATIONAL	COKING COAL	0	13,400	13,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,400
	HARD COKE	0	0	0	0	12,100	12,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,100
	LAM COKE	0	0	0	0	0	0	0	0	0	0	2,500	2,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,500
	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	10,734	10,734	21,468	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,468
NABA BHARAT FERRO ALLOYS LTD	COKING COAL	0	0	0	0	7,351	7,351	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,351
	FERRO CHROME	11,983	0	11,983	5,900	0	5,900	2,600	0	2,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,483
	HARD COKE	0	5,250	5,250	0	7,154	7,154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,404
NAGREEKA EXPORTS LTD	IRON ORE	0	0	0	26,302	0	26,302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,302
NAMAKKAL TRANSPORT CARRIERS (P) LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	220	220	0	0	0	0	0	0	0	0	0	0	0	0	220
NARAYAN TRADING COMPANY.	IRON ORE	47,250	0	47,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47,250
NARBHERAM VISHRAM	IRON ORE	0	0	0	0	0	0	0	0	0	1,09,104	0	1,09,104	80,500	0	80,500	1,46,855	0	1,46,855	34,340	0	34,340	75,800	0	75,800	0	0	0	0	0	0	0	0	0	4,46,599
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000
NARSINGH ISPAT LIMITED	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	0	0	0	0	0	0	5,000
NATIONAL AGRICULTURAL CO-OP MARKETING	ED. OIL	0	0	0	0	0	0	0	0	0	0	0	0	0	18,007	18,007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,007
NATIONAL ALUMINIUM CO. LTD.	CONTAINER	31,231	0	31,231	39,457	0	39,457	29,470	0	29,470	40,050	801	40,851	23,854	0	23,854	27,559	0	27,559	20,770	0	20,770	31,790	0	31,790	62,528	99	62,627	29,878	0	29,878	7,508	0	7,508	3,44,995
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	1,15,450	1,15,450	0	1,62,089	1,62,089	0	0	0	0	0	0	0	0	0	0	1,33,351	1,33,351	0	1,09,203	1,09,203	0	0	0	5,20,093
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	237	237	0	1,271	1,271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,508
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,83,935	2,83,935	0	1,03,905	1,03,905	0	0	0	3,87,840
	THERMAL COAL	0	0	0	0	1,97,353	1,97,353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,97,353
NATIONAL ENTERPRISES	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	53,300	0	53,300	1,49,386	0	1,49,386	52,750	0	52,750	55,300	0	55,300	0	0	0	5,592	0	5,592	0	0	0	3,16,328
NATIONAL THERMAL POWER CORP.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,313	4,313	4,313
	THERMAL COAL	0	0	0	0	13,32,593	13,32,593	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,32,593
NAVA BHARAT VENTURES LTD	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	6,052	6,052	0	6,030	6,030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,082
	FERRO CHROME	0	0	0	0	0	0	0	0	0	11,981	0	11,981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,981
NAVA BHARAT VENTURES LTD	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	10,617	10,617	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,617
	METROLOGICAL COK	0	0	0	0	0	0	0	5,486	5,486	0	10,393	10,393	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,879
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27,000	27,000	0	0	0	0	0	0	27,000
NAVLAXMI ROCK & MINERAL P. LTD	CONTAINER	0	0	0	20	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
NAYAK	IRON ORE	30,584	0	30,584	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,584
NEELACHAL ISPAT NIGAM LTD.	COKING COAL	0	2,12,726	2,12,726	0	9,66,923	9,66,923	0	10,11,435	10,11,435	0	11,10,484	11,10,484	0	9,70,405	9,70,405	0	5,82,866	5,82,866	0	6,95,239	6,95,239	0	6,24,362	6,24,362	0	5,37,359	5,37,359	0	7,35,369	7,35,369	0	3,08,230	3,08,230	77,55,398
	HARD COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,87,302	1,87,302	0	0	0	0	0	0	1,87,302
	HARD COKE	0	77,402	77,402	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77,402
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	1,007	1,007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,007
NEEPAZ METALIKS LTD.	HARD COKE	0	0	0	0	26,227	26,227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,227
NEO METALIKS	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	22,434	22,434	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,434
NIKILA ENTERPRISES	IRON ORE	0	0	0	0	0	0	0	0	0	23,400	0	23,400	59,472	0	59,472	1,03,086	0	1,03,086	67,874	0	67,874	0	0	0	0	0	0	0	0	0	0	0	0	2,53,832
NILACHAL CARBO METALICKS P.LTD	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	0	11,000	11,000	0	43,998	43,998	0	0	0	0	0	0	59,998

	HARD COKE	0	0	0	0	10,416	10,416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,416
	LAM COKE	0	0	0	0	0	0	0	1,964	1,964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,964
	METALOGICAL COAL	0	0	0	0	0	0	0	10,000	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	5,500	5,500	0	0	0	0	0	0	0	0	0	15,500
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	0	0	0	0	0	0	5,000
NILACHAL IRON & POWER LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000	11,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000
NILKANTH FERRO LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,500	5,500	0	0	0	0	0	0	0	5,307	5,307	0	0	0	10,807
NOBLE RESOURCES & TR. IND PLTD	IRON ORE	0	0	0	0	0	0	61,225	0	61,225	60,510	0	60,510	1,46,664	0	1,46,664	3,81,986	0	3,81,986	1,17,451	0	1,17,451	53,235	0	53,235	27,400	0	27,400	0	0	0	0	0	0	8,48,471
NSIL EXPORTS LIMITED.	IRON ORE	2,04,318	0	2,04,318	1,57,405	0	1,57,405	28,839	0	28,839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,90,562
NSS TRADE (INDIA) PVT. LTD.	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,668	4,668	0	0	0	4,668
NTECL A/C CHETTINAD LOGISTICS PVT LTD.	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,85,841	0	8,85,841	9,02,244	0	9,02,244	17,88,085
NTECL A/C KCT & BROS. (CS) LTD.	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98,164	0	98,164	5,60,387	0	5,60,387	10,99,807	0	10,99,807	0	0	0	17,58,358
OCL INDIA LIMITED	CEMENT CLINKER	0	0	0	0	0	0	0	40,001	40,001	0	0	0	0	0	0	0	2,07,962	2,07,962	0	0	0	0	87,012	87,012	0	0	0	0	0	0	0	0	0	3,34,975
	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,750	10,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,750
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52,459	52,459	0	25,000	25,000	0	0	0	0	0	0	0	0	0	77,459
OIL & NATURAL GAS CORPN. LTD.	DRILLING MATERIAL	747	43	790	6,883	2,436	9,319	2,439	1,745	4,184	3,276	1,162	4,438	693	311	1,004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19,735
OLYMPIC OIL INDUSTRIES LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,500	49,500	0	0	0	0	0	0	0	0	0	49,500
OM SRI DURGA	COKING COAL	0	8,030	8,030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,030
OMAR & SONS	IRON ORE	0	0	0	0	0	0	0	0	0	21,211	0	21,211	59,575	0	59,575	36,500	0	36,500	9,311	0	9,311	0	0	0	0	0	0	0	0	0	0	0	0	1,26,597
OPG POWER GENERATION PVT. LTD.	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,17,669	0	2,17,669	1,60,619	0	1,60,619	2,40,567	0	2,40,567	1,64,234	0	1,64,234	7,83,089
ORECAST(INDIA)	IRON ORE	0	0	0	41,150	0	41,150	9,220	0	9,220	1,50,308	0	1,50,308	56,100	0	56,100	2,51,989	673	2,52,662	83,910	0	83,910	67,671	0	67,671	0	0	0	0	0	0	0	0	0	6,61,021
ORIND STEEL LIMITED	CHROME CONCENTR	900	0	900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	900
ORISSA CEMENT LIMITED	CEMENT CLINKER	0	0	0	0	0	0	0	0	0	0	0	0	0	43,983	43,983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43,983
	DEAD BURNT MAGN	0	0	0	0	0	0	0	1,204	1,204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,204
	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000	12,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000
ORISSA CEMENT LIMITED	IRON ORE	27,500	0	27,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27,500
ORISSA CHROME EXPORT&MINING CO	CHROME CONCENTR	26,892	0	26,892	14,050	0	14,050	33,250	0	33,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74,192
ORISSA COALFIELDS & W.LTD.	THERMAL COAL	67,070	0	67,070	66,014	0	66,014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,33,084
ORISSA MINERALS DEVELOPMENT CO	IRON ORE	0	0	0	1,03,334	0	1,03,334	53,650	0	53,650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,56,984
ORISSA MINING CORP. LTD.	CHROME CONCENTR	1,71,100	0	1,71,100	1,85,100	0	1,85,100	1,69,650	0	1,69,650	1,15,900	0	1,15,900	39,350	0	39,350	8,500	0	8,500	7,000	0	7,000	0	0	0	0	0	0	0	0	0	0	0	0	6,96,600
	CHROME ORE	1,63,686	0	1,63,686	1,51,300	0	1,51,300	2,04,000	0	2,04,000	87,850	0	87,850	0	0	0	28,500	0	28,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,35,336
	IRON ORE	5,00,469	0	5,00,469	3,05,622	0	3,05,622	3,73,961	0	3,73,961	1,56,268	0	1,56,268	2,00,045	0	2,00,045	1,85,750	0	1,85,750	59,000	0	59,000	2,34,691	0	2,34,691	0	0	0	0	0	0	0	0	0	20,15,806
ORISSA SPONGE IRON LTD.	THERMAL COAL	0	0	0	0	37,495	37,495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37,495
ORISSA STEVEDORES LTD.	CHROME CONCENTR	0	0	0	0	0	0	2,750	0	2,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,750
	IRON ORE	1,16,172	0	1,16,172	71,452	0	71,452	1,30,252	0	1,30,252	1,21,500	0	1,21,500	75,419	0	75,419	75,205	0	75,205	41,000	0	41,000	0	0	0	26,000	0	26,000	0	0	0	0	0	0	6,57,000
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	853	853	0	0	0	0	0	0	853
OSWAL A/C IFFCO	SULPHER	0	0	0	0	37,558	37,558	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37,558
OSWAL CHEMICAL& FERTILISER LTD	AMMONIA	0	1,78,175	1,78,175	0	59,004	59,004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,37,179
	ROCK PHOS	0	12,72,864	12,72,864	0	2,26,059	2,26,059	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,98,923
	SULPHER	0	3,70,380	3,70,380	0	65,138	65,138	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,35,518
PARADIP CARBON LTD.	CALCINATED PETRO	10,311	0	10,311	25,200	0	25,200	21,758	5,868	27,626	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63,137
	HARD COKE	0	11,000	11,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000
	PETROLEUM COKE	0	83,075	83,075	0	1,61,484	1,61,484	0	1,12,243	1,12,243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,56,802
PARADIP PHOSPHATES LTD.	AMMONIA	0	2,34,684	2,34,684	0	2,93,821	2,93,821	0	2,89,413	2,89,413	0	2,88,713	2,88,713	0	2,00,565	2,00,565	0	2,55,052	2,55,052	0	2,70,781	2,70,781	0	2,30,076	2,30,076	0	2,15,750	2,15,750	0	2,23,830	2,23,830	0	1,18,374	1,18,374	26,21,059
	MOP	0	73,353	73,353	0	1,60,491	1,60,491	0	1,75,613	1,75,613	0	1,78,588	1,78,588	0	3,10,023	3,10,023	0	1,57,722	1,57,722	0	2,27,251	2,27,251	0	1,00,838	1,00,838	0	91,500	91,500	0	77,006	77,006	0	36,846	36,846	15,89,231
	P.ACID	0	3,80,904	3,80,904	0	4,77,352	4,77,352	0	4,05,344	4,05,344	0	4,67,211	4,67,211	0	2,58,920	2,58,920	0	4,63,020	4,63,020	0	3,39,696	3,39,696	0	3,08,110	3,08,110	0	1,48,467	1,48,467	0	1,68,694	1,68,694	0	97,498	97,498	35,15,216
	PROJECT MATERIAL	0	0	0	0	426	426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	426
	ROCK PHOS	0	6,93,997	6,93,997	0	8,14,579	8,14,579	0	9,62,363	9,62,363	0	8,44,468	8,44,468	0	7,90,376	7,90,376	0	8,12,322	8,12,322	0	8,58,985	8,58,985	0	7,74,766	7,74,766	0	7,46,271	7,46,271	0	8,47,762	8,47,762	0	3,03,368	3,03,368	84,49,257
	SUL.ACID	0	19,698	19,698	0	98,567	98,567	0	1,79,726	1,79,726	0	1,85,749	1,85,749	0	1,19,938	1,19,938	0	1,32,675	1,32,675	0	2,37,870	2,37,870	0	1,35,510	1,35,510	0	2,05,020	2,05,020	0	2,00,598	2,00,598	0	1,00,491	1,00,491	16,15,842
	SULPHER	0	1,94,102	1,94,102	0	2,63,852	2,63,852	0	2,34,971	2,34,971	0	2,50,248	2,50,248	0	1,92,967	1,92,967	0	1,91,900	1,91,900	0	2,22,922	2,22,922	0	2,39,104	2,39,104	0	1,91,821	1,91,821	0	2,03,576	2,03,576	0	94,766	94,766	22,80,229
PATANAIK MINERALS P. LTD	IRON ORE	15,367	0	15,367	54,441	0	54,441	48,771	0	48,771	1,06,793	0	1,06,793	89,949	0	89,949	1,02,700	0	1,02,700	83,000	0	83,000	15,750	0	15,750	0	0	0	0	0	0	0	0	0	5,16,771
PEC LIMITED.	COKING COAL	0	8,944	8,944	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,944
	FERRO CHROME	248	0	248	500	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	748
	IRON ORE	76,366	0	76,366	73,586	0	73,586	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,49,952
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	98,214	98,214	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98,214
PHULCHAND EXPORTS LTD.	HARD COKE	0	400	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400
	IRON ORE	1,76,823	0	1,76,823	77,905	0	77,905	17,073	0	17,073	1,10,700	0	1,10,700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,82,501
PKS LIMITED	IRON ORE	0	0	0	51,631	0	51,631	1,01,579	0	1,01,579	1,02,867	0	1,02,867	59,428	0	59,428	22,000	0	22,000	12,850	0	12,850	0	0	0	0	0	0	0	0	0	0	0	0	3,50,355
PM EXPORTS	IRON ORE	0	0	0	25,312	0	25,312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,312
POONA DAL IMPORT&EXPORT P. LTD	IRON ORE	0	0	0	1,23,429	0	1,23,429	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,23,429
POWER GRID CORP. INDIA LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,556	1,556	0	3,255	3,255	0	0	0	4,811
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	502	502	0	0	0	0	0	0	0	0	0	502
PRADHAN INDUSTRIES (P) LTD	CHROME CONCENTR	15,184	0	15,184	10,112	0	10,112	945	0	945	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,241
PRAKASH INDUSTRIES LTD.	IRON ORE	0	0	0	0	0	0	44,447	0	44,447	6,711	0	6,711	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51,158
PRANAY AGENCIES PVT LTD.	IRON ORE	0	0	0	21,616	0	21,616	41,038	0	41,038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62,654
PRAXAIR INDIA PRIVATE LIMITED.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	139	0	0	0	0	0	0	0	0	0	139
PREMIER SEAFOOD LIMITED	CONTAINER	28	0	28	46	0	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74
PRESIDENCY EXPORT AND INDUSTRIES LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,532	17,532	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,532
PRESIDENCY EXPORTS & INDUSTRIES LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,532	0	17,532	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,532
PURBI BHARATI COAL PRODUCT PVT. LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	35,001	35,001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,001
PURVI BHARAT COAL PRODUCTS PVT. LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	57,000	57,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57,000
PURVI BHARAT STEELS LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	6,098	6,098	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,098
R PIYARELALL IRON & STEEL PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	1,09,146	0	1,09,146	57,360	0	57,360	72,165	0	72,165	33,480	0	33,480	0	0	0	0	0	0	0	0	0	0	0	0	2,72,151
R. PIYARELAL INTERTIONAL P.LTD	CEMENT CLINKER	0	0	0	0	0	0	0	5,590	5,590	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,590
	IRON ORE	88,169	0	88,169	1,52,070	0	1,52,070	2,16,259	0	2,16,259	1,17,722	0	1,17,722	74,348	0	74,348	88,438	0	88,438	29,400	0	29,400	0	0	0	0	0	0	0	0	0	0	0	0	7,66,406
R.K.M POWERGEN PVT. LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,127	2,127	0	0	0	0	0	0	2,127
RABIRUN VINIMAY (P) LTD.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,196	1,196	0	0	0	0	0	0	0	0	0	0	0	0	1,196
RAJESHWARI IRON STEEL CO. PVT. LTD.	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000	11,000	0	0	0	0	0	0	11,000
RAP MOOVERS PVT. LTD.	CONTAINER	0	0	0	0	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
RASHMI BULK SHIPPING LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	67	0	0	0	0	0	0	67
RASHMI CEMENT LIMITED	CEMENT CLINKER	0	0	0	0	0	0	0	6,728	6,728	0	0	0	0	0	0	0	25,139	25,139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31,867
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,675	3,675	0	8,054	8,054	0	0	0	11,729
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27,500	27,500	0	0	0	0	0	0	27,500
RASHMI METALIKS LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	35,000	35,000	0	0	0	0	0	0	0	25,091	25,091	0	0	0	0	0	0	0	0	0	0	0	0	60,091
	IRON ORE	0	0	0	0	0	0	0	0	0	2,81,107	0	2,81,107	3,03,077	0	3,03,077	2,56,569	0	2,56,569	1,13,770	0	1,13,770	1,11,500	0	1,11,500	0	0	0	0	0	0	0	0	0	10,66,023
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000	12,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,000
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,800	3,800	0	0	0	3,800
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	26,500	26,500	0	0	0	0	0	0	0	14,798	14,798	0	0	0	0	0	0	51,298
	PIG IRON	0	0	0	0	0	0	0	0	0	0	0	0	9,122	0	9,122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,122
RAWMET COMMODITIES PVT. LTD.	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,771	11,750	20,521	0	33,751	33,751	0	25,000	25,000	79,272
	CHROME CONCENTR	0	0	0	9,650	0	9,650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,650
	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	50,616	50,616	0	60,001	60,001	0	0	0	0	0	0	0	16,000	16,000	0	76,344	76,344	0	90,881	90,881	2,93,842
	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,090	0	3,090	0	0	0	0	0	0	3,090
	IRON ORE	69,565	0	69,565	69,473	0	69,473	16,300	0	16,300	1,77,267	0	1,77,267	1,08,148	0	1,08,148	1,20,204	0	1,20,204	32,100	0	32,100	0	0	0	5,500	0	5,500	0	0	0	0	0	0	5,98,557
	LAM COKE	0	0	0	0	0	0	0	11,914	11,914	0	34,376	34,376	0	23,725	23,725	0	26,388	26,388	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96,403
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,000	0	3,000	0	0	0	0	0	0	3,000
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	7,359	7,359	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,359
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	2,517	2,517	0	0	0	0	0	0	9,780	0	9,780	0	0	0	0	0	0	0	0	0	0	0	0	12,297
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,18,086	1,18,086	0	1,56,386	1,56,386	0	1,07,015	1,07,015	3,81,487
RAWMET FERROUS INDUST. (P) LTD	CHROME CONCENTR	0	0	0	0	0	0	18,856	0	18,856	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,856
	IRON ORE	0	0	0	0	0	0	31,500	0	31,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31,500
	LAM COKE	0	0	0	0	0	0	0	25,929	25,929	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,929
REKTOR MINES & MINERALS LTD	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,98,628	0	2,98,628	92,910	0	92,910	13,200	0	13,200	0	0	0	0	0	0	0	0	0	4,04,738
RELIANCE INDUSTRIES LTD.	COKING COAL	0	2,235	2,235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,235
	DRILLING MATERIAL	10,428	3,394	13,822	0	0	0	0	121	121	100	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,043
RESOURCES INTERNATIONAL P LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	24,462	0	24,462	7,150	0	7,150	66,295	0	66,295	1,75,705	0	1,75,705	40,000	0	40,000	0	0	0	0	0	0	0	0	0	3,13,612
RESURGERE MINES & MINERALS INDIA LIMITED	IRON ORE	0	0	0	0	0	0	13,927	0	13,927	1,00,401	0	1,00,401	30,000	0	30,000	10,000	0	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,54,328
ROCKSOL RESOURCES PRIVATE LIMITED	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21,562	21,562	21,562
ROHIT FERRO-TECH LTD	ANTHRACITE COAL	0	0	0	0	0	0	0	6,020	6,020	0	29,653	29,653	0	27,190	27,190	0	26,767	26,767	0	34,649	34,649	0	13,200	13,200	0	0	0	0	11,250	11,250	0	9,962	9,962	1,58,691
	CONTAINER	0	0	0	0	0	0	0	0	0	2,864	0	2,864	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,864
	FERRO CHROME	1,478	0	1,478	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,478
ROHIT FERRO-TECH LTD	G.SLAG	0	0	0	0	0	0	0	0	0	0	0	0	0	16,600	16,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,600
	HARD COKE	0	0	0	0	4,904	4,904	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,904
	LAM COKE	0	0	0	0	0	0	0	20,098	20,098	0	32,437	32,437	0	0	0	0	7,000	7,000	0	22,028	22,028	0	0	0	0	0	0	0	28,420	28,420	0	0	0	1,09,983
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	23,273	23,273	0	40,805	40,805	0	13,000	13,000	0	4,045	4,045	0	33,460	33,460	0	29,719	29,719	0	38,992	38,992	0	0	0	1,83,294
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	7,795	7,795	0	0	0	0	0	0	0	0	0	0	22,000	22,000	0	0	0	0	12,308	12,308	42,103

ROTOMAC EXPORTS PVT, LTD.	IRON ORE	0	0	0	3,539	0	3,539	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,539
ROTOMAC GLOBAL PVT. LTD.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52,793	52,793	0	0	0	0	0	0	0	0	0	52,793
ROURKELA MINERAL COMP PVT LTD.	IRON ORE	0	0	0	18,372	0	18,372	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,372
RUNGTA MINES LTD.	IRON ORE	14,73,461	0	14,73,461	19,60,606	0	19,60,606	16,06,673	0	16,06,673	13,72,142	0	13,72,142	16,62,950	0	16,62,950	20,59,883	0	20,59,883	5,86,414	0	5,86,414	6,75,140	0	6,75,140	1,35,437	0	1,35,437	3,02,000	0	3,02,000	65,000	0	65,000	1,18,99,706
	MANGANESE ORE	0	0	0	17,662	0	17,662	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,662
	OTHERS	1,400	1,400	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,800
RUNGTA SONS PVT. LTD.	IRON ORE	0	0	0	0	0	0	39,000	0	39,000	1,98,250	0	1,98,250	2,39,544	0	2,39,544	1,72,947	0	1,72,947	4,92,159	0	4,92,159	5,61,461	0	5,61,461	0	0	0	2,29,716	0	2,29,716	81,120	0	81,120	20,14,197
S. M. NIRYAT PRIVATE LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,47,231	0	4,47,231	8,85,727	0	8,85,727	67,485	0	67,485	14,00,443
S.K. SARAWAGI & CO. PVT. LTD.	IRON ORE	0	0	0	0	0	0	2,46,252	0	2,46,252	2,80,771	0	2,80,771	2,46,187	0	2,46,187	3,38,541	0	3,38,541	49,311	0	49,311	41,631	0	41,631	0	0	0	0	0	0	0	0	0	12,02,693
S.K. SARAWAGI CO. PVT. LTD.	IRON ORE	3,25,659	0	3,25,659	3,92,120	0	3,92,120	1,43,843	0	1,43,843	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,61,622
SAKTHI SHIPPING	SWEET SAND	0	0	0	0	0	0	0	0	0	0	0	0	5,521	0	5,521	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,521
SAKTI SUGAR LTD.	RAW SUGAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43,070	43,070	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43,070
SAL STEEL LIMITED	CHROME ORE	0	0	0	8,778	0	8,778	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,778
SARA INTERNATIONAL LTD	CHROME CONCENTR	0	0	0	0	0	0	2,750	0	2,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,750
	COKING COAL	0	0	0	0	0	0	0	0	0	0	10,000	10,000	0	0	0	0	19,792	19,792	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,792
	CONTAINER	0	0	0	0	0	0	0	0	0	674	0	674	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	674
	IRON ORE	92,400	0	92,400	1,70,352	0	1,70,352	1,07,557	0	1,07,557	2,98,020	0	2,98,020	1,64,029	0	1,64,029	2,41,999	0	2,41,999	1,29,165	0	1,29,165	31,180	0	31,180	0	0	0	0	0	0	0	0	0	12,34,702
	METALOGICAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,283	18,283	0	0	0	0	0	0	0	0	0	18,283
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	22,000	22,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,000
SARA/OSL	IRON ORE	40,300	0	40,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,300
SARAOGI UDYOG (P) LTD.	COKE BREEZE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,205	17,205	0	0	0	17,205
	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36,500	36,500	0	0	0	0	0	0	0	22,000	22,000	0	0	0	0	0	0	58,500
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	15,000	0	0	0	0	0	0	0	0	0	0	0	0	15,000
	METALOGICAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,800	9,800	0	0	0	0	0	0	0	0	0	9,800
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,716	35,716	0	21,903	21,903	0	0	0	0	0	0	57,619
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,541	53,541	0	0	0	0	0	0	0	39,837	39,837	93,378
SARDA ENERGY & MINERALS LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,410	5,410	0	0	0	0	0	0	0	0	0	0	0	0	5,410
SARVESH REFRACTORY (P) LTD	DEAD BURNT MAGN	0	0	0	0	0	0	0	702	702	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	702
SCAW INDUSTRIES PVT. LTD.	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,250	18,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,250
SEAMASTER SHIPPING L P LTD	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEAWAYS SHIPP. LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEAWAYS SHIPPING & LOGISTICS LIMITED	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,167	4,167	395	13,352	13,747	575	9,486	10,061	97	1,513	1,610	29,585
SENDOZ IMPEX LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,000	4,000	0	0	0	0	0	0	4,000
SEPCO ELECTRIC POWER CONSTRUCTION CORP.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	536	536	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	536
SEPCOIII ELECTRIC POWER CONSTRUCTION	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	46	0	46	0	0	0	0	838	838	0	15	15	0	32	32	0	0	0	0	0	0	931
SERAJUDDIN & CO. PVT. LTD.	IRON ORE	0	0	0	0	0	0	69,794	0	69,794	2,06,480	0	2,06,480	1,21,503	0	1,21,503	2,23,130	0	2,23,130	1,82,875	0	1,82,875	43,600	0	43,600	0	0	0	0	0	0	0	0	0	8,47,382
SESA GOA LTD.	IRON ORE	4,98,860	0	4,98,860	4,86,915	0	4,86,915	10,20,799	0	10,20,799	8,14,275	0	8,14,275	9,40,072	0	9,40,072	8,95,601	0	8,95,601	8,54,682	0	8,54,682	6,532	0	6,532	0	0	0	0	0	0	0	0	0	55,17,736
SESA INTERNATIONAL LTD.	STEEL BILLETS	0	2,688	2,688	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,688
SESA STERLITE LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,65,801	1,65,801	1,65,801
SEVEN HILLS OVERSEAS LTD.	CHROME CONCENTR	0	0	0	15,907	0	15,907	21,540	0	21,540	10,275	0	10,275	800	0	800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48,522
	IRON ORE	0	0	0	0	0	0	25,969	0	25,969	1,57,187	0	1,57,187	1,60,419	0	1,60,419	11,300	0	11,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,54,875
SHAH INC.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,211	9,211	0	0	0	0	0	0	0	0	0	0	0	0	9,211
SHAH SPONGE & POWER LTD.	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,500	3,500	0	0	0	0	0	0	3,500
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,410	11,410	0	0	0	0	0	0	11,410
SHARK MINES & MINERALS PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,63,761	0	1,63,761	0	0	0	1,63,761
SHARP FERRO ALLOYS LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	11,950	11,950	0	18,420	18,420	0	4,000	4,000	0	0	0	0	0	0	0	3,220	3,220	0	0	0	37,590
SHIVAM DHATU UDYOG PRIVATE LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,500	7,500	0	0	0	0	0	0	7,500
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,850	3,850	0	0	0	0	0	0	3,850
SHIVAM IRON & STEEL CO. LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,986	5,986	0	3,780	3,780	0	0	0	0	0	0	0	0	0	9,766
SHIVNATH RAI HARNARAIN (I) LTD	IRON ORE	8,500	0	8,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,500
SHREE DURGA IRON & STEEL CO. LTD.	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,139	30,139	30,139
SHREE GANESH INDUSTRY	CHROME CONCENTR	0	0	0	1,661	0	1,661	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,661
SHREE INDUSTRIES.	CHROME CONCENTR	1,200	0	1,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,200
SHREE RENUKA SUGARS LTD.	RAW SUGAR	0	0	0	0	0	0	0	0	0	0	0	0	61,597	78,795	1,40,392	23,691	80,386	1,04,077	14,129	0	14,129	0	0	0	6,108	6,108	12,216	0	0	0	0	0	0	2,70,814
SHRI GIRIJA SMELTERS LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000
SHRIRAM EPC LIMITED.	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,666	1,666	0	0	0	0	0	0	0	0	0	0	0	0	1,666
SHYAM DRI POWER LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,540	15,540	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,540
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38,111	38,111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38,111
SHYAM FERRO ALLOYS LTD.	MANGANESE ORE	0	0	0	0	0	0	0	36,218	36,218	0	52,400	52,400	0	76,170	76,170	0	60,801	60,801	0	29,592	29,592	0	18,153	18,153	0	0	0	0	24,934	24,934	0	21,600	21,600	3,19,868
SHYAM METALICS AND ENERGY LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,060	24,060	0	18,151	18,151	0	0	0	0	10,600	10,600	0	12,420	12,420	65,231
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,100	11,100	0	0	0	0	0	0	0	0	0	11,100
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,000	18,000	0	0	0	0	0	0	18,000
SHYAM SEL & POWER LTD	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,800	3,800	0	0	0	3,800
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,459	9,459	0	45,684	45,684	0	7,097	7,097	0	0	0	0	6,820	6,820	0	5,400	5,400	74,460
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,400	7,400	0	11,000	11,000	0	0	0	0	0	0	18,400
SHYAM SEL LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	73,793	73,793	0	33,336	33,336	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,07,129
SINGHANIA & SONS PVT. LTD.	IRON ORE	33,282	0	33,282	53,613	0	53,613	1,00,130	0	1,00,130	1,03,707	0	1,03,707	89,547	0	89,547	1,29,755	0	1,29,755	53,915	0	53,915	40,827	0	40,827	0	0	0	0	0	0	0	0	0	6,04,776
SINOSTEEL INDIA PVT. LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	623	0	623	0	0	0	0	0	0	0	0	0	623
	IRON ORE	0	0	0	0	0	0	11,520	0	11,520	39,510	0	39,510	35,600	0	35,600	27,843	0	27,843	1,34,237	0	1,34,237	0	0	0	0	0	0	11,000	0	11,000	0	0	0	2,59,710
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	14,400	14,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,400
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	39,108	39,108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39,108
SKS POWER GENERATION (CHHATTISGARH)	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	631	631	0	2,205	2,205	2,836
SKYLARK FISCAL SERVICES P LTD	IRON ORE	0	0	0	0	0	0	43,226	0	43,226	62,641	0	62,641	33,500	0	33,500	27,507	0	27,507	4,000	0	4,000	0	0	0	0	0	0	0	0	0	0	0	0	1,70,874
SOKEO POWER PRIVATE LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,147	1,147	0	810	810	0	0	0	1,957
SOVA ISPAT ALLOYS LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	34,630	34,630	0	21,413	21,413	0	0	0	0	3,850	3,850	0	0	0	0	0	0	0	0	0	0	0	0	59,893
SPS STEEL AND POWER LTD.	IRON ORE	0	0	0	0	0	0	30,000	0	30,000	1,52,849	0	1,52,849	12,595	0	12,595	25,000	0	25,000	6,200	0	6,200	0	0	0	0	0	0	0	0	0	0	0	0	2,26,644
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	24,844	24,844	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,844
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,200	16,200	0	0	0	0	0	0	0	0	0	0	0	0	16,200
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,500	16,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,500
	STEAM COAL	0	0	0	0	0	0	0	30,000	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000
	THERMAL COAL	0	0	0	0	1,06,409	1,06,409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,06,409
SREE METALIKS LTD	HARD COKE	0	0	0	0	15,240	15,240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,240
	THERMAL COAL	0	0	0	0	15,000	15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000
SRI GAYATRI MINERALS PVT. LTD.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,450	3,450	0	0	0	3,450
SRI LALITHA ENTERPRISES INDUSTRIES (P) LTD.	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,620	0	2,620	0	0	0	2,620
SRI VASVI INDUSTRIES LTD	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	6,001	6,001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,001
	CHROME ORE	0	0	0	0	0	0	0	0	0	0	16,988	16,988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,988
	COKING COAL	0	0	0	0	5,250	5,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,250
	FERRO CHROME	9,643	0	9,643	2,000	0	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,643
	HARD COKE	0	5,461	5,461	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,461
	LAM COKE	0	0	0	0	0	0	0	14,905	14,905	0	18,637	18,637	0	11,000	11,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44,542
SRINIVASA FERRO ALLOYS LTD	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,450	3,450	0	0	0	3,450
STAR OVERSEAS	IRON ORE	0	0	0	0	0	0	40,723	0	40,723	58,020	0	58,020	41,114	0	41,114	15,000	0	15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,54,857
STATE TRADING CORP.LTD	IRON ORE	0	0	0	40,779	0	40,779	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,779
STC INDIA LTD. (A/C NTPC)	NON-COKING COAL	0	0	0	0	0	0	0	11,73,040	11,73,040	0	13,75,203	13,75,203	0	24,31,450	24,31,450	0	10,11,209	10,11,209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59,90,902
	THERMAL COAL	0	0	0	0	2,89,747	2,89,747	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,89,747
STEEL AUTHORITY OF INDIA LTD.	COKING COAL	0	11,01,361	11,01,361	0	15,26,041	15,26,041	0	17,14,732	17,14,732	0	11,31,976	11,31,976	0	13,30,189	13,30,189	0	8,93,864	8,93,864	0	11,20,976	11,20,976	0	14,46,338	14,46,338	0	10,95,329	10,95,329	0	25,46,450	25,46,450	0	5,90,449	5,90,449	1,44,97,705
	HARD COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	53,072	53,072	0	0	0	0	0	0	0	0	0	0	34,219	34,219	0	1,45,347	1,45,347	0	25,639	25,639	2,58,277
	HARD COKE	0	64,715	64,715	0	21,073	21,073	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85,788
	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,06,256	0	1,06,256	0	0	0	0	0	0	1,06,256
	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,31,734	1,31,734	0	1,40,453	1,40,453	0	0	0	0	0	0	2,72,187
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	26,933	26,933	0	1,11,305	1,11,305	0	88,722	88,722	0	91,985	91,985	0	2,90,598	2,90,598	0	2,85,858	2,85,858	0	1,62,903	1,62,903	10,58,304
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,618	28,618	0	85,205	85,205	1,13,823
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	410	410	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	410
STEER OVERSEAS PVT. LTD.	IRON ORE	0	0	0	0	0	0	92,906	0	92,906	1,27,972	0	1,27,972	1,40,442	0	1,40,442	1,52,263	0	1,52,263	92,279	0	92,279	13,700	0	13,700	0	0	0	0	0	0	0	0	0	6,19,562
STEMCOR INDIA PRIVATE LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,13,414	2,13,414	0	1,02,738	1,02,738	0	0	0	3,16,152
	HARD COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19,800	19,800	0	0	0	0	0	0	19,800
STERLITE ENERGY LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	6,088	6,088	38	50,654	50,692	0	32,588	32,588	52	0	52	48	24	72	0	195	195	0	164	164	0	0	0	89,851
STORK FERRO AND MINERAL INDUSTRIES PVT.	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,500	5,500	0	0	0	0	0	0	0	0	0	5,500
SUDAMIN TRADING INDIA (P) LTD	CHROME CONCENTR	0	0	0	9,056	0	9,056	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,056
	IRON ORE	0	0	0	7,170	0	7,170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,170
SUNDARAM STEELS PVT. LTD.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,500	7,500	0	0	0	0	0	0	7,500
SUNFLAG IRON & STEEL CO. LTD.	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,582	6,582	6,582
SUPER SMELTERS LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,459	2,459	2,459
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,885	3,885	0	7,853	7,853	0	0	0	11,738

SURYA ALLOY INDUSTRIES LIMITED	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,276	4,276	0	0	0	0	0	0	0	0	0	0	0	0	4,276
SUSHANT MINERALS PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,434	0	33,434	3,01,160	0	3,01,160	77,200	0	77,200	0	0	0	0	0	0	0	0	0	4,11,794
SV POWER PRIVATE LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,500	7,500	0	0	0	0	0	0	0	0	0	7,500
SWARUP GROUP OF INDUSTRIES	IRON ORE	1,06,972	0	1,06,972	49,400	0	49,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,56,372
SWASTIK AGRO PRODUCT PVT. LTD	IRON ORE	0	0	0	24,082	0	24,082	0	0	0	0	0	0	0	0	0	53,514	0	53,514	82,835	0	82,835	33,730	0	33,730	0	0	0	0	0	0	0	0	0	1,94,161
SWASTIK MINERALS	CHROME CONCENTR	0	0	0	2,500	0	2,500	2,000	0	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,500
SWATI INTERNATIONAL	IRON ORE	42,931	0	42,931	30,205	0	30,205	6,800	0	6,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79,936
SWATI MINING PVT. LTD.	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,581	7,581	0	0	0	7,581
SYNERGY SHIPPING PVT LTD.	SWEET SAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,530	0	14,530	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,530
TAMIL NADU GENERATION AND DISTRIBUTION	THERMAL COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58,00,099	0	58,00,099	73,26,115	0	73,26,115	86,66,808	0	86,66,808	36,15,655	0	36,15,655	2,54,08,677
TAMILNADU ELECTRICITY BOARD	THERMAL COAL	85,44,519	0	85,44,519	72,55,180	0	72,55,180	83,80,740	0	83,80,740	87,74,658	0	87,74,658	79,70,755	0	79,70,755	75,76,587	0	75,76,587	67,03,961	0	67,03,961	11,53,261	0	11,53,261	0	0	0	0	0	0	0	0	0	5,63,59,661
TATA CHEMICALS LIMITED	OTHERS	4,276	0	4,276	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,276
TATA INTERNATIONAL LTD.	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,473	30,473	0	0	0	30,473
TATA IRON & STEEL COMPANY LTD.	CHROME CONCENTR	3,77,400	0	3,77,400	4,66,650	0	4,66,650	2,61,313	0	2,61,313	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,05,363
	CHROME ORE	1,69,715	0	1,69,715	1,73,950	0	1,73,950	86,656	0	86,656	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,30,321
	COKING COAL	0	9,17,120	9,17,120	0	7,45,213	7,45,213	0	3,38,258	3,38,258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,00,591
	FERRO CHROME	58,554	0	58,554	80,600	0	80,600	48,000	0	48,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,87,154
	FERRO MANGANESE	0	0	0	4,000	0	4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,000
	H.R. COILS	7,051	0	7,051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,051
	HARD COKE	0	46,561	46,561	0	57,802	57,802	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,04,363
	IRON ORE	97,612	0	97,612	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97,612
	LAM COKE	0	0	0	0	0	0	0	48,567	48,567	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48,567
	LIME AND LIMESTON	0	1,74,087	1,74,087	0	2,55,217	2,55,217	0	2,26,007	2,26,007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,55,311
	MANGANESE ORE	11,676	0	11,676	42,100	0	42,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,776
	METROLOGICAL COK	0	0	0	0	0	0	0	7,839	7,839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,839
	NON-COKING COAL	0	0	0	0	0	0	0	1,01,176	1,01,176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,01,176
	PETROLEUM COKE	0	0	0	0	40,832	40,832	0	1,35,106	1,35,106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,75,938
	STEEL PIPES	1,110	0	1,110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,110
	THERMAL COAL	0	23,952	23,952	0	80,258	80,258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,04,210
TATA METALIKS LTD.	COKING COAL	0	26,583	26,583	0	63,483	63,483	0	0	0	0	1,58,628	1,58,628	0	61,308	61,308	0	44,239	44,239	0	650	650	0	0	0	0	0	0	0	0	0	0	0	0	3,54,891
	HARD COAL	0	0	0	0	0	0	0	18,685	18,685	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,685
	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	17,175	17,175	0	80,918	80,918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98,093
	PIG IRON	0	0	0	0	0	0	0	0	0	0	0	0	25,578	0	25,578	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,578
TATA POWER COMPANY LTD.	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	34,911	34,911	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,911
TATA REFRACTORIES LTD.	DEAD BURNT MAGN	0	4,012	4,012	0	0	0	0	7,161	7,161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,173
TATA SPONGE IRON LIMITED	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,959	40,959	40,959
	NON-COKING COAL	0	0	0	0	0	0	0	53,350	53,350	0	96,794	96,794	0	1,02,234	1,02,234	0	1,02,579	1,02,579	0	2,12,102	2,12,102	0	1,81,277	1,81,277	0	0	0	0	0	0	0	0	0	7,48,336
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48,212	48,212	0	0	0	0	23,058	23,058	0	1,89,036	1,89,036	0	2,22,023	2,22,023	0	1,35,005	1,35,005	6,17,334
	THERMAL COAL	0	0	0	0	43,392	43,392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43,392
TATA STEEL LTD.	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	5,960	5,960	0	0	0	0	43,698	43,698	0	53,024	53,024	0	60,318	60,318	0	21,500	21,500	0	0	0	0	21,925	21,925	2,06,425
	C.R. COILS	0	0	0	0	0	0	0	0	0	0	0	0	3,301	0	3,301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,301
	CHROME CONCENTR	0	0	0	0	0	0	2,36,500	0	2,36,500	3,91,550	0	3,91,550	2,48,180	0	2,48,180	3,77,176	0	3,77,176	4,15,100	0	4,15,100	3,69,350	0	3,69,350	1,86,600	0	1,86,600	1,71,380	0	1,71,380	17,550	0	17,550	24,13,386
	CHROME ORE	0	0	0	0	0	0	13,300	0	13,300	0	0	0	0	0	0	3,774	0	3,774	0	0	0	0	0	0	5,000	0	5,000	0	0	0	0	0	0	22,074
	COKING COAL	0	0	0	0	0	0	0	2,21,900	2,21,900	0	4,03,563	4,03,563	0	11,24,609	11,24,609	0	9,47,863	9,47,863	59,470	11,99,743	12,59,213	46,116	3,13,029	3,59,145	0	2,49,053	2,49,053	0	4,30,272	4,30,272	25,100	3,91,269	4,16,369	54,11,987
	CONTAINER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,075	0	10,075	40,591	0	40,591	66,528	0	66,528	74,396	0	74,396	45,730	0	45,730	10,323	0	10,323	2,47,643
	FERRO CHROME	0	0	0	0	0	0	32,100	0	32,100	93,585	0	93,585	72,727	0	72,727	41,837	0	41,837	48,808	0	48,808	27,131	0	27,131	28,525	0	28,525	27,375	0	27,375	8,134	0	8,134	3,80,222
	H.R. COILS	0	0	0	0	0	0	8,757	0	8,757	0	0	0	60,710	0	60,710	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69,467
	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,30,930	1,30,930	1,30,930
	LAM COKE	0	0	0	0	0	0	0	16,787	16,787	0	1,01,543	1,01,543	0	57,965	57,965	0	63,000	63,000	0	70,556	70,556	0	11,000	11,000	0	79,605	79,605	0	27,500	27,500	0	0	0	4,27,956
	LIME AND LIMESTON	0	0	0	0	0	0	0	1,84,747	1,84,747	33,512	5,26,142	5,59,654	84,500	5,89,870	6,74,370	0	6,27,524	6,27,524	18,026	5,23,963	5,41,989	20,655	3,46,140	3,66,795	0	7,15,207	7,15,207	0	8,40,249	8,40,249	0	3,46,365	3,46,365	48,56,900
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96,084	96,084	22,641	2,18,397	2,41,038	0	63,814	63,814	0	1,10,402	1,10,402	0	35,359	35,359	5,46,697
	MANGANESE ORE	0	0	0	0	0	0	0	0	0	0	0	0	6,600	11,000	17,600	0	0	0	0	0	0	0	9,369	9,369	0	15,500	15,500	0	24,393	24,393	0	0	0	66,862
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	30,900	30,900	0	31,500	31,500	0	9,859	9,859	0	11,692	11,692	0	92,398	92,398	0	1,63,551	1,63,551	0	77,411	77,411	0	21,001	21,001	4,38,312
	NON-COKING COAL	0	0	0	0	0	0	0	77,370	77,370	0	3,42,267	3,42,267	0	3,44,575	3,44,575	0	4,72,320	4,72,320	0	21,853	21,853	0	0	0	0	0	0	0	0	0	0	0	0	12,58,385
	OLIFLUX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,03,866	1,03,866	0	1,13,922	1,13,922	0	13,000	13,000	2,30,788
	PETROLEUM COKE	0	0	0	0	0	0	0	92,136	92,136	0	3,05,294	3,05,294	0	67,619	67,619	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,65,049
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	184	184	0	1,675	1,675	0	0	0	0	0	0	0	0	0	0	9,384	9,384	0	0	0	11,243
	PYROXENITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69,500	69,500	0	1,19,017	1,19,017	0	3,21,680	3,21,680	0	98,565	98,565	6,08,762
	STEEL BILLETS	0	0	0	0	0	0	0	0	0	0	0	0	12,258	0	12,258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,258
	STEEL SLABS	0	0	0	0	0	0	0	0	0	0	0	0	26,620	0	26,620	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,620
TAURIAN IRON&STEEL CO.PLTD	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,500	23,500	0	0	0	0	0	0	23,500
	IRON ORE	39,171	0	39,171	1,32,754	0	1,32,754	5,44,745	0	5,44,745	6,07,485	0	6,07,485	6,63,832	0	6,63,832	7,44,462	0	7,44,462	7,02,874	0	7,02,874	2,20,289	0	2,20,289	5,500	0	5,500	5,500	0	5,500	0	0	0	36,66,612
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31,940	31,940	0	0	0	0	0	0	31,940
TCP LIMITED	THERMAL COAL	0	0	0	1,05,651	0	1,05,651	2,10,691	0	2,10,691	1,39,679	0	1,39,679	3,03,144	0	3,03,144	2,69,220	0	2,69,220	2,09,445	0	2,09,445	3,36,948	0	3,36,948	2,15,778	0	2,15,778	3,18,011	0	3,18,011	76,265	0	76,265	21,84,832
THAKUR PRASAD SAO & SONS PVT. LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	1,96,731	0	1,96,731	1,68,270	0	1,68,270	49,560	0	49,560	94,984	0	94,984	1,05,628	0	1,05,628	0	0	0	0	0	0	0	0	0	6,15,173
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,000	16,000	0	0	0	0	0	0	16,000
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,308	3,308	0	0	0	3,308
THE ASSOCIATED CEMENT COMP LTD	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,700	49,700	0	0	0	0	1,98,309	1,98,309	0	1,59,335	1,59,335	4,07,344
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	51,011	51,011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51,011
THE LIBERTY MARINE SYNDICATE PVT. LTD.	IRON ORE	0	0	0	0	0	0	18,784	0	18,784	1,70,123	0	1,70,123	85,390	0	85,390	2,28,170	0	2,28,170	2,75,287	0	2,75,287	62,583	0	62,583	73,940	0	73,940	3,17,017	0	3,17,017	0	0	0	12,31,294
THE STATE TRADING CORPORATION OF INDIA	IRON ORE	0	0	0	0	0	0	0	0	0	57,000	0	57,000	0	0	0	68,000	0	68,000	11,500	0	11,500	0	0	0	0	0	0	0	0	0	0	0	0	1,36,500
THE STC OF INDIA LTD. A/C TOP INFRASTRUCTURE	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,550	33,550	0	0	0	0	0	0	0	0	0	33,550
TIFFANY CONSULTING PVT LTD.	IRON ORE	13,200	0	13,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,200
TIRUMALA BALAJI ALLOYS PVT. LTD.	LAM COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,500	1,500	0	0	0	1,500
TM INTERNATIONAL LOGISTICS LTD	COKING COAL	0	31,753	31,753	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31,753
	LIME AND LIMESTON	0	26,278	26,278	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,278
TOP INFRASTRUCTURE PRIVATE LIMITED (A/C	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,01,825	1,01,825	0	10,70,625	10,70,625	0	0	0	0	0	0	0	0	0	11,72,450
TPROY CHOWDHURY & CO(P)LTD	IRON ORE	79,344	0	79,344	55,950	0	55,950	53,142	0	53,142	24,000	0	24,000	27,623	0	27,623	9,053	0	9,053	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,49,112
TRIUNE IMPEX	IRON ORE	0	0	0	0	0	0	23,000	0	23,000	16,000	0	16,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39,000
TRN ENERGY LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,247	1,247	0	7,234	7,234	0	205	205	8,686
TUF METALLURGICAL PVT. LIMITED	IRON PALLETS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,000	0	35,000	35,000
TULIP MINES (P) LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	71,380	0	71,380	22,000	0	22,000	2,500	0	2,500	0	0	0	0	0	0	0	0	0	0	0	0	95,880
ULTRATECH CEMENT LIMITED	CEMENT CLINKER	0	0	0	0	0	0	0	68,370	68,370	0	32,430	32,430	0	44,111	44,111	0	60,460	60,460	0	0	0	0	43,175	43,175	0	94,682	94,682	0	79,790	79,790	0	0	0	4,23,018
	GYPSUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97,400	97,400	0	33,150	33,150	0	1,16,500	1,16,500	0	15,500	15,500	2,62,550
USHA MARTIN LIMITED	ANTHRACITE COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,300	10,300	10,300
	COKING COAL	0	81,872	81,872	0	0	0	0	0	0	0	0	0	0	0	0	0	1,55,100	1,55,100	0	1,10,734	1,10,734	0	0	0	0	1,04,050	1,04,050	0	95,632	95,632	0	90,901	90,901	6,38,289
	H.R. COILS	0	0	0	1,137	0	1,137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,137
	LAM COKE	0	0	0	0	0	0	0	0	0	0	34,183	34,183	0	40,737	40,737	0	15,000	15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89,920
	LIME AND LIMESTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,450	53,450	0	51,746	51,746	0	1,49,535	1,49,535	0	1,52,329	1,52,329	0	1,03,615	1,03,615	5,10,675
	LOW ASH PCI COAL.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,999	10,999	0	0	0	0	52,102	52,102	63,101
	METROLOGICAL COK	0	0	0	0	0	0	0	0	0	0	15,000	15,000	0	0	0	0	25,000	25,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,000
	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55,000	55,000	0	0	0	0	0	0	55,000
	PROJECT MATERIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	0	97	0	0	0	0	0	0	97
	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000
	THERMAL COAL	0	0	0	0	23,446	23,446	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,446
UTKAL ALLOYS PVT.LTD.	THERMAL COAL	0	81,205	81,205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81,205
UTKAL STEELS LTD.	IRON ORE	1,78,627	0	1,78,627	63,414	0	63,414	81,856	0	81,856	27,510	0	27,510	78,090	0	78,090	29,850	0	29,850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,59,347
	THERMAL COAL	0	41,415	41,415	0	51,863	51,863	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93,278
UTTAM GALVA METALLICS LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,500	14,500	0	0	0	0	0	0	0	0	0	14,500
VANTAMURI TRADING & INVESTMENTS LIMITED	STEAM COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,450	29,752	39,202	15,470	3,909	19,379	0	26,090	26,090	84,671
VAROMET TRADING PVT. LTD.	CHROME CONCENTR	0	0	0	7,300	0	7,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,300
	IRON ORE	0	0	0	28,412	0	28,412	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,412
VEDANTA ALUMINA LIMITED	PROJECT MATERIAL	0	0	0	0	0	0	0	61,620	61,620	0	1,79,806	1,79,806	13	66,260	66,273	0	13,212	13,212	0	0	0	0	948	948	0	606	606	0	1	1	0	0	0	3,22,466
VENKATESWARA TRADERS	SWEET SAND	0	0	0	0	0	0	0	0	0	0	0	0	5,650	0	5,650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,650
VIKASH METAL & POWER LIMITED	ANTHRACITE COAL	0	0	0	0	0	0	0	6,068	6,068	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,068
VINAYAK IRON & COKE PVT. LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000	11,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000
VISA COKE LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66,000	66,000	0	0	0	66,000
VISA COMTRADE LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,812	23,812	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,812
VISA RESOURCES INDIA LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29,600	29,600	0	0	0	0	0	0	29,600
VISA STEEL LIMITED	CHROME CONCENTR	36,850	0	36,850	24,762	0	24,762	14,707	0	14,707	6,659	0	6,659	6,000	0	6,000	0	0	0	5,600	0	5,600	0	0	0	0	0	0	0	0	0	0	0	0	94,578
	COKING COAL	0	36,080	36,080	0	0	0	0	1,63,584	1,63,584	0	3,68,176	3,68,176	0	3,85,182	3,85,182	0	5,45,322	5,45,322	0	4,15,313	4,15,313	0	3,06,181	3,06,181	0	2,46,745	2,46,745	0	0	0	0	0	0	24,66,583
	FERRO CHROME	0	0	0	0	0	0	0	0	0	0	0	0	3,070	0	3,070	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,070
	HARD COKE	0	20,961	20,961	0	1,03,051	1,03,051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,24,012
	IRON ORE	59,851	0	59,851	63,570	0	63,570	79,907	0	79,907	13,369	0	13,369	5,000	0	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,400	15,400	2,37,097
	LAM COKE	0	0	0	0	0	0	0	1,35,795	1,35,795	0	45,497	45,497	0	2,616	2,616	0	0	0	0	0	0	0	0	0	0	0	0	0	11,550	11,550	0	8,798	8,798	2,04,256

	METROLOGICAL COK	0	0	0	0	0	0	0	31,292	31,292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,805	17,805	0	16,540	16,540	65,637
	NON-COKING COAL	0	0	0	0	0	0	0	10,300	10,300	0	0	0	0	69,226	69,226	0	53,223	53,223	0	54,300	54,300	0	0	0	0	14,400	14,400	0	33,000	33,000	0	11,000	11,000	2,45,449
	PIG IRON	0	0	0	0	0	0	53,150	0	53,150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53,150
	PROJECT MATERIAL	0	0	0	0	6,309	6,309	0	0	0	0	486	486	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,795
	STEAM COAL	0	0	0	0	0	0	0	21,937	21,937	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,465	14,465	0	41,700	41,700	0	1,33,889	1,33,889	2,11,991
	THERMAL COAL	0	0	0	0	75,417	75,417	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75,417
VISA SUNCOKE LIMITED	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,67,337	4,67,337	0	1,55,618	1,55,618	6,22,955
VYOM TRADELINK PRIVATE LIMITED	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,44,911	3,44,911	0	82,813	82,813	0	0	0	0	0	0	0	0	0	0	0	0	4,27,724
VYOM TRADELINK PRIVATE LIMITED A/C NALCO	NON-COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,14,486	4,14,486	0	0	0	0	0	0	0	0	0	4,14,486
WELLMAN CARBO METALICKS (INDIA) LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000	20,000	0	0	0	0	21,701	21,701	0	0	0	0	0	0	0	0	0	41,701
WELLMAN COKE (INDIA) LTD.	COKING COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,917	56,917	0	5,000	5,000	0	0	0	0	0	0	0	0	0	0	0	0	61,917
WELLMAN COKE INDIA LTD.	COKING COAL	0	0	0	0	0	0	0	27,500	27,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27,500
WESTBENGAL ESSENTIAL COM SCLTD	IRON ORE	2,41,392	0	2,41,392	75,009	0	75,009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,16,401
Y MAHABALESWARAPPA & SONS	IRON ORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,200	0	11,200	0	0	0	0	0	0	11,200
YAZDANI INTERNATIONAL (P) LTD.	IRON ORE	0	0	0	0	0	0	0	0	0	46,200	0	46,200	2,51,350	0	2,51,350	2,74,633	0	2,74,633	2,75,055	0	2,75,055	81,900	0	81,900	0	0	0	59,000	0	59,000	20,500	0	20,500	10,08,638
ZENITH ALLOYS	IRON ORE	0	0	0	0	0	0	0	0	0	5,000	0	5,000	3,545	0	3,545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,545
ZENITH CARBON PRIVATE LIMITED	CALCINATED PETRO	0	0	0	0	0	0	0	5,500	5,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,500
	PETROLEUM COKE	0	0	0	0	0	0	0	0	0	0	5,250	5,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,250
ZENITH MINING PVT. LTD.	IRON ORE	50,697	0	50,697	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50,697
ZUARI AGRO CHEMICALS LIMITED	P.ACID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,704	20,704	0	10,285	10,285	0	0	0	30,989
Total		2,16,65,818	84,37,841	3,01,03,659	2,16,85,244	1,14,23,519	3,31,08,763	2,48,54,476	1,36,53,496	3,85,07,972	2,55,82,946	1,68,37,475	4,24,20,421	2,65,21,887	1,98,83,710	4,64,05,597	2,78,35,027	2,91,73,399	5,70,08,426	2,47,21,562	3,12,20,311	5,59,41,873	1,81,90,183	3,59,87,872	5,41,78,055	1,73,62,908	3,91,13,080	5,64,75,988	2,72,77,070	4,06,72,035	6,79,49,105	92,65,603	1,81,94,747	2,74,60,350	50,95,60,209

Annexure – 11

Land Details of Pankapal Village

ANNEXURE -11

WAPCOS LTD. BHUBANESWAR

TERMINAL SITE, NW-5

LAND RECORD OF VILLAGE-PANKAPAL

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
1	130	223	0.41	Bush/Creeper Jungle
2	131	226	0.28	Vill. Forest
3	132	226	0.31	Vill. Forest
4	133	226	0.29	Vill. Forest
5	134	223	0.56	Bush/Creeper Jungle
6	134/1172	113	0.26	Early Paddy Land
7	135	223	0.59	Bush/Creeper Jungle
8	136	223	0.62	Bush/Creeper Jungle
9	137	226	0.59	Vill. Forest
10	138	226	0.25	Vill. Forest
11	139	226	0.57	Vill. Forest
12	140	6	0.38	Early Paddy Land
13	140/1171	223	0.06	Bush/Creeper Jungle
14	172	223	0.17	Bush/Creeper Jungle
15	173	226	1.04	Vill. Forest
16	174	223	0.08	Bush/Creeper Jungle
17	175	223	0.12	Bush/Creeper Jungle
18	176	223	0.14	Bush/Creeper Jungle
19	177	223	0.15	Bush/Creeper Jungle
20	178	66	0.15	Early Paddy Land
21	179	223	0.1	Bush/Creeper Jungle
22	180	223	0.12	Bush/Creeper Jungle
23	181	223	0.08	Bush/Creeper Jungle
24	182	223	0.12	Bush/Creeper Jungle
25	183	223	0.06	Bush/Creeper Jungle
26	184	223	0.06	Bush/Creeper Jungle
27	185	223	0.05	Bush/Creeper Jungle
28	186	223	0.06	Bush/Creeper Jungle
29	187	223	0.11	Bush/Creeper Jungle
30	188	223	0.25	Bush/Creeper Jungle
31	189	223	0.07	Bush/Creeper Jungle
32	190	223	0.24	Bush/Creeper Jungle
33	191	66	0.16	Early Paddy Land
34	191/	16	0.06	Early Paddy Land
35	192	223	0.08	Bush/Creeper Jungle
36	193	223	0.08	Bush/Creeper Jungle
37	194	223	0.25	Bush/Creeper Jungle
38	195	223	0.05	Bush/Creeper Jungle
39	196	223	0.13	Bush/Creeper Jungle
40	197	223	0.09	Bush/Creeper Jungle
41	198	223	0.07	Bush/Creeper Jungle
42	199	226	0.09	Vill. Forest
43	200	224	13.25	River
44	201	223	0.27	Bush/Creeper Jungle
45	202	226	0.14	Vill. Forest
46	203	226	0.19	Vill. Forest
47	204	226	0.33	Vill. Forest
48	205	225	0.4	Road
49	206	227	0.4	Road

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
50	207	117	0.36	Early Paddy Land
51	208	51	0.07	Early Paddy Land
52	209	215	0.07	Early Paddy Land
53	210	207	0.21	Early Paddy Land
54	211	215	0.12	Early Paddy Land
55	212	227	0.16	Road
56	213	226	0.36	Vill. Forest
57	214	226	0.47	Vill. Forest
58	215	226	0.06	Vill. Forest
59	216	226	1.14	Vill. Forest
60	217	223	0.41	Mango Orchard
61	218	223	0.08	Mango Orchard
62	219	223	0.26	Orchard One
63	220	223	0.21	Mango Orchard
64	221	215/6	0.06	Early Paddy Land
65	222	176	0.05	Early Paddy Land
66	223	222	0.12	Early Paddy Land
67	224	119	0.09	Early Paddy Land
68	225	26	0.08	Early Paddy Land
69	226	164	0.08	"pala"
70	227	51	0.05	Early Paddy Land
71	228	215	0.05	Early Paddy Land
72	229	110	0.08	Early Paddy Land
73	230	106	0.08	Early Paddy Land
74	231	9	0.11	Early Paddy Land
75	232	57	0.06	Early Paddy Land
76	233	37	0.07	Early Paddy Land
77	234	88	0.05	Early Paddy Land
78	235	22	0.1	Early Paddy Land
79	236	127	0.1	Early Paddy Land
80	237	21	0.12	Fallow Land
81	238	8	0.1	Fallow Land
82	239	203	0.09	Fallow Land
83	240	34	0.02	Fallow Land
84	241	223	0.48	Mango Orchard
85	242	212	0.1	Fallow Land
86	243	110	0.09	Fallow Land
87	244	143	0.13	Fallow Land
88	245	8	0.12	Fallow Land
89	246	57	0.08	Fallow Land
90	247	37	0.08	Fallow Land
91	248	174	0.12	Fallow Land
92	249	215	0.14	Fallow Land
93	250	123	0.12	Fallow Land
94	141	182	0.4	Early Paddy Land
95	142	164	0.12	Early Paddy Land
96	143	164	0.2	"pala"
97	144	193	0.13	Early Paddy Land
98	144/1130	163	0.03	Early Paddy Land
99	145	39	0.19	Early Paddy Land
100	146	203	0.06	Early Paddy Land
101	147	151	0.04	Early Paddy Land
102	148	129	0.08	Early Paddy Land

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
103	149	9	0.03	Fallow Land
104	149/1152	173	0.03	Fallow Land
105	150	174	0.1	Fallow Land
106	151	215/65	0.08	Early Paddy Land
107	152	9	0.1	Early Paddy Land
108	153	106	0.09	Early Paddy Land
109	154	110	0.24	Early Paddy Land
110	155	176	0.34	Early Paddy Land
111	156	215/65	0.23	Early Paddy Land
112	157	142	0.08	Early Paddy Land
113	158	203	0.2	Early Paddy Land
114	159	203	0.23	Early Paddy Land
115	160	176	0.28	Early Paddy Land
116	161	176	0.07	Early Paddy Land
117	162	176	0.08	Early Paddy Land
118	163	44	0.05	Early Paddy Land
119	164	22	0.1	Early Paddy Land
120	164/1135	145	0.1	Early Paddy Land
121	165	88	0.17	Early Paddy Land
122	166	127	0.26	Early Paddy Land
123	167	8	0.15	Early Paddy Land
124	168	26	0.22	Early Paddy Land
125	169	32	0.63	Early Paddy Land
126	170	39	0.08	Early Paddy Land
127	171	223	0.15	Bush/Creeper Jungle
128	251	158	0.12	Fallow Land
129	252	175	0.12	Early Paddy Land
130	253	226	1.21	Vill. Forest
131	254	151	0.08	Fallow Land
132	255	119	0.08	Fallow Land
133	256	2	0.1	Fallow Land
134	257	88	0.05	Fallow Land
135	258	22	0.05	Fallow Land
136	259	9	0.05	Fallow Land
137	260	106	0.06	Early Paddy Land
138	261	151	0.06	Early Paddy Land
139	262	142	0.11	Early Paddy Land
140	262/1104	127	0.05	Early Paddy Land
141	262/1105	156	0.05	Early Paddy Land
142	263	223	0.2	Fallow Land
143	263/1173	113	0.07	Early Paddy Land
144	264	223	0.09	Bush/Creeper Jungle
145	265	223	0.05	Bush/Creeper Jungle
146	266	73	0.17	Early Paddy Land
147	315	194	0.48	Early Paddy Land
148	316	40	0.29	Early Paddy Land
149	316/1168	120	0.29	Early Paddy Land
150	317	92	0.31	Early Paddy Land
151	318	100	0.32	Early Paddy Land
152	319	101	0.6	Early Paddy Land
153	320	86	0.22	Early Paddy Land
154	321	86	0.19	Early Paddy Land
155	322	196	0.75	Early Paddy Land

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
156	329	40	0.19	Early Paddy Land
157	329/1169	120	0.2	Early Paddy Land
158	330	207	0.12	Early Paddy Land
159	331	215	0.09	Early Paddy Land
160	332	170	0.51	Early Paddy Land
161	333	80	0.12	Early Paddy Land
162	334	45	0.27	Early Paddy Land
163	342	73	0.13	Early Paddy Land
164	343	113	0.21	Early Paddy Land
165	344	142	0.06	Early Paddy Land
166	344/1103	117	0.06	Early Paddy Land
167	345	9	0.14	Early Paddy Land
168	346	106	0.14	Early Paddy Land
169	347	187	0.14	Early Paddy Land
170	348	86	0.48	Early Paddy Land
171	349	86	0.59	Early Paddy Land
172	350	89	0.1	Early Paddy Land
173	350/1101	53	0.2	Early Paddy Land
174	350/1102	156	0.1	Early Paddy Land
175	351	151	0.04	Early Paddy Land
176	352	106	0.04	Early Paddy Land
177	353	9	0.05	Early Paddy Land
178	354	22	0.08	Early Paddy Land
179	355	145	0.08	Early Paddy Land
180	356	88	0.19	Early Paddy Land
181	357	2	0.35	Early Paddy Land
182	358	119	0.19	Early Paddy Land
183	359	108	0.16	Early Paddy Land
184	360	213	0.17	Early Paddy Land
185	361	108	0.17	Early Paddy Land
186	362	151	0.02	Early Paddy Land
187	363	175	0.19	Early Paddy Land
188	364	158	0.18	Early Paddy Land
189	365	128	0.15	Early Paddy Land
190	366	158	0.14	Early Paddy Land
191	367	19	0.25	Early Paddy Land
192	368	207	0.15	Early Paddy Land
193	369	51	0.15	Early Paddy Land
194	370	200	0.12	Early Paddy Land
195	371	226	0.18	Habitable
196	372	226	0.12	Habitable
197	373	203	0.06	Early Paddy Land
198	374	215/4	0.83	Early Paddy Land
199	375	200	0.27	Early Paddy Land
200	376	203	0.16	Early Paddy Land
201	377	39	0.16	Early Paddy Land
202	378	119	0.05	Early Paddy Land
203	379	59	0.11	Early Paddy Land
204	379/1128	29	0.1	Early Paddy Land
205	380	77	0.1	Early Paddy Land
206	381	37	0.04	Early Paddy Land
207	382	174	0.18	Early Paddy Land
208	383	37	0.04	Early Paddy Land

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
209	384	57	0.16	Early Paddy Land
210	385	78	0.23	Early Paddy Land
211	386	146	0.21	Early Paddy Land
212	386/1106	143	0.08	Early Paddy Land
213	387	110	0.28	Early Paddy Land
214	388	212	0.16	Early Paddy Land
215	389	34	0.25	Fallow Land
216	390	22	0.14	Fallow Land
217	390/1167	73	0.07	Early Paddy Land
218	391	20	0.27	Fallow Land
219	392	88	0.21	Fallow Land
220	393	203	0.02	Fallow Land
221	394	78	0.03	Fallow Land
222	395	21	0.03	Fallow Land
223	396	127	0.03	Fallow Land
224	397	73	0.02	Early Paddy Land
225	398	88	0.03	Fallow Land
226	399	37	0.02	Fallow Land
227	400	57	0.02	Fallow Land
228	401	203	0.18	Fallow Land
229	402	188	0.08	Fallow Land
230	403	29	0.02	Fallow Land
231	404	151	0.02	Fallow Land
232	405	106	0.03	Fallow Land
233	406	151	0.03	Fallow Land
234	407	110	0.02	Fallow Land
235	408	207	0.03	Fallow Land
236	409	110	0.09	Fallow Land
237	410	164	0.02	Fallow Land
238	411	8	0.04	Fallow Land
239	412	26	0.02	Fallow Land
240	413	119	0.02	Fallow Land
241	414	222	0.03	Fallow Land
242	415	176	0.01	Fallow Land
243	416	227	6.8	Road
244	417	226	0.58	Habitable
245	418	226	0.16	Habitable
246	419	205	0.32	Fallow Land
247	420	16	0.42	Fallow Land
248	421	226	0.2	Vill. Forest
249	422	226	0.29	Cattle Grazing Field
250	423	21	0.1	Fallow Land
251	424	110	0.12	Fallow Land
252	425	143	0.12	Fallow Land
253	426	201	0.15	Early Paddy Land
254	427	39	0.16	Early Paddy Land
255	428	68	0.07	Fallow Land
256	428/1140	141	0.03	Early Paddy Land
257	429	88	0.05	Early Paddy Land
258	430	88	0.06	Early Paddy Land
259	431	145	0.09	Early Paddy Land
260	432	96	0.09	Early Paddy Land
261	433	226	0.22	Vill. Forest

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
262	434	164	0.08	Early Paddy Land
263	435	44	0.05	Early Paddy Land
264	436	148	0.14	Early Paddy Land
265	437	119	0.07	Early Paddy Land
266	438	193	0.08	Early Paddy Land
267	439	189	0.12	Early Paddy Land
268	440	215/15	0.09	Early Paddy Land
269	441	215	0.08	Early Paddy Land
270	442	207	0.08	Early Paddy Land
271	443	26	0.27	Early Paddy Land
272	444	26	0.03	Early Paddy Land
273	445	88	0.1	Early Paddy Land
274	446	88	0.08	Early Paddy Land
275	447	145	0.11	Early Paddy Land
276	448	83	0.12	Early Paddy Land
277	449	44	0.07	Early Paddy Land
278	450	78	0.18	Early Paddy Land
279	451	39	0.02	Early Paddy Land
280	452	51	0.04	Early Paddy Land
281	453	215/23	0.04	Early Paddy Land
282	454	207	0.04	Early Paddy Land
283	455	163	0.03	Early Paddy Land
284	456	68	0.08	Early Paddy Land
285	456/1141	55	0.05	Early Paddy Land
286	457	148	0.08	Early Paddy Land
287	458	187	0.27	Early Paddy Land
288	459	189	0.24	Early Paddy Land
289	460	68	0.2	Early Paddy Land
290	461	13	0.12	Early Paddy Land
291	462	215/5	0.34	Early Paddy Land
292	463	174	0.25	Early Paddy Land
293	464	174	0.35	Early Paddy Land
294	465	102	0.36	Fallow Land
295	466	174	0.36	Early Paddy Land
296	467	163	0.11	Early Paddy Land
297	468	189	0.31	Early Paddy Land
298	469	189	0.19	Early Paddy Land
299	470	203	0.19	Early Paddy Land
300	471	203	0.18	Early Paddy Land
301	472	78	0.22	Early Paddy Land
302	473	203	0.24	Early Paddy Land
303	474	203	0.2	Early Paddy Land
304	475	203	0.15	Early Paddy Land
305	476	203	0.15	Early Paddy Land
306	477	170	0.53	Early Paddy Land
307	478	148	0.23	Early Paddy Land
308	479	141	0.08	Early Paddy Land
309	480	68	0.13	Early Paddy Land
310	481	13	0.2	Paddy Land
311	482	68	0.23	Paddy Land -3
312	483	146	0.06	Paddy Land -3
313	484	215/6	0.26	Paddy Land
314	485	215/6	0.16	Paddy Land

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
315	486	164	0.17	Paddy Land -3
316	487	50	0.16	Paddy Land -3
317	488	110	0.07	Paddy Land -3
318	489	110	0.08	Paddy Land -3
319	490	110	0.13	Paddy Land -3
320	491/1149	78	0.13	Paddy Land -3
321	492	151	0.05	Paddy Land -3
322	493	9	0.05	Paddy Land -3
323	494	150	0.04	Paddy Land -3
324	497	215	0.05	Paddy Land -3
325	498	207	0.06	Paddy Land
326	499	124	0.19	Paddy Land
327	500	64	0.15	Paddy Land -3
328	501	60	0.11	Paddy Land -3
329	502	145	0.08	Paddy Land -3
330	503	188	0.15	Paddy Land -3
331	674	146	0.06	Paddy Land -2
332	675	142	0.06	Paddy Land
333	676	201	0.82	Paddy Land -2
334	677	51	0.12	Paddy Land -2
335	678	215	0.14	Paddy Land -2
336	679	207	0.2	Paddy Land -2
337	680	51	0.07	Paddy Land -2
338	681	215	0.08	Paddy Land -2
339	682	215/21	0.12	Paddy Land -2
340	683	215/22	0.07	Paddy Land -2
341	684	166	0.06	Paddy Land -2
342	685	143	0.05	Paddy Land -2
343	686	160	0.4	Paddy Land -2
344	687	215/22	0.07	Early Paddy Land
345	688	215/15	0.08	Early Paddy Land
346	689	193	0.08	Early Paddy Land
347	690	110	0.19	Early Paddy Land
348	691	193	0.06	Early Paddy Land
349	692	215	0.06	Early Paddy Land
350	693	207	0.06	Early Paddy Land
351	694	215/15	0.02	Early Paddy Land
352	695	215	0.03	Early Paddy Land
353	696	164	0.08	Early Paddy Land
354	697	110	0.11	Early Paddy Land
355	698	21	0.09	Early Paddy Land
356	699	21	0.09	Early Paddy Land
357	700	53	0.04	Early Paddy Land
358	701	127	0.05	Early Paddy Land
359	702	119	0.05	Early Paddy Land
360	703	37	0.09	Early Paddy Land
361	704	119	0.17	Early Paddy Land
362	705	215/49	0.04	Early Paddy Land
363	706	215/40	0.04	Early Paddy Land
364	707	43	0.03	Early Paddy Land
365	708	175	0.02	Early Paddy Land
366	709	175	0.06	Early Paddy Land
367	710	51	0.13	Early Paddy Land

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
368	711	207	0.06	Early Paddy Land
369	712	134	0.08	Early Paddy Land
370	713	134	0.12	Early Paddy Land
371	714	134	0.35	Early Paddy Land
372	715	134	0.04	Early Paddy Land
373	716	6	0.16	Early Paddy Land
374	717	16	0.04	Early Paddy Land
375	718	16	0.04	Early Paddy Land
376	719	215/33	0.1	Early Paddy Land
377	720	215/33	0.1	Early Paddy Land
378	721	118	0.17	Early Paddy Land
379	722	53	0.07	Early Paddy Land
380	723	8	0.24	Early Paddy Land
381	724	78	0.24	Early Paddy Land
382	725	28	0.08	Early Paddy Land
383	726	119	0.1	Early Paddy Land
384	727	119	0.08	Early Paddy Land
385	728	119	0.05	Early Paddy Land
386	729	88	0.08	Early Paddy Land
387	730	88	0.09	Early Paddy Land
388	731	88	0.07	Early Paddy Land
389	732	88	0.07	Early Paddy Land
390	733	215/45	0.08	Early Paddy Land
391	734	222	0.95	Early Paddy Land
392	735	187	0.08	Early Paddy Land
393	736	215/39	0.07	Early Paddy Land
394	737	215/45	0.19	Early Paddy Land
395	738	223	0.08	
396	739	223	0.07	
397	740	215/36	0.07	Fallow Land
398	741	215/31	0.46	Early Paddy Land
399	742	215/46	0.11	Fallow Land
400	743	43	0.07	Fallow Land
401	744	43	0.06	Fallow Land
402	745	215/40	0.1	Fallow Land
403	746	88	0.08	Fallow Land
404	747	88	0.07	Early Paddy Land
405	748	215/45	0.11	Fallow Land
406	749	83	0.09	Fallow Land
407	750	146	0.11	Early Paddy Land
408	751	44	0.02	Fallow Land
409	752	3	0.32	Fallow Land
410	753	112	0.19	Early Paddy Land
411	754	37	0.29	Early Paddy Land
412	755	88	0.14	Early Paddy Land
413	756	31	0.09	Early Paddy Land
414	757	118	0.4	Early Paddy Land
415	758	106	0.07	Early Paddy Land
416	759	9	0.08	Early Paddy Land
417	760	110	0.13	Early Paddy Land
418	761	110	0.13	Early Paddy Land
419	762	215/52	0.25	Early Paddy Land
420	763	151	0.08	Early Paddy Land

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
421	764	211	0.68	Early Paddy Land
422	765	215/47	0.07	Early Paddy Land
423	766	164	0.07	Early Paddy Land
424	767	70	0.19	Early Paddy Land
425	768	187	0.05	Fallow Land
426	769	95	0.11	Early Paddy Land
427	770	215/45	0.11	Early Paddy Land
428	771	215/37	0.21	Early Paddy Land
429	772	127	0.06	Early Paddy Land
430	773	215/43	0.1	Early Paddy Land
431	774	88	0.08	Fallow Land
432	775	88	0.09	Fallow Land
433	776	215/41	0.2	Fallow Land
434	777	215/48	0.2	Early Paddy Land
435	778	215/35	0.07	Early Paddy Land
436	779	215/50	0.07	Early Paddy Land
437	780	215/51	0.06	Early Paddy Land
438	781	215/32	0.27	Early Paddy Land
439	782	211	0.18	Early Paddy Land
440	783	99	0.41	Early Paddy Land
441	784	134	1.15	Early Paddy Land
442	785	134	0.08	Early Paddy Land
443	786	146	0.3	Early Paddy Land
444	786/1100	143	0.22	Early Paddy Land
445	787	132	0.08	Early Paddy Land
446	788	119	0.14	Early Paddy Land
447	789	210	0.11	Early Paddy Land
448	790	88	0.07	Early Paddy Land
449	791	79	0.43	Early Paddy Land
450	792	8	0.8	Paddy Land -2
451	793	44	0.06	Early Paddy Land
452	794	145	0.05	Early Paddy Land
453	795	22	0.03	Early Paddy Land
454	796	22	0.07	Early Paddy Land
455	797	145	0.07	Early Paddy Land
456	798	88	0.1	Early Paddy Land
457	799	202	0.28	Early Paddy Land
458	800	211	0.13	Early Paddy Land
459	801	163	0.04	Early Paddy Land
460	802	112	0.22	Early Paddy Land
461	803	189	0.13	Early Paddy Land
462	804	211	0.4	Early Paddy Land
463	805	167	1.3	Early Paddy Land
464	817	163	0.17	Early Paddy Land
465	818	163	0.13	Early Paddy Land
466	819	51	0.16	Early Paddy Land
467	820	3	0.1	Early Paddy Land
468	821	9	0.06	Early Paddy Land
469	822	150	0.06	Early Paddy Land
470	823	127	0.06	Early Paddy Land
471	824	127	0.08	Early Paddy Land
472	825	37	0.57	Early Paddy Land
473	826	226	0.11	Habitable

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND
474	827	226	0.16	Habitable
475	828	143	0.09	Early Paddy Land
476	828/1115	146	0.08	Early Paddy Land
477	829	215/54	0.08	Early Paddy Land
478	829/1116	156	0.08	Early Paddy Land
479	830	163	0.11	Early Paddy Land
480	831	207	0.1	Early Paddy Land
481	832	51	0.1	Early Paddy Land
482	833	70	0.29	Early Paddy Land
483	834	9	0.07	Early Paddy Land
484	835	29	0.06	Early Paddy Land
485	836	77	0.02	Early Paddy Land
486	837	77	0.04	Early Paddy Land
487	838	129	0.06	Early Paddy Land
488	839	151	0.09	Early Paddy Land
489	840	215/17	0.14	Early Paddy Land
490	841	88	0.13	Early Paddy Land
491	842	145	0.05	Early Paddy Land
492	843	95	0.06	Early Paddy Land
493	844	203	0.1	Early Paddy Land
494	845	203	0.07	Early Paddy Land
495	846	6	0.1	Early Paddy Land
496	847	6	0.08	Early Paddy Land
497	848	74	0.4	Early Paddy Land
498	849	6	0.45	Early Paddy Land
499	850	200	0.15	Early Paddy Land
500	851	14	0.16	Early Paddy Land
501	852	14	0.18	Early Paddy Land
502	853	210	0.29	Early Paddy Land
503	854	119	0.32	Early Paddy Land
504	855	210	0.05	Early Paddy Land
505	856	119	0.04	Early Paddy Land
506	857	88	0.14	Early Paddy Land
507	858	83	0.12	Early Paddy Land
508	859	145	0.1	Early Paddy Land
509	860	88	0.15	Early Paddy Land
510	861	145	0.08	Early Paddy Land
511	862	44	0.13	Early Paddy Land
512	863	15	0.17	Early Paddy Land
513	864	110	0.11	Early Paddy Land
514	865	110	0.1	Early Paddy Land
515	866	110	0.05	Early Paddy Land
516	867	110	0.2	Early Paddy Land
517	868	110	0.09	Early Paddy Land
518	872	88	0.07	Early Paddy Land
519	870	88	0.08	Early Paddy Land
520	871	95	0.05	Early Paddy Land
521	872	81	0.19	Early Paddy Land
522	873	78	1.13	Early Paddy Land
523	949	110	1.88	Early Paddy Land
524	950	95	0.48	Early Paddy Land
TOTAL			**107.12**	

SL. NO	PLOT NO	KHATA NO	AREA IN ACRE	TYPE OF LAND

Total - 524 Plots **Area -** **107.12 Ac**

Sd/- C. Biswal
Revenue Inspector
Manatira
Tahasil- Danagadi, Jajpur Road
12/09/2014

Annexure – 14 .1

Terminal – BOQ and Cost Estimate

BILL OF QUANTITIES

Terminal - 400 mx22m

Sl. No	Delhi SR 2014 Code No./Pg.No.	Description	Unit	Nos.	Length (m)	Breadth (m)	Depth (m)	Quantity
1	20.2 A, Pg.353	Boring, providing and installation bored cast-in-situ reinforced cement concrete piles of garde M-25 of specified diameter and length below pile cap, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. by Crawler mounted, telescopic boom hydraulic pilling Rig all complete, including removal of excavated earth with all its lifts and leads (length of pile for payment shall be measured up to bottom of pile cap).						
		1000 mm dia.	Rm	200			42.75	8550.000
			Rm					**8550.00**
2	5.48, Pg.104	Providing and laying Reinforced cement concrete for construction of piers, abutments, portal frames, pier caps and bearing pedestals and seismic arresters over pier/ abutment caps at all locations with specified grade using Ordinary Portland Cement (conforming to strength requirement of IS:8112) including the cost of steel centering and shuttering etc. complete including testing of materials etc. for casting pier & pier cap in one/two stage, necessary tools, plants, machinery and all related operations as required to complete the work as per drawings and Specifications with all leads, lifts and depths true to level and position but excluding the cost of providing reinforcement. Reinforcement shall be measured and paid separately . Note:- Cement content considered in this item is 480 Kg./ Cum. Excess/ less cement used as per design mix is payable/ recoverable separately. 5.48.1 Reinforced Cement Concrete -M-50						
		Pile cap	Cum	200	1.30	1.300	0.750	253.50
		Cross beam	Cum	50	17.60	0.60	0.85	448.80
		Deck Slab	Cum	1	400.00	22.00	0.30	2640.00
		Fender wall	Cum	25	10.50	0.60	8.00	1260.00
								4602.30
3	5.48, Pg.104	Providing and laying Reinforced cement concrete for construction of piers, abutments, portal frames, pier caps and bearing pedestals and seismic arresters over pier/ abutment caps at all locations with specified grade using Ordinary Portland Cement (conforming to strength requirement of IS:8112) including the cost of steel centering and shuttering etc. complete including testing of materials etc. for casting pier & pier cap in one/two stage, necessary tools, plants, machinery and all related operations as required to complete the work as per drawings and Specifications with all leads, lifts and depths true to level and position but excluding the cost of providing reinforcement. Reinforcement shall be measured and paid separately . Note:- Cement content considered in this item is 480 Kg./ Cum. Excess/ less cement used as per design mix is payable/ recoverable separately. 5.48.1 Reinforced Cement Concrete -M-50						

Sl. No	Delhi SR 2014 Code No./Pg.No.	Description	Unit	Nos.	Length (m)	Breadth (m)	Depth (m)	Quantity
		Pile - 1000 mm Dia.	Cum	200	0.79		42.75	6716.03
			Cum					**6716.03**
4	5.15, Pg. 98	Providing, hoisting and fixing up to floor five level precast reinforced cement concrete in lintels, beams and bressumers, including setting in cement mortar 1:3 (1 cement : 3 coarse sand), cost of required centering and shuttering but excluding the cost of reinforcement, with 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).						
		Precast RCC Girder (T-Beam)	Cum	8	400.000	0.923		2952.00
			Cum					**2952.00**
5	5.9, Pg 97	Centering and shuttering including strutting, propping etc. and removal of form for 5.9.6 Columns, Pillars, Piers, Abutments, Posts and Struts						
i.		Cross Beam						
		Sides	Sqm	100	17.60		0.85	1496.00
		Bottom	Sqm	50	17.60	0.60		528.00
		Two ends	Sqm	2	0.60	0.85		1.02
ii.		Deck Slab						
		Bottom	Sqm	1	400.00	22.00		8800.00
		Sides	Sqm	2	400.00		0.30	240.00
			Sqm	2	22.00		0.30	13.20
iii.		Pile cap						
		Rectangular portion	Sqm	200	5.20		0.75	780.00
iv		Fender wall						
		Bottom	Sqm	25	10.50	0.60		157.50
		Sides	Sqm	50	10.50		8.00	4200.00
		Two ends	Sqm	2	0.60		8.00	9.60
			Sqm					**16225.32**
6	5.22 A, Pg.99	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level 5.22A.6 Thermo-Mechanically Treated bars						
		Cross Beam	Kg	448.80		120.000		53856.00
		Deck Slab	Kg	2640.00		100.000		264000.00
		Pile	Kg	6716.03		150.000		1007403.75
		Pile cap	Kg	253.50		120.000		30420.00
		Fender wall	Kg	1260.00		100.000		126000.00
		Precast RCC Girder (T-Beam)	Kg	2952.00		120.000		354240.00
			Kg	14270.33				1835919.75
			MT					**1835.92**
7	4.2, Pg.85	Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window sills, fillets, sunken floor,etc., up to floor five level, excluding the cost of centering, shuttering and finishing. 4.2.2 1:1½:3 (1 cement:1½ coarse sand:3 graded stone aggregate 20 mm nominal size)						
		Wearing Coat (75 mm)	Cum	1	400.00	22.00	0.075	660.00
			Cum					**660.00**
8		Providing temporary platform to convey the material to the working spot with required angles, channels including welding etc., complete adjacent to Berthing structure (Jetty).						
			Sqm	2	400.00	2.00		1600.00
			Sqm	2	22.00	2.00		88.00
			Sqm					**1688.00**

Sl. No	Delhi SR 2014 Code No./Pg.No.	Description	Unit	Nos.	Length (m)	Breadth (m)	Depth (m)	Quantity
9	7247, Pg.34	Vertical load testing (initial) of piles in accordance with IS : 2911 (Part- IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & above 50 tonne and up to 100 tonne	Nos	5				5
10		Carrying out Concrete mix test etc. complete as per specification & direction of Engineer-in-charge.	Nos	50				50
11		Supplying and fixing in position used rubber/nylon tyres having size of 1000 x 20 - 16 PR including necessary fixture complete in all resects as per drawing, specification and direction with all material labour and equipments	Nos	25				25
12		Supplying and fixing in position galvanised mild steel Mooring rings in concrete deck all complete as per drawings, specifications and directions including all labour, material and equipment	Nos.	25				25
13		Supplying transportation and fixing Cast iron bollards of 5 tonne capacity (approx. 117 kg) in concrete deck in position and filled with M30 grade concrete as per direction including materials, labour and equipment @ 5 m c/c	Nos.	25				25

COST ESTIMATE

Terminal - 400 m x 22m

Sl. No	Delhi SR 2014 Code No./Pg.No.	Description	Quantity	Unit	Rate	Amount
1	20.2 A, Pg.353	Boring, providing and installation bored cast-in-situ reinforced cement concrete piles of garde M-25 of specified diameter and length below pile cap, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. by Crawler mounted, telescopic boom hydraulic pilling Rig all complete, including removal of excavated earth with all its lifts and leads (length of pile for payment shall be measured up to bottom of pile cap).	8550.00	Rm	8683.15	74240933.00
2	5.48, Pg.104	Providing and laying Reinforced cement concrete for construction of piers, abutments, portal frames, pier caps and bearing pedestals and seismic arresters over pier/ abutment caps at all locations with specified grade using Ordinary Portland Cement (conforming to strength requirement of IS:8112) including the cost of steel centering and shuttering etc. complete including testing of materials etc. for casting pier & pier cap in one/two stage, necessary tools, plants, machinery and all related operations as required to complete the work as per drawings and Specifications with all leads, lifts and depths true to level and position but excluding the cost of providing reinforcement. Reinforcement shall be measured and paid separately . Note:- Cement content considered in this item is 480 Kg./ Cum. Excess/ less cement used as per design mix is payable/ recoverable separately. 5.48.1 Reinforced Cement Concrete -M-50	4602.30	Cum	6873.00	31631608.00
3	5.48, Pg.104	Providing and laying Reinforced cement concrete for construction of piers, abutments, portal frames, pier caps and bearing pedestals and seismic arresters over pier/ abutment caps at all locations with specified grade using Ordinary Portland Cement (conforming to strength requirement of IS:8112) including the cost of steel centering and shuttering etc. complete including testing of materials etc. for casting pier & pier cap in one/two stage, necessary tools, plants, machinery and all related operations as required to complete the work as per drawings and Specifications with all leads, lifts and depths true to level and position but excluding the cost of providing reinforcement. Reinforcement shall be measured and paid separately . Note:- Cement content considered in this item is 480 Kg./ Cum. Excess/ less cement used as per design mix is payable/ recoverable separately. 5.48.1 Reinforced Cement Concrete -M-50	6716.03	Cum	6873.00	46159240.00

Sl. No	Delhi SR 2014 Code No./Pg.No.	Description	Quantity	Unit	Rate	Amount
4	5.15, Pg. 98	Providing, hoisting and fixing up to floor five level precast reinforced cement concrete in lintels, beams and bressumers, including setting in cement mortar 1:3 (1 cement : 3 coarse sand), cost of required centering and shuttering but excluding the cost of reinforcement, with 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	2952.00	Cum	8191.40	24181013.00
5	5.9, Pg 97	Centering and shuttering including strutting, propping etc. and removal of form for 5.9.6 Columns, Pillars, Piers, Abutments, Posts and Struts	16225.32	Cum	453.35	7355749.00
6	5.22 A, Pg.99	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level 5.22A.6 Thermo-Mechanically Treated bars	1835.92	MT	68100.00	125026135.00
7	4.2, Pg.85	Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window sills, fillets, sunken floor,etc., up to floor five level, excluding the cost of centering, shuttering and finishing. 4.2.2 1:1½:3 (1 cement:1½ coarse sand:3 graded stone aggregate 20 mm nominal size)	660.00	Cum	6954.30	4589838.00
8		Providing temporary platform to convey the material to the working spot with required angles, channels including welding etc., complete adjacent to Berthing structure (Jetty).	1688.00	Sqm	350.00	590800.00
9	7247, Pg.34	Vertical load testing (initial) of piles in accordance with IS : 2911 (Part- IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & above 50 tonne and up to 100 tonne	5	Nos.	40300.00	201500.00
10		Carrying out Concrete mix test etc. complete as per specification & direction of Engineer-in-charge.	50	Nos	2000.00	100000.00
11		Supplying and fixing in position used rubber/nylon tyres having size of 1000 x 20 - 16 PR including necessary fixture complete in all resects as per drawing, specification and direction with all material labour and equipments	25	Nos	50000.00	1250000.00
12		Supplying and fixing in position galvanised mild steel Mooring rings in concrete deck all complete as per drawings, specifications and directions including all labour, material and equipment	25	Nos	1000.00	25000.00
13		Supplying transportation and fixing Cast iron bollards of 5 tonne capacity (approx. 117 kg) in concrete deck in position and filled with M30 grade concrete as per direction including materials, labour and equipment @ 5 m c/c	25	Nos	15000.00	375000.00
14		Supplying and fixing in position galvanised mild steel fender hooks in concrete deck all complete as per drawings, specifications directions including all labour, material and equipment	50	Nos.	1200.00	60000.00
		Total				**315786816.00**

TOTAL COST OF TERMINAL (400 m LENGTH) Rs. 31.58 Crores

Say, Rs. 32.00 Crores

Annexure – 14 .2

Diaphragm Wall – BOQ and Cost Estimate

BILL OF QUANTITIES

DIAPHRAGM WALL (650 m)

Sl. No.	Delhi SR 2014 Code No./ Pg No	Description	Unit	No	Length (m)	Width (m)	Height (m)	Total
1	2.6, Page 72	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth. 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed.						
		Guide Wall	Cum	1	650.00	1.20	1.50	1170.00
			Cum	2	650.00	0.70	0.30	273.00
		Tie Beam	Cum	90	9.00	0.45	0.70	255.15
			Cum				**Total**	**1698.15**
2	2.25, Page 75	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.						
		Total earthwork quantity	Cum					1698.15
		Deduction						
		Tie Beam	Cum	90	9.00	0.45	0.70	-255.15
			Cum				**Total**	**1443.00**
3	4.2.7, Pg.86	Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window sills, fillets, sunken floor,etc., up to floor five level, excluding the cost of centering, shuttering and finishing. 4.2.7 1:3:6 (1 cement : 3 fine sand : 6 graded stone aggregate 40 mm nominal size)						
		Guide Wall - web	Cum	2	650.00	0.30	1.20	468.00
		Guide Wall - flange	Cum	2	650.00	1.00	0.30	390.00
			Cum				**Total**	**858.00**
4		Excavation by Boring of 600 mm wide trench in all types of soil, including pebbles, gravel, rocks, boulders to 2 m depth for construction of diaphragm wall including bentonite mud circulation/crane mounded grab including of all labour, equipments and machinery for excavation, bentonite circulation, hire charges for grab, crane, etc.,						
		Diaphragm Wall - 600 mm thick	Sqm	1	650.00		23.50	**15275.00**

Sl. No.	Delhi SR 2014 Code No./ Pg No.	Description	Unit	No	Length (m)	Width (m)	Height (m)	Total
5	5.48, Pg.104	Providing and laying Reinforced cement concrete for construction of piers, abutments, portal frames, pier caps and bearing pedestals and seismic arresters over pier/ abutment caps at all locations with specified grade using Ordinary Portland Cement (conforming to strength requirement of IS:8112) including the cost of steel centering and shuttering etc. complete including testing of materials etc. for casting pier & pier cap in one/two stage, necessary tools, plants, machinery and all related operations as required to complete the work as per drawings and Specifications with all leads, lifts and depths true to level and position but excluding the cost of providing reinforcement. Reinforcement shall be measured and paid separately . Note:- Cement content considered in this item is 480 Kg./ Cum. Excess/ less cement used as per design mix is payable/ recoverable separately. 5.48.1 Reinforced Cement Concrete -M-50						
		Diaphragm Wall	Cum	1	650.00	0.60	23.50	9165.00
		Tie beam	Cum	90	9.00	0.45		364.5
			Cum				**Total**	**9529.50**
6	5.9, Pg 97	Centering and shuttering including strutting, propping etc. and removal of form for 5.9.6 Columns, Pillars, Piers, Abutments, Posts and Struts						
		Guide wall - Web portion	Sqm	4	650.00	-	1.50	3900.00
		Flange	Sqm	2	650.00		0.30	390.00
		Tie beam sides	Sqm	180	9.00		0.70	1134.00
		Tie beam bottom	Sqm	90	9.00		0.45	364.50
			Sqm					**5788.50**
7	5.22 A, Pg.99	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level 5.22A.6 Thermo-Mechanically Treated bars						
		Guide wall @ 100 kg/cum	Kg	100	858.00			85800.00
		Diaphragm Wall @ 190 kg/cum	Kg	190	9165.00			1741350.00
		Tie Beam @ 160 Kg/Cum	Kg	160	364.50			58320.00
					10387.50		**Kg**	**1885470.00**
						Say	**MT**	**1886.00**
8	15.58, Pg.247	Demolishing R.C.C. work by mechanical means and stockpiling at designated locations and disposal of dismantled materials up to a lead of 1 kilometre, stacking serviceable and unserviceable material separately including cutting reinforcement bars.						
		Guide Wall - web	Cum	2	650.00	0.30	1.20	468.00
		Guide Wall - flange	Cum	2	650.00	1.00	0.30	390.00
			Cum				**Total**	**858.00**
9		Providing and fixing weep holes of 50mm dia PVC pipes at 1m c/c as per drawing for diaphragm wall, etc., complete.						
			Rmt	1	650			**650.00**
10		Providing granite/trap/quartzes/gneiss rubble filling behind the diaphragm wall and wings, etc., complete	Cum	1	650	0.3	6	**1170.00**

ABSTRACT ESTIMATE

DIAPHRAGM WALL (650 m)

Sl. No.	Delhi SR 2014 Code No./Pg.No.	Description	Quantity	Unit	Rate (Rs)	Amount (Rs)
1	2.6, Page 72	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth. 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed.	1698.15	Cum	155.60	264232.14
2	2.25, Page 75	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.	1443.00	Cum	112.40	162193.2
3	4.2.7, Pg.86	Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window sills, fillets, sunken floor,etc., up to floor five level, excluding the cost of centering, shuttering and finishing. 4.2.7 1:3:6 (1 cement : 3 fine sand : 6 graded stone aggregate 40 mm nominal size)	858.00	Cum	5383.25	4618828.5
4		Excavation by Boring of 600 mm wide trench in all types of soil, including pebbles, gravel, rocks, boulders to 2 m depth for construction of diaphragm wall including bentonite mud circulation/crane mounded grab including of all labour, equipments and machinery for excavation, bentonite circulation, hire charges for grab, crane, etc.,	15275.00	Sqm	14000.00	213850000
5	5.48, Pg.104	Providing and laying Reinforced cement concrete for construction of piers, abutments, portal frames, pier caps and bearing pedestals and seismic arresters over pier/ abutment caps at all locations with specified grade using Ordinary Portland Cement (conforming to strength requirement of IS:8112) including the cost of steel centering and shuttering etc. complete including testing of materials etc. for casting pier & pier cap in one/two stage, necessary tools, plants, machinery and all related operations as required to complete the work as per drawings and Specifications with all leads, lifts and depths true to level and position but excluding the cost of providing reinforcement. Reinforcement shall be measured and paid separately . Note:- Cement content considered in this item is 480 Kg./ Cum. Excess/ less cement used as per design mix is payable/ recoverable separately. 5.48.1 Reinforced Cement Concrete -M-50	9529.50	Cum	6873.00	65496253.5
6	5.9, Pg 97	Centering and shuttering including strutting, propping etc. and removal of form for 5.9.6 Columns, Pillars, Piers, Abutments, Posts and Struts	5788.50	Sqm	453.35	2624216.475

Sl. No.	Delhi SR 2014 Code No./Pg.No.	Description	Quantity	Unit	Rate (Rs)	Amount (Rs)
7	5.22 A, Pg.99	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level 5.22A.6 Thermo-Mechanically Treated bars	1886.00	MT	68100.00	128436600
8	15.58, Pg.247	Demolishing R.C.C. work by mechanical means and stockpiling at designated locations and disposal of dismantled materials up to a lead of 1 kilometre, stacking serviceable and unserviceable material separately including cutting reinforcement bars.	858.00	Cum	1374.50	1179321
9		Providing and fixing weep holes of 50mm dia PVC pipes at 1m c/c as per drawing for diaphragm wall, etc., complete.	650.00	Rmt	200.00	130000
10		Providing granite/trap/quartzes/gneiss rubble filling behind the diaphragm wall and wings, etc., complete	1170.00	Cum	1026.00	1200420
					Total Cost (Rs.)	**417962064.8**

TOTAL COST OF DIAPHRAGM WALL (650 m LENGTH) Rs. 41.80 Crores

Annexure – 14 .3

Navigational Lock - BOQ and Cost Estimate

ANNEXURE-14.3

NAVIGATIONAL LOCK

BILL OF QUANTITIES

Item No	Description	Unit	Length (m)	Width (m)	Depth (m)	Quantity
1	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth upto 30 cm measured at a height of 1m above ground level and removal of rubbish upto a distance of 50 m outside the periphery of the area cleared.	Sqm	300.00	100.00		30000
2	Excavation in weathered rock	Cum	300.00	70.00	5.00	105000
3	Consolidation grouting					
a	Consolidation grouting of foundation area by drilling holes at the rate of 1 hole per 3 sq.m area, minimum depth 5 m area and grouting with cement slurry	Rm	200/3	60/3	6.00	8000.0
b	Grouting @1.5 bag/m	bags				12000.0
4	M-30 concrete in Pier and side walls					
i	Central Pier	Cum	440.00		17.00	7480
ii	Side walls / Retaining walls	Cum	1260.00		17.00	21420
	Total	Cum				**28900**
5	M-20 Concrete in pavement, concrete block and concrete over blocks					
i	Concrete in pavement	Cum	2 x 150	18.00	0.30	1620
ii	Concrete block	Cum	2 x 150	18.00	0.75	4050
iii	Concrete over blocks	Cum	2 x 150	18.00	0.50	2700
	Total	Cum				**8370**
6	M-10 lean concrete	Cum	200.00	60.00	0.15	1800
7	Providing water stop @ 25m c/c	Rm	150/25	36+17+17		420
8	Bitumastic filler for joints	Rm	150/25	36+17+17		420
9	Reinforcement steel in R.C.C					
a)	For Pier @ 60 Kg/m³	MT				448.80
b)	For Retaining wall @ 60 Kg/m³	MT				1285.20
d)	Concrete in pavement @ 30 Kg/m³	MT				48.60
e)	Concrete block @ 30 Kg/m³	MT				121.50
f)	Concrete over blocks @ 30 Kg/m³	MT				81.00
	Total	MT				**1985.10**
10	0.75 thk. graded filter	Cum	150.00	50	0.75	5625
11	Providing swing bridge (2 Nos. x 18 m clear span)	m	36			36
12	Fender	Nos				24
13	Security Room (4 Nos) 3m x 3m each	Sqm	3	3		36
14	Lock operating room (2 nos) with operating panel 3m x 7m each	Sqm	7	3		42
15	Power Room (2 Nos) for battery with acid resistance tiles 3m x 4m each	Sqm	4	3		24
16	Stand by Generator Room(2 Nos) 5mx3m each	Sqm	5	3		30
17	Store Room (2 Nos) 8m x 5m each	Sqm	8	5		80
18	Wash Room (2 Nos) 6m x 4m each	Sqm	6	4		48
19	Bollard	Nos				5
20	High Mast	Nos				5
21	Fencing	Rm	300.00	2		600

NAVIGATIONAL LOCK

BILL OF QUANTITIES

Item No	Description	Unit	Length (m)	Width (m)	Depth (m)	Quantity
22	Lock Lighting Arrangement					L.S
23	Instrumentation					L.S

NAVIGATIONAL LOCKS

COST ESTIMATE

ITEM - A (CIVIL WORKS & ACCESSORIES)

Sl.No	Description	Qty	Unit	Rate (Rs.)	Amount (in Lacs)
1	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth upto 30 cm measured at a height of 1m above ground level and removal of rubbish upto a distance of 50 m outside the periphery of the area cleared.	30000	Sqm	10.00	3.00
2.a)	Excavation in weathered rock	105000	Cum	250.00	262.50
b)	Excavation in Hard rock	5250	Cum	420.00	22.05
3	Consolidation grouting				
a)	Consolidation grouting of foundation area by drilling holes at the rate of 1 hole per 3 sq.m area, minimum depth 5 m area and grouting with cement slurry	8000	m	700.00	56.00
b)	Grouting	12000	Bags	500.00	60.00
4	M-30 concrete in Pier and Side walls	28900	Cum	6880.00	1988.32
5	M-20 Concrete in pavement, concrete block and concrete over blocks	8370	Cum	6240.00	522.29
6	M-10 lean concrete	1800	Cum	4840.00	87.12
7	Providing water stop @ 25m c/c	420	m	500.00	2.10
8	Bitumastic filler for joints	420	m	450.00	1.89
9	Reinforcement steel in R.C.C	1985.10	tonne	68100.00	1351.85
10	0.75 thk. graded filter	5625	Cum	2000.00	112.50
11	Providing swing bridge (2 Nos. x 15m clear span)	36	m	L.S	50.00
12	Fender	24	Nos	2000.00	0.48
13	Security Room (4 Nos) 3m x 3m each	36	Sqm	4000.00	1.44
14	Lock operating room (2 nos) with operating panel 3m x 7m each	42	Sqm	4000.00	1.68
15	Power Room (2 Nos) for battery with acid resistance tiles 3m x 4m each	24	Sqm	5000.00	1.20
16	Stand by Generator Room (2 Nos) 5m x 3m each	30	Sqm	4000.00	1.20
17	Store Room (2 Nos) 8m x 5m each	80	Sqm	4000.00	3.20
18	Wash Room (2 Nos) 6m x 4m each	48	Sqm	4000.00	1.92
19	Bollard	5	Nos	20000.00	1.00
20	High Mast	5	Nos	30000.00	1.50
21	Fencing	600	m	500.00	3.00
22	Lock Lighting Arrangement		L.S		10.00

23	Instrumentation	L.S	15.00
		Sub-total (1 to 23)	**4561.24**
24	Dewatering at 2% of above cost		91.22
25	Work charges and contingencies @ 5%		228.06
		Total	**4880.53**
		Say	**4890.00**

ITEM - B (MISCELLANEOUS)

Sl.No	Description	Qty	Unit	Rate (Rs.)	Amount (in Lacs)
1	D.G Set		L.S		30.00
2	Lock wall accessories				
a	Floting Mooring Bitts		L.S		
b	Line Hooks and check ports		L.S		
c	Guard rail and parapets		L.S		
d	Safety job crane		L.S		
e	Distance markers and sill markers		L.S		
3	Tow haulage unit and movable kevel		L.S		
				Total	**30.00**

ITEM - C (GATES)

Sl.No	Description	Qty	Unit	Rate (Rs.)	Amount (in Lacs)
1	Mitre Gate (2 gates per chamber, per lock 2 chambers, total no. of gates = 4/lock)	430.00	MT	200000	860.00
2	Vertical Lift gate	211.00	MT	125000	263.75
3	Tressle and Hoisting equipment		L.S		150.00
	Total				**1273.75**

ABSTRACT OF TOTAL COST

Sl.No.	Description of Items	Total cost (Rs. In Lacs)
1	Item A (Civil works and accessories)	4890.00
2	Item B (Miscellaneous)	30.00
3	Item C (Gates)	1273.75
	Sub-Total	**6193.75**
	Operating system cost for Mitre Gates	100.00
	Total (Rs. In Lacs)	**6293.75**
	Say,	**6300.00**
	Total (Rs. in Crores)	**63.00**

Annexure – 14 .4

Bank Protection Works - BOQ and Cost Estimate

BILL OF QUANTITIES

BANK PROTECTION WORKS

Sl. No	Description	Unit	Nos.	Length (m)	Breadth (m)	Depth (m)	Quantity
1	Earthwork excavation for foundation and basement in all classes of soils, sub soils and ordinary soil loose soil, wet sand except hard rock requiring blasting with an initial lead of 10M and lift of 2 m including shoring, strutting and bailing and water strutting and bailing and water wherever necessary and refilling the side of foundation with excavated earth laid in layers of not more that 15 cm thick well watered and consolidated and depositing the surplus earth as directed by the department officers etc., complete as per standard specifications						
		Cum	1	1000.00	35.30		35300.00
							35300.00
2	Providing Geo fabric filter opening size 095 < 0.075 mm permiability > 9 lit / Sqm/Sec						
		Sqm	1	1000.00	12.80	-	12800.00
							12800.00
3	Providing and laying stone pitching 50 to 100 Kg Stone for revetment works-armour stones						
		MT					**23744.00**

ABSTRACT OF COST

BANK PROTECTION WORKS

Sl. No	Description	Quantity	Unit	Rate (Rs.)	Amount (Rs.)
1	Earthwork excavation for foundation and basement in all classes of soils, sub soils and ordinary soil loose soil, wet sand except hard rock requiring blasting with an initial lead of 10M and lift of 2 m including shoring, strutting and bailing and water strutting and bailing and water wherever necessary and refilling the side of foundation with excavated earth laid in layers of not more that 15 cm thick well watered and consolidated and depositing the surplus earth as directed by the department officers etc., complete as per standard specifications (DSR Cl.2.8, Page 72)	35300.00	Cum	181.13	6393712.50
2	Providing Geo-fabric filter opening size 095 < 0.075 mm permiability > 9 lit / Sqm/Sec	12800.00	Sqm	625.00	8000000.00
3	Providing and laying stone pitching 50 to 100 Kg Stone for revetment works-armour stones	23744.00	MT	1500.00	35616000.00
	TOTAL COST				**50,009,712.50**

TOTAL COST	**Rs.**	**50009.713**
	Say, Rs.	**50000.000**


VIEW OF JOKADIA BARRAGE DURING AUGUST 2014 FLOOD


VIEW OF SUJANPUR WEIR DURING AUGUST 2014 FLOOD