Techno-Economic Feasibility Study Report

For Expansion of Captive Jetty in Revdanda Creek at Salav, Maharashtra

Submitted To:
Ministry of Environment, Forest & Climate Change
New Delhi

Submitted By:
JSW Salav Port Private Limited
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1. Introduction

India’s shipping sector has been following a sinusoidal curve vis-a-vis the Indian economy. In the recent times as the economy has started to look up, so has the Indian shipping sector. The manufacturing industry has also started to look up and improve progressively. Ports play a vital role as the gateway to the industrial growth by facilitating import of raw material and export of finished goods and vice versa. JSW Infrastructure Limited and other companies of the JSW Group have been playing a vital role in the expansion of India’s shipping and manufacturing facilities and continue to add to the growth of the country’s economy.

1.1. Maharashtra Maritime Board (MMB)

Maharashtra Maritime Board (MMB) is the nodal agency that takes care of the regulatory and developmental framework of the state’s maritime activities. Over the years, the board has taken a number of initiatives to harness the potential of its coastline. These include development of the marine front including setting up of several cargo jetties, passenger jetties, larger port terminals, inland water transport system and shipyards among many others. MMB ports presently handle close to 8 percent of the total cargo handled by non-major ports in the country. With the new impetus the handling percentage is likely become double digit number by the turn of this year.

1.2. Company Background

JSW Group is one of the fastest growing business conglomerates with a strong presence in the core economic sector. This enterprise, led by Mr. Sajjan Jindal has grown from a steel rolling mill in 1982 to a multi business conglomerate worth US $ 11 billion within a short span of time. As part of the US $ 18.0 billion O.P. Jindal Group, JSW Group has diversified interests in Steel, Energy, Minerals and Mining, Aluminum, Infrastructure, Cement and Information Technology.
JSW Group has grown significantly over the years and taking steps for rapid expansion to ramp up the capacity of Vijaynagar Steel Plant in Karnataka from the present 12 MTPA to 14 MTPA by the year 2016. In addition, JSW Energy Limited, a JSW Group company is the first independent power producer to set up 2 units of 130 MW each and 4 units of 300 MW each, producing power using Corex gas and coal.

The JSW Group owns and operates JSW Steel Limited, Dolvi, a 3.2 million tonnes per annum (MTPA) steel plant based in Dolvi, Maharashtra working on BF-DR-CONARC-CSP process. The plant also has facilities for cold rolling, galvanizing, colour coating, galvalume, and supplements the pipe and tube plant at Kalmeshwar, Nagpur in the state of Maharashtra. The facility at Dharamtar is also going through an expansion phase and proposed to produce 10 MTPA by the year 2017, in phases. The first phase of expansion to 5 MTPA is likely to be operational by the middle of 2015. The raw material requirements of this port are taken care by the JSW Dharamtar Port, through a Barge Jetty. This jetty is under expansion to handle the new demands post expansion.

The JSW Infrastructure Ltd. (JSWIL) is a JSW Group company which is presently into design, finance, development, operation and maintenance of ports, rail road and inland water connectivity, development of port based SEZ and other related infrastructure development works along with terminal handling operations and port management. The JSWIL has constructed a mega port in Jaigarh, near Ratnagiri, in Maharashtra with a capacity of 15 MTPA. The port is in its second phase expansion and post expansion would be able to handle about 70 million tons of Bulk, Containerised, Liquid, Chemicals, break bulk and other cargos. Another subsidiary of JSWIL, the South West Port Limited (SWPL), has developed berth number 5A and 6A in the Mormugoa Port Trust on BOOT basis and has successfully handled more than 50 million tonnes of cargos in about 9 years. The present capacity of the berth is about 10 MTPA.
For the JSW Steel Works, Dolvi the cargo in the fair season is handled at the Mumbai outer anchorage (mostly in the Bravo anchorage) and then transported through barges to the jetty at Dharamtar, near Dolvi. The berthing facility consists of 331.5 m barge berth with two approaches. The berth is equipped with two barge unloaders and two LHM 250 Leibherr Cranes.

JSW Steel Works has acquired M/s Welspun Maxsteel Limited plant at Salav which had earlier acquired M/s Vikram Ispat and now JSW Steel Salav has plans to expand the capacity to 3 Mt/year steel plant and 3 Mt/year Coke oven plant. The facility at Salav will also feed the raw material requirement for JSW Steel Works at Dolvi, especially during the monsoon season. It is planned that JSWIL or an SPV under the aegis of JSWIL will be operating the jetty facility at Salav in Revdanda Creek under a special SPV namely JSW Salav Port Private Limited (JSWSPPL).

The Techno-Economic Feasibility study for expansion of the jetty facilities at Salav and its scope are given as follows.

The scope of the present report is:

1. Study the expansion potential of the existing working facility in Revdanda Creek
2. Collect information from secondary sources
3. Details of project site and environment
4. Details of facilities and Infrastructure
5. Details of project investment and financial analysis
6. Recommendations
1.3. Project Background

JSW Steel Works has acquired M/s Welspun Maxsteel Limited plant at Salav which had earlier acquired M/s Vikram Ispat and now the new facility is rechristened as JSW Steel Salav Limited (JSWSSL). M/s Welspun Maxsteel Limited (WMSL) operation included a 0.75 MTPA DRI manufacturing plant located at Salav village near Kundalika estuary in Raigad district, Maharashtra. This plant is equipped with a shallow water jetty in the downstream of Kundalika River for handling of 1.2 MTPA iron ore and other bulk cargo. JSW Steel post acquisition of the WMSL has proposed to expand the capacity to 3 Mt/year steel plant and 3Mt/year Coke oven plant.

1.3.1. Existing Facility

Salav Port lies in the estuary of Kundalika River. The estuary entrance is protected by a peninsula on west side of entrance on which Korlai fort is situated. Though there is protection from south westerly waves, the westerly waves enter the Kundalika estuary entrance. The prevailing depth in berthing basin at port facility is 5 to 6 m from chart datum. The Jetty is concrete block gravity wall with a length of 235 m with end radius of 7.5 m at both ends. Mooring dolphins lie 21 m to the east. Thus the total length of Jetty becomes 256 m. As the Jetty is L shaped, both the faces of jetty are used for berthing of vessels. The north face accommodates two (2) unloading berths and one (1) loading berth. The Southern face of jetty is used for mooring of barges awaiting discharge, barges undergoing repairs and idle barges. The south face provides two berths. Existing Revdanda Port facility is shown in Figure 1.1.
In view of the limited depth and presence of a sand bar at confluence of Kundalika River with ocean the port is used as lighterage port. The port facilities are in the form of L shape Jetty. Iron ore is transshipped in the self-propelled IV barges of capacity 25-2800 DWT from mother vessel. A 100 m wide 7 nautical miles long entrance channel leads from anchorage point to jetty for safe navigation of barges. At the confluence of Kundalika River with ocean a shallow sandbar has been formed due to depth over sandbar is only 1.5 to 2 m and channel is maintained by regular dredging.

A bridge exists on Kundalika River about 400 m east of existing Jetty. The bridge has nine (9) span with middle span has air drought of 9.6 m at highest high tide of +3.30 m. The clear span at soffit of beam is 38 m. Middle spans of Bridge on Kundalika River is shown in the Figure 1.2.
Figure 1-2: Existing Bridge on Kundalika River

After unloading the iron ore on to the jetty the iron ore is transported to the plant through conveyer belt for distance of approximately 2 km to the stock pile in plant area. The material handing system on berth and up to plant is as follows:

- One (1) bucket type barge unloader: 1200 tph capacity
- One (1) Figee crane barge unloader: 450 tph capacity
- One (1) barge loader: 1200 tph capacity and approx. length 220 m

- Conveyer from approach to silo: 1200 tph capacity and approx. length 300 m
- Silo: 2000 tonnes capacity
- Conveyer from silo to plant: 700 tph capacity and approx. length 2200 m
1.3.2. The Proposal for Expansion

The facility at Salav is envisaged to cater to the enhanced raw material requirement for JSW Steel Salav Limited, and the JSW Steel Limited, Dolvi works; especially during the monsoon season. It is planned that JSWSPL (namely, JSW Salav Port Private Limited), an SPV under the aegis of JSWIL will be operating the jetty facility at Salav in Revdanda Creek.

This facility once ready would meet the increased requirement of the expanded/ existing steel plant and the proposed coke oven plant. It is therefore, incumbent upon the proposed Jetty facility to cope with the increased raw material handling capacity with higher degree of mechanization.

It is proposed to examine the feasibility of direct berthing of Panamax and/or cape size vessels at the jetty in this report, so that the economy of scale could be achieved in the cargo transport logistics. For the Dolvi operations, it is proposed to use 8000 DWT barges from the existing facility, whereas the newly proposed berth would take care of the berthing and handling of the Mother vessels.

It is proposed to refurbish and modernize the existing jetty facility and construct a new facility on piles for the direct berthing of the Mother vessels. The jetty length will be expanded to about 500 m additionally to cater 2 ships berthing simultaneously and the remaining for the barge operations and port crafts.

1.4. Project Objective

The main objective of the present assignment is to explore and work out a technically feasible concept of direct berthing port facility. This comprises preparation of plans, preliminary computation of logistics of internal movement of cargo, loading and unloading, development of
back up storage of cargo and navigation feasibility with vessel size suited to the existing conditions. This scheme after obtaining requisite clearance will be detailed with design & engineering and finally executed. Objective of study is broadly described as below:

The setting up of 3 MTPA integrated steel plant necessitate construction of separate berthing facilities as the existing is fully occupied in handling enhanced volumes of iron ore cargo post expansion of DRI plant. Additional cargoes will be transported by conveyor belt as is currently done to the stacking area behind the berth from berthing jetty. The required raw material then could be carried to the necessary areas of the plant using a raw material handling systems to be installed at the back up area.

At Jetty side a material handling equipment is required to unload raw materials and the loading of the finished products. The system planning of the material handling, storage and re transport to the plant facility would entail a detailed design process that would be taken up at the Detailed Project Report stage.

1.5. Outline of the Report

The report is presented in the following chapters;

1. Introduction
2. Project Description and Site Analysis
3. Projected Traffic for the Facility
4. Water Area Planning
5. Infrastructure Facilities
6. Environmental Aspects
7. Details of Cost Estimates
8. Financial Analysis
9. Recommendations
2. Project Description and Site Analysis

2.1. Project Detail

The proposed expansion of jetty facility at Salav is envisaged to cater to the enhanced raw material requirement for JSW Steel Salav Limited, and the JSW Steel Limited, Dolvi works; especially during the monsoon season. JSW Salav Port Private Limited will be operating the jetty facility at Salav in Revdanda Creek.

JSW Steel (Salav) Ltd., propose to expand the existing plant & achieve a 3.0 Mtpa steelmaking capacity at Salav. The plant will be integrated with Sponge Iron Plant, Corex, EAF, Ladle Furnace, RH-TOP, Thin Slab Caster, Compact Strip Plant, Shaped Beam Casters, Heavy Section Mill, Light Section Mill, Lime Plant & Dolo Plant, Oxygen Plant, Raw Material Handling System, Township, Jetty, Power Plant, Cement Plant and related logistics services and utilities for the production of flat products.

Simultaneously, JSW propose to set up a 3 Mtpa Coke Oven Plant for the substitution of Natural Gas with Coke Oven gas. The proposed project envisages installation of a 3.0 Mt/yr coke oven plant to generate 150,000 Nm³/hr of coke oven gas along with coke and by-products.

This jetty facility once ready would meet the increased requirement of the expanded/ existing steel plant and the proposed coke oven plant. It is therefore, incumbent upon the proposed Jetty facility to cope with the increased raw material handling capacity with higher degree of mechanization. The facility would capable of handling about 21 MTPA of raw material of various cargoes and nearly 10 MTPA of finished products.
2.2. Shoreline, Foreshore and Backup Land

The proposed jetty for handling of captive cargo has been planned on piles slightly north of the existing jetty of erstwhile M/s Welspun Maxsteel Ltd., which has been acquired by JSW Steel Limited. On the west side of the proposed expansion plans lie the ruins of Korlai Fort at an estimated distance of about 2 nautical miles (5.6 km). This headland provides shelter from the south and southwest directions, especially during the monsoon conditions making the creek tranquil although the year. There proposed site will be protected from the southwest monsoon and can operate throughout the year without any artificial protections. Figure 1 below shows the proposed area. JSW has backup land of about 400 acres located about 3 km away. Therefore, area behind the berth would be required for the cargo handling and storage, for which necessary reclamation is proposed. In order to have minimum impact of reclamation on the flow hydrodynamics the same is restricted to ‘0’ m contour in the inter-tidal area.

![Image of Project Site](image.png)

Figure 2-1: Project Site

The proposed Jetty site is located in Revdanda Creek, District Raigad, Maharashtra. The site is north of Salav village and west of existing Road Bridge. The site can be approached by direct access road from Mumbai,
Alibaug, Revdanda right upto Salav village. The site is around 115 Km from Mumbai and around 20 Km from Alibaug. Figure 2 below shows the site and the district road and rail network.

Figure 2-2: Raigad District Road and Rail Connections

The nearest railway station is Roha which is around 35 Km from the site. The nearest airport is at Mumbai, around 120 Km from the site.

2.3. Navigation charts and bathymetry

Bathymetry has been studied from:

- NHO Charts 2026 and 211
- A 2007 and 2008 bathymetry survey undertaken for the channel made available by WMLS – this has contour intervals at 2 m.
- Channel and River bathymetry undertaken in November/December 2009
WMLS has recently undertaken bathymetric survey in the existing channel, additional area behind the existing jetty and the upstream portion in the river. This bathymetry shows that water depths in and around the existing jetty are of the order of –5 m CD. However, in the fairway the depths range from –3 m CD to -5 m CD. There are sandy shoals and pockets of shallower depths in the existing channel.

Bathymetry inside the river also shows a similar pattern, where generally the depths reduce upstream in the river. All along the center of the river channel, depths ranging between -3.5 m CD to -4.5 m CD. Towards the coast, the depths reduce to about -0.5 m CD to -1 m CD.

![Existing bathymetry of the Channel](image)

**Figure 2-3:** Existing bathymetry of the Channel

### 2.4. Existing land use

The water areas of Sites 2 & 3 and the landfall of the approach trestle lie very near to the existing and planned WMLS operations. However, land will need to be acquired for the conveyor galleries, on shore backup facilities, etc. Some of the inter-tidal area may be utilised by reclamation. There is a gas pipeline crossing the river, which needs to be given due attention while planning marine facilities upstream or near the pipeline. More information on the laid depth and type of pipeline will be required.
2.5. Geology

However, for the purpose of this report, following stratigraphy onshore and offshore available from the Site is assumed to be similar at other sites as well, summarized as:

- The seabed is generally smooth with a negligible gradient towards the west, with minor undulations. The depth increases along the approach channel off Korlai Fort.
- Superficial sediments on the sea bed over the surveyed area are made up of coarse sand overlying a basement of weathered/hard rock.
- The sandy layer at the top varies in thickness.
- An intermediate stratum of firm silty marine clay between the sands and the rock is also observed in places.
- Near the existing jetty, rock appears to be deep seated up to approximately 16 m below sea bed. The sea bed in this region is likely to be made up of soft to firm silty clays with increase in depth.
- Some rock outcrops are also observed at some places towards the entrance of the channel.

Apart from seismic survey, some data was studied from observations of bed materials and assessments for the same discussed in WAPCOS, 1991 report. Bed material is observed as clay to very fine silt in the channel between the Korlai Fort and the existing jetty.

2.6. Details of Climatic and Sea Conditions

Meteorological data has been collected from secondary sources from Indian Meteorological Department (IMD) and is given in subsequent paragraphs:
2.6.1. Temperature

The region experiences tropical climate and generally moderate to extreme temperature variations have been observed. The temperature at the proposed site ranges from 16°C to 33°C.

2.6.2. Rainfall

Majority of the rainfall in this region occurs during the SW monsoon months of June – September. The mean annual rainfall observed in the region during the monsoon season is about 2350 mm.

2.6.3. Relative Humidity

The relative humidity in this region is observed to vary between 61% and 86%.

2.6.4. Visibility

The visibility is good for most part of the year however it reduces during monsoon conditions in July – August. For the balance year the visibility is of the order of 4-5 km. Visibility reduces slightly during the months from November to March due to fog in the regions around Mumbai, which is mostly observed in early mornings or sometimes in the evenings.

2.6.5. Winds

Regular seasonal wind variation has been observed in the region. During the monsoon months from middle of June until the end of September the region experiences the effects of the SW monsoon winds.

The predominant direction of wind is N to NE during fair weather season and W to SW during monsoon season. Calm winds with a speed ranging from 8.2 km/hr to 14.8 km/hr prevail mostly in the mornings. General wind speed in the area, through the year, range
between 1 km/hr – 19 km/hr, except for occasional short duration winds of magnitude up to 60 km/hr.

2.6.6. Waves

As the proposed location is close to the mouth of the creek and is in sheltered waters, the wave effect will be negligible and near tranquil conditions can be considered during fair weather season and the reflected waves of about 0.5 to 1 m during the foul weather season.

2.6.7. Tides

The tides at the proposed site are semi-diurnal in nature with a period of 12 hours and 40 minutes, that is on an average two high waters and two low waters are experienced daily. The tidal levels as per Indian navigational chart #2026 at Revdanda (Lat: 18°33”N Long: 72°56”E) are as follows:

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<th>Tidal Levels:</th>
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<tbody>
<tr>
<td>MHHW</td>
<td>3.6 m</td>
</tr>
<tr>
<td>MLHW</td>
<td>3.3 m</td>
</tr>
<tr>
<td>MHLW</td>
<td>1.7 m</td>
</tr>
<tr>
<td>MLLW</td>
<td>1.0 m</td>
</tr>
<tr>
<td>MSL</td>
<td>2.4 m</td>
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</tbody>
</table>

Table 2-1: Design ship dimensions for bulk liquid (chemicals)

The tidal levels are referred to the datum of soundings (chart datum).
2.6.8. Currents

Strong coastal currents flowing in a northeasterly direction cross the channel of the port. The harbour and Korlai Fort peninsula reduce this to peak current velocities of about 0.75 knots (ebb) to 1.2 knots (flood).

2.6.9. Cyclone

Proposed site and the immediate adjoining region are relatively free from severe tropical storms as their recorded paths have been observed to veer away from the land in its vicinity. Frequency of heavy cyclonic storms has been observed to be one or two in a century. The last severe cyclonic storm was experienced in 1982.

2.6.10. Cloud Cover

On the basis of information on cloud cover available from Alibaug and Colaba observatory, it is observed that:

- For almost 79 days (most of the period in the monsoon months) the sky is fully covered with clouds.
- For 140 days of the year, more than 50% of the sky is covered with clouds.
- The cloud cover is quite low during the months from November until February.

2.6.11. Datum

The datum to which all levels will be referred to for the purpose of work is Mean Sea Level (MSL). The chart datum (CD) is about 2.225 m below the MSL.

2.6.12. Littoral Transport

The general direction of drift is from north to south at 0.2 million cubic meters per year during the non-monsoon period.
2.7. Hydrographic Data

The hydrographic information of the proposed site and surrounding region are shown on navigational chart # 2026 on a scale of 1:30000 and MMB chart number 1204/2010 on a scale of 1:5000. The relevant extracts of the charts are shown below in Figure 2.3 & Figure 2.4.
Figure 2-5: MMB Chart # 1204/2010 (extract)
3. Projected Traffic for the facility

3.1. Type of Commodity to be handled

The proposed captive jetty will be used for import of raw materials and transport of finished product from the Steel Plant (steel products) and Coke Oven Plant (coke). The capacity of the steel plant would be 3 MTPA and that of the coke oven plant would be 3 MTPA. For these the various commodities that will be handled at the jetty are:

Inward
- Iron ore fines
- Coking coal
- PCI
- Limestone (BF grade)
- Clinker
- Dolomite (BF and SMS grade)
- Quartzite
- Bentonite / Gypsum
- Ferro Alloys

Outward
- Finished steel – Hot rolled coil, Rebars and Sections
- DRI
- Pellet
- Coke
- Cement
- Tar
- Crude Benzol
- Sulphur Paste

3.1.1. Iron Ore

The estimated requirement of total Iron ore fines is ~ 12.0 MTPA on net and dry basis. Considering about 10% losses due to moisture and
5% losses due to handling, the iron ore requirement works out to be \( \sim 14.0 \) MTPA.

### 3.1.2. Coal and PCI

The PCI Coal requirement for the blast furnace is about 675,000 TPA on net and dry basis for pulverised coal injection through the tuyeres. Considering moisture loss 10% and handling loss of 5% the annual requirement is about 0.78 MTPA.

The ash content of the injected coal is normally lower than that of the coke for the most efficient coal dust injection operation. Since very low ash content non-coking coal is not available in India, it will be met through imports.

### 3.1.3. Limestone

Limestone will be required as flux material for iron making and for steel making. In case of steel making, limestone will be calcined in a captive calcination plant and the calcined product, namely burnt lime, will be used in steel melt shop for production of liquid steel.

The desirable chemical analysis of BF grade limestone is as follows:

<table>
<thead>
<tr>
<th>( \text{SiO}_2 )</th>
<th>( \text{Al}_2\text{O}_3 )</th>
<th>( \text{CaO} )</th>
<th>( \text{MgO} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.61%</td>
<td>0.60%</td>
<td>50.74%</td>
<td>1.91%</td>
</tr>
</tbody>
</table>

**Table 3-1:** Domestic Lime Stone (Chemical analysis)

For quality reasons, sustained supply and cost effectiveness, some imported SMS grade limestone may also be used. High-grade low silica limestone is produced and traded by several countries namely Japan, Vietnam, Thailand, and Middle East etc. The typical analysis of imported limestone is as follows:

<table>
<thead>
<tr>
<th>( \text{SiO}_2 )</th>
<th>( \text{Al}_2\text{O}_3 )</th>
<th>( \text{CaO} )</th>
<th>( \text{MgO} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.43%</td>
<td>0.20%</td>
<td>54.54%</td>
<td>0.91%</td>
</tr>
</tbody>
</table>

**Table 3-2:** Imported Lime stone (Chemical Analysis)
Some of the calcined lime requirement will be fulfilled from the existing lime calcination plant.

3.1.4. Dolomite

Dolomite will be required as flux material both for iron making and for steel making. In case of steel making, Dolomite will be calcined in a captive calcination plant and the calcined product, namely brunt dolo, will be used in steel melt stop for production of liquid steel.

For quality reasons, sustained supply and cost effectiveness, some imported SMS grade limestone may also be used.

3.1.5. Quartzite

It has been proposed to use quartzite in the blast furnace. It has been proposed to procure quartzite from local region.

A typical analysis of quartzite from the area is as follows:

<table>
<thead>
<tr>
<th></th>
<th>SiO₂</th>
<th>Al₂O₃</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>96.5%</td>
<td>0.60%</td>
</tr>
</tbody>
</table>

3.2. Projection of Traffic at Proposed Terminal

As the captive jetty will be used for the transportation of raw material for the steel plant and coke oven plant and thereafter for the transportation of the finished product, the traffic is determined by the capacity of these plants. For 3 MTPA capacity steel plant and 3 MTPA coke oven plant, the quantities required and quantities of the finished products are summarized in the tables below:
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Commodity</th>
<th>From</th>
<th>To</th>
<th>Mode of Transportation</th>
<th>Quantity (t/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Iron Ore Fines</td>
<td>Imported / Indigenous</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>1,18,80,000</td>
</tr>
<tr>
<td>2</td>
<td>Coking Coal (Imported)</td>
<td>Imported</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>44,80,000</td>
</tr>
<tr>
<td>3</td>
<td>PCI</td>
<td>Imported</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>6,75,000</td>
</tr>
<tr>
<td>4</td>
<td>Limestone (BF grade)</td>
<td>Imported</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>6,18,000</td>
</tr>
<tr>
<td>5</td>
<td>Limestone (SMS grade)</td>
<td>Imported</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>7,00,000</td>
</tr>
<tr>
<td>6</td>
<td>Clinker</td>
<td>Hinterland</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>15,00,000</td>
</tr>
<tr>
<td>7</td>
<td>Dolomite (BF grade)</td>
<td>Imported</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>5,50,000</td>
</tr>
<tr>
<td>8</td>
<td>Dolomite (SMS grade)</td>
<td>Imported</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>2,70,000</td>
</tr>
<tr>
<td>9</td>
<td>Quarzite</td>
<td>Indigenous</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>60,000</td>
</tr>
<tr>
<td>10</td>
<td>Bentonite / Gypsum</td>
<td>Indigenous</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>1,78,000</td>
</tr>
<tr>
<td>11</td>
<td>Ferro Alloys</td>
<td>Indigenous</td>
<td>Raw Material yard</td>
<td>Sea</td>
<td>76,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>20,987,000</strong></td>
</tr>
</tbody>
</table>

Table 3-3: Commodity and Quantity of raw material
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Finished Product</th>
<th>From</th>
<th>To</th>
<th>Mode of Transportation</th>
<th>Quantity (T/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Finished Steel - Hot Rolled Coil</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>21,60,000</td>
</tr>
<tr>
<td>2</td>
<td>Finished Steel - Rebars</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>14,00,000</td>
</tr>
<tr>
<td>3</td>
<td>Finished Steel - Sections</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>10,00,000</td>
</tr>
<tr>
<td>4</td>
<td>DRI</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>10,00,000</td>
</tr>
<tr>
<td>5</td>
<td>Pellet</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>6,00,000</td>
</tr>
<tr>
<td>6</td>
<td>Coke</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>4,50,000</td>
</tr>
<tr>
<td>7</td>
<td>Cement</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>30,00,000</td>
</tr>
<tr>
<td>8</td>
<td>Tar</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>1,42,000</td>
</tr>
<tr>
<td>9</td>
<td>Crude Benzol/ BTX</td>
<td>Plant</td>
<td>Hinterland</td>
<td>Sea</td>
<td>41,000</td>
</tr>
<tr>
<td>10</td>
<td>Sulphur Paste</td>
<td>Plant stockyard</td>
<td>Hinterland</td>
<td>Sea</td>
<td>9,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>9,802,000</strong></td>
</tr>
</tbody>
</table>

Table 3-4: Commodity and Quantity of finished product

3.3. Past and Present Cargo Handling in the Said Area

Revdanda creek is navigable in excess of 20 Km in length. The existing captive jetty of M/s JSW Steel Salav is located in approximate position 18° 32.30’ N and 72° 55.55’ E. This jetty handles about 4 - 6 lakh tonnes of cargo through barges. The mother ship comes at anchorage, which is located about 6-8 miles from the headland.

The multi-purpose jetty of M/s IEIL is located at Sanegaon where coal is handled through barges. These barges traverse from the mother ship at anchorage (which is about 6-8 nautical miles from the headland) to the Sanegaon jetty covering an approximate distance of about 15-18 nautical miles. An average of 7-10 lakh tonnes of coal is handled at this jetty annually.
There is dredging activity in the Revdanda Creek/Kundalika River during non-monsoon period by dredgers. The dredged sand is transported by barges, to Mumbai. It is considered that this existing traffic will not affect the proposed direct berthing of ships at this jetty.
4. Water Area Planning

4.1. General

While planning the facility one must have the knowledge of cargo volumes to be handled, number of berth required, cargo handling equipments, navigational and operational parameters etc. with due consideration for site.

4.1.1. Site Conditions

The facility is to be located in the tidally influenced Kundalika River. The tide are semi diurnal with a tidal range varying from 0.12 m to 4.65 m. The proposed site is on the upstream of Revadanda Bridge. The middle span of the Revadanda Bridge has a width of 36.0 m while the maximum air draught under the bridge is 9.60 m. The depths available beyond the Revadanda Bridge varies from 3.50 to 4.50 m. During monsoon the wave disturbance near the mouth of Kundalika River are high thus restricting operational days in a year. The various requirements are discussed below.

4.2. Navigational and Operational Requirements

The navigational and operational requirement will be governed by the vessel size and dimension. The vessel calling at the port should get adequate width, depth and maneuvering area for it safe operation.

4.2.1. Vessel Size and Dimension

Based on the dredging requirements and the types of soil the vessel sizes would be decided. The available data indicates that navigation of Panamax size vessels in the Creek would not involve any rock dredging, however, for Cape size vessels, rock dredging may be involved.

Therefore for the phase I development Panamax and for the Master
Plan Scenario Cape Size vessels shall be deployed. The sizes of these vessels are given in Table 4-1.

<table>
<thead>
<tr>
<th>Type of Vessel</th>
<th>Vessel Size (DWT)</th>
<th>LOA (m)</th>
<th>Beam (m)</th>
<th>Draft (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panamax Size (Aframax)</td>
<td>105,000</td>
<td>255</td>
<td>48</td>
<td>14.5</td>
</tr>
<tr>
<td>Cape Size</td>
<td>180,000</td>
<td>294</td>
<td>50</td>
<td>18.5</td>
</tr>
</tbody>
</table>

Table 4-1: Vessel Size and Dimension

4.3. Navigational Channel

4.3.1. Width of the channel

It is proposed to handle Panamax size vessels of about 250 m in length and 45 m width initially and Cape size vessels of 300 m length and 50 m width subsequently. Therefore it is planned to have a channel width of 225 m which is approximately 5 times the beam of the Design Vessel based on the PIANC Guidelines. The widening of this channel will be considered at a later stage when the traffic builds up at the port or Cape size vessels frequents the facility.

4.3.2. Channel Depths

It is seen from MMB chart # 1204/2010 that average depths available in the inner navigational channel vary from about 1.3 – 7 m.

It has been ascertained from geotechnical and geophysical studies undertaken that the channel can be dredged up to 14.7 m below chart datum by undertaking soft dredging. The chart datum is about 2.225 m below mean sea level and the tidal levels in the area range from 1.0 m as mean lowest low water (MLLW) to 3.6 m as mean highest high water (MHHW) that is a variation of about 2.6 m. It can thus be seen that on an average depths of 15.7 m during low water to about 18.3 m in high water will be available in the channel. This will
be good enough for the Panamax Vessels for which the initial facility is proposed.

In order to accommodate Cape size vessels in future it is proposed to undertake dredging of rock patches/rock outcrops to achieve depths of about 18 – 20 m. The details of the maximum depth that can be achieved will be finalized after intensive geophysical and geotechnical studies in the area.

4.3.3. Navigable Route

The general alignment of the berths will be along the existing navigation channel. The navigation channel from the captive jetty is in a westerly direction till near Rat Island, where it turns into a north westerly direction till clearing the Korlai headland and the outer channel thereafter will be aligned along 070° - 250°. The navigational channel is shown in Figure 5.1 in section 5.6.

4.3.4. Ship Size

It is proposed to utilize Panamax size ships of 250 m length and 45 m width with a draft of 14.5 m in the initial stages and thereafter use Cape size vessels of about 300 m length, 50 m width and 18.5 m draft.

4.4. Consent from ‘Users’ for Handling Cargo at the Proposed Jetty

As the proposed jetty is for captive use to meet the requirements of the existing steel plant and its expansion there is no need of the written consents from other users. The additional capacity of this jetty will be used to meet the direct requirements of the company’s other steel plants at Dharamtar and also of trade.

4.5. Locational Advantages

The site for the jetty was examined with respect to the following:

1. Adequate depths in the navigational channel
2. Navigational safety for year round operations
3. Availability of backup land
4. Meteorological conditions – shelter from southwest monsoon

Advantages of the proposed site are as follows:

1. The site is located west of existing road bridge over Revdanda creek and therefore there is no limitation as to the size of the vessels which can be handled at the proposed jetty.
2. The site is located in the lee of the Korlai headland providing shelter from west and southwesterly directions as well as southwest monsoon.
3. The geophysical and geotechnical investigations undertaken in the creek by MMB and other agencies reveal existence of a navigational channel, which can be dredged to about 14.7 m below chart datum, consisting of soft material. With additional hard dredging deeper depths can be achieved.
4. The site is suitable for direct berthing of ships after dredging the navigational channel.
5. Additional storage cum backup land can be created by reclamation of the inter-tidal area.
6. The site is close to the existing road and will provide direct connectivity/access to north as well as south bound cargo.
7. The existing captive jetty facility is connected to the main plant with conveyor system, which can be augmented to meet additional cargo carriage requirements.

4.6. Planning Parameters

The waterfront planning will consist of construction of berths with handling equipment to handle Panamax and Cape size vessels which will directly berth at the jetty. The design of the berths would be based on the various forces/stresses that will be experienced during berthing of vessels as well as during unloading/loading operations of the cargo.
Similarly, the land side facilities would include the loading/unloading equipment at the berth; the conveying systems requirement, planning and design of open/covered storage, the stacker cum reclaimers and facilities for evacuation and supply of the cargo to the coke/steel plant as per the demand, and ancillary requirements of back-up power supply, water supply and sewage treatment; storm water drainage; firefighting and environmental monitoring.
5. Infrastructure Facilities

5.1. Number of Proposed Berths with Dimensions

5.1.1. Layout and Orientation

The jetty is proposed to be located at -4.50 m contour and is aligned to the tidal flow. The layout necessitates the need of an approach trestle aligned perpendicular at center of jetty. The approach trestles will facilitate the movement of vehicles; walk way, utility pipelines, conveyor belts and cables. The navigational channel for the jetty is planned along the river center line.

5.1.2. Location

The corner dimensions of the new facility proposed are, Lat. 18° 32’ 15.7” N, Long. 72° 55’ 11.7” E, and Lat. 18° 32’ 15.7” N, Long. 72° 54’ 28.7” E aligned in East - West direction. This orientation is so chosen by considering flow of river, after model studies proposed to be carried out at the CWPRS. This location of the new water front facility starts immediate western extreme of the existing facility and extends westwards.

5.1.3. Number of Berths

Based on the cargo projections, at the end of this phase the total import requirements are 21 MPTA and total export requirement is about 10 MTPA. With a berth occupancy factor of 0.70 as suggested by the UNCTAD, the total unloading time required for the bulk cargo with a 5000 Tons per hour rated unloading capacity and 2500 average unloading capacity at the berth = 8400 hr

Hence total berth time required = 8400/0.7 = 12000 hr

Assuming 20 hours operations a day, number of days required = 600 days.
This would amount to 2 berths of 300 m each.

Similarly for the export volumes of 10 MTPA, which would consists of various types and quality of material as described in Chapter 3, the calculation is as follows;

1. Assuming similar loading rate (which is conservative) the berth days required = 286 days, which is equivalent to one berth.

Since the berths are in line, with the separation distance between them and the mooring requirements, a total length of 500 m additional water front over and above the existing facility would be required.

Therefore, it is proposed to construct a new captive jetty of about 500 m length and a width of 25 m, just north of the existing jetty with an alignment along the existing navigational channel. The jetty will be able to handle 2 vessels simultaneously. The existing berth after refurbishment will continue to handle the smaller crafts and port crafts and would be used as lighterage facility. This also shall cater for harbour crafts like tugs, pilot launch and other boats to comply with ISPS code, as well as for barges for coastal movements. The proposed jetty is shown below in Map (Figure 5-1).
5.2. Backup Area Requirement

As the plant is located about 3 km away from the proposed Jetty, the cargo storage and handling would be carried out behind the berth where about 100 acres of land would be carved out in shallow waters using dredged material. The reclamation will be limited to the 0 m contours in order to have the minimum impact on the flow hydrodynamics of the creek. This backup area will be provided with necessary cargo handling system/stacker and reclaimer for mechanical handling of cargo.

5.3. Cargo Handling Machinery

It is proposed to provide mechanical handling system for the cargo with appropriate hopper and conveyor system. The existing conveyor system will be suitably modified to meet the additional requirement and an additional conveyor will also be considered during the DPR stage.
5.4. Navigational Aids

The captive jetty terminal will be an all-weather facility and operations will be round the clock. The navigational aids will be provided to ensure safe navigation. The channel will be properly delineated and navigational aids in the form of lighted buoys will be provided. Navigational aids will confirm to the International Association of Light House Authority (IALA) regulations. These buoys will facilitate night navigation.

5.5. Fire Fighting Facilities

As coal is proposed to be handled, it is necessary to provide fire-fighting equipment at the captive jetty site. The conveyor from the jetty to the stack yard will transport the coal; fire-fighting arrangement will also cater to the transportation system through the conveyor. The fire-fighting equipment will include fire hoses with accessories, pumps & pipelines and fire extinguishers etc.

5.6. Approach Channel Details

The navigation channel has been identified after studying the available geophysical and geotechnical investigations, by MMB and other agencies, in the inner harbour area and is generally in alignment with the existing navigation channel being used in Revdanda creek by the barges of M/s JSW Steel Salav and M/s Indo Energy International Ltd. located at Sanegaon. It has been ascertained from the studies undertaken that the channel can be dredged upto 14.7 m below chart datum by undertaking soft dredging. The chart datum is about 2.225 m below mean sea level and the tidal levels in the area range from 1.0 m as mean lowest low water (MLLW) to 3.6 m as mean highest high water (MHHW) that is a variation of about 2.6 m. It can thus be seen that on an average depths of 15.7 m during low water to about 18.3 m in high water will be available in the channel. The available depths in the channel indicate that mini cape size vessels can be operated by undertaking soft dredging in the
channel. By undertaking hard dredging to dredge rock outcrops/hard strata it is possible to dredge the channel to about 18.5 – 19 m below chart datum. The details will be worked out during the preparation of DPR, which will allow operation of cape size vessels of about 300 m length, 50 m width and about 18.5 m draft by using the available tides.

Considering a ship width of 50 m it is proposed to have a one way navigational channel of a width of 225 m. Widening of navigational channel to a two way channel will be considered at a later stage as per traffic requirements. From the berth, the channel will be aligned in a westerly direction thereafter turning in north westerly direction near Korlai and after crossing Korlai headland the outer channel will be aligned to 070°-250°.

The navigation channel is shown on navigation chart # 2026 show in Map 5.1 below.

![Navigational Channel Plan - Navigation Chart # 2026 (extract)](image)

**Figure 5-2:**  Navigational Channel Plan – Navigation Chart # 2026 (extract)

### 5.7. Dredging

For a width of 225 m and a depth of 14.5 m deep channel the channel length will be approximately 18 km with a total dredgable quantity of about 30 million cubic meters.

In phase 2 of the project the channel can be deepened to 18.5 m – 19 m
by undertaking hard dredging in some portions of the channel based on detailed geophysical and geotechnical investigations to enable operation of cape size vessels.

5.8. Breakwater

Since the proposed site is sheltered by the headland, there is no need for a breakwater.

5.9. Port Craft

Following port crafts will be used for port operations:

(a) Pilot Boat/ Speedboat
(b) Two Tugs

The above crafts will also meet the requirements of patrolling during operations and for security as per ISPS guidelines/compliance.

5.10. Electricity, Water Supply, Transportation

5.10.1. Electric Supply

As the plant at Salav is operational the electric supply is already available from MSEB. The supply requirement will be augmented to meet the expansion plans of the plant as well as the jetty areas including material handling systems. The berth and surrounding area will be illuminated using high masts of 30 m height using sodium vapour and metal alloid lamps. Street lighting with 9 m height posts with sodium vapour lamp will be used.

5.10.2. Water Supply

The facility at Salav is already operational and hence the water supply connection is available from Jeevan Pradhikaran. It is also planned to make arrangement for rain harvesting at the storage site, which will cater for the domestic requirement. Any spare capacity will be extended to local villages, to augment their requirements.
5.10.3. Roads and Railways

The site is serviced by road from Revdanda and Alibaug, which connects to NH4B and NH66. The nearest railway station is Roha, which is around 35 Km from the site.

5.10.4. Pollution Prevention Appliances

The EIA report will be made after obtaining terms of reference from MoEF and will include details of pollution prevention plan. However, some of the pollution prevention equipment and measures are proposed as follows:

- During construction phase use of exhaust silencers and water sprinklers for unpaved roads.
- The DG sets will be as per standards of MoEF.
- Separate green zones will be created to prevent atmospheric pollution. The selection of trees in the area will be as per the local climate in consultation with expert horticulturists.
- Transportation of coal would be through covered conveyors and use of water sprinkling systems for dust suppression.
- Training and implementation of strict hygiene equipment and strict procedures to prevent pollutions of all kinds.

5.11. Communication

Communication equipment at the jetty will be provided as per ISPS requirement, to cater to communication at Jetty as well as from jetty to storage area and ships.

5.12. Drainage and Sewage System

Storm water drainage system using rational method with RCC drains of various sizes is proposed. The sewerage system will be designed as per standard manual on sewage and sewage treatment and will be discharged into the sea through outfalls after treatment.
6. Environmental Aspects

6.1. General

The project consists of construction of new captive jetty of 1000 m length and 23 m width. The jetty will be provided with three rail mounted grab unloaders and hopper for conveyor. Major activities involved in construction/operation activities in the captive jetty are as follows:

- Piling for construction of jetty and approach trestle
- Reclamation for operational area
- Installation of rails on the jetty
- Installation of conveyor belt
- Unloading of coal/iron based cargo
- Transportation of coal/iron based cargo from jetty to storage site through conveyor

6.2. Air Quality

6.2.1. Construction phase:

Actual construction activities at the jetty location will marginally increase the suspended particulate matter. However, the impact during construction phase will be of temporary nature.

Mitigative Measures: This will be addressed using mechanised handling and the latest construction technology.

6.2.2. Operational phase:

The major source of pollution is from dust generated during unloading of coal at the jetty and its transportation to the storage.

Mitigative Measures: Dust will be minimized by providing suitable dust suppression / extraction systems at jetty unloading site, belt
transfer points, stack yard, junction towers etc. Coal will be transported from jetty site to the stack yard through covered/tube conveyor system.

6.3. Water Quality

6.3.1. Construction phase:

Water Pollution may be caused due to construction activities like piling and reclamation etc. However, this will be temporary in nature.

Mitigative measures: This will be addressed by avoiding/minimising spillage or leakage of oil or grease as well as regular maintenance of construction equipments.

6.3.2. Operation phase:

During unloading, it is likely that some quantity of coal may fall in the creek, which may reduce depth of water near berth.

Mitigative Measures: This will be addressed by maintenance dredging/desilting.

6.4. Noise Pollution

6.4.1. Construction Phase:

Noise levels are likely to increase during construction phase due to operation of construction equipment, movement of vehicles and other construction activities at the project site.

Mitigative Measures: Noise levels will be addressed by providing ear plugs to the persons working at the project site and by putting barriers of corrugated sheets around the construction site to reduce noise in the surrounding areas.
6.4.2. Operation Phase:

Noise levels during operation phase are anticipated within permissible limits.

Mitigative Measures: Ear plugs/deafeners will be provided to personnel in areas where the noise levels cross the permissible limits.

6.5. Risk Analysis and Disaster Management Plan

A disaster management plan will be prepared for the jetty and all personnel at the jetty will be educated and trained to follow the plan.

The disasters can be in the form of fire, damage due to earthquake or cyclone. Proper fire-fighting arrangements and pollution prevention teams will be provided. Formulation of the plans will be undertaken in liaison with the other emergency services authorities and hospitals.

6.6. Environment Monitoring Plan

Environmental management plan envisages the proper monitoring and implementation of the mitigative measures.

The recommended Environmental Monitoring Plan is given in table below.

Methodology used for sampling & analysis will be as per prevalent requirements of Ministry of Environment & Forest and Indian Standard (IS) codes.

Environmental Parameters to be monitored:
<table>
<thead>
<tr>
<th>Air Quality</th>
<th>Once in quarter excluding monsoon (24 hr/day for 2 consecutive working days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPM, NOx, SO, CO</td>
<td></td>
</tr>
<tr>
<td>Noise Levels</td>
<td>Once in quarter (Continuous 24 hour reading with a frequency of 10 minutes for 2 non-consecutive days)</td>
</tr>
</tbody>
</table>
7. Details of Estimated Project Costs

7.1. The Land and Site Development:

It is proposed to reclaim land for use. An approximate of 60 acres of land will be reclaimed. Provision has been made for the development of the site.

7.2. Surveys:

Provision has been made in the project cost for bathymetric, currents, geophysical, geotechnical and model studies.

7.3. Jetty:

Provision has been made for construction of berthing jetty as well as the approach trestles. The dimensions of the berthing jetty are 900 mx23 m.

7.4. Buildings:

Provision has been made for administrative, customs and other support buildings.

7.5. Engineering:

Block provision has been made for engineering services.

7.6. Fire Fighting:

Firefighting equipment consisting of pumps, hoses, fire extinguishers and other accessories has been considered.

7.7. Environment Considerations:

Block provision has been made in the project cost for environment study and clearance and environment management plan.
7.8. Sewage Disposal:

Block provision has been made for sewage and drainage.

7.9. Navigation Aids:

Provision has been made for navigational aid equipment including lighted buoys etc.

7.10. Water Supply:

Provision has been made for augmentation of existing water supply system and distribution.

7.11. Fencing & ISPS:

Provision has been made for fencing and ISPS compliance.

7.12. Dredging:

A 225 m wide and 14.5 m deep channel is proposed initially. The length of this channel would be approx. 18 Km and the dredging quantity will be about 30 million cubic meters. Cost for dredging upto 18.5 – 19 m depth will be worked out during DPR stage.

7.13. Mechanical (material handling and machinery):

7.13.1. Grab Unloaders/Mobile Crane

Provision has been made for procurement of grab unloaders and mobile cranes.

7.13.2. Hopper with dust suppresser:

Provision has been made for the procurement of hopper with dust suppresser.

7.13.3. Conveyor Steel Works:

Provision has been made for the procurement of conveyor and steel works.
7.14. Electrification and Instrumentation:

Provision has been made for augmentation of existing cabling, distribution, communication and electric supply.

7.15. Port Craft:

Port crafts will be used on hire basis as pilot boat, tug boat and for security.

7.16. Contingencies and Overheads:

Provision has been made for contingency and overheads at 5% of the total cost.

<table>
<thead>
<tr>
<th>Index</th>
<th>Item</th>
<th>Estimated Amount (Rs. In Lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Civil Work</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Land and Site Development</td>
<td>6000</td>
</tr>
<tr>
<td>6.2</td>
<td>Surveys</td>
<td>400</td>
</tr>
<tr>
<td>6.3</td>
<td>Jetty</td>
<td>15000</td>
</tr>
<tr>
<td>6.4</td>
<td>Buildings</td>
<td>250</td>
</tr>
<tr>
<td>6.5</td>
<td>Engineering</td>
<td>250</td>
</tr>
<tr>
<td>6.6</td>
<td>Fire Fighting</td>
<td>150</td>
</tr>
<tr>
<td>6.7</td>
<td>Environmental Considerations</td>
<td>200</td>
</tr>
<tr>
<td>6.8</td>
<td>Sewerage Disposal</td>
<td>60</td>
</tr>
<tr>
<td>6.9</td>
<td>Navigation Aids</td>
<td>400</td>
</tr>
<tr>
<td>6.10</td>
<td>Water Supply</td>
<td>60</td>
</tr>
<tr>
<td>6.11</td>
<td>Fencing &amp; ISPS</td>
<td>150</td>
</tr>
<tr>
<td>6.12</td>
<td>Dredging</td>
<td>47077</td>
</tr>
</tbody>
</table>

(A) Sub Total Civil Work 69747
### B. Mechanical Work

<table>
<thead>
<tr>
<th>6.13</th>
<th>Material Handling &amp; Machinery</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.13.1 Grab Unloaders/Mobile Cranes</td>
<td>15000</td>
</tr>
<tr>
<td>6.13.2 Hopper with dust suppresser</td>
<td>1500</td>
</tr>
<tr>
<td>6.13.3 Conveyor with steel works</td>
<td>2500</td>
</tr>
<tr>
<td>(B) Sub Total Mechanical Work</td>
<td>19000</td>
</tr>
</tbody>
</table>

### C. Electrical

<table>
<thead>
<tr>
<th>6.14</th>
<th>Cabling, Distribution, Communication, DG Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1200</td>
</tr>
<tr>
<td>I Sub Total Electrical</td>
<td>1200</td>
</tr>
</tbody>
</table>

### D. Others

<table>
<thead>
<tr>
<th>6.15</th>
<th>Port Crafts       On Hire</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.16 Contingency and Overheads @ 5%</td>
<td>4497</td>
</tr>
<tr>
<td>(D) Sub Total Others</td>
<td></td>
</tr>
<tr>
<td>Grand Total (A+B+C+D)</td>
<td>944,44*</td>
</tr>
</tbody>
</table>

*The cost is without taxes, duties, and erection cost

Table 7-1:  lock Cost Estimates for the Project
8. Financial Analysis

8.1. Financial Performance

JSW Infrastructure Ltd. is financially sound with healthy balance sheets with increased turnover and profits on year on year basis. As per the Net worth Certificate issued by charted accountants of the company, the company has adequate resources to meet the equity requirements for funding the project.

The details of Net worth as per JSW Infrastructure Ltd. Annual Reports are as follows:

<table>
<thead>
<tr>
<th>#</th>
<th>Head</th>
<th>Year Ending 31.03.2013 (Million Rs.)</th>
<th>Year Ending 31.03.2012 (Million Rs.)</th>
<th>Year Ending 31.03.2011 (Million Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Net worth</td>
<td>7560.57</td>
<td>6016.26</td>
<td>5170.02</td>
</tr>
</tbody>
</table>

Table 8-1: Design ship dimensions for bulk liquid (chemicals)

8.2. Projected Annual Income to MMB

All statutory dues, levies, port charges and any other such charges as per government rules and regulations would be paid to Maharashtra Maritime Board.

Based on the Maharashtra Maritime Board Act, 1996 (Mah. XV of 1997) and the Amendment Notification dated 7 July 2011 with respect to the Maharashtra Maritime Board Landing and Shipping Regulations, 2001, the rate for captive jetties applicable for some of the major commodities and the approximate projected revenue is as follows:
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Commodity</th>
<th>Rate (Rs./T)</th>
<th>Revenue (Million Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Iron Ore Fine</td>
<td>18.75</td>
<td>222.75</td>
</tr>
<tr>
<td>2</td>
<td>Coking Coal</td>
<td>18.75</td>
<td>84.00</td>
</tr>
<tr>
<td>3</td>
<td>PCI</td>
<td>18.75</td>
<td>12.66</td>
</tr>
<tr>
<td>4</td>
<td>Limestone</td>
<td>23.00</td>
<td>30.31</td>
</tr>
<tr>
<td>5</td>
<td>Clinker</td>
<td>22.50</td>
<td>33.75</td>
</tr>
<tr>
<td>6</td>
<td>Dolomite</td>
<td>23.00</td>
<td>12.65</td>
</tr>
<tr>
<td>7</td>
<td>Quartzite</td>
<td>8.00</td>
<td>0.48</td>
</tr>
<tr>
<td>8</td>
<td>Bentonite/Gypsum</td>
<td>30.00</td>
<td>5.34</td>
</tr>
<tr>
<td>9</td>
<td>Ferro Alloys</td>
<td>75.00</td>
<td>5.7</td>
</tr>
<tr>
<td>10</td>
<td>Finished Steel</td>
<td>50.00</td>
<td>228</td>
</tr>
<tr>
<td>11</td>
<td>DRI</td>
<td>28.75</td>
<td>28.75</td>
</tr>
<tr>
<td>12</td>
<td>Pellet</td>
<td>18.75</td>
<td>11.25</td>
</tr>
<tr>
<td>13</td>
<td>Coke</td>
<td>18.75</td>
<td>8.44</td>
</tr>
<tr>
<td>14</td>
<td>Cement</td>
<td>22.50</td>
<td>67.5</td>
</tr>
<tr>
<td>15</td>
<td>Tar</td>
<td>18.75</td>
<td>2.66</td>
</tr>
<tr>
<td>16</td>
<td>Crude Benzol/BTX</td>
<td>30.00</td>
<td>1.23</td>
</tr>
<tr>
<td>17</td>
<td>Sulphur Paste</td>
<td>45.00</td>
<td>0.41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>755.88</strong></td>
</tr>
</tbody>
</table>

**Table 8-2:** Design ship dimensions for bulk liquid (chemicals)

Therefore for an estimated traffic of around **31 million tonnes** annually, revenue to MMB would be around **Rs. 755.88 million** as wharfage charges. In addition applicable port dues and lease rent for land and Inter-tidal land (ITZ) will be payable to MMB. It is also planned to handle cargo of opportunity for third parties from this jetty, which will provide additional income to MMB.
9. Any other relevant information

JSWSPPL is committed to provide for the following schemes as their corporate social welfare contribution:

1. Creation of jobs, both direct and indirect.
2. Medical facilities including OPD services for nearby villages.
3. Educational institution for locals.
4. Rainwater harvesting in the area and providing excess fresh water to neighboring villages, free of cost.
5. Welfare measures for fishing community/locals in consultation with the gram panchayat and community heads.
10. Recommendations

10.1. Recommendations

With due considerations to the site conditions, project requirements, bathymetry and topography of the region, the site is considered suitable for expansion of captive jetty to meet the requirements of import of raw material and export of finished goods totaling to about 31 million tonnes.

The expansion plan of the jetty will form the nucleus for further development of the region. M/s JSWIL and JSW Steel have the expertise in this field as well as the financial strength for augmentation of captive jetty facilities as well as the plant.

Detailed investigations on the coastal, marine and meteorological aspects will need to be undertaken for detailed designing and refinement of project components at DPR stage.

As can be seen from the details as given in preceding chapters, this project of expansion of captive jetty facilities is technically and economically viable.

JSW is known for its commitment in fulfilling its corporate social responsibilities wherever they undertake projects. The CSR activities at Salav/Revdanda will be beneficial in the overall development of the region.

Apart from the cost benefit analysis from economic considerations, the project has considerable social cost benefits. The proposed project will have major impact on the social and economic upliftment of the region and provide an impetus for overall improvement in living standards by creation of new jobs, increase in volume of general trade, and general
improvement in infrastructure facilities with a better transport and communication network.

The project has obtained approval of MMB/Government of Maharashtra for a waterfront of about 500 m with a backup area of reclaimed land of about 100 acres on lease for a period of 30 years.