FEASIBILTY REPORT

FOR

MECHANIZATION OF EXISTING OPERATIONAL BERTHS IN THE EASTERN & CENTRAL DOCK

AND

EXPANSION OF INNER HARBOUR INCLUDING DEVELOPMENT OF WESTERN DOCK

MECHANIZATION OF EXISTING OPERATIONAL BERTHS IN THE EASTERN & CENTRAL DOCK

Executive Summary

Paradip Port Trust (referred to as "PPT" or the "Client") has engaged the services of M/s Feedback Infra Private Limited (referred to as "FIL" or the "Consultants"), for providing Transaction Advisory services spanning legal, technical and financial advisory for PPP projects being undertaken at the Paradip Port for a period of 3 years. As part of the mandate, the Consultants' mandate includes development of a Techno-Economic Feasibility Report for Mechanization of EQ-1 to EQ-3 on PPP Basis (referred to as the "Project"). In fulfillment of the requirements of the Paradip Port Trust, the Consultants have undertaken the study based on information shared by Paradip Port Trust, analysis of information available in the public domain and publicly available guidelines on Port Operations.

The Project aims at mechanization of the currently operational EQ-1 to EQ-3 berths at Paradip Port, for a capacity of 30 MTPA (approximately). Current capacities and overall traffic handled at the berths are listed in the table 1 below:

Table 1: Current Berth Capacity and Traffic - EQ-1 to EQ-3

Berth	Traffic Handled 2014-15 (MT)	Traffic Handled 2013-14 (MT)	Traffic Handled 2012-13 (MT)	Traffic Handled 2011-12 (MT)
EQ-1	2.54	1.96	1.33	1.77
EQ-2	2.74	2.52	1.87	1.32
EQ-3	2.76	3.19	3.27	3.45
Total	**8.04**	**7.67**	**6.47**	**6.54**

Source: Paradip Port Trust

Paradip Port Trust had, in 2011, been in discussion with M/s Mahanadi Coalfields Limited and M/s Mahaguj Collieries Limited for development of a Captive Coal Terminal at the EQ-1 to EQ-3 location, with a capacity of about 22 MTPA. In order to evaluate the feasibility of the same, a study was conducted, for the development of a dedicated coal terminal. The study at the time was conducted under the aegis of M/s Mahaguj Collieries Limited.

In view of subsequent developments in Coal consumption in South India, mainly being served by mines in the Talcher Region, Paradip Port Trust is desirous of investigating the feasibility of developing a 30 MTPA capacity terminal on PPP basis at the EQ-1 to EQ-3 location. Under the Consultant's mandate in assisting Paradip Port Trust in all PPP Transactions, a techno-economic feasibility assessment of Mechanization of EQ-1 to EQ-3, with a capacity of 30 MTPA has been undertaken.

In order to assess the Techno-Economic feasibility the Consultants undertook the following studies/analyses:

- Traffic Forecasting for the terminal across various scenarios
- Tariff Assessment based on applicable tariffs at Paradip
- Revenue Forecasting based on the traffic and applicable tariffs
- Functional planning/Facility Planning based on discussions with Paradip Port Trust
- Cost Assessment – Operating Costs and Capital Costs

- Financial Modeling and Returns Assessment

A summary of the findings of the report is indicated in this section of the report:

Traffic Assessment

Traffic for the mechanized terminal was estimated based on analysis of historical coal production all over India. The consultants determined the overall coal production across India and determined Paradip Port's Outbound Coal Traffic share as a percentage of overall coal production in the country. Additionally, the Consultants undertook stakeholder consultations and secondary research to determine the additional coal production plans in the Talcher region – which forms the most immediate hinterland for coal generation, for Paradip Port Trust.
The consultants segregated the outbound coal traffic to factors influenced by two parameters – All India coal production growth and rapid growth in the Talcher Region owing to the plans of Mahanadi Coalfields Limited – which presents the major traffic driver for outbound coal at Paradip Port over the medium term, providing high amounts of coal to power plants in South India. Traffic projections for the terminal adjust for the current capacity of the Mechanized Coal Handling Plant at Paradip, which is expected to remain operational for the foreseeable future. Two scenarios have been generated with regards to Coal Traffic projections, based on the plans for coal production in the Talcher region.

Details regarding the assessment methodology and the key assumptions are listed in subsequent sections of this report.

Summary of Traffic Potential for Paradip Port, as estimated by the Consultants is:

Particulars	2017	2020	2021	2022	2023	2024	2025
Coal Traffic (Scenario 1)	30.24	41.18	43.23	45.40	47.67	50.05	52.55
Coal Traffic (Scenario 2)	44.64	64.99	68.24	71.65	75.23	78.99	82.94

Based on the traffic analysis conducted, given that the traffic at Paradip will be in excess of 50 MTPA in the medium term, creation of a facility capable of handling approximately 30 MTPA of Outbound Thermal Coal can be envisaged at Paradip Port, given that the current capacity is about 21 MTPA (for the MCHP). This mechanization project aims to achieve exactly the same. The Consultants assume that additional potential (over and above the capacity) can be catered to through additional developments in the medium term future.

Tariff Assessment

The Tariffs applicable at the mechanized terminal have been estimated according to Revised "Guidelines for Determination of Tariff for Projects at Major Ports, 2013", notified on 30th September. The revised TAMP guidelines permit port trusts to adopt the highest tariff approved for the same commodity under the same port trust or adopt a tariff based on the 2008 guidelines of the same commodity under any other port trust by giving due justification. Accordingly the tariff of the (under implementation) Deep Draught Coal Berth (under concession with M/s Essar Ports Limited) at

PPT has been adopted and indexed as per TAMP norms. The same has been passed by TAMP on 21st February 2014 vide No. TAMP/12/2014–PPT

Revenue Assessment

Revenues accruable to the project have been evaluated using the traffic available to the terminal – based on its capacity envisaged (30 MTPA) and the Tariffs as calculated as part of the Tariff Assessment module.

Functional Planning/Facility Planning

The Consultants, under discussion with key stakeholders at Paradip Port Trust, have determined a general functional plan for development – keeping in view the following

- Inbound coal at the Port, based on an assessment of the upgrade of Rail Line capacity (through the implementation of the Intermodal Block Signaling System (IBSS)) along the Talcher – Paradip Rail link which will increase the line capacity to handle additional 25-26 rakes per day
- Rake unloading capacity, through the development of an additional rail line between the station and the stackyard
- Consideration of two 12 wagon length track hoppers, which will be adequate to handle the target traffic comfortably
- Development of an underground and over ground conveyor system to move coal from the rake hoppers to the relevant stack yard or vessels
- Determination of envisaged stack yard area and the capacity of the same to cater to the requirements of 30 MTPA throughput of outbound coal
- Determining feasibility of coal handling systems at the berth – based on current berth design and installation of 6500 TPH ship loaders
- Estimation of expected parcel size of ships that will call at the port in the future, based on the draught and turning circle related constraints at the Port

Based on the same, the Consultants have determined that, with mechanization as outlined in this report (listed in greater detail in subsequent sections), handling 30 MTPA of outbound coal is possible at the terminal.

Summary of equipments required for mechanization are provided in the tables below:

Table 2: Equipment Summary

Equipment	Number/Length	Remarks
Track hopper	2 Nos	12 Wagon Length each
Belt feeder	2 sets	
Incoming conveyor- underground	8700 m	Includes underground, over ground, despatch and secondary conveyors as detailed previously (5000 TPH receiving and 6500 TPH reclaiming/despatch capacity)
Incoming conveyor- over ground		
Incoming secondary conveyor		
Stockyard and Dispatch conveyor		
Stacker reclaimers	4 Nos	Stacking Capacity 5000 TPH Reclaiming Capacity 6500 TPH
Reclaimers	2 Nos	Reclaiming Capacity 6500 TPH
Ship loader (6500 TPH)	2 Nos	6500 TPH Capacity

Note: All the above equipment shall have a capacity ranging from 4000-6500 TPH to meet the above requirement of 30 MTPA terminal. For the purpose of this report, we have considered above required equipments.

Construction Phase

Paradip Port Trust has decided to permit the Concessionaire to facilitate Cargo handling in the EQ – 1, 2, 3 berths during the Construction Phase and collect the wharfage charges from the users as per the prevailing Scale of Rate (SOR) of Paradip Port. The entire berth length of 686 meters would be handed over to the concessionaire on the appointed date. The Concessionaire can start the extension activity in one half of the entire berth length and shall facilitate cargo handling on the remaining half and once the extension is completed in the first portion the concessionaire can handle ships on the same while doing extension activity on the remaining portion of the berth.

PPT has further decided that after the completion of the Project Facilities related to the Project and the submission of the "Completion Certificate" by the Independent Engineer, the Concessionaire will be allowed to handle only thermal coal exports as envisaged under this Project and collect charges as per the tariff approved by Tariff Authority of Major Ports (TAMP).

During the Construction Phase, the Concessionaire shall pay PPT a Revenue Share i.e. "Royalty" as agreed in the Concession Agreement.

Project Costs

Based on the mechanization requirements and determination of costs for relevant works and equipments, based on expert opinions, from PPT inputs and other key inputs, the Consultants have evaluated the cost of implementation of the project as listed below:

Capex Head	Cost (INR cr)
Preliminary Works	0.86
Quay or Berths	56.04
Yard Development & Railways	119.29
Buildings	3.55
Electrical Works	77.50
Other Utilities	21.40
Equipments	731.63
Total Construction Costs	**1,010.28**
DC, PMC, LIE, IE Services, Loan Fees	80.06
Overall Contingency	29.29
Escalation (due to price inflation, taken at 4.5% per annum)	151.28
Total Hard Capex	**1,270.91**
Total IDC (Capitalized Interest)	141.85
Total Project Cost for Concessionaire	**1,412.76**
Add, Dredging cost (to be done by PPT)	25.00
Total Project Cost	**1437.76**

Operating costs for the project have been evaluated using Guidelines issued by the TAMP and based on benchmarks available with the Consultant – vis-à-vis key cost elements for Coal Terminals.

Financial Viability Assessment

Based on the fund inflows and outflows for the project, the Consultants have evaluated the financial viability of the project under the two traffic scenarios generated and the two capital expenditure scenarios generated. The Project has been determined to provide sufficient returns to attract private sector interest for investment. The project also offers substantial revenue share opportunities for the Paradip Port Trust.

Key financial highlights, as determined from the financial evaluation of the project are listed in the Table below:

Return Parameter	Scenario 1	Scenario 2
Post Tax Project IRR (Standalone)	22.47%	26.43%
Post Tax Equity IRR (Standalone)	29.32%	39.62%
Economic IRR	27.12%	33.27%

Note: The financial viability of the project has been evaluated after considering the revenue generation from partial operations of the berths for handling general cargo during the Construction Phase.

Project Introduction

Overview of Odisha's economy

As per the 2013 Economic Survey of Odisha, Odisha's economy has grown, in real terms at 2004 - 05 prices at the rate of 9.14 percent during 2012-13 over 2011-12. The state's economy continues to be on a high growth trajectory with a marked shift in the economic structure – from an agriculture based economy to an industry-led and service-led economy. The industry sector which includes manufacturing, mining and quarrying and electricity-gas-water supply contributes about 25% to Odisha's GDP. The agriculture sector contributes 17.5% and the balance 57.5% is contributed by the service sector.

With several large scale investments in the pipeline, Odisha is targeting immense industrial growth over the next few years and subsequently also planning expansion of its infrastructure.

Overview of Paradip Port

Located close to the mineral rich states of India, Paradip Port is the first major port on the East Coast to be commissioned after independence. The port is the only major port in the state of Odisha and is strategically located between Haldia and Visakhapatnam.

Paradip Port serves a vast hinterland spreading over the states of Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, Uttar Pradesh, Bihar and West Bengal. The port is the largest handler of thermal coal traffic in India and also handles substantial quantities of POL, iron ore and coking coal.

Executive Summary

Paradip Port Trust (referred to as "PPT" or the "Client") has engaged the services of M/s Feedback Infra Private Limited (referred to as "FIPL" or the "Consultants"), for providing Transaction Advisory services spanning legal, technical and financial advisory for PPP projects being undertaken at the Paradip Port for a period of 3 years. As part of the mandate, the Consultants' mandate includes development of a Techno-Economic Feasibility Report for Mechanization of CQ-1 to CQ-2 (Central Quay 1 and 2) on PPP Basis (referred to as the "Project"). In fulfillment of the requirements of the Paradip Port Trust, the Consultants have undertaken the study based on information shared by Paradip Port Trust, analysis of information available in the public domain and publicly available guidelines on Port Operations.

The Project aims at mechanization of the currently operational CQ-1 and CQ-2 berths at Paradip Port, for a capacity of approximately 20 million tons per annum of import cargo. Current capacities and overall traffic handled at the berths are listed in the table below:

Table 1: Current Berth Capacity and Traffic handled – CQ 1 & CQ 2

Berth	Current Capacity (MTPA)	Traffic Handled 2014-15 (MT)	Traffic Handled 2013-14 (MT)	Traffic Handled 2012-13 (MT)
CQ-1	3.68	3.23	3.89	3.58
CQ-2	5.48	3.07	3.61	3.15
Total	**9.16**	**6.30**	**7.50**	**6.73**

Source: Paradip Port Trust

Need for the Project

At present, Paradip Port back loads on an average, 16 rakes per day manually with the help of pay loaders. The average turnaround time for the rakes is high which results in huge demurrage charges to be paid to the Railways. Further, the overall efficiency of the port remains low because of slow evacuation of the cargo. The CQ - 1 and CQ - 2 berths are being dredged to a draught of 14.5 meters for handling vessels up to 90,000 DWT. The quick turnaround of ships and from these two berths will increase cargo handling efficiency and attract more users to Paradip port.

The present practice followed is to deploy harbour mobile cranes for unloading imported coking as well as non coking coals from the vessels to the jetty and from the jetty it is transported by intra – port trucks to the various loading points. At the loading points, the wagons are generally loaded using pay loaders. Thus, the entire process takes a very long time and drastically reduces the overall efficiency of cargo operation.

In order to address these problems and improve the present efficiency of cargo operation, it is essential to mechanize CQ-1 and CQ-2 berths for unloading the vessels carrying imported cargoes like coking as well as non coking coals, limestone and flux materials etc. by using high capacity ship unloaders and then carrying the cargo through conveyor to the loading points.

The berths are being designed for handling import of four commodities – coking coal, thermal coal, limestone and dolomite. The target industries are steel and thermal power plants. Considering the increasing import dependency of these two industries for these commodities and the available facilities at CQ 1 – 2 berths, the projected terminal capacity has been estimated at 20 million tons.

Project Feasibility

In order to assess the Techno-Economic feasibility the Consultants undertook the following studies/analyses:

- Traffic Forecasting for the terminal across various scenarios
- Tariff Assessment based on applicable tariffs at Paradip
- Revenue Forecasting based on the traffic and applicable tariffs
- Functional planning/Facility Planning based on discussions with Paradip Port Trust
- Cost Assessment – Operating Costs and Capital Costs
- Financial Modeling and Returns Assessment

A summary of the findings of the report is indicated in this section of the report:

Traffic Assessment

Traffic was assessed for four commodities proposed to be handled at the mechanized terminal i.e. Coking Coal, Thermal Coal, Limestone and Dolomite.

Traffic for the mechanized terminal was assessed using two methods – Top down and Bottom up Assessment. Under the Top Down assessment, we analyzed the past trends in the consumption of the above four commodities in respect of the general economic growth, steel and coal production and consumption growth, trends in imports of the above 4 commodities across India and in Paradip. Based on past trends and expected future scenario including competition, expected growth in GDP, expected consumption levels and available cargo handling capacity at the port, the traffic was projected for the port as well as the CQ 1 – 2 berths.

In the Bottom Up Assessment, we analyzed the expected demand for the above 4 commodities taking into consideration the capacity expansion plans for coal based thermal power plants and steel manufacturers in the port's hinterland for the next 5 – 6 years post which we expected the growth in steel and thermal power production to be in line with past trends. Based on these observations and assessment, we determined the demand for the above 4 commodities in the hinterland and projected the expected traffic at CQ 1 – 2 berths taking into consideration competition from neighbouring ports as well as the existing and future berths in Paradip port currently handling/expected to handle these commodities.

Under both scenarios, we considered two scenarios – Realistic and Optimistic Scenario. The difference between these scenarios is the expected future growth rate in GDP. Since steel and coal production as well as consumption are closely related to GDP growth rates, any change in the GDP growth is likely to affect the demand for these commodities as well as the need for import of the above 4 commodities planned for handling at the terminal.

Based on the expected future scenario, the traffic assessed under the Bottom up assessment methodology has been considered. The details regarding the assessment methodology and key assumptions for the same are listed in the subsequent sections of this report.

The traffic for the CQ 1 – 2 project under the Bottom up assessment method can be summarized in the below table.

Table 2: Traffic Projection for the CQ 1 – 2 berth in million tons – Scenario 1

Particulars	2020	2025	2030	2035	2040	2045	2050
Coking Coal Imports	3.94	5.02	6.40	7.52	8.34	9.13	9.86
Thermal Coal Imports	10.00	10.00	10.00	9.21	8.02	6.89	5.84
Limestone Imports	1.25	1.60	2.04	2.39	2.66	2.91	3.15
Dolomite Imports	0.46	0.58	0.74	0.87	0.97	1.06	1.15
Total	15.64	17.20	19.18	20.00	20.00	20.00	20.00

Table 3: Traffic Projection for the CQ 1 – 2 berth in million tons – Scenario 2

Particulars	2020	2025	2030	2035	2040	2045	2050
Coking Coal Imports	3.94	5.26	7.00	8.00	8.96	9.84	10.63
Thermal Coal Imports	10.00	10.00	9.96	8.52	7.14	5.86	4.74
Limestone Imports	1.25	1.67	2.23	2.55	2.86	3.14	3.40
Dolomite Imports	0.46	0.61	0.81	0.93	1.04	1.15	1.24
Total	15.64	17.55	20.00	20.00	20.00	20.00	20.00

Based on the traffic analysis conducted, it can be observed that the creation of a facility capable of handling 20 MTPA of inbound traffic is feasible at Paradip port. This mechanization project aims to achieve the same. The Consultants assume that additional potential (over and above the capacity) can be catered to through additional developments in the medium term in the future.

Tariff Assessment

The Tariffs applicable for the current project have been estimated according to Revised "Guidelines for Determination of Tariff for Projects at Major Ports, 2013", notified on 30th September. Revised TAMP guidelines permit port trusts to adopt the highest tariff approved for same commodity under same port trust or adopt 2008 guidelines based tariff of same commodity under any other port trust by giving due justification. Accordingly for coal products, the tariff of (under implementation) Deep Draught Coal Berth (Under concession with M/s Essar Ports Limited) at PPT has been adopted and indexised as per TAMP norms.

Due to non-availability of 2008 guidelines based tariff for Limestone and Dolomite, PPT adopted the tariff and performance standards notified for same commodity in nearby port i.e. Vizag Port Trust. The said tariff notification has been approved by TAMP vide Case No. TAMP/51/2012-VPT, on 26th February 2013. Accordingly, the referred has been indexised by 4.53% as per TAMP indexation norms, as the referred tariff has been notified prior to April 1st, 2013. Further as the referred notification of VPT does not have tariff specific to Dolomite, PPT adopted the tariff and performance standards of Limestone as the size, type, nature of Dolomite are similar to Limestone.

Tariff escalation has been estimated based on WPI Inflation rate of 5%, based on consensus estimates of WPI inflation in the country over the medium term. As per TAMP Guidelines, only 60% of the impact of WPI inflation has been considered on Tariffs, on an annual basis.

Revenue Assessment

Revenues accruable to the project have been evaluated using the traffic available to the terminal – based on its capacity envisaged (20 MTPA) and the Tariffs as calculated as part of the Tariff Assessment module.

Functional/Facility Planning

The consultants, under discussion with key stakeholders at Paradip Port Trust, have determined a general functional plan for development. This functional plan is based on the concept note developed for the project.

The CQ 1 – 2 mechanization has been proposed keeping in mind the present cargo handling system, which is largely manual intensive and takes a very long time that reduces the overall efficiency of cargo operation.

In order to address these problems and improve the present efficiency of cargo handling, it is necessary to mechanize CQ – 1 and CQ – 2 berths for unloading the vessels carrying imported cargoes like coking as well as non coking coals, limestone and flux materials etc. by using high capacity ship unloaders and then carrying the cargo through conveyor to the loading points. Total area of stackyard is approximate 259,584 sq meters with net storage area is around 200,000 sq meters (excluding area of equipment and other structures). The stackyard is located near Indira Park and has been divided in 3 patches to store multiple verities of cargo. The stackyard is proposed to have two silos, each of capacity 2,000 tons each with rapid loading system fitted at the bottom for in motion loading of BOBRN as well as BOXN wagons. The location of the stack yards is such that BOBRN wagons can be loaded on the northern side by using the empty rakes generated in the Mechanical Coal Handling Plant and on the southern side, the other silo can be utilized for loading BOXN wagons which are generated from the wagon tippler of IOHP as well as other manual unloading sidings of the port. It can be utilized for loading of empties, if any, provided by the East Coast Railways.

Each rapid loading with silo will be capable of loading a full empty rake maximum within 1 hour. Thus, the expected capacity from each silo will be atleast 10 rakes per day. To feed 10 rakes per day per silo, at least 4 ship unloaders should be deployed in CQ 1 and 2 berths having an unloading capacity of atleast 2500 TPH. From CQ – 1 and CQ – 2 berths, 2 conveyors having capacity of 5000 TPH each will carry the coal via transfer points to the stack yards.

The twin conveyors will have the 1st drive house on the Northern side of the existing transfer tower of M/s. Essar near CQ – 3 berth. From there, the conveyors will be laid in the North-Western direction around 515m and cross M/s. Essar as well as M/s. IFFCO conveyors near to proposed stack yards. Each stack yard will have a junction house to direct the cargo to the stack yards as well as receive the cargo from the stack yard by the process of reclamation. Just after the junction house, there will be a transfer point with a single conveyor having dual drives to charge the silo. In the 1st junction house, provision will also be kept to connect the 2nd junction house so that there will be flexibility between the 3 stack yards and the 2 systems i.e. cargo can be reclaimed from any stack yard for charging into any silo.

Summary of equipments required for mechanization are provided in the tables below:

Table 4: Equipment Summary

Equipment	Number/Length	Remarks
Ship unloaders	4	2500 TPH each
Stacker cum Reclaimers (4000 TPH)	2	one between stackyard 1&2 and another between stackyard 2&3
Stackers	2	1 for stack yard 1 and 3
Conveyor system	12,000 meters	Total length including from berth to each stack yard and/or to the silo directly
Conveyor Gallery	12,000 meters	To support the conveyor system
Silo with rapid loading system	2	2000 Ton capacity silo with facility for loading cargo from the silo to the rake
Reclaimers	2	For arranging cargo in the stack yard. one between stackyard 1&2 and another between stackyard 2&3
Foundation for stacker – reclaimer	1	To support to stacker – reclaimer at the stack yard

Construction Phase

The Concessionaire shall facilitated cargo handling in the CQ – 1 and CQ – 2 berths during the Construction Phase and collects only wharfage charges from the users as per the prevailing Scale of Rate (SOR) of Paradip Port. The entire berth length of 485 meters would be handed over to the concessionaire on the appointed date. The Concessionaire can start the mechanization activity related to project and shall facilitate cargo handling on the berth.

PPT has further decided that after the completion of the Project Facilities related to the Project and the submission of the "Completion Certificate" by the Independent Engineer, the Concessionaire will be allowed to handle only thermal coal, coking coal, dolomite and limestone for imports as envisaged under this Project and collect charges as per the tariff approved by Tariff Authority of Major Ports (TAMP).

During the Construction Phase, the Concessionaire shall pay PPT a Revenue Share i.e. "Royalty" as agreed in the Concession Agreement.

Project Costs

Based on the mechanization requirements and determination of costs for relevant works and equipments, based on expert opinions, from PPT inputs and other key inputs, the Consultants have evaluated the cost of implementation of the project as listed below:

Table 5: Capital Expenditure Summary

Capex Head	Cost Rs. Crore
Preliminary Works	0.66
Quay or Berths	7.12
Yard Development & Railways	49.48
Buildings	2.74

Electrical Works	59.68
Other Utilities	16.48
Equipments	620.49
Total Construction Costs	756.64
DC, PMC, LIE, IE Services, Loan Fees	37.83
Overall Contingency	22.70
Escalation (due to price inflation, taken at 4.5% per annum)	194.78
Total Hard Capex	1011.95
Total IDC (Capitalized Interest)	91.47
Total Project Cost	**1103.42**

Operating costs for the project have been evaluated using Guidelines issued by the TAMP and based on benchmarks available with the Consultant – vis-à-vis key cost elements for Coal Terminals.

Financial Viability Assessment

Based on the fund inflows and outflows for the project, the Consultants have evaluated the financial viability of the project under the two traffic scenarios generated and the two capital expenditure scenarios generated. The Project has been determined to provide sufficient returns to attract private sector interest for investment. The project also offers substantial revenue share opportunities for the Paradip Port Trust.

Key financial highlights, as determined from the financial evaluation of the project are listed in the Table below:

Table 6: Project Viability Summary

Return Parameter	Scenario 1	Scenario 2
Post Tax Project IRR (Standalone)	23.84%	24.22%
Post Tax Equity IRR (Standalone)	38.65%	39.49%
Post Tax Economic IRR (Standalone)	28.30%	28.74%

EXPANSION OF INNER HARBOUR INCLUDING DEVELOPMENT OF WESTERN DOCK

Expansion of PPT Inner Harbour facilities to handle capesize vessels including development of Western Dock

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Paradip Port Trust is the second largest Major Port of India and it handled 89.60 MT of cargo during 2016-17. The harbour basin is protected by two breakwaters, viz. south breakwater which is approximately 1217 m long and the north breakwater which is approximately 538 m long. The approach channel, which is approximately 9,800 m long and 300 m wide, is dredged to a depth of 18.7 m CD. The entrance channel is 2,200 m long and 240 m wide and 17.1 CD m deep. The port has a turning circle with a diameter of 520 m. The existing berth facilities at Paradip port are situated in the east and central docks. The eastern dock has three general cargo berths, including one iron Ore and two coal berths. The central dock has three multipurpose berths including two fertilizer berths along with one multipurpose berth. Three offshore Single Point Mooring (SPM) Buoys of IOCL of 37 MTPA are operational to handle Very Large Crude Carrier (VLCC) up to 3, 50,000 DWT size.

PPT proposes to further augment its port infrastructure to handle the future projected traffic – mainly in respect of Crude oil (POL), Iron ore, Thermal coal and Coking coal. As a part of the augmentation programme, it is proposed to expand the inner harbour facilities to handle capesize vessel including development of Western Dock and to deepen the navigational channel as follows to cater to 185,000 DWT vessels.

Description	Details	Existing	Proposed
Approach channel	Length	9800 m	9800 m
	Width	300 m	300 m
	Deep	-18.7 m	-21.2 m
Entrance channel	Length	2200 m	2200 m
	Width	240 m	240 m
	Deep	-17.10 m	-19.8 m
New Turning circle	Diameter	--	600 m

The proposed expansion of work includes 500m extension of the south breakwater which will provide tranquility in the approach channel for the required stopping distance to vessels of sizes up to 185,000 DWT.

A borehole survey has been conducted and further, numerical modeling based on PLAXIS has been carried out to analyze the stability of navigation channel as well as the settlement of breakwaters in particular where, the

channel runs in the close vicinity of the breakwaters. From the detailed study, it is noted that the resultant stress distribution from the superposed loads due to breakwaters will not affect the stability of the proposed deepening of the navigation channel. However, in case if it is felt that a sheet pile type protection is required during dredging to protect the breakwater, a sheet pile wall can be provided for 200m length of channel.

The Western Dock is proposed to be developed on the new captive berth policy of the Govt. of India for Port Dependent Industries.

The key features of the Western Dock are as under:

- Dock Dim:400X300X 18m draft
- No. of Berths: 2
- Backup stack yard area of over 40 Ha.
- Dry Bulk Cargo handling in Cape Size Vessel upto 1,85,000 DWT

With commissioning of above inner harbour facilities, the capacity will be created to the tune of 30 MTPA handling cape size vessels up to 18 mtrs. draft (dredging in the outer approach channel- (-) 21.2 metrs, inner basin- (-)19.8 mtrs.)

SCOPE OF WORK & ESTIMATIVE COST OF INNER HARBOUR DEVELOPMENT:

INDICATIVE COST:

Total Expenditure for Capital Dredging(16.23 Million Cum.)	Rs. 325 Cr.
Extension to Breakwaters (500 mtrs.)	Rs. 300Cr.
Protection works to Breakwaters & ancillary works (L.S.)	Rs. 100 Cr.
Capital Cost(approx.) to PPT	**Rs. 725 Cr.**
Western Dock on Captive Basis	**Rs. 1275Cr.**
Total Cost	**Rs. 2000 Cr.**

However, considering the common components with the earlier approved ToR for the Outer harbour, the estimated cost of the inner harbour development actually works out as follows:

Expenditure for Capital Dredging (8.0 Million Cum.)	Rs. 160 Cr.
Extension to Breakwaters (500 mtrs.)	Cost included in Outer Harbour
Protection works to Breakwaters & ancillary works (L.S.)	Rs. 100 Cr.
Capital Cost(approx.) to PPT	**Rs. 260 Cr.**
Western Dock on Captive Basis	**Rs. 1275 Cr.**
Total Cost	**Rs. 1535 Cr.**