Corrigendum – I

No. SMPK/KDS/MARINE/RFQ/

Dated: 13-JULY-2022

Name of work - **"**Setting up of Floating Crane Facilities to increase lightening / topping up of cargo and Container at Diamond Harbour / other deep draft locations in the limit of Syama Prasad Mookerjee Port, Kolkata".

RFQ No. SMPK/KDS/MARINE/RFQ/175; Dated: 20-JUNE-2022

Reference to subject tender, please find the followings vide this **CORRIGENDUM-I:**

I) TECHNO ECONOMIC FEASIBILITY REPORT (TEFR)

II) Revised dates for raising pre bid query (as per the format attached in RFQ) and Pre Application conference along with meeting link as mentioned below in annexure-I

III) Pre Application Conference Meeting Link:https://teams.microsoft.com/l/meetup-join/19%3ameeting_NjUyMDM2OWQtNmE5Ni00Y2FlLWJkNDUtZGMyYjUyMDYwZjVm%40thread.v2/0?context=%7b%22Tid%22%3a%2205b5fe2e-db2c-48e5-bfd8-778b75cb0f8e%22%2c%22Oid%22%3a%228d63093d-b343-4753-a325-f75f9cbf2cec%22%7d

As per RFP	**Revised Date**
1.3 Schedule of Bidding Process	
Last date for receiving queries: [14-July-2022] (up to 1700 hrs.)	Last date for receiving queries: [25-July-2022] (up to 1700 hrs.)
Pre-Application Conference: [20-July-2022] (at 12:00 hrs.)	Pre-Application Conference: [27-July-2022] (at 12:00 hr
1.4 Pre-Application Conference The date, time and venue of the Pre-application Conference shall be: Date: 20-July-2022 Time: at 1200 hrs. Venue (Offline / Online): To be updated via corrigendum eventually. Meeting Link	The date, time and venue of the Pre-application Conference shall be: Date: 27-July-2022 Time: at 1200 hrs. Venue (Online): Date: 27-July-2022 Time: 12:00 hrs.

All other terms & conditions and Clauses will remain same as per original.

Director, Marine Department

Syama Prasad Mookerjee Port, Kolkata

Grant Thornton

#GTBharat
SHAPING A VIBRANT INDIA

Techno Economic Feasibility Report

FEASIBILITY STUDY FOR "SETTING UP OF FLOATING CRANE FACILITIES AT DIAMOND HARBOUR/OTHER DEEP DRAFT LOCATIONS IN THE LIMITS OF KOLKATA PORT TRUST FOR A PERIOD OF 15 YEARS"

Content

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Chapter – I "Introduction"

Introduction

Background

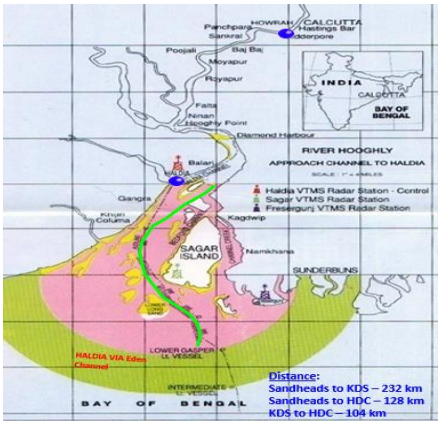
Syama Prasad Mookerjee Port, Kolkata (erst. while Kolkata Port trust) is the gateway to Eastern India for the rest of the world. It is the only riverine major port in the eastern coast of India, situated 232 kms. Up-stream from the Sandheads. It has one of the longest navigational channels in the world. In the 87 kms stretch from Sandheads to Sagar, the vessels are guided through Vessel Traffic Management System (VTMS) of the Syama Prasad Mookerjee Port, Kolkata. Thereafter, at Sagar, the Pilots embark the vessels for pilotage, from where the distance of KDS is 143 kms,

Haldia Dock Complex, a modern dock complex of Syama Prasad Mookerjee Port, Kolkata, was set up in 1977 for handling larger vessels, carrying bulk cargo with optimum economy, keeping Kolkata Dock System primarily for handling break bulk cargo, container etc. The two dock systems of Kolkata Port viz. KDS and HDC are complementary to each other.

Geographically, Kolkata Dock System is situated on the left bank of the river Hooghly in position Latitude of 22°32'53" North and Longitude - 88°18'5" East. Haldia Dock Complex is situated on the right bank of River Hugli in position Latitude of 22°02' North and Longitude 88°06' East.

Kolkata Port has a synergistic linkage with the city of Kolkata with an array of road, railway and inland waterway network connecting all parts of the country. The Port is well connected with national and state highways, railways and national waterways. KDS is connected with NH-6, NH-2 and NH-34 through city roads. NH-41 connects Haldia with NH-6 and rest of the country. KDS is connected to Eastern Railway through Sealdah and Budge Budge Sections. HDC is connected to the South Eastern Railway via Panskura. Kolkata Port is connected to National Waterway No.1 (Ganga), National Waterway No.2 (Brahmaputra) and Waterways through Sundarbans.

Project Objective



The Government of India has been undertaking continuous measures aimed at continuous socio-economic reform in the Country. To this effect, the vision of Government of India also includes Modernisation and upgradation of the Major Port to meet the increasing demand in Export & Import etc. under the self-sustaining models, integrating infrastructure etc. and becoming the world leader in all dimensions.

There has been requirement for the trade & industry to expedite the process of loading & unloading of various Cargo, where in the need of to set up Floating Crane is a vital component to enhance the activities of economic of scale to meet the national & internal benchmark.

In view of the above cargo potential, there is need to set up a floating crane facility at Diamond Harbour for transfer of cargo / containers between mother vessel and barges / daughter vessels. In line with the requirements, SMP has been taking initiatives for Setting up of "Floating Crane Facilities at Sagar/ other Deep Draft Locations in the limits of Syama Prasad Mookerjee Port Kolkata for a Period of 15 Years', considering three anchorages at Diamond Harbour where lighterage/ topping up of cargo operation is proposed to be done for both geared and non - geared vessels. This will enable the trade to bring additional cargo matching with the draft available at Diamond Harbour anchorage.

In order to accomplish the said augmentation and considering the prevailing policies/guidelines, SMP, Kolkata has decided to carry on the Project depending on the feasibility of the Project for PPP mode or other mode, as the case may be.

Need of Study

In hinterland of KDS it has been projected that KDS has potential to handle 90 MMT of cargo subject to availability of draft and capacity. The traffic at SMP, Kolkata has been showing steady growth over last (07) seven years with a CAGR of 6.97%. The cargo traffic at the port is steadily rising and reached 63.98 Million Tonnes in the year 2019-20 from 39.93 Million Tonnes in 2012-13. Only during FY 20-21, cargo volume dropped to 61.36 MMT due to COVID – 19 pandemic. The traffic at SMP, Kolkata for last seven (07) years is shown in Figure A & Figure B.

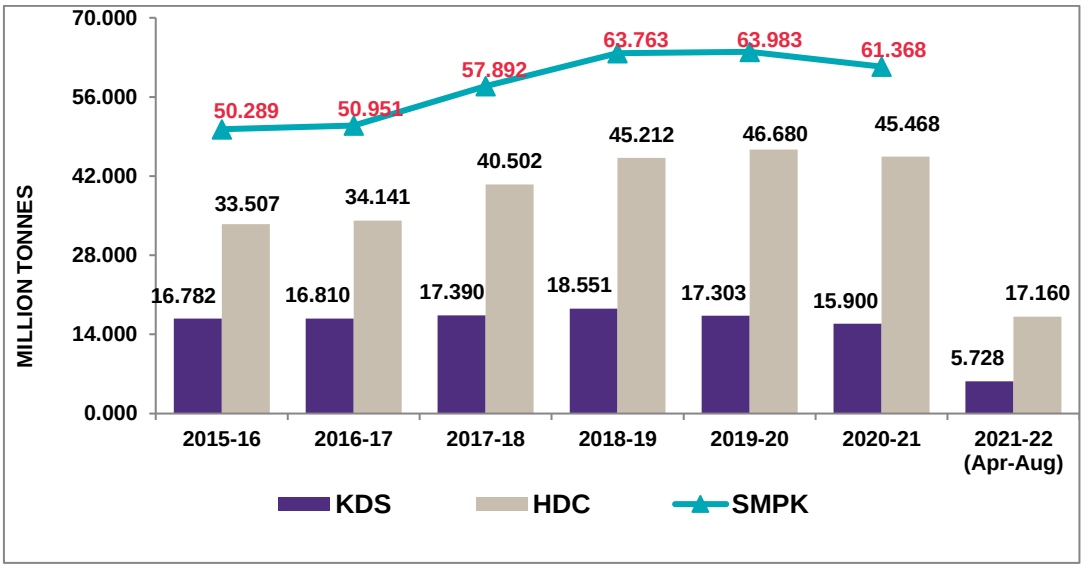


Figure A: Cargo traffic of SMP, Kolkata in past seven (07) years (in MMT)

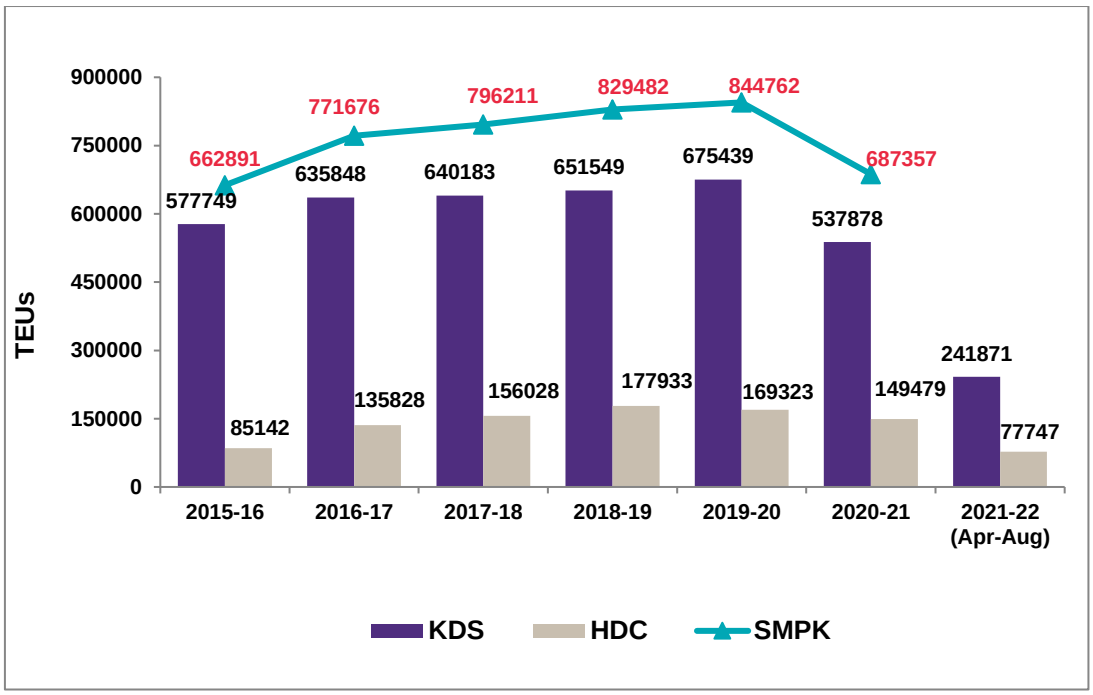


Figure B: Container traffic of SMP, Kolkata in past seven (07) years (in TEUs)

Apart from that, as part of National Perspective Plan of Maritime sector in India under Sagarmala scheme. It is also recommended for implementing long-term capacity augmentation at SMP, Kolkata. The recommendations highlight the need of deployment of floating cranes at anchorages within the water limit of SMP, Kolkata for improvement of overall of the port's operation.

Major Challenges faced at Kolkata Dock System (KDS) are low draft availability, High turnaround time of vessel due to tide limitation resulting lower vessel size & parcel size.

Chapter – II "Meteorological and Oceanographic Details"

Meteorological and Oceanographic Details

Climate

The climate of the anchorage point's area is humid and tropical. It is characterized by a hot and dry summer from March to May, a south-west monsoon or rainy season from June to September, a pleasant post-monsoon or retreating monsoon from October to November and a cool winter from December to February.

KDS: Kolkata has tropical wet and dry climate. The maximum and minimum recorded temperatures are 43.9 C and 6.9 C. The average annual high and low temperature is 31.7 and 22.2 C. During the months of November to February, Kolkata observes winter season with an average low temperatures dropping below 20 C. Similarly average high temperatures rise above 35 C in months of April and May making them the hottest months in year.

Wind

The annual mean wind speed at Kolkata is around 4.7 km/h with the mean monthly wind speed ranging between 2.3 km/h (during December) and 7.7 km/h (during May). Wind speed is relatively high during the summer months of March to May (mean monthly being 5.0 - 7.7 km/h) and during the monsoon months of June to September (mean monthly being 4.4 - 6.6 km/h). During the post monsoon and winter months of October to February the wind speed is relatively low (mean monthly being 2.3 - 3.5 km/h).

Rainfall

The total annual mean rainfall received at Kolkata is about 1,686 mm. Rainfall peaks during the month of July (mean monthly being about 331 mm) followed by September (mean monthly being about 312 mm) with the four monsoon months (June to September) contributing about 69% (about 1170 mm) of the total annual rainfall, whereas contribution during May and October are about 13% and 12% of the total respectively. The rest six months (November to April) together contributes only 6% of the total. Rainfall is lowest in January. Total number of rainy days is about 84 days per annum.

Temperature

In Kolkata, the maximum (35.0°C) of the mean daily maximum temperatures has been recorded during May and the minimum (14.0°C) of the mean daily minimum temperatures recorded during January. In the summer months including June (March-June), the mean daily maximum temperature ranges between 33.5 to 35.4°C and in the winter months (December-February), the mean daily minimum temperature ranges between 14.0 to 17.3°C. The annual averages of maximum and minimum mean daily temperatures are 31.6°C and 22.3°C respectively.

Extreme Events

Cyclone

Historically the east coast of India has observed more frequent cyclones than the west coast. In IMD database since 1945, there are 110 cyclonic storms passed within 300 KM form Kolkata Dock System and Haldia Dock Complex. The most severe storm observed was in 2007. The storm has the maximum wind speed of 260 km/hr. Figure B showcases the track of cyclones making landfall from 2003-17 near project site. In the period of last 15 years, there has been only 3 severe cyclonic storm and two cyclonic storm passing within 300 KM radius from HDC.

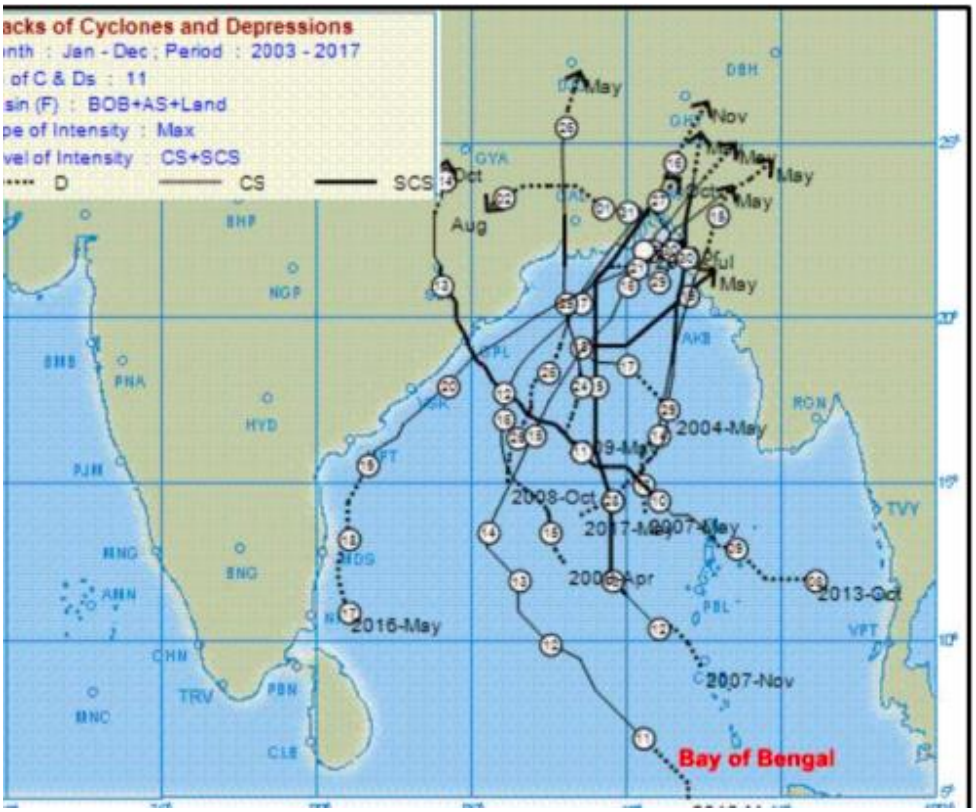


Figure C: Cyclones passing near KDS and HDC during 2003-2018

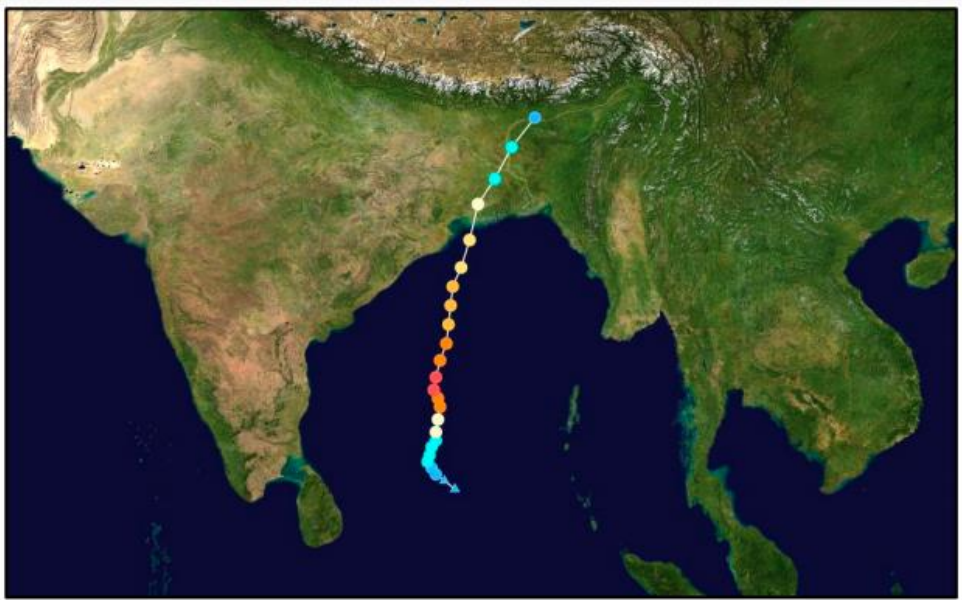


Figure D: Track of Cyclone Amphan

The latest cyclone within the 300 KM radius of the port was Amphan (2020). The cyclone was super cyclonic storm on IMD scale and its peak intensity of 3 minutes sustained wind speeds of 240 km/h (160mph), and a minimum central barometric pressure of 935 mbar (27.32 in Hg). The cyclone made landfall at Bakhali, West Bengal which is about 110 KM from Kolkata. The cyclone produced sustained winds of 112km/h (70mph) and gusts to 190 km/h (120 mph) in West Bengal. Figure C above shows the track of cyclone.

Earthquake

- Kolkata falls under seismic zone III, as per the seismic map of India shown in IS 1893-2016 (part 1)
- Haldia falls under seismic zone III, as per the seismic map of India shown in IS 1893-2016 (part 1)
- Diamond Harbour anchorage under seismic zone III
- Sagar anchorage under seismic zone III

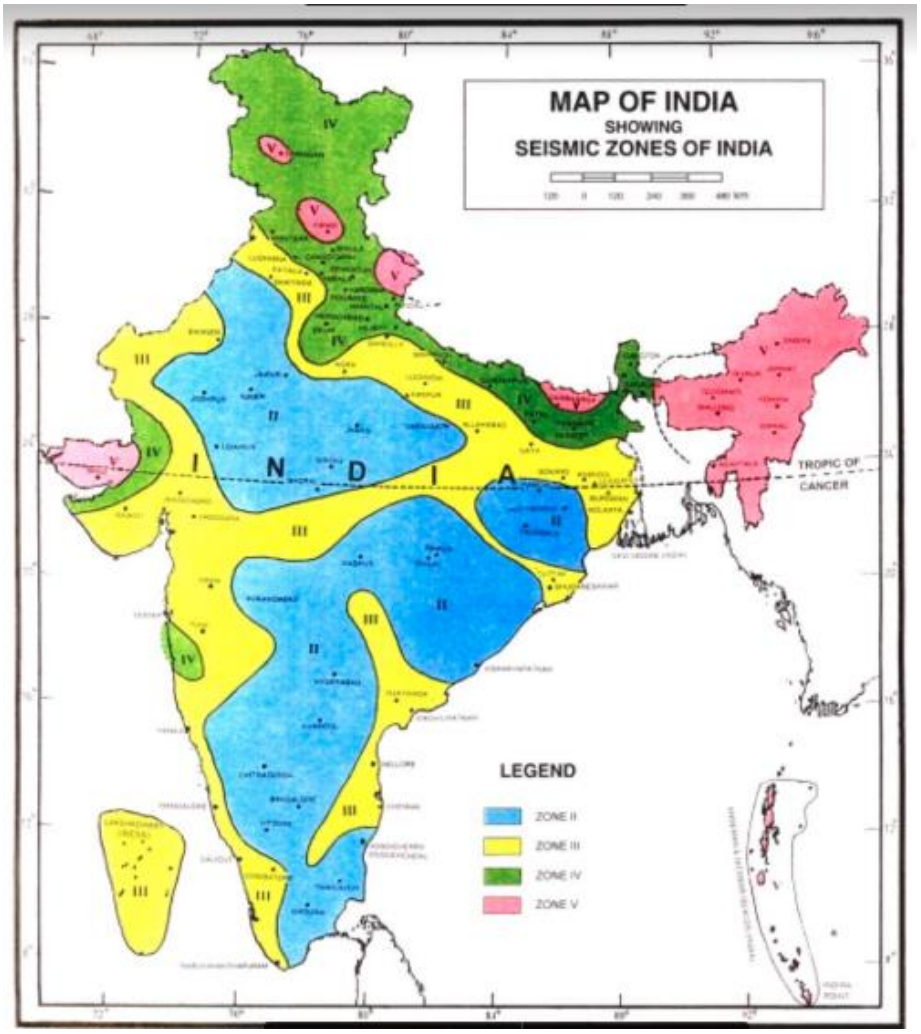


Figure E: Seismic Zones of India as per IS: 1893 Part I – 2002

Connectivity of SMP, Kolkata via Inland Waterways

Inland Waterways Authority of India (IWAI) operates 1620 KM long National Waterway – 1 along the Ganga, Bhagirathi and Hoogly river system. The waterway has 18 floating terminals and 2 Fixed RCC terminals along the course. SMP, Kolkata is strategically connected to NW-I, NW-02 & NW-05 and therefore has potential to attract cargo from Inland Waterways.

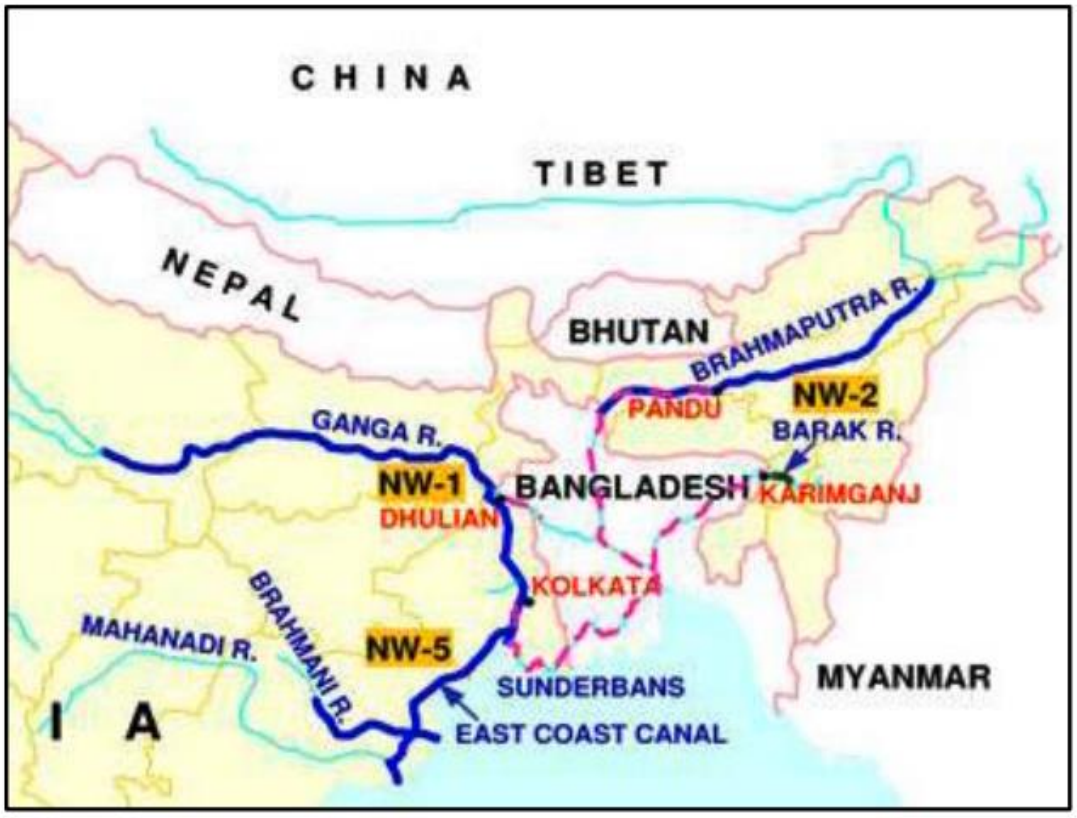


Figure F: Inland water connectivity to Kolkata Port

Anchorage Location

SMP has the Total 11 Anchorages and various sand head anchorages below Sagar:

- 03 anchorages at Diamond Harbour
- 04 Anchorages at Sagar
- 04 Anchorages below Sagar (Fair weather anchorages) and numerous sand head anchorages

Distance between Anchorage Location

The distance between these Anchorage are as under:

- Diamond Harbour to Sagar – 38 nautical miles approx.
- From Sagar to Point X: 8.67 nautical miles approx.
- From Sagar to NX-1, NX-2 & NX-3): 23 nautical miles approx.
- From Sagar to Sand Heads: 46 nautical miles approx
- It may be noted that generally floating crane handles vessel at Sandheads during fair weather season for a period of six 06 months.

Time consumed in vessel movement

- From one Anchorage to another Anchorage: 3 to 5 hours approx.
- From one location to another location (i.e. Diamond Harbour to Sager or other locations, as the case may be.) 10 to 12hours approx.

Marine Maps

Diamond Harbour: (03) Three anchorages at Diamond Harbour and another 03 anchorages at Sagar are operated though out the year. The draft at Diamond harbour anchorage is about an average draft of 8 m approx.. and can cater to vessels LOA 200 m max m and can cater to pannamax and

The anchorages at Sagar are deep drafted than at Diamond Harbour, here the available draft is upto 9.5 Average draft available 7.0 m to 8 m at Diamond Harbour: However, estimated fresh water Draft forecast for the coming months are available on the website of SMP, Kolkata.

Table 1: Specification of Vessels arriving at Diamond Harbour

Maximum Size of vessel	200 m
Maximum permissible draft	9.5 m
# Vessel with 172 LOA X 25 beam is arriving at NSD through Diamond Harbour	

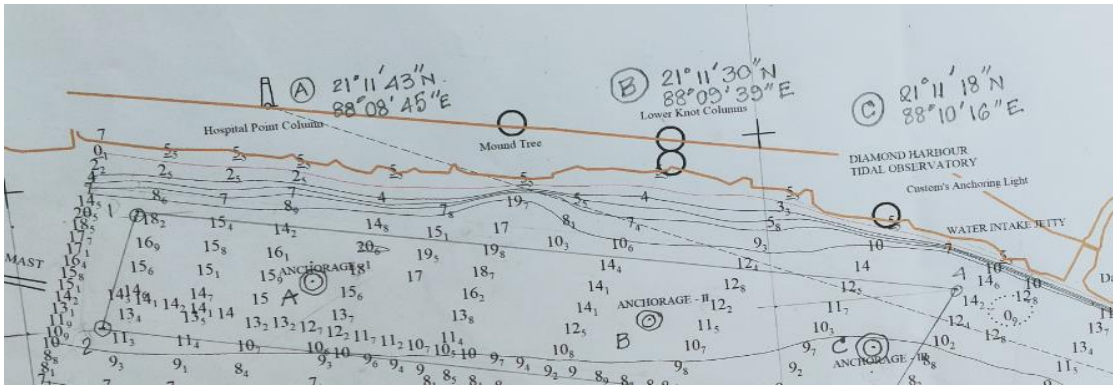


Figure G: Marine Map for Diamond Harbour along with Coordinates

Sagar Anchorages

Babycape LOA 253 m X beam 43 m and minicape vessels Cape vessels are now acceptable at Sagar with a Tidal range of 4.0m and with a laden draft of 9.5 m in all-weather condition.

Sandheads

For catering to CAPE vessels there are 04 anchorages created at inner sand heads below Sagar. They are named as point X (draft – 9.5 + min) and NX-1 draft 9.5 m) NX-2 draft 10 m NX-3 Draft 10.5 m. Point X & NX anchorages are fair weather anchorages. Any other bigger vessels can be anchored at Sand heads there are no draft and beam restrictions at sand heads.

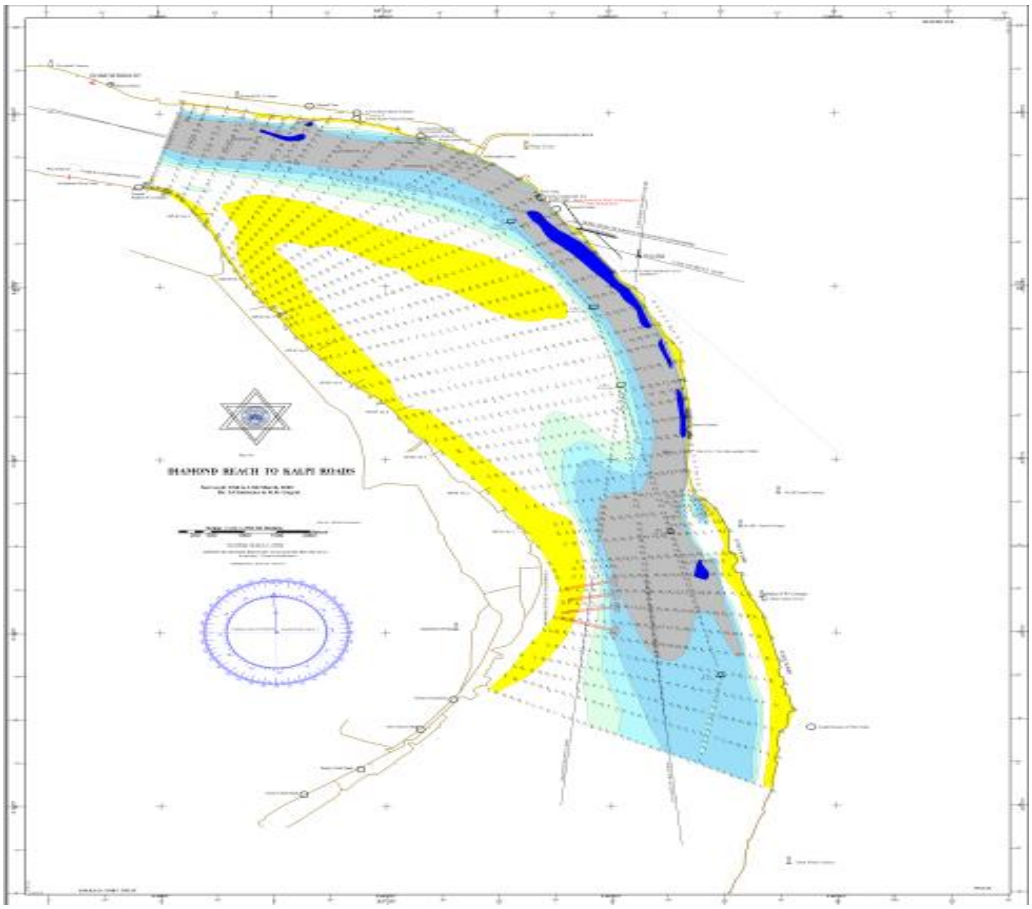


Figure H: Marine Map of Sagar Road

Size of Vessel at various anchorages

- Diamond Harbour: Range of vessel sizes LOA of 200 m Approx.
- Sagar: Range of vessel sizes Range of vessel sizes – Max LOA 295m
- Below Sagar (Fair weather): Range of vessel size (Size is not a constraint).

Navigational Aids

To facilitate the pilotage appropriate navigational aids have been provided throughout the passage. At present the following aids are available:

Lighthouse

Sagar Lighthouse (Lat. 21°39'N, Long. 088°03'E) is situated at Middleton Point on the Sagar Island one and half km. inshore. It is visible in clear weather from a distance of 28 Km.
Dariapur Lighthouse (Lat. 21°47'N, Long. 087°52'E) is situated on the right bank of Hugli south of Rasulpur river and about 2.7 kms. inshore. It is visible in clear weather from a distance of 35 Km.

Light Vessels

There are five unmanned light vessels. These are as follows: (distances shown against each are southward from the Sagar Lighthouse).

- U.G.L.F. Lat. 21°29'51" N Long. 088°06'36.5" E
- L.G.L.F. Lat. 21°21'54" N Long. 088°09'34" E
- TALENT WK L.V. Lat. 21°17'00" N Long. 088°11'25" E
- Eastern Channel L.V Lat. 21°02'54.6" N Long. 088°11'30" E
- Western Channel L.V Lat. 21°05'002" N Long. 087°50'24.8" E

Automatic Tide Gauges

These are maintained at Garden Reach, Diamond Harbour and Haldia for round-the-clock recording of tidal data, which is used for the prediction of tides and preparation of tide tables by Survey of India.

Manual Tide Gauges

These are maintained at Akra, Moyapur, Hooghly Point, Balari, Gangra and Sagar for displaying rises of tide for the convenience of various vessels navigating, dredging and surveying in the River Hooghly.

River Marks and Buoys

(The manual tide gauges are now being converted into automatic tide gauge)

There are 500 River marks some of which are lighted. These are extremely useful in pilotage and dredging. There are also 90 lighted buoys and 42 unlit buoys marking the navigational channel from Sandheads to Kolkata.

Wireless/VHF Network

In order to facilitate speedy communication between various shore establishments and SMP vessels operating in the river wireless stations have been provided at Kolkata, Haldia and on board all dredgers, pilot vessels, despatch and survey/research vessels. In addition, these stations/vessels are also provided with VHF sets which are installed at many other vital operational points including tidal stations within Kolkata Dock System & Haldia Dock Complex.

Differential Global Positioning System (DGPS)

SMP has a fully operational DGPS system. The satellite based DGP System functions with the help of orbiting satellite and reference stations installed by SMP. Mobile Sets on board the vessels receive signals from the satellite as well as correction signal from the reference Stations giving exact

locations of any mobile craft having the DGPS receivers in terms of latitude, longitude or in other coordinate system along with related navigational parameters for safe navigation, dredging and survey purpose.

Figure I: VTMS Control Room at Haldia

Vessel Traffic Management System (VTMS)

The VTMS is a Radar Surveillance System Operating on radars at strategic locations connected through microwave data link and communication system. With a view to providing more effective and safer guidance to ship from the Sandheads to Haldia through radar surveillance, Vessel Traffic Management System (VTMS) was taken up in the first phase from the Sandheads to Haldia.

The system was operational in April 1996. Further, for the requirement of ISPS code and also for maintaining a back up to the VTMS system, a standalone VTS with Automatic Identification System (AIS) facility was established at the Saugar pilot station in May 2005.

Oceanographic Data

The tide levels observed at Kolkata are illustrated in table 2.

Table 2: Tide Table

Tide Level	Kolkata
Highest High Water (HWH)	(+) 7.70 m CD
Mean High Water Spring (MHWS)	(+) 5.62 m CD
Mean High Water (MHW)	(+) 4.88 m CD
Mean High Water Neap (MHWN)	(+) 4.10 m CD
Mean Sea Level (MSL)	(+) 3.19 m CD

Mean Low Water Neap (MLWN)	(+) 2.00 m CD
Mean Low Water (MLW)	(+) 1.68 m CD
Mean Low Water Spring (MLWS)	(+) 1.41 m CD
Lowest Low Water (LLW)	(+) 0.14 m CD

Tides and Current data have been collected at three designated locations. Details of the locations with geographic coordinates are listed out in the table below.

Tide Detail

Table 3: Details of Anchorages

Location	Maximum Water Level (m)	Minimum Water Level (m)	Draft (Avg.)	Coordinates	Current Max (Knots)	Current Min (Knots)
Diamond Harbour – 03 Anchorages						
Point A	7.35	0.08	8	21 11’ 43’’ N 88 08’ 45” E	6.0	3.0
Point B	7.35	0.08	8	21 11’ 30” N 88 09’ 39” E	6.0	3.0
Point C	7.35	0.08	8	21 11’ 18” N 88 10’ 16” E	6.0	3.0
Sagar Road : 05 Anchorages						
Point A-1	6.6	0.92	9.0	21 42’ 20” N 88 01’ 44” E	6.0	3.0
Point A-2	6.6	0.92	9.0	21 40’ 57” N 88 01’ 23” E	6.0	3.0
Point A-3	6.6	0.92	9.0	21 39’ 59”N 88 01’ 26”E	6.0	3.0
Point T-1	6.6	0.92	9.0	21 43’ 00”N 88 01’ 59”E	6.0	3.0
Point T-2	6.6	0.92	9.0	21 41’ 39”N 88 01’ 31”E	6.0	3.0
Anchorages below Sagar (Fair Weather anchorages) and numerous sand head anchorages						

Point X	6.6	0.92	9.5	0-1 33.5' N 088 06.85' E	6.0	3.0
NX-1	6.6	0.92	9.5	21 18' 15" N 088 13' 45 E	6.0	3.0
NX-2	6.6	0.92	10	21 16' 45" N 088 14' 00" E	6.0	3.0
NX-3	6.6	0.92	10.5	21 15' 30" N 088 14' 00" E	6.0	3.0
Sandheads	-	-	50	-	-	-

[##] Anchorages below Sagar (Fair Weather anchorages) and numerous sand head anchorages:

These three anchorages may be treated as "Inner Sandheads Anchorages" and shall have no pilotage requirement. These three (03) "new inner Sandheads anchorages" are hereby designated as NX1, NX2 & NX3 from North to South, and having drafts 9.5m, 10m and 10.5m respectively and no dimensional (length or Beam restrictions) constraint of vessels. These anchorages are to be exclusively used for midstream lighterage / Topping up of only Cape, Baby Cape, Panamax etc. and not for waiting vessels.

Size of the Vessels Analysis

Vessel size is one of the crucial governing parameters for design of port infrastructure. Selection of suitable vessel is very vital in the development of a port as it influences the facilities to be developed at the port. Vessels carrying cargo to the port may be of different sizes and may be arriving in a random fashion depending on its demand and availability.

The overall length of the ship governs the physical dimensions of the port infrastructure. The length of berths and locks, diameter of turning circle etc. depends solely on the length of the largest vessels intended to visit the port. By using floating crane bigger vessel can be called at KDS bringing economies of scale.

Figure J below illustrates the length of vessels visiting KDS. The histogram in the figure J depicts the distribution of the overall length of vessels and the line chart provides the cumulative frequency of the same. Majority of vessels (78% approx..) have overall lengths between 110 to 170 m. 97% of the vessels visiting KDS has LOA of 200 m or less. The longest vessel to enter KPD & NSD has the lengths of only 157 m and 172 m respectively and a length of 196 m an Budge Budge. This is attributed to the lock gate restrictions at the docks. All the vessels of length more than 180 m were serviced at Diamond Harbour Anchorages, Sagar Anchorages.

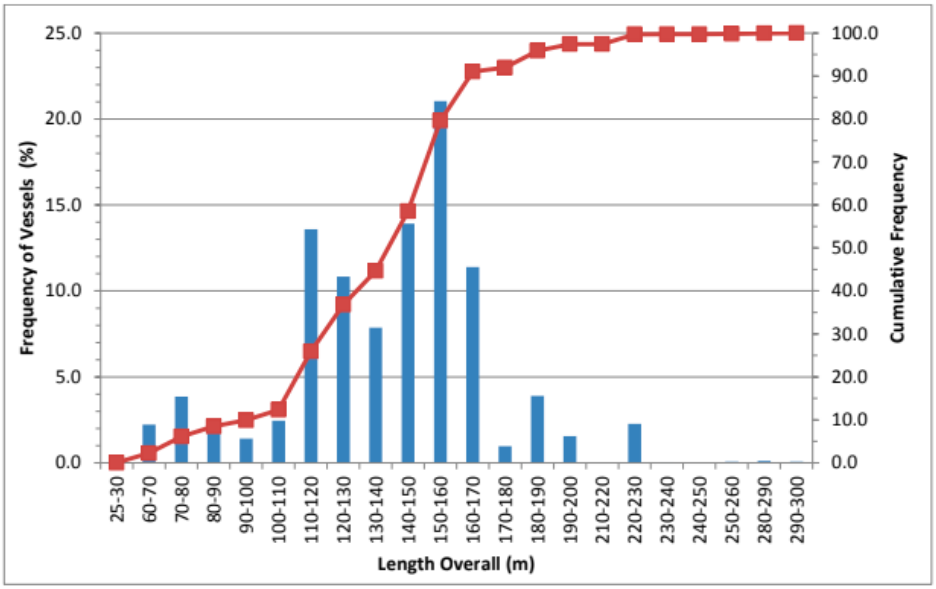


Figure J: Overall length of vessels visiting KDS

Table 4: Length of Cargo carrying vessel

Break Bulk	60 to 200 m
Container	70 to 180 m
Dry Bulk	85 to 290 m
Liquid Bulk	90 to 170 m
Overall	60 to 290 m

Beam

Beam is also known as width of the ship. It is a crucial parameter which determines the facilities like width of lock gates and approach channels. The beam of cranes required for unloading and space between the two quays of dock arm. In KDS the beam dimensions of vessels are mostly governed by the lock gate width. Figure K and Figure L depicts the beam of ships visiting KDS and commodity wise range of draft ships.

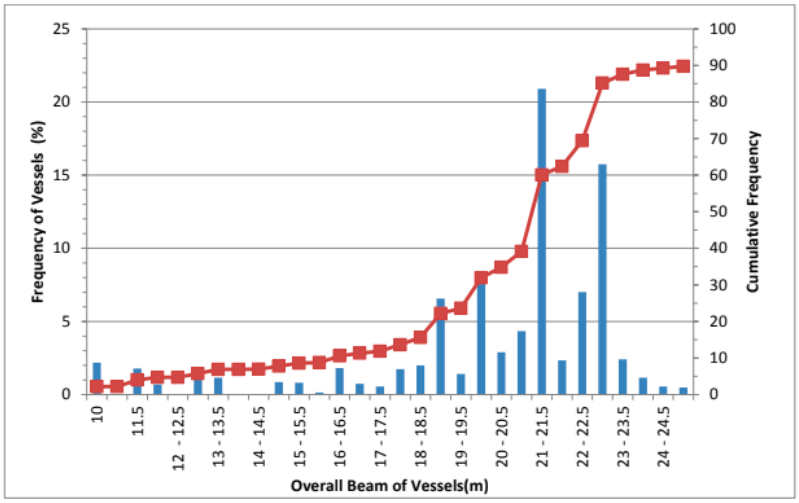


Figure K – Beam of Vessels visiting KDS

Table 5: Beam of Cargo carrying Vessel

Commodity	Beam Sizes
Break Bulk	10 m to 32 m
Container	12 m to 24 m
Dry Bulk	14 m to 32 m
Liquid Bulk	16 m to 27 m
Overall	10 m to 32 m

- At Diamond Harbour anchorage points: Maximum size of vessel: 200 LOA
- At Sagar anchorage point: Max LOA: 295 m beam: 50 m
- At Sandheads: no limitations

Draft

The ability to navigate is greatly hindered in low water depths. Ships run risk of grounding and significant hull damage in lower water depths. Figures below depicts the drafts of ships visiting KDS and commodity wise range of draft ships

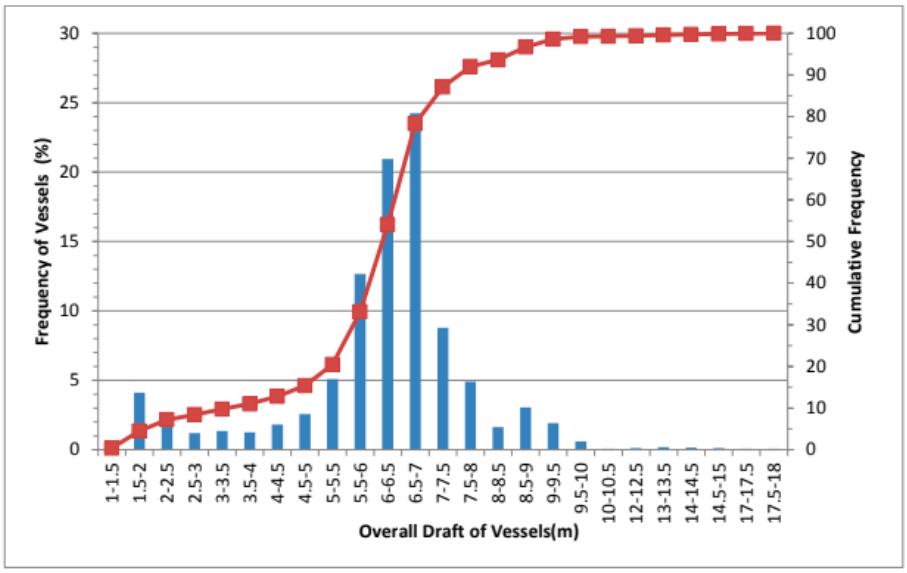


Figure L: Draft of Vessels visiting KDS

Table 6: Vessel draft requirement

Cargo	Draft requirement of vessels
Break Bulk	1.5 m to 10 m
Container	1.5 m to 8 m
Dry Bulk	1.5 m to 15 m
Liquid Bulk	2.5 m to 8 m
Overall	1.5 m to 15 m

Table 7: Detail of maximum Vessel size arriving at KDS

Sl. No.	Major Commodity	Location	DWT (T)	LOA (m)	Beam (m)	Draft (m)*
1.	Containers, Coal	NSD	20,000	172	25	8.5
2.	Containers, Coal, Food Grains	KPD	20,000	157	21.43	8

Characteristics of Vessels Visiting KDS

The characteristics of the vessels play a vital role in designing the facilities and infrastructure required for cargo handling and safe manoeuvring within a port. For an existing port, the characteristics of ships visited enable us to anticipate the spectrum of vessels that can be expected in future.

Vessel Dimension

The three major ship dimensions analysed are overall length, breadth and Draft. Since the KDS is an impounded dock complex, the size of the vessel is restricted due to lock gates and hence this analysis is crucial.

The length overall (LOA) of a ship is defined as the length measured from the extreme forward end to the aftermost point of the stern.

Table 8: Vessel Dimension

	Min	Max	Mean	Median	Mode
LOA (m)	65.60	288.99	139.16	145.92	154.85
Breadth (m)	10	32.26	21.22	21.5	21.5
Draft (m)	1.35	14.76	6.22	6.5	6.5

Parcel Size

The quantity of cargo loaded to or unloaded from a vessel is called parcel size. The ships arriving to ports sometimes unload cargo partially. This leads to difference between the capacity of the ship arriving and the parcel size received at Port. Keeping all other parameters constant, in order to maximize the berth capacity, the parcel size needs to be maximized.

When Categorized as Import and Export cargo, the average parcel size is found to be 6760 T and 6230 T respectively.

Table 9: Cargo – wise parcel size distribution

Sl. No	Cargo	Parcel Size (Tonnes) / Average
1.	Containers	12405
2.	Dry Bulk	5940
3.	Liquid Bulk	5101
4.	Break Bulk	2037
5.	Overall	9525

Geared and Non-Geared Vessels

- **Diamond Harbour (**03 anchorages): Geared vessels performs lighterage operation at Diamond Harbour. Diamond Harbour – LOA of 200m. LOA more than 200 m will not be allowed due to width of channel.
- **Sagar (**04 Anchorages): 99 % vessels are non - geared vessels performs lighterage at Sagar anchorages. Sagar max LOA of Ship = 295 m and is an all weather anchorage points.
- **Sand heads (**04 Anchorages) below Sagar (Fair weather anchorages) and numerous sand head anchorages**:** Maximum LOA 295 m Cape vessels handled at Sand heads and Point X (99% non-geared vessels)

Floating Crane Facility at SMP, Kolkata

At present two Floating Crane facilities are available at HDC of SMP, Kolkata and it caters to lighterage operation of homogenous cargoes especially bulk cargo**.** Barge of max capacity of 3500 MT worked alongside with mother vessels by existing FC operators. This operation is considered to be an established activity as vessels have been discharging cargos into barges from many years in stream with barges coming to port of KDS & HDC for offloading.

The proposed mode of operation is detailed below:

(a) Mode of Operation for Bulk Cargos

In the proposed mode of handling cargos, the mother vessels will continue to discharge cargo into barges at anchorage point at Diamond Harbour or Sagar Anchorage Points. The Barges then move to port where they discharge their cargo for storage and dispatch.

Lighterage operation - Mid Stream

In this method, mother vessels at anchorage point would discharge containers on barge using floating crane facility. The barge will go to port where their cargo will be further offloaded for subsequent storage and delivery. The reverse process will take place for exports.

(b) Mode of Operation for Containers Handling:

a) The regular feeder vessels coming to KDS can offload containers in Diamond Harbour Draft.

b) Floating crane shall discharge the boxes from the main feeder vessel to the daughter vessel/Barge deployed by the feeder operator until the main feeder vessel attains the Kolkata dock draft.

c) Both the main feeder vessel and the sister vessel/barge shall make inward to Dock after the Trans-loading operations.

The same operation may be carried out in the export leg too where the sister vessel/barge deployed will be used to top up the main feeder vessel at the anchorages

Terminal Facility Planning /Existing Facilities at KDS

The Kolkata Dock System –SMP consists of Netaji Subhas Dock, Kidderpore Dock and Budge Budge Jetties. The locations of these divisions are given in Figure M.

Figure M: Kolkata Dock System

Navigational Channel and Navigational Aids

The eastern channel is dredged and maintained by SMP for navigation of vessels from sea to Kolkata Dock System. The length of channel from Sand head to KDS is about 223 KM out of which 75 KM is sea pilotage and remaining 148 KM is river navigation. The navigation channel is well marked with 92 lighted buoys, 42 unlit buoys, light vessel and 500 River Marks, Regular Hydro-graphic surveys are carried out to ensure channel depth and width.

Existing Berths and Dry Docks

The berths in Kolkata Dock System are located at three places: (a) Netaji Subhas Dock (NSD) (b) Khidderpore Dock (KPD) and (c) Budge Budge Jetties. The figure N illustrates Google images representing NSD, KPD

Figure N: Netaji Subhas Dock and Kidderpore Dock

Netaji Subhas Dock (NSD)

Netaji Subhas Dock houses 10 berths and 2 dry docks as presented by Figure O. The total available berth length at NSD is 1850 m. The longest berth is Berth 8 (225m) and the shortest berth is Berth 12 (152 m). The average berth length at NSD is 185m and average design depth at berths is 8.38m. Berth no. 3,4,5,7 and 8 handle containers, while Berth no 12 is liquid berth and Berth no 1, 13 and 14 are general cargo berths. Berth No.2 is used to handle coastal cargo. Maximum dimension of vessel acceptable at N.S. Dock is 172 m LOA and 25.0 m Beam**.**

Figure O: Layout of Netaji Subhas Dock

Kidderpore Dock

Kidderpore Dock is located north of NSD. The Bascule Bridge divides the dock into two basins KD-1 and KD-2. The dock is separated from river via twin lock system. KD-1 has 12 berths and 3 dry docks whereas KD-02 has 8 Berths, The layout of Kidderpore Dock is presented in figure 3-4. The total available quay length at Kidderpore Dock is 2814 m. The average berth length at KD is 156m and average design at berths is 8.48m. Maximum dimension of vessel acceptable at the Dock is 157m LOA and 21.3m Beam.

Figure P: Overview of Existing Berths at KDS

Berths Particulars and Dimension at KDS

Table 10: Berth at Kolkata Dock System (KDS)

Sl. No.	Berth Number	Cargo/ Type of Berth	Design Depth (m)	Quay Length (m)
A. Kidderpore Dock (KPD)				
1	1 KPD	General Cargo	8.0	133
2	2 KPD	General Cargo	8.5	162
3	3 KPD	General Cargo	8.7	128
4	4 KPD	General Cargo	8.5	136
5	5/7 KPD	General Cargo	8.7	229
6	6 KPD	General Cargo	8.2	118
7	8 KPD	General Cargo	8.5	128
8	9 KPD	General Cargo	8.7	108
9	10 KPD	General Cargo	8.5	161
10	11 KPD	General/ Postal Cargo/ Passenger	8.5	143
11	22 KPD	General Cargo	8.7	151
12	23 KPD	General Cargo	8.7	147
13	24 KPD	General Cargo	8.7	152
14	25 KPD	General Cargo	8.5	169
15	26 KPD	General Cargo	8.4	185
16	27 KPD	General Cargo	8.2	195
17	28 KPD	General Cargo	8.4	195
18	29 KPD	General Cargo	8.4	185

Table 11: Berth Details at Netaji Subhash Dock

Sl NO	Berth Number	Cargo/Type of Berth	Design Depth (m)	Quay Length (m)
B Netaji Subhash Dock (NSD)				
1	1 NSD	General Cargo (Heavy Lift)	8.2	200
2	2 NSD	General Cargo	8.5	187
3	3 NSD	General Cargo	8.7	183
4	4 NSD*	Container	8.5	181

SI NO	Berth Number	Cargo/Type of Berth	Design Depth (m)	Quay Length (m)
5	5 NSD*	Container	8.6	182
6	7 NSD*	Container	8.7	192
7	8 NSD*	Container	8.0	225
8	12 NSD	Liquid Bulk	8.0	152
9	13 NSD	General Cargo	8.4	174
10	14 NSD	General Cargo	8.2	174

Table 12: Berth details at Budge Budge

SI NO	Berth Number	Cargo/Type of Berth	Design Depth (m)	Quay Length (m)
C Budge Budge Jetties (BB)				
1	1 BB	Liquid Bulk	11.5	190
2	2 BB	Liquid Bulk	11.5	105
3	3 BB	Liquid Bulk	11.5	140
4	5 BB	Liquid Bulk	10.5	190
5	7 BB	Liquid Bulk	8.5	140
6	8 BB	Liquid Bulk	8.5	177

Lock Dimensions at KDS

NSD & KPD are impounded dock system with lock facilities. These lock facilities plays a significant role in number and size of vessels entering the docks. The dimensions of lock at KDS are presented below in table

Table 13: Lock Type and Dimensions

Dock	Type	Length (m)	Width (m)	Depth (m)
NSD	Box Cassion	213.36	27.43	11.43
KPD	Mitre Gate	176.78	24.38	12.19

Chapter – III “Lighterage Operation”

Lighterage Operation

Due to draught constraints, large vessels with capacity loads cannot enter KDS and HDC. Such ships unload part of their cargo (Lighterage operations) at ports like Paradip and Dhamra before calling on SMP, Kolkata. Because of this, additional costs are incurred by the shipper and Port also loses revenue. Even Panamax had to be partly lightered at Paradip/Dhamra to achieve required Draft. In-order to avoid this, SMP, Kolkata have commissioned Floating cranes under License agreement at Anchorage to unload part cargo from these Panamax mother vessels to barges so that it can achieve the desired draft.

Even Baby Cape Size vessels which were not bound for SMP, Kolkata are being fully lightened at Sandheads. This operation is ensuring additional cargo to Haldia port and also reducing the import cost of cargo.

Figure Q: Cargo handling by Floating Crane

The lighterage operations by SMP, Kolkata are presently carried out at three locations, namely Diamond Harbour, Sandheads and Sagar Island. M/s Sharat Chatterjee and Co. Pvt. Ltd. and M/s Ripley Offshore Pvt. Ltd. are licensed to operate the floating crane to assist lighterage operations. Most of the lighterage operations are carried out by Floating Crane whereas for few instances ship cranes have been utilized.

Table 14: The existing Floating Crane Specifications

Barge	
Length Over All	55.00 m
Breadth :	24.00 mtrs
Depth (Mouded)	4.50 mtrs
Draft(Max)	3.35
Gross Tonnage	1700
Net Tonnage	500
CRANE	
Crane Model No.	Liebherr CBG 350
Crane Weight	265 MT (Including Counter Weight)
Lifting Capacity	35.00 MT @36 mtrs of Radius
Power Pack	Cummins KTA-50-D(M1)-950KWE

Table 15: Type of commodities handled

Commodities handled via at KDS in 2019-20	Commodities handled via Floating Crane
• Fertiliser • Sulphur • Roc phosphate • Petroleum Coke • Metallurgical Coke • Thermal Coal • Iron & Steel • Machinery • Timber • Pulses • Gypsum • Iron Ore • Manganese ore / slag • Maize • Coking Coal • Sugar • Salt • Food Grains (rice) • Food Grains (Wheat) • Limestone • Cement Clinker	• Coal • Clinker • Coke • Gypsum • Limestone • Manganese Ore

Chapter – IV "Traffic Data"

Traffic Data

Cargo Handled In Last five (05) Years By SMP Kolkata: (in Million Tonnes)

Financial Year	Container Traffic
2014-15	SMP handled 6,30,094 TEUs during 2014-2015 against 5,62,020 TEUs registering an impressive growth of 12.11% (vis-à-vis 6.71% growth of major ports) and ranked Third among Indian Major Ports. Containerized Cargo handled at Port was 1,00,66,433 tonnes in 2014-2015 vis-a-vis from 92,92,670 tonnes in 2014-2015 recording a growth of 8.33% against 4.11% growth at India Major Ports. Incidentally, KDS also achieved the highest ever container throughput of 5,26,166 TEUs for 2014-2015, registering a phenomenal growths of 17.55% over 4,49,300 TEUs handled in for 2013-14. Containerized cargo also increased at KDS to 81,09,140 tonnes 2014-15 as against 70.63,237 tonnes in 2013-2014 registering commendable growths of 14.81%. In 2014-2015, 1,01,928 TEUs were handled at HDC..
2015-16	SMP handled 6,62,891 TEUs during 2015-2016 against 6,30,094 TEUs registering an impressive growth of 5.21% against 2.96% growth at Indian Major Ports and ranked Third among Indian Major Ports. Containerized Cargo handled at Port was 1,06,39,522 tonnes in 2015-2016 vis-a-vis from 1,00,66,433 tonnes in 2014-2015 i.e. a growth of 5.69% was recorded against 3.08% growth at Major Ports. Incidentally, both KDS achieved the highest ever container throughput of 5,77,749 TEUs for 2015-2016, registering and impressive growths of 9.39% over 5,26,166 TEUs for 2015-16. Containerized cargo also increased at KDS to 92,63,338 tonnes 2015-16 as against 81,09,140 tonnes in 2014-2015 registering commendable growths of 14.23%. In 2015-2016, 85,142 TEUs were handled at HDC.
2016-17	SMP handled 7,71,676 TEUs during 2016-2017 against 6,62,891 TEUs registering an impressive growth of 16.41% against 3% growth at Indian Major Ports and ranked Third among Indian Major Ports. Containerized cargo also increased at the port to 1,23,53,972 tonnes in 2016-2017 from 1,06,39,522 tonnes in 2015-2016 achieving a very high growth of 16.11% against 1.1% growth at Indian Major Ports. Incidentally, both KDS and HDC also achieved the highest ever container throughput of 6,35,848 TEUs and 1,35,828 TEUs, respectively in 2016-2017, registering significant growths of 10.06% and 59.53% over 5,77,749 TEUs and 85,142 TEUs in 2015-2016. Containerized cargo also increased both at KDS and HDC to 98,86,868 tonnes and 24,67,104 tonnes in 2016-2017 respectively, against 92,63,338 tonnes and 13,76,184 tonnes in 2015-2016 registering high growths of 6.73% and 79.27%.
2017-18	SMP ranked 3rd in 2017-18 amongst Indian Major Ports in terms of Container traffic. The total number of Containers handled at Kolkata Port during 2017-18 increased to 7,96,211 TEUs from 7,71,676 TEUs in 2016-17 registering a growth of 3.18%. Containerized cargo also increased at the port to 1,24,32,329 tonnes in 2017-18 from 1,23,53,972 tonnes in 2016-17. Incidentally, both KDS and HDC also achieved the highest ever container throughput of 6,40,183 TEUs and 1,56,028 TEUs, respectively, in 2017-18 against 6,35,848 TEUs and 1,35,828 TEUs handled in 2016-17. An impressive growth of 14.87% was registered at HDC in 2017-18 vis-à-vis 2016-17. Containerized cargo also increased at HDC to 26,72,470 tonnes in 2017-18 from 24,67,104 tonnes in 2016-17 registering a high growth of 8.32%. At KDS, 97,59,859 tonnes of containerized cargo was handled in 2017-18 against 98,86,868 tonnes in 2016-17.

2018 – 19	SMP ranked 3rd in 2018-19 amongst Indian Major Ports in Container traffic. Total number of Containers handled at SMP during 2018-19 increased by 4.18% to 8,29,482 TEUs from 7,96,211 TEUs in 2017-18.Containerised cargo also increased at the Port to 1,30,74,461 tonnes in 2018-19 from 1,24,32,329 tonnes in 2017-18 (5.17% growth). Incidentally, both KDS and HDC achieved the highest ever container throughput of 6,51,549 TEUs and 1,77,933 TEUs, respectively in 2018-19 against 6,40,183 TEUs and 1,56,028 TEUs in 2017-18. Impressive growth of 14.04% and 17.51% was registered at HDC in 2018-19 in terms of Container TEUs and Tonnage handling respectively w.r.t. 2017-18. At KDS also, both Container TEUs and Tonnage increased in 2018-19 vis-à-vis 2017-18.
2019 – 20	SMP ranked 3rd in 2019-20 amongst all Indian Major Ports in Container traffic. Total number of Containers handled at SMP, Kolkata during 2019-20 increased to 8,44,762 TEUs from 8,29,482 TEUs in 2018-19 registering a growth of 1.84%. Total containerized tonnage was 1,27,99,563 tonnes at SMP, Kolkata in 2019-20 vis-à-vis 1,30,74,461 tonnes in 2018-19. KDS achieved the highest ever container throughput of 6,75,439 TEUs in 2019-20 against 6,51,549 TEUs handled in 2018-19 i.e. a growth of 3.67%. Containerized cargo handled at KDS in 2019-20 was 97,66,837 tonnes. At HDC, 1,69,323 TEUs and 30,32,726 tonnes of containerized cargo were handled in 2019-20. Intermodal handling at KDS and HDC during 2019-20 was 6,67,014 TEUs and 1,68,359 TEUs, respectively. Number of containers (TEUs) and containerized tonnage handled at KDS and HDC during the years 2019-2020 and 2018-2019 are shown in tables 2.5 and 2.6, respectively. In 2019-20, the total number of merchant vessels, which left KDS and HDC, was 3518 with a gross registered tonnage of 733 lakh tonnes, as against 3623 with a gross registered tonnage of 748 lakh tonnes in 2018-19. At KDS, 1285 vessels and at HDC, 2233 vessels were handled in 2019-20.

Table 16: Number of Containers Handled

			(In TEUs)
Mode	**Import**	**Export**	**Total**
2014-15	269472	258694	528166
2015-16	297791	279958	577749
2016-17	327474	308374	635848
2017-18	330266	309917	640183
2018-19	329606	321943	651549
2019-20	340752	334687	675439

Table 17: Volume of Containerized Cargo*

			*(In Tonnes)
Mode	**Import**	**Export**	**Total**
2014-15	4453502	3655638	8109140
2015-16	4941143	4322195	9263338
2016-17	5390711	4496157	9886868
2017-18	5262661	4497198	9759859
2018-19	5139021	4795043	9934064
2019-20	5329575	4437262	9766837
(*Tare weight included)			

Table 18: Number of Containers Handled at KDS

Container & Containerised Cargo* : Import -(in TEUs)						
F.Y	Import		Coastal		Total	
	'000 Tonnes	(No. TEUs)	000 Tonnes	(No. TEUs)	000 Tonnes	(No. TEUs)
2014-15	4445	267273	9	2199	4454	269472
2015-16	4929	297065	12	726	4941	297791
2016-17	5378	324216	13	3258	5391	327474
2017-18	5253	327318	10	2948	5263	330266
2018-19	5123	326669	16	2937	5139	329606
2019-20	5316	337393	14	3359	5330	340752
(*Tare weight included)						

Table 19: Container & Containerized Cargo

Container & Containerised Cargo* : Export					
Export		Coastal		Total	
000 Tonnes	(No. TEUs)	000 Tonnes	(No. TEUs)	000 Tonnes	(No. TEUs)
3625	256577	31	2117	3656	258694
4287	277931	35	2027	4322	279958
4442	305236	54	3138	4496	308374
4447	307048	50	2869	4497	309917
4740	318798	55	3145	4795	321943
4385	330950	52	3737	4437	334687
(*Tare weight included)					

Table 20: Total Import & Export of Container & Containerized Cargo

Container & Containerised Cargo		
F.Y	Grand Total (Import + Export)	
	000 Tonnes	(No. TEUs)
2014-15	8110	528166
2015-16	9263	577749
2016-17	9887	635848
2017-18	9760	640183
2018-19	9934	651549
2019-20	9767	675439
(*Tare weight included)		

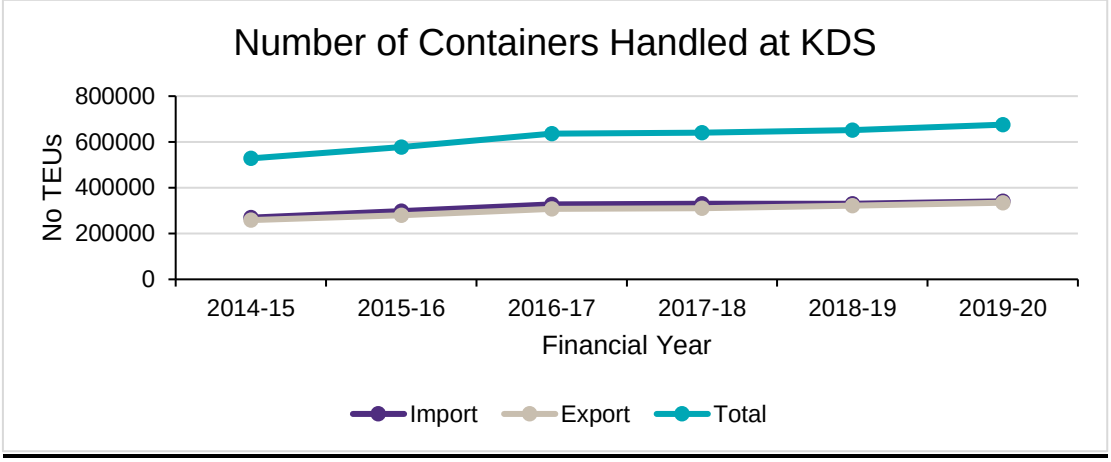


Figure R: Number of Containers Handled at KDS

Consolidated impact: from the FY 2014-15 to FY 2019-20: The increase in Import is observed @ 4.81% CAGR and Export @ 5.29% CAGR. Therefore, the overall impact is @ 5.04% CAGR

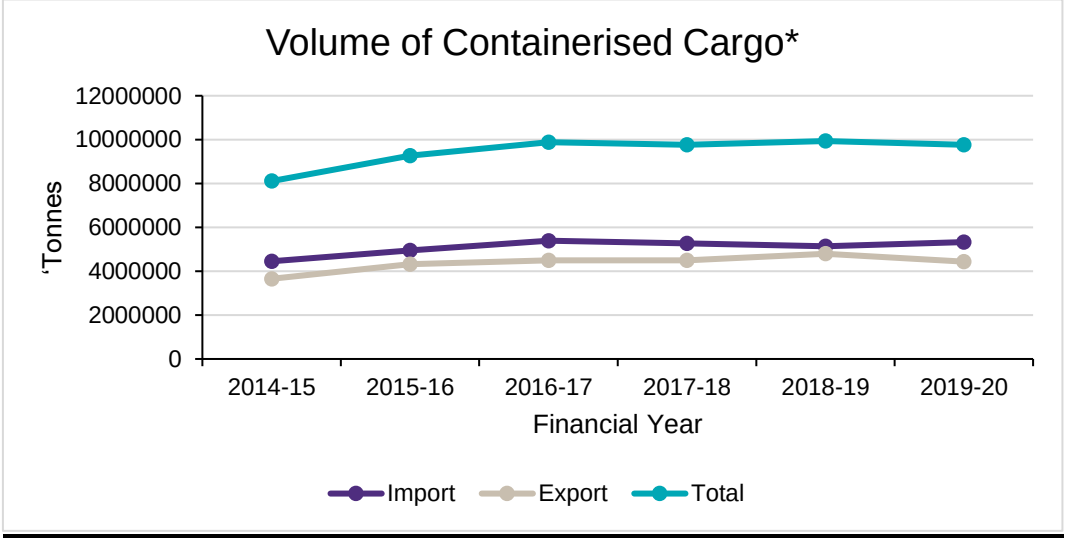


Figure S: Volume of Containerized Cargo at KDS

Consolidated impact: from the FY 2014-15 to FY 2019-20. The increase in Import is observed @ 3.66% CAGR and Export @ 3.95 % CAGR. Therefore, the overall impact is @ 3.79% CAGR

Dry Bulk (DB)

Table 21: Container & Containerized Cargo- Import

'000 Tonnes							
F.Y	Import			Transhipment (Import)			Total Import
	Foreign	Coastal	Total	Foreign	Coastal	Total	
2014-15	865	107	972	1264	28	1292	2264
2015-16	996	59	1055	1313	8	1321	2376
2016-17	441	22	463	443	0	443	906
2017-18	433	6	439	847	6	853	1292
2018-19	1522	0	1522	2787	7	2794	4316
2019-20	1164	10	1174	1573	0	1573	2747

Table 22: Container & Containerized Cargo – Export

000 Tonnes							
F.Y	Export			Transhipment (Export)			Total Export
	Export	Coastal	Total	Export	Coastal	Total	
2014-15	393	31	424	33	2	35	459
2015-16	376	92	468	6	0	6	474
2016-17	1715	83	1798	0	0	0	1798
2017-18	1887	73	1960	0	0	0	1960
2018-19	1885	54	1939	0	0	0	1939
2019-20	2020	78	2098	32	0	32	2130

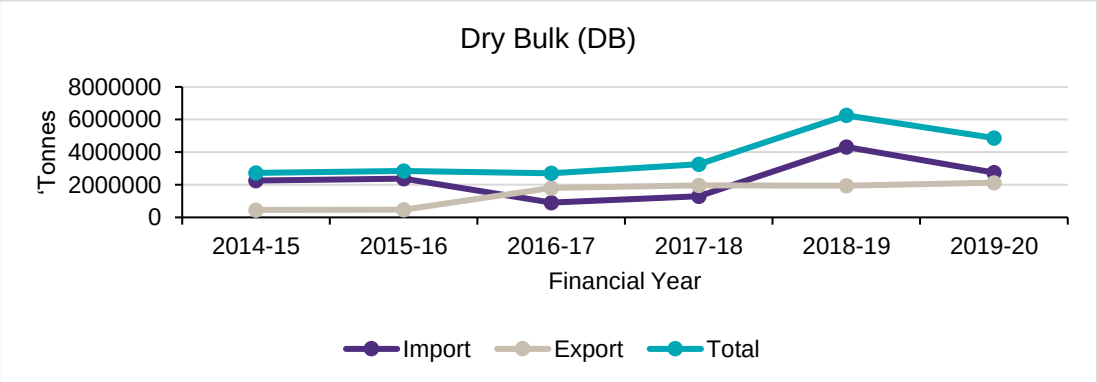


Figure T: Dry Bulk Cargo handled at KDS

Consolidated impact: from the FY 2014-15 to FY 2019-20: The increase in Import is observed @ 3.94% CAGR and however, Export @ 35.93% CAGR. Therefore, the overall impact is @ 12.36% CAGR

It may be noted that the Cargo handled by the Existing Floating Cranes through Lease Contract at SMP, is placed as under.

Table 23: Type of Cargo

		(tonnes)
F.Y	Cargo	Qty handled
2018-19	Coal, Clinker, Gypsum, Limestone	1059532
2019-20	Coal, Limestone	816332
2020-21	Coal, Manganese	798476

It may be noted that the above cargo handled by Floating Crane is for SMPK (KDS and HDC), as whole, which is just to understand the usefulness & utilization of Floating Crane.

Traffic handled by existing Floating Crane

Dry Bulk Cargo Handled by Floating Crane at Kolkata Dock System already in operation on Lease Contracts. The details of Cargo handled are as under**:**

Table 24: Floating Crane: Cargo Handled for KDS during 2018-19

Cargo	Place	Month	Foreign	Coastal
Coal	Sagar	May'18		9150
Coal	Sagar	July'18	5400	37488
Coal	Sagar	Aug'18		4500
Limestone	Sagar	Aug'19		7000
Coal	Sandheads	Nov'18	25569	
Limestone	Sagar	Nov'& Dec18		7000
Coal	Sagar	Dec'18		7600
Total			30969	72738

Figure U: Floating Crane

Table 25: Floating Crane: Cargo Handled for KDS

Details of Lighterage operation of Dry Bulk a Cargo at Anchorage point			
Time Period	**1st April to 31st March**		**Variation**
Financial Year	**FY 21-22**	**FY 20-21**	
Vessels handled with floating Crane (Nos)	20	24	-16,67%
Quantity on account of such vessels handled with Floating Crane (In MT)	16,53,346	14,82,748	11.51%

Total Dry Bulk lightened at Various deep drafted location in (MT)			
Time Period	1st April to 31st March		% Variation
Financial Year	FY 21-22	FY 20-21	
Sagar	4,90,809	1,33,113	268.72%
Point – X	3,04,281	4,02,435	-24.39%
Sandheads	11,56,966	16,24,486	-28.78%
Total Quantity Lightened	19,52,056	21,60,034	-9.63%

Table 26: Commodity wise Cargo handled by Floating Crane

Commodity	FY 20-21 (till 24.03.21) (MT)	FY 19-20 (MT)	FY 18-19 (MT)
Coaking Coal	96,402	1,42,500	2,89,000
Limestone	0	1,43,040	1,05,231
Manganese Ore	19,730	0	0
Met. Coke	0	14,500	7,500
Other Coal	13,57,816	11,64,401	14,69,032
R.P. Coke	8,800	0	0
Urea (Bulk)	0	9,569	0
Total	14,82,748	14,74,010	18,70,763

Chapter – V "India Economy Growth Expectation"

India Economy Growth Expectation

India recorded the real GDP (gross domestic product) growth of 0.4% in the third quarter of FY 2021, as per the NSO's (National Statistical Office) second advance estimates. This rise indicates V-shaped recovery progression that started in the second quarter of FY2021.

As per Economic Survey 2020-21, India's real GDP growth for FY2022 is projected at 11%. The January 2021 WEO update forecast an 11.5% increase in FY2022 and a 6.8% rise in FY2023. According to the IMF, in the next two years, India is also expected to emerge as the fastest-growing economy.

India is expected to be the third largest consumer economy as its consumption may triple to US$ 4 trillion by 2025, owing to shift in consumer behaviour and expenditure pattern. It is estimated to surpass USA to become the second largest economy in terms of purchasing power parity (PPP) by 2040.

The Growth rate are taken on the basis of 2019-20, as the data of 2021-22 is provisional (not published yet). Further, there is substantive increase has been observed in Dry Bulk Cargo 2020-21 despite of Covid-19. However, the Containers (TEU) handling has come down to 20.08%, which does not give any impact on the potential demand of proposed floating crane in this TEFR, the same has been as explained subsequently herein below duly substantiated with the relevant data and initiative taken by GoI, MoSP&W and SMP. Moreover, as observed in case of Dry Bulk Cargo handling i.e. in year 2019-20 it was 48,77,000 tonnes, which is increase to 55,73,000 during 2020-21 i.e. an increase of 14.27%. So there is not much impact of Covid-19 on the floating crane scope & potential traffic (cargos) as a whole.

Since Covid-19 has impacted marginally (as a whole i.e. increase in Dry Bulk Cargo and decrease in TEU) the year 2021-22. However, the same may be recovered i.e. not only the Traffic may retain back to normal Growth rate but even may enhance on a faster track. Further, the growth in the economy as projected by IBEF, there may be increase in the export&/import both in the Foreign &/coastal Cargo.

Initiative under Sagarmala

MoPS&W, has been taking an initiative under Sagarmala vision, which stipulates as under:

Aligning the various stakeholders and decision makers involved at various stages of the POL, cement, increase the coastal shipping of fertilizers movement value chain, the value chain for all commodities will be the most important driver to increase coastal shipping of the commodity. The government will need to encourage and incentivize private-sector investment through PPP models for port infrastructure, railway infrastructure and coastal shipping. Some specific action points include: Significant action points and discussions would be required for realizing the Sagarmala vision for the optimization of cargo:

- On-boarding of private players to initiate coastal shipping.
- Creating dedicated coastal berths, bunkering and storage capacities at relevant ports.
- Establishing a coastal shipping fleet dedicated to carrying POL products under the Shipping Corporation of India.
- Developing appropriate ship-repairing/ship-building facilities at key ports; currently, most ship repairs happen outside the country.

- Aggregation services: Identifying or setting up an aggregation agency to handle small parcel sizes and operate logistics
- Dedicated coastal shipping fleet under the Shipping Corporation of India
- Appropriate ship-repairing/ship-building facilities at key ports; most ship repairs currently happen outside the country

The various projects and initiatives within the initiative fall under the purview of a wide range of ministries as well as public and private enterprises. While the MoPS&W is the nodal body for driving the Sagarmala initiative, the vast scope of the project requires alignment, partnership with and support from key stakeholders to realize its full potential.

These nuances call for the ownership and involvement of all communities that stand to benefit from the initiative.

Initiatives taken by SMP

Despite of Covid-19 pandemic, SMP, Kolkata has been able to initiate the following activities

- Rejuvenation of KPD; Project Cost: Rs. 181.81 Cr
- Extended gate facility at Balagarh: Rs. 332 Cr (EPC+PPP)
- Petroleum Wharves at Budge: Under TEFR preparation stage
- Mechanization of Berths 4, 5 NSD: PPP: Under TEFR preparation stage
- Mechanization of Berth 7, 8 NSD Container: Under TEFR preparation stage

Other important projects:

- Improvement of road and rail connectivity
- Additional Reefer parks inside dock (NSD)
- Costal cargo to be handled at 6 Berth of KPD East
- Development of the extended gate facility of Port at Dankuni
- Evacuation Strategy in respect of Cargo Traffic for Direct Connectivity of Kolkata Dock System (Under conceptualisation stage)

Traffic Forecast and Modal Split

Traffic Forecast

Traffic forecast for SMP, Kolkata has been carried out for next 20 years (upto 2039). An extensive analysis of the hinterland of Kolkata Port has been made along with total logistics cost method to arrive at the traffic demand for which the port is to be planned. A commodity wise forecast to the traffic along with the container traffic is made and the details of which are summarised in the following sections of this chapter,

The hinterland considered for this study includes states of West Bengal, Bihar, Jharkhand, North – East states and parts of Uttar Pradesh, Odisha and Chhattisgarh. The hinterland also compromises of International territories of Nepal, Bhutan and Bangladesh.

The forecasted traffic at KDS is summarised in Table below

Table 27: Forecasted traffic at KDS (in MMT)

Commodity	FY 22	FY 23	FY 24	FY 25	FY 30	FY 35	FY 39
Imports							
Coking Coal	0.31	0.35	0.4	0.46	0.59	0.75	0.91
Veg Oil	0.74	0.78	0.82	0.88	1.08	1.06	1
POL	0.84	0.86	0.89	0.91	1.22	1.56	1.89
LPG	0	0	0	0	0	0	0
LNG	2.5	2.5	2.5	2.5	5	5	5
Pulses	1.79	1.85	1.91	1.86	1.55	1.17	1
Manganese Ore	0.1	0.11	0.11	0.12	0.16	0.21	0.26
Limestone	0.16	0.17	0.19	0.21	0.33	0.38	0.5
Container	6.94	7.67	8.5	8.96	11.82	14.04	16.11
Container (MTEUs)	0.43	0.48	0.53	0.56	0.73	0.87	1
Export							
Thermal Coal	0	0	0	0	0	0	0
Iron Ore	0.06	0.06	0.06	0.06	0.06	0.06	0.07
Fly Ash	2.39	2.59	2.81	3.05	4.57	6.32	6.32
Container	5.37	5.82	6.13	6.46	8.21	9.75	11.19
Container (MTEUs)	0.36	0.39	0.41	0.43	0.55	0.65	0.75
TOTAL							
Top Commodities including container	21.2	22.77	24.32	25.45	34.59	40.31	44.06
Container (MTEUs)	0.79	0.87	0.94	0.99	1.29	1.53	1.75
Other General Cargo	3.46	3.72	3.97	4.16	5.65	6.58	7.19
TOTAL	24.65	26.49	28.29	29.62	40.24	46.89	51.25

Chapter – VI "Scope of Work"

Scope of Work

During the period of the Project as may be prescribed in the Draft Concession Agreement, the Concessionaire shall set up, operate and maintain Floating Crane facilities and also undertake, perform and discharge other responsibilities and obligations at their cost, expenses, manpower and other arrangements as mentioned herein below: -

- Supply, delivery, installation and commissioning, operation and maintenance of Floating Crane, Tug and other equipment for undertaking the following operations on round the clock basis on all the days in a year at Diamond Harbour and other deep drafted locations within the limits of SMP, Kolkata at the cost, charges, expenses, risk, manpower and arrangements of the Concessionaire
    - i Transfer of container and cargo in the midstream at Diamond Harbour and other deep drafted location between the (i) sea going vessels, (ii) sea going barges and (ii) sea going vessels and non-sea going barges
    - ii Cleaning of rib / frames and sweeping of cargo inside the hatches in case of import cargo, trimming of cargo inside the hatches in case of export cargo including sweeping of deck of the vessel / barges as may be required.
    - iii Shifting of the Floating Crane to the desired location and making fast the Floating Crane alongside the vessels for cargo transfer operations as per the direction of SMP, Kolkata will be final.
- Apart from the functions as given as above, the Concessionaire shall also undertake the following operations / actions at his cost, charges, expenses, risk and manpower and arrangements:
    - i To ensure that the cargo, during transfer operations, does not fall into the water.
    - ii Undertaking other associated on board works (other than those specifically mentioned above) which may be required to be done for undertaking the cargo transfer operations.
    - iii Providing fresh water, ration, medical facilities etc. for the manpower to be deployed by the Concessionaire for the operation of the Floating Crane, tug and other associated equipment / facilities.
- The Concessionaire shall supervise all the functions as mentioned as above at its cost, charges, expenses, risk, manpower and other arrangements.
- The Concessionaire shall carry out the operations relating to making fast of the Floating Crane, cargo transfer and other on-board functions under the provisions of the Concessionaire Agreement & in close coordination with SMP, Kolkata. Master of the vessels/barges as well as representatives of other agencies involved.
- The Concessionaire shall provide & maintain a launch for transportation of man & material from work location to shore & back over the entire tenure of contract at his cost, charges, expenses, risk, manpower and arrangements.

Chapter –VII "Specification & Cost Estimate",

Floating Crane Specification & Cost Estimate

Equipment Specification

The Concessionaire shall supply, install and commission the following minimum number of equipment/craft with specifications matching that as given in the Table.

Table 34: Equipment Specification & Feature

Equipment*	Number to be deployed including Specification	Primary operations to be performed	Other details
Floating crane	A dumb barge with a crane mounted on the deck of minimum 35MT SWL (safe working load) with 36m outreach, capable of handling vessels up to 32.2m beam.	Transfer of cargo between the (i) sea going vessels, (ii) sea going vessels and sea going barges and (ii) sea going vessels and non-sea going barges	The floating cranes comprising the crane, Dumb Pontoon/barges and other associated facilities shall be new.
TUG	1 no tug with at least 25T Bollard Pull	For movement of the floating crane, berthing / unberthing alongside / from the vessels/ barges	The Tug shall be new and have all required certificates from the authorities for the designated works
Grabs	25 cbm – 2 nos.	For facilitating cargo handling operation	New Grabs to be fitted.
Launch	1 No.	For transportation of man & material from work location to shore & back	The launch may be old but shall have all required certificates issued by the competent authority for to & fro movement in the open sea conditions within the limits of SMP.
Front end Loader	3 cbm capacity	To be utilized inside hatches for aggregation / trimming of cargo during cargo transfer operation.	

Equipment*	Number to be deployed including Specification	Primary operations to be performed	Other details
Floating fenders	3 nos. of adequate size	To be utilized between the floating crane and the vessels / barges during berthing / unberthing	
Spreader	2 nos.	To be utilized for container handling	
Generator	1.2 MVA	For power Generation	

*Any other required equipment/ Machinery/ instrument (electrical/mechanical both) shall be unconditionally without any extra charge provided by the Concessionaire for the successful operations/transfer of Container and cargo from mother vessel to daughter vessel/ dock and transfer up to any deep drafted location within the limit of SMP, Kolkata. The dumb barge and the Tug to be preferably a composite/integrated unit for the ease of operation. The Tug is to be of Indian Built.

The Project is for Setting up of "floating crane facilities at diamond harbour / other deep draft locations in the water limit of SMP, Kolkata, considering on PPP mode with a Concession Period of 15 years on DBFO.

Estimated Capital Cost

The Estimated Capital Cost is considered on the basis of cost as mentioned in the TAMP Notification No. 467 dated 17 December 2019. The cost has been escalated at an annual rate of 4.5% and relevant exchange rate for Euro to Rs..

Table 35: Estimate Project Cost

Sl. No	Particulars	Cost in Rs. Cr
1	Floating-crane	33.33
2	Floating Barge and Generator	24.07
3	Tug	12.04
4	Loader	0.92
5	Miscellaneous (including Mobilisation)	1.00
6	Interest during Construction	5.19
7	Contingency @1% of Capital Cost	0.71
Total		**77.26**

For the purpose of arriving at the Project Cost, it has been assumed that the Debt: Equity Ratio for the project shall be 70:30 with the Cost of Debt being 9.6% as per the prevailing market rate for good quality borrowers. The period of implementation is considered to be 18 months.

Note:

The MoSP&W guidelines stipulates as under:

(F.No.PD-11020/47/2016-KoPT, GoI, MoS, Port Wing dated 01.02.2017 addressed to The Chairmen, All Major Ports)

The Project Cost of PPP Projects which is incorporated in the Bid Documents including draft Concession Agreement, have been adhering to TAMP Guidelines on the subject. Accordingly Ports have been taking the Finance Cost component of the project cost, comprising of project supervision expenses, contingencies, taxes, IDC etc. equal to 5% of civil cost of the project.

In a SFC Meeting, it was pointed out that the normative approach for Finance Cost is not in order as it does not lead to realistic assessment of the project cost. As project cost has implications on Project IRR, financial viability etc. of the project, it was desired that IDC for the project may be calculated as per the assessed interest rate, project implementation period/ schedule etc.

It has therefore been decided that for all future PPP projects, Ports may continue to provide IDC, FIRR and Project cost restricting IDC to 5% of civil cost as per TAMP norms but should also provide second set of numbers calculating the IDC as per the prevalent interest rate, implementation schedule etc. while arriving at the cost of project along with IRR and project cost. This may be followed in all future PPP projects.

Chapter –VIII "Implementation Schedule"

Setting up & implementation, Schedule & Concession Period

The project is small in nature and simple i.e. on the award of the Project, the Concessionaire has to purchase the Crane and dumb barge along with other supporting equipment as already mentioned in the Estimated Project Cost. The Concessionaire will bring its own design as per the minimum specification and technology required, as specified in this TEFR. However, the Concessionaire may bring better specification & technology in the Project.

Thereafter, the design will be approved by the Authority through review & recommendation of the Independent Engineer for the PPP project. Since, the design is to be brought by the Concessionaire, and at the end of the Concession Period, the Assets left out at the end of the project, may not be suitable for transferring to the Authority; hence the Project is recommended on the Design, Build. Finance & Operate (DBFO) basis under PPP mode.

The model concession agreement (MCA) Clause, 3.1 defines Conditions Precedent, which includes the formation of SPV furnishing documents, submission of Financing Plan and Financing Documents for the Project, opening of Escrow Account & complying with the provisions of Financial Closure etc.

The MCA Clause 3..2 stipulates as "The aforesaid Conditions Precedent shall be complied with within [180 - (One Hundred and eighty)] Days of the date of the Agreement. For the purpose of compliance of Financial Close obligation, Concessionaire, shall not be considered at default if the conditions pending for achieving financial close are only those which are required to be fulfilled by the Concessioning"

Therefore, the minimum period required the above activities & compliances generally takes 180 days. As per the project specific requirements of the Project, the Concessionaire needs arrange the procurement of Floating Crane etc.

Concession Period:

As per the TAMP order, the setting up of floating crane is considered for a period of 15 years. Therefore, the TEFR is prepared based on the same.

The implementation schedule is assumed as under:

- Manufacturing time: 12 months (fabrication yard including inspection works)
- Mobilization to desired location: 3 months subject to the distance and weather conditions.
- Crane registration under "COASTING VESSEL ACT 1838" at Mumbai: 3 months

Tentative timeline for FC		2022								2023												2024												2030	2039
Particulars	**Duration (months)**	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	....	
Activity of SMPK																																			
SFC		1																																	
RFQ, Security Clearance, RFP & LOIA	6		1	2	3	4	5	6																											
SPV formation, Completion of CP & FC	06 to 08								1	2	3	4	5	6																					
Activity of Concessionaire																																			
Procurement, Installation, Testing of FC	12														1	2	3	4	5	6	7	8	9	10	11	12									
Crane registration under "COASTING VESSEL ACT 1838" at Mumbai	3																										1	2	3						
Mobilization	3																													1	2	3			
Operation Period	450																																15 years of O&M Period		

CP – Conditions Precedent; FC – Financial Closure

Figure Y: Implementation Schedule

Chapter –IX "Financial Viability Analysis"

Financial Analysis

Optimum Capacity Calculation Considered

Table 36: Specifications

i.	**Crane considered: CBG 360 crane, Grab Capacity: 25CBM with 22 cycles per hour**		
ii.	Maximum Handling Rate per hour (25cbm grab*0.9*22 cycles per hour)	495 Tons/Hr.	24 TEUs
iii.	Maximum Handling Rate per day [(ii) * 20hrs)]	9900 Tons/day	480 TEUs/day
iv.	Operating Load factor	80%	
v.	Handling of Dry Bulk Cargo per day	7920 Tons/day	480 TEUs/day
vi.	Total cargo/container working days per year (**Assumption:** Estimated 4 days per month in total for shifting the cranes from its anchor position and positioning alongside vessel @ 4x1 times per month: 8 days / month i.e. 96 days/year) (Utilization: 75% while alongside. Stoppages in cargo due to shifting crane between hatches / mooring-unmooring of barges/sea and swells etc. (365-96) * 0.75 = 237.5 days ~ 240 days (Sharing between container and bulk 50:50)	120 days	120 days
vii	Individual cargo capacity	950400 Tons	57600 TEUs

General Assumptions

Fuel Consumption

Floating Crane	1250 lpd
Other equipment	880 lpd

Based on average consumption of existing FC operator at Haldia (calculated as 170 days average)

Lpd = Litres Per Day

Full Maintenance Cost and Insurance

Equipment	FMC	Insurance	Remarks	Equipment
Floating-crane	7.0%	1%	4th Year onwards	Floating-crane
Floating Barge and Generator	5.0%	1%	4th Year onwards	Floating Barge and Generator
Tug	7.0%	1%	2nd Year onwards	Tug

Rate Calculation

Operating Cost as calculated from Projections			
		Total	**Bulk**
A	**Operating Cost**		**In Rs Cr**
i	Fuel (Except Loader)	5.08	2.54
ii	Fuel (Loader)	0.10	0.10
iii	Loader Operating cost	0.26	0.26
iv	Launch Hiring Cost	0.33	0.17
v	Average Dry Docking Cost	0.10	0.05
vi	Repair and Maintenance	4.39	2.20
vii	Insurance	0.70	0.35
viii	Depreciation	4.53	2.27
ix	Cost of manpower	2.40	1.20
x	Administrative cost	1.01	0.51
	Sub Total	18.91	9.63
	Add: ROCE*@16%	12.36	6.18
	Total	31.27	15.81
	Cost per unit @ 100% utilization (Rs.)		**164.52**
***ROCE (Concessionaire's Margin) considered as 16%**			

Revenue Calculation

Revenue from container

Container & Containerized Cargo* :						
FY	Export					
	Foreign		Coastal		Total	
	'000 Tonnes	(No. TEUs)	'000 Tonnes	(No. TEUs)	'000 Tonnes	(No. TEUs)
2021-22	4732	357131	64	4596	4796	361727
2022-23	4915	370988	71	5097	4986	376084
2023-24	5106	385382	79	5652	5185	391035
2024-25	5304	400335	87	6269	5392	406604
2025-26	5510	415869	97	6952	5607	422820
2026-27	5724	432005	107	7709	5831	439714
2027-28	5946	448767	119	8550	6065	457317
2028-29	6177	466180	132	9482	6309	475661
2029-30	6416	484268	146	10515	6563	494783
2030-31	6665	503058	162	11661	6828	514719
2031-32	6924	522577	180	12932	7104	535509
2032-33	7193	542853	200	14341	7392	557195
2033-34	7472	563917	221	15904	7693	579821
2034-35	7762	585797	245	17638	8007	603435
2035-36	8063	608526	272	19560	8335	628087
2036-37	8376	632138	302	21692	8678	653830
2037-38	8701	656705	335	24102	9036	680807
2038-39	9039	682198	372	26760	9411	708958

F.Y	Import					
	Foreign		Coastal		Total	
	'000 Tonnes	(No. TEUs)	'000 Tonnes	(No. TEUs)	'000 Tonnes	(No. TEUs)
2021-22	5710	362428	17	3979	5727	366407
2022-23	5919	375633	18	4331	5937	379964
2023-24	6134	389320	20	4714	6154	394034
2024-25	6358	403505	21	5131	6379	408636
2025-26	6589	418208	23	5585	6613	423792
2026-27	6829	433446	25	6078	6855	439524
2027-28	7078	449239	28	6616	7106	455855
2028-29	7336	465607	30	7201	7366	472808
2029-30	7603	482572	33	7838	7636	490410
2030-31	7881	500156	36	8531	7916	508686
2031-32	8168	518379	39	9285	8206	527664
2032-33	8465	537267	42	10106	8507	547373
2033-34	8774	556843	46	10999	8820	567843
2034-35	9093	577133	50	11972	9143	589105
2035-36	9425	598161	54	13031	9479	611192
2036-37	9768	619956	59	14183	9827	634139
2037-38	10123	642515	64	15440	10188	657955
2038-39	10492	665898	70	16870	10562	682768

Revenue from Dry Bulk

Traffic Projection ('000 MT)

F.Y	Import			Transshipment (Import)			Total Import
	Foreign	Coastal	Total	Foreign	Coastal	Total	
2021-22	1311	11	1322	1717	1	1718	3040
2022-23	1391	12	1403	1794	1	1795	3198
2023-24	1476	13	1489	1874	1	1875	3364
2024-25	1566	13	1580	1958	1	1959	3539
2025-26	1662	14	1676	2045	1	2046	3723
2026-27	1764	15	1779	2137	1	2138	3917
2027-28	1872	16	1888	2232	1	2233	4121
2028-29	1986	17	2003	2332	1	2333	4337
2029-30	2108	18	2126	2436	2	2438	4564
2030-31	2237	19	2256	2545	2	2547	4803
2031-32	2374	20	2394	2659	2	2660	5054
2032-33	2519	22	2540	2778	2	2779	5320
2033-34	2673	23	2696	2902	2	2904	5600
2034-35	2836	24	2861	3032	2	3034	5894
2035-36	3010	26	3036	3167	2	3169	6205
2036-37	3194	27	3221	3309	2	3311	6532
2037-38	3389	28	3221	3457	2	3311	6532
2038-39	3596	29	3221	3612	2	3311	6532

F.Y	Export			Transshipment (Export)			Total Export
	Foreign	Coastal	Total	Foreign	Coastal	Total	
2021-22	2133	113	3035	33	0	33	3067
2022-23	2253	136	3650	33	0	33	3683
2023-24	2379	163	4389	33	0	33	4423
2024-25	2513	196	5279	34	0	34	5312
2025-26	2654	236	6349	34	0	34	6383
2026-27	2803	284	7635	34	0	34	7670
2027-28	2960	341	9183	35	0	35	9218
2028-29	3126	411	11044	35	0	35	11079
2029-30	3301	494	13282	35	0	35	13318
2030-31	3487	594	15974	36	0	36	16010
2031-32	3682	714	19212	36	0	36	19248
2032-33	3889	859	23105	36	0	36	23142
2033-34	4107	1033	27788	37	0	37	27825
2034-35	4337	1242	33420	37	0	37	33457
2035-36	4581	1494	40193	38	0	38	40231
2036-37	4838	1797	48339	38	0	38	48377
2037-38	5109	2161	48339	38	0	38	48377
2038-39	5396	2600	48339	39	0	38	48377

Revenue Calculation

Revenue from Container Traffic

				Considering LF		Operating Load Factor	Inflation Adjusted Rate Applied		Revenue
Year	Foreign	Coastal	Total	Foreign	Coastal		Foreign	Coastal	Rs. Cr.*
	(No. TEUs)	(No. TEUs)	(No. TEUs)	(No. TEUs)	(No. TEUs)		Rs./TEU	Rs./TEU	
2021-22	719559	8575	728134	-	-				
2022-23	746621	9428	756049	-	-				
2023-24	774702	10366	785068	28800	-	100%	191.68	115.01	9.66
2024-25	803840	11400	815240	57600	-	100%	197.43	118.46	19.90
2025-26	834077	12537	846614	57600	-	100%	203.35	122.01	20.50
2026-27	865451	13787	879238	57600	-	100%	209.45	125.67	21.11
2027-28	898006	15166	913172	57600	-	100%	215.74	129.44	21.75
2028-29	931787	16683	948470	57600	-	100%	222.21	133.33	22.40
2029-30	966840	18353	985193	57600	-	100%	228.88	137.33	23.07
2030-31	1003214	20192	1023406	57600	-	100%	235.74	141.45	23.76
2031-32	1040956	22217	1063173	57600	-	100%	242.81	145.69	24.48
2032-33	1080120	24447	1104567	57600	-	100%	250.10	150.06	25.21
2033-34	1120760	26903	1147663	57600	-	100%	257.60	154.56	25.97
2034-35	1162930	29610	1192540	57600	-	100%	265.33	159.20	26.75
2035-36	1206687	32591	1239278	57600	-	100%	273.29	163.97	27.55
2036-37	1252094	35875	1287969	57600	-	100%	281.49	168.89	28.37
2037-38	1299220	39542	1338762	57600	-	100%	289.93	173.96	29.23
2038-39	1348096	43630	1391726	28800	-	100%	298.63	179.18	15.05

** Revenue is calculated after converting TEUs into MT with the Conversion Factor 1 TEU = 17.50 MT*

Applicable rates are considered from the date of operations and escalated at 3% (being 60% of 5% inflation considered as per explation provided against the Table of General Operating Costs)

Revenue from Dry Bulk Cargo

F.Y	Traffic Volume ('000 MT)			Considering LF		Operating Load Factor	Inflation Adjusted Rate applied		Revenue Rs. Cr
	Foreign	Coastal	Total	Foreign	Coastal		Foreign Rs./MT	Coastal Rs./MT	
2021-22	5194.32	125.00	5319.32	-	-				-
2022-23	5471.00	149.00	5620.00	-	-				-
2023-24	5762.39	177.00	5939.39	285.61	4.39	80%	191.68	115.01	5.53
2024-25	6070.88	210.00	6280.88	632.16	21.87	80%	197.43	118.46	12.74
2025-26	6394.85	251.00	6645.85	697.87	27.39	80%	203.35	122.01	14.53
2026-27	6737.73	300.00	7037.73	768.98	34.24	80%	209.45	125.67	16.54
2027-28	7098.97	358.00	7456.97	845.70	42.65	80%	215.74	129.44	18.80
2028-29	7479.02	429.00	7908.02	928.37	-	80%	222.21	133.33	20.63
2029-30	7880.39	514.00	8394.39	950.40	-	80%	228.88	137.33	21.75
2030-31	8304.60	615.00	8919.60	950.40	-	80%	235.74	141.45	22.40
2031-32	8751.20	736.00	9487.20	950.40	-	80%	242.81	145.69	23.08
2032-33	9221.77	883.00	10104.77	950.40	-	80%	250.10	150.06	23.77
2033-34	9718.93	1058.00	10776.93	950.40	-	80%	257.60	154.56	24.48
2034-35	10242.33	1268.00	11510.33	950.40	-	80%	265.33	159.20	25.22
2035-36	10795.65	1522.00	12317.65	950.40	-	80%	273.29	163.97	25.97
2036-37	11378.62	1826.00	13204.62	950.40	-	80%	281.49	168.89	26.75
2037-38	11993.99	2191.58	14185.57	950.40	-	80%	289.93	173.96	27.56
2038-39	12643.17	2631.13	15274.30	475.20	-	80%	298.63	179.18	14.19

Applicable rates are considered from the date of operations and escalated at 3% (being 60% of 5% inflation considered as per explation provided against the Table of General Operating Costs

Operational Costs Calculation

General Operational Costs

All figures in Rs. Cr

F.Y.	Fuel	Crew Salary	IRS Survey fee	Crane FMC cost	Crane Engineer attendance & supervision cost	Other Misc Admin	Loader operating Cost	Launch	Dry Dock	Crane Operators	Other Operational staff	Captain and Engineers Captain	Food and Lodging expenses	Administrative expenses
2023-24	2.59	0.56	0.31	-	0.44	0.22	0.13	0.17	-	0.08	0.38	0.12	0.04	0.22
2024-25	5.52	1.18	1.28	-	0.92	0.46	0.27	0.18	-	0.17	0.80	0.25	0.08	0.46
2025-26	5.87	1.23	1.30	-	0.97	0.49	0.29	0.18	-	0.18	0.84	0.26	0.09	0.49
2026-27	6.22	1.30	1.33	-	1.02	0.51	0.30	0.19	0.67	0.19	0.88	0.28	0.09	0.51
2027-28	6.57	1.36	1.36	-	1.07	0.53	0.32	0.20	-	0.19	0.92	0.29	0.10	0.53
2028-29	6.92	1.43	1.38	-	1.12	0.56	0.33	0.21	-	0.20	0.97	0.31	0.10	0.56
2029-30	7.26	1.50	1.41	-	1.18	0.59	0.35	0.22	-	0.21	1.02	0.32	0.11	0.59
2030-31	7.61	1.58	1.44	-	1.24	0.62	0.37	0.23	0.81	0.23	1.07	0.34	0.11	0.62
2031-32	7.96	1.65	1.47	-	1.30	0.65	0.38	0.25	-	0.24	1.12	0.35	0.12	0.65
2032-33	8.31	1.74	1.50	-	1.37	0.68	0.40	0.26	-	0.25	1.18	0.37	0.12	0.68
2033-34	8.65	1.82	1.53	-	1.43	0.72	0.42	0.27	-	0.26	1.24	0.39	0.13	0.72
2034-35	9.00	1.92	1.56	-	1.51	0.75	0.44	0.29	0.99	0.27	1.30	0.41	0.14	0.75
2035-36	9.35	2.01	1.59	-	1.58	0.79	0.47	0.30	-	0.29	1.36	0.43	0.14	0.79
2036-37	9.70	2.11	1.62	-	1.66	0.83	0.49	0.31	-	0.30	1.43	0.45	0.15	0.83
2037-38	10.05	2.22	1.65	-	1.74	0.87	0.51	0.33	-	0.32	1.50	0.48	0.16	0.87
2038-39	5.20	1.16	1.26	-	0.91	0.46	0.27	0.17	1.20	0.17	0.79	0.25	0.08	0.46

[CAGR of growth in Fuel Prices as per estimates is approximately 5%. Fuel being the highest consumable, average cost inflation considered accordingly]

FMC and Insurance Cost

All figures in Rs. Cr

	Full Mainteance Contract				Insurance			
	Floating-crane	Floating Barge and Generator	Tug	Loader	Floating-crane	Floating Barge and Generator	Tug	Loader
2023-24	-	-	-	-	-	-	-	-
2024-25	-	-	0.45	0.01	-	-	0.06	0.00
2025-26	-	-	0.90	0.01	-	-	0.12	0.01
2026-27	-	-	0.90	0.01	-	-	0.11	0.01
2027-28	1.25	0.65	0.90	0.01	0.14	0.10	0.11	0.01
2028-29	2.51	1.29	0.90	0.01	0.27	0.20	0.10	0.01
2029-30	2.51	1.29	0.90	0.01	0.25	0.18	0.09	0.01
2030-31	2.51	1.29	0.90	0.01	0.23	0.17	0.08	0.01
2031-32	2.51	1.29	0.90	0.01	0.21	0.15	0.07	0.01
2032-33	2.51	1.29	0.90	0.01	0.19	0.13	0.07	0.01
2033-34	2.51	1.29	0.90	0.01	0.16	0.12	0.06	0.00
2034-35	2.51	1.29	0.90	0.01	0.14	0.10	0.05	0.00
2035-36	2.51	1.29	0.90	0.01	0.12	0.09	0.04	0.00
2036-37	2.51	1.29	0.90	0.01	0.10	0.07	0.04	0.00
2037-38	2.51	1.29	0.90	0.01	0.08	0.06	0.03	0.00
2038-39	1.25	0.65	0.45	0.01	0.06	0.04	0.02	0.00

* Insurance Cost against loader is shown as approximated to Rs. Cr calculated on depreciated value as per Industry practice

Consolidated OPEX

All figures in Rs. Cr

FY	OperatingCost	FMC	Insurance	Depreciation	Loan-Interest	Total Opex
2023-24	5.25	-	-	2.27		7.52
2024-25	11.58	0.46	0.07	4.53	3.78	20.42
2025-26	12.18	0.92	0.13	4.53	4.77	22.54
2026-27	13.48	0.92	0.12	4.53	3.76	22.82
2027-28	13.45	2.82	0.36	4.53	2.69	23.85
2028-29	14.10	4.72	0.57	4.53	1.63	25.55
2029-30	14.77	4.72	0.53	4.53	0.57	25.11
2030-31	16.26	4.72	0.48	4.53	-	26.00
2031-32	16.15	4.72	0.44	4.53	-	25.83
2032-33	16.86	4.72	0.39	4.53		26.50
2033-34	17.59	4.72	0.35	4.53		27.19
2034-35	19.33	4.72	0.30	4.53		28.88
2035-36	19.10	4.72	0.26	4.53		28.61
2036-37	19.89	4.72	0.21	4.53		29.35
2037-38	20.70	4.72	0.17	4.53		30.11
2038-39	12.39	2.36	0.12	2.27		17.13

Economic Viability Analysis

Economic Viability Analysis at TAMP approved Rates

Project Returns

Figures in Rs. Cr

Year of Op	FY	Capex	Cash Flow			Sensitivity Analysis		
						Capex	Revenue	O&M
			In Flow	Out Flow	Net Flow	10%	-10%	10%
	2022-23	77.26			(77.26)	(84.99)	(77.26)	(77.26)
1	2023-24		15.19	7.55	7.63	7.70	6.11	7.26
2	2024-25		32.64	15.77	16.87	17.00	13.60	16.13
3	2025-26		35.02	16.98	18.04	18.18	14.54	17.26
4	2026-27		37.65	18.97	18.67	18.81	14.91	17.77
5	2027-28		40.54	21.64	18.91	19.04	14.85	17.82
6	2028-29		43.03	24.63	18.40	18.53	14.09	17.09
7	2029-30		44.82	25.92	18.90	19.03	14.42	17.51
8	2030-31		46.17	27.51	18.65	18.79	14.04	17.15
9	2031-32		47.55	27.82	19.74	19.87	14.98	18.24
10	2032-33		48.98	28.71	20.27	20.40	15.37	18.73
11	2033-34		50.45	29.63	20.82	20.95	15.77	19.23
12	2034-35		51.96	31.27	20.69	20.83	15.49	18.99
13	2035-36		53.52	31.55	21.97	22.11	16.62	20.28
14	2036-37		55.13	32.55	22.57	22.71	17.06	20.84
15	2037-38		56.78	33.58	23.20	23.34	17.52	21.41
16	2038-39		33.02	19.63	13.39	13.46	10.46	12.35
Add: Salvage Value					3.78	4.16	3.78	3.78
Project FIRR					**20.51%**	**18.69%**	**15.62%**	**19.22%**
NPV					**40.05**	**33.93**	**15.80**	**33.15**

*Outflow = [Cash Inflow – {(Total Opex – Depreciation-Interest)+(Cash Inflow – Total Opex)*30%)}]; Tax Rate considered as 30%*

Rates applied: Bulk Rs. 191.68 per MT

Sensitivity of Project Return to Container Volume Handled at Different Rates

Container Handling	NPV*@191.68		NPV*@164.52		NPV*@177.00		NPV*@190	
	Base Case	10% Reduction in Revenue	Base Case	10% Reduction in Revenue	Base Case	10% Reduction in Revenue	Base Case	10% Reduction in Revenue
100%	36	(2)	13	(21)	23	(12)	35	(3)
95%	40	1	16	(19)	27	(10)	39	(0)
90%	44	3	19	(16)	30	(7)	42	2
85%	46	5	21	(15)	33	(5)	45	4
80%	49	7	23	(13)	35	(4)	47	6
75%	**50**	**8**	**25**	(12)	**37**	(3)	**49**	7
70%	**51**	**9**	**25**	(12)	**37**	(2)	**50**	8
65%	**50**	**8**	**25**	(12)	**36**	(3)	**49**	7
60%	48	6	23	(14)	34	(5)	46	5
55%	44	4	20	(16)	31	(7)	43	3
50%	40	1	16	(19)	27	(10)	39	(1)
45%	35	(3)	12	(22)	22	(14)	34	(4)
40%	30	(8)	7	(26)	17	(17)	28	(9)
35%	24	(12)	2	(30)	12	(22)	22	(13)
30%	17	(17)	(4)	(35)	6	(27)	16	(18)
25%	10	(23)	(10)	(42)	(1)	(33)	9	(24)
20%	3	(30)	(17)	(48)	(8)	(40)	2	(31)
15%	(5)	(37)	(25)	(55)	(16)	(47)	(6)	(38)
10%	(15)	(45)	(34)	(62)	(25)	(54)	(16)	(46)
5%	(24)	(54)	(43)	(70)	(34)	(62)	(26)	(55)
0%	(35)	(63)	(52)	(78)	(44)	(71)	(36)	(64)

**** NPV in Rs. Cr***

Figures indicated in Red are negative NPV implying that the project is unviable in such cases

Four different scenarios have been considered

Scenario 1 – TAMP approved rate of Rs. 191.68 per MT for Bulk Cargo

Scenario 2 – Calculated rate of Rs. 164.52 per MT for Bulk Cargo

Scenario 3 – Proposed rate of Rs. 177.00 per MT for Bulk Cargo

Scenario 4 – Proposed rate of Rs. 190.00 per MT for Bulk Cargo

As can be seen from the above Table, optimum returns are obtained when the proposed Floating Crane is utilised 60% to 85% of the time for container handling. As the container handling reduces, the project viability reduces gradually.

Critical handling time, i.e. minimum container handling time by the Floating Crane in the above cases are 20%, 35%, 30% and 20% respectively. Below these threshold levels, the project becomes unviable.

The project is most sensitive in case there is a fall in revenue collection. Accordingly, a second set of analysis has been carried out in all the three Scenarios as mentioned earlier in such cases where there is a fall of 10% in revenue collection.

As can be seen from the above Table, optimum returns continue to be obtained when the proposed Floating Crane is utilised 60% to 85% of the time for container handling even in case there is a fall in revenue earnings. As the container handling reduces, the project viability reduces gradually.

Conclusion

On carrying out a detailed analysis, it is seen that that project is feasible in the base case if the rates for bulk cargo and container are considered at Rs. 191.68 per MT for Bulk Cargo (considering 1 TEU = 17.50 MT). Though there is a fall in returns from the project in case revenue collections fall by 10%, there will be sufficient margin for the concessionaire even after reasoanble share of revenue is shared with SMPK.

It is therefore proposed that TAMP approved rates may be considered as the base rates on which the concessionaire shall share revenue. At the TAMP approved rates, the project is viable within the following boundary conditions:

i. More than 10% of material handling time should be dedicated to handling of containers

ii. Using the Floating Crane for 60% to 85% of the time towards handling of containers yields higher returns from the project with peak returns at 70%

iii. For SMP, optimum Revenue Share is between 16% - 20% depending on container handling. With container handling time between 50% to 95%, the project remains viable up to Revenue Share of 16%. Actual share of revenue being the proposed criteria for selection of Concessionaire would be decided by the bidders while submitting their respective bids.

In terms of Clause 27(f) of Chapter III (D), Major Ports Act, 2021 and in pursuance of Article 8 of the Draft MCA circulated by MoSPW vide their letter dated 12th November, 2021, "…in case of Public Private Partnership projects after the commencement of this Act, concessionaire shall fix the tariff based on market conditions and on such other conditions as may be notified:

Provided further that the revenue share and other conditions would be as per the provisions of the specific concession agreement between the Board and the Public Private Partnership concessionaire appointed under the Public Private Partnership project"

The SMP Authorities may accordingly like to take a decision on the Tariff for the proposed Floating Crane Facility. Share of revenue is proposed to be the bid parameter for the Transaction.

Appendices

Indexed Cost of Floating Crane

(Figures in INR unless stated otherwise)

Euro Conversion Rate		85
CIF Value (Indexed at 4.5% for two years)		261,758,393
Formula	**Duty Rates**	**DutyAmount**
Assessable Value – (A)		
(CIF Value + 1% Landing Charge of CIF)		264,375,976
Basic Duty – (B)		
(A) x Basic Duty Rate	10%	26,437,598
Preferential Duty – (B)		
(A) x Pref. Duty Rate	0%	
IGST: Additional Duty – (C)		
(A+B) x IGST Rate	5%	14,540,679
Central Excise Edu Cess – (D)		
(C) x Central Excise Edu Cess rate	0%	
Customs Education Cess – (E)		
(B+C+D) x Customs Edu. Cess rate	0%	
Social Welfare Surcharge – Special Duty – (F)		
(A+B+C+D+E) x Social Welfare Surcharge	10%	30,535,425
Total Custom Duty		**71,513,702**

Calculation of IDC and Interest Expenses

(All figures in INR Crore)

Financial Year	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Term Loan Released	43.26	10.81	-	-	-	-	-
Cumulative TL Released	43.26	54.07	-	-	-	-	-
Interest Capitalised (IDC)	2.60	2.60	-	-	-	-	-
Cumulative IDC	2.60	5.19	-	-	-	-	-
Interest Charged to PL	-	2.60	5.07	4.09	2.93	1.78	0.62

Cost of Debt considered at 9.6% assuming Highest Category of Borrower

Statistical Projection of Fuel Price

(Cost in INR per litre)

Timeline	Forecast	Lower Confidence Bound	Upper Confidence Bound
2021-22	87.66	77.75	97.57
2022-23	94.46	83.38	105.54
2023-24	101.26	88.36	114.16
2024-25	108.07	92.75	123.38
2025-26	114.87	96.63	133.11
2026-27	121.67	100.07	143.27
2027-28	128.47	103.16	153.79
2028-29	135.28	105.92	164.64
2029-30	142.08	108.39	175.76
2030-31	148.88	110.61	187.15
2031-32	155.69	112.59	198.78
2032-33	162.49	114.34	210.64
2033-34	169.29	115.88	222.71
2034-35	176.09	117.22	234.97
2035-36	182.90	118.36	247.43
2036-37	189.70	119.32	260.08
2037-38	196.50	120.10	272.90
2038-39	203.31	120.71	285.90

Calculated on historical prices of last 18 years

Statistic	Value
Alpha	0.33
Beta	0.17
Gamma	0.00
MASE	1.82
SMAPE	0.09
MAE	6.00
RMSE	6.62

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