

**BID DOCUMENT
for
SELECTION OF A CONSULTANT
For**

**PREPARATION OF DETAILED PROJECT REPORT (DPR) AND BID DOCUMENTS
INCLUDING RAPID ENVIRONMENT IMPACT ASSESSMENT AND ENVIRONMENT
MANAGEMENT PLAN (EIA & EMP)**

**FOR
DEVELOPMENT OF AN EXTENDED PORT GATE SYSTEM AT BALAGARH,
WEST BENGAL**

**For
KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED**

Issued by

**CHIEF ENGINEER, KOLKATA PORT TRUST
FOR KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED
15 STRAND ROAD, KOLKATA 700001**

TELEPHONE: 033 2230-0413/033-2231-3214

FAX: 033 2230-0413/033-2231-3271

e-mail: ce@kolkataporttrust.gov.in/dmd@kolkataporttrust.gov.in

e-Tender Call Notice (e-TCN)

Tender No : KOPT/KDS/CIV/T/2288/38 DATE 20.07.2018

e-Tender Notice No- KoPT/Kolkata Dock System/CE/99/18-19/ET/232

1. (a) Global e-Tenders are invited in Single Stage Two Bid System in Item Rate for the following work on behalf of Kolkata Port Infrastructure Development Limited from the experienced Bidders meeting the pre-qualifying criteria through on-line bidding on the website <https://www.mstcecommerce.co> having Digital Signature Certificate (DSC) issued from any agency authorized by Controller of Certifying Authority (CCA), Govt. of India and which can be traced up to the chain of trust to the Root Certificate of CCA.

(b) The Bidder who wants to participate should have valid licence/Registration. Any Foreign agency can also participate by making a Consortium/ Joint Venture with some Indian Firm fulfilling the above criteria.

(c) The Bidder should submit PAN Details and GST particulars

2. The Bidder should submit bids for the following work.

Description of work	Earnest Money Deposit (in Rs.)	Tender fee (in Rs.) (incl 18% GST)	Period of Completion
Preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environment Impact Assessment and Environment Management Plan (EIA & EMP), for Development of an extended port gate system at Balagarh, West Bengal	3,00,000/-	2950/-	7 Months
Scope of work: (i) Preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environment Impact Assessment and Environment Management Plan (EIA & EMP), for Development of an extended port gate system at Balagarh, West Bengal as detailed in the Tender Document. (ii) Providing & submitting detailed design and drawings (iii) Preparing and submitting proposal for approval of KOLKATA PORT			

INFRASTRUCTURE DEVELOPMENT LIMITED for the estimate for all the works included in scope of work based upon CPWD/PWD scheduled of Rates (SOR) and standard Rate Analysis, Market rates etc and total program / bar chart / CPM.

(iv) Preparation of tender documents preparing scrutiny Report and assist in selecting the Contractor after opening of tender documents.

(1) The bidder must upload experience certificate of Preparation of Detailed Project Report for development of Port project executed by him along with the Technical Bid.

(2) The deposit of cost of Tender Document and E.M.D by the participating Bidder will be made by National Electronic Fund Transfer (NEFT)/Real Time Gross Settlement (RTGS) or by Banker's cheque/ Bank Draft/ Pay Order payable to Kolkata Port Infrastructure Development Limited and payable at Kolkata within 3 working days of last date of submission of bid at the office of the Chief Engineer, Kolkata Port Trust, Kolkata Port Infrastructure Development Limited, 15 Strand Road, Kolkata 700001, only to the Account mentioned as at 3.1(B) (Bid Information).

3. TIME SCHEDULE OF TENDER

Sl. No.	Particulars	Date	Time
1	Tender e-Publication date	25.07.2018	11.00 AM
2	Last date for seeking Clarification on-line	06.08.2018	05.30 P.M
3	Date of Pre-Bid meeting at KoPT Head Office at 15 Strand Road, Kolkata 700001	07.08.2018	11.00 A.M
4	Date of uploading response to Clarifications sought	16.08.2018	03.30 P.M
5	(a) Bid Submission start date	17.08.2018	10.00 A.M
	(b) Bid Submission end date	27.08.2018	01.00 P.M
6	Tender Opening Date.	27.08.2018	03.00 P.M

3.1 CONTRACT DATA

(A) GENERAL INFORMATION:

1	Name of the work	Preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environment Impact Assessment and Environment Management Plan (EIA & EMP), for Development of an extended port gate system at Balagarh, West Bengal
2	Employer	KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED
3	Employer's Representative	CHIEF ENGINEER, KOLKATA PORT TRUST, FOR KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED, 15 STRAND ROAD, KOLKATA 700001
4a	Contact Persons for queries/ details/data	SHRI A. K. JAIN, CHIEF ENGINEER-033-22300413, 9836277661 -CAPT. J.J BISWAS, DIRECTOR, MARINE DEPARTMENT, 033-22303214, 9836298620
4b	Contact Persons of MSTC	Mr. Pritam Biswas, Assistant Manager (ERO) Mobile- 9903248755, email- pbiswas@mstcindia.co.in 2) Mr. Mayank Jain, Assistant Manager (ERO) Mobile- 9721277969, email- mhjain@mstcindia.co.in 3) Mr. Vikash Kumar Jaiswal, Regional Manager (ERO) Mobile- 9903042449, email- vikash@mstcindia.co.in
5	DETAILED FEASIBILITY STUDY PREPARED BY INDIAN PORTS ASSOCIATION, NEW DELHI	Soft Copy available at the following link www.kolkataporttrust.gov.in under "Important Information"

(B) BID INFORMATION :

1	Intended completion period/Time period assigned for completion	7 Months.
2	Last Date & Time of submission of Bid	Upto 1300 hours on 27.08.2018
3	Date of opening	1500 hours on 27.08.2018
4	Earnest Money Deposit and Tender Fee	EMD Rs.3,00,000/- and Tender Fee Rs.2950/- (including 18% GST) to be deposited separately by (i) NEFT/RTGS to the Bank Account as detailed below: A/C : Kolkata Port Trust A/c No : 067502000005535 IFSC : IOBA0000675 Bank Name Indian Overseas Bank Branch Name : STRAND ROAD Branch OR (ii) by Banker's cheque/ Bank Draft/ Pay Order payable to Kolkata Port Infrastructure Development Limited and payable at Kolkata within 3 working days of last date of submission of bid at the following address Office of the Chief Engineer, Kolkata Port Trust, for, Kolkata Port Infrastructure Development Limited, 15 Strand Road, Kolkata 700001
5a	Transaction Fee (Transaction fee is non-	Rs.8,850/- (Including GST @ 18% on the whole) Payment of Transaction fee by

	refundable.)	NEFT/RTGS in favour of MSTC LIMITED (As per special Note mentioned below)
5b	Special Note towards Transaction fee	The vendors shall pay the transaction fee using "Transaction Fee Payment" Link under "My Menu" in the vendor login. The vendors have to select the particular tender from the event dropdown box. On selecting NEFT, the vendor shall generate a challan by filling up a form. The vendor shall remit the transaction fee amount as per the details printed on the challan without making change in the same. Once the payment gets credited to MSTC's designated bank account, the transaction fee shall be auto authorized and the vendor shall be receiving a system generated mail
6	Last date of submission of EMD & Bid Document fee at Kolkata Port Trust Last date of submission of Transaction fee through RTGS/NEFT in favour of MSTC	26.08.2018 <u>Three working days before the last date of closing of online bidding for the e-tender</u> Bidders should attempt to deposit Transaction Fee 3 days prior to closing of bid to avoid rejection of bid on account of failure to confirm receipt by mstc
7	Bid validity period	180 days from date of opening
8	Currency of Contract	INR
9	Language of contract	English

4.0 Experience & Financial Criteria:

a) The tenderer should have National/International experience in providing consultancy services in respect of **Preparation of Detailed Project Report** for development of Port projects **during last 7 years** ending on **30.4.2018** including Engineering Surveys & Investigations, Planning and Designing of Port layouts, Marine Structures like Breakwaters, Berthing structures including dredging, Cargo Handling Equipment etc.

b) The Bidder should have experience in **Preparation of Detailed Project Report** with project cost as mentioned below. **The estimated value of project is 245 crores.**

i) One single eligible project of 196 crores. (or)

ii) Two individual eligible projects of 123 crores (or)

iii) Three individual eligible projects of 98 crores of estimate cost each.

c) The tenderer should have an average Annual Turnover of at least Rs.10 crore from consultancy assignments executed during the last three financial years ending on 31.3.2018.

Note:

(1) In case of consortium the combined experience of the consortium members shall be taken into consideration. However, the above mentioned project values should be of individual projects only.

(2) The executed Project cost as specified by the bidder (in case of currency other than Indian Rupees) shall be calculated based on the currency rate prevailing on the date of opening of the bid for evaluation purpose.

5.0 Kolkata Port Infrastructure Development Ltd' Right to Accept or Reject Proposal:

5.1 Kolkata Port Infrastructure Development Limited does not bind itself to accept the lowest tender and reserves to itself the authority to reject any or all the tenders received without assigning any reason whatsoever. The work also may be split up between two or more contractors or accepted in part and not entirely, if considered expedient. Tenders in which any of the particulars and prescribed information are missing or are incomplete in any respect and/or the prescribed conditions are not fulfilled are liable to be rejected. Tenderers may please note that any conditions be it financial or otherwise, not covered in the tender documents will not be entertained and such tenders are liable for rejection.

5.2 Canvassing in connection with tenders are strictly prohibited and the tenders submitted by the tenderer(s) who resort to canvassing will be liable to rejection.

5.3 Notwithstanding anything contained in this Proposal Document, Kolkata Port Infrastructure Development Limited reserves the right to accept or reject any Proposal and to annul the bidding process and reject all Proposals, at any time without any liability or any obligation for such acceptance, rejection or annulment, without assigning any reasons.

5.4 Kolkata Port Infrastructure Development Limited also reserves the right to invite revised Technical Proposals and /or revised Financial Proposals from Bidders with or without amendment of the Proposal document at any stage, without liability or any obligation for such invitation and without assigning any reason.

5.5 Kolkata Port Infrastructure Development Limited reserves the right to reject any Proposal if:

- a) at any time, a material misrepresentation is made or uncovered, or
- b) The Bidder does not respond promptly and thoroughly to requests for supplemental information required for the evaluation of the proposal.

5.6 Bid documents consisting of e-Tender Notice, Instruction to Bidders for e-procurement, Instruction to Bidders, General Conditions of Contract (GCC), Terms of Reference (TOR) & Format for Financial Bid (BOQ) in prescribed format and the set of terms and conditions of contract and tender details can be seen in the website:

<https://www.mstcecommerce.com/eprochome/kopt.>

6. (a) For effecting the Bid, the Bidder will deposit the Tender Paper cost and EMD separately to the A/C mentioned at 3.1(B) (Bid Information) by NEFT/RTGS and obtain the acknowledgement of the said transaction or by Banker's cheque/ Bank Draft/ Pay Order payable to **Kolkata Port Infrastructure Development Limited** and payable at Kolkata within 3 working days of last date of submission of bid at the office of the Chief Engineer, Kolkata Port Trust, for, Kolkata Port Infrastructure Development Limited, 15 Strand Road, Kolkata 700001. A self-signed copy of these documents should be uploaded by the Bidder with the Tender in respect of the documents regarding EMD & Tender Paper cost which will be verified after opening of the Bid.

The Bidder should ensure that the above transaction should be within the stipulated bidding period for that tender. No previous dues of the Bidder shall be adjusted towards the above transaction of tender paper cost and EMD. The Bidder shall not use the same transaction in more than one tender; otherwise his bid will be rejected. The account from which the tender paper cost and EMD will be deposited should be in the name of Contractor/Authorised person of the firm who have digitally signed the Bid. Refund of EMD in respect of unsuccessful Bidders will also be made to that specific account of the Bidder.

(b) The standard form for refund of EMD is available in the Tender documents under heading "APPENDIX C", so as to facilitate the Bidder for applying refund of

EMD. Refund of EMD in respect of unsuccessful Bidder will only be made to that account from which it was deposited by the Bidder.

7. The Bid documents will be available in the website: <https://www.mstcecommerce.com/eprochome/kopt> from **27.07.2018** 1100 hours to **26.08.2018** up to 13:00 Hours for online bidding.

8. The Bidder must possess compatible Digital Signature Certificate (DSC) of Class-II or Class-III.

9. All Bids are to be submitted online on the Website <https://www.mstcecommerce.com/eprochome/kopt>. No Bid shall be accepted off-line. The Bids shall be received only “on line” on or before 1300 hours on 27.08.2018.

10. The copies of the licence/registration, ESI and EPF registration, GST registration etc. as applicable should be uploaded by the bidder.

11. In the e-Tender system, after uploading the Bid; the Bidder should not send any documents (Hard copy) to the Tender inviting Authority.

12. The documents uploaded by bidder(s) will be scrutinized. In case any of the information furnished by the bidder is found to be false during scrutiny, EMD of defaulting bidder(s) will be forfeited. Punitive action including suspension and banning of business can also be taken against defaulting bidders.

13. After evaluation of bid, all the Bidders will get the information regarding their eligibility/pre-qualification on website. Thereafter, a system generated e-mail confirmation will be sent to all successful Bidders. The Bidders can check the same from the portal.

14. The Price-bid of the successful Bidders (qualified in Technical-bid) will be decrypted and opened on-line, on the scheduled date and after the pre-scheduled time by the Bid Openers with their Digital Signature Certificate (DSC).

15. A separate comparative statement shall be prepared by the Department basing on the scores obtained by the Bidders, by combining both technical and financial scores obtained by each qualified Bidder, and shall be uploaded in the Website for information of the Bidders. The combined score shall finalise the Rank 1 (one) Bidder.

16. Backing out from the offer by the participating Bidder after opening of Technical Bid by the successful Bidder will liable for forfeiture of EMD and debarment of the Bidder from participating in any future tenders.

17. Other details can be seen in the bidding documents.

18. The authority will not be held responsible for any technical snag or network failure during on-line bidding. It is the Bidder's responsibility to comply with the system requirement i.e. hardware, software and internet connectivity at Bidder's premises to access the e-Tender website. Under any circumstances, Kolkata Port Trust and /or **Kolkata Port Infrastructure Development Limited** shall not be liable to the Bidders for any direct/ indirect loss or damages incurred by them arising out of incorrect use of the e-Tender system or internet connectivity failures.

19. The authority reserves the right to reject any or all tenders without assigning any reasons thereof and shall also not be bound to accept the lowest tender.

20. If the documents as per Notice Inviting Tender (NIT) are not submitted/uploaded along with the bid or shortfalls are noticed, then the offer may be summarily rejected and no correspondence is to be entertained in this regard with any Bidder.

Sd/-

Authorised Signatory,

**CHIEF ENGINEER, KOLKATA PORT TRUST,
FOR KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED**

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21. GENERAL INFORMATION:

This section of the bidding documents provides the information necessary for Bidders to prepare online responsive bids, in accordance with the requirements of the Tender Inviting Authority. It also provides information on, online bid submission, opening, evaluation and contract award.

21.1 INSTRUCTIONS FOR ONLINE BID SUBMISSION:

The Bidders are required to submit soft copies of their bids electronically on the <https://www.mstcecommerce.com/eprochome/kopt>, using valid Digital Signature Certificates. The instructions given below are meant to assist the Bidders in registering on the MSTC Portal, prepare their bids in accordance with the requirements and submitting their bids online on the MSTC Portal.

21.2 REGISTRATION:

(i) Bidders are required to enrol on the e-Procurement module of the <https://www.mstcecommerce.com/eprochome/kopt> by using the “Register as Vendor” option available on the home page. Enrolment on the MSTC Portal is free of charge.

(ii) During enrolment / registration, the Bidders should provide the correct/true information including valid email-id & mobile No. All the correspondence shall be made directly with the contractors/Bidders through e-Mail-id provided.

(iii) As part of the enrolment process, the Bidders will be required to choose a unique username and assign a password for their accounts.

(iv) For e-tendering possession of valid Digital Signature Certificate (Class II or Class III Certificates (preferably Class III) with signing key usage) is mandatory which can be obtained from SIFY/TCS/n-Code/e-Mudra or any Certifying Authority recognized by CCA India on e-Token/ Smart Card.

(v) Upon enrolment on MSTC Portal for e-tendering, the Bidders shall register their valid Digital Signature Certificate with their profile.

(vi) Only one valid DSC should be registered by a Bidder. Bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse and should ensure safety of the same.

(vii) Bidders can then log into the site through the secured login by entering their user ID/password and the password of the DSC / e-Token.

Note : Those who already enrolled need not to go through this step.

21.3 PREPARATION OF BIDS

(i) For preparation of bid, Bidders shall search the tender from published tender list available on site and download the complete tender document and should take into account corrigendum if any published before submitting their bids.

(ii) Bidder shall go through the tender document carefully to understand the documents required to be submitted as part of the bid. Bidder shall note the number of parts in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

(iii) Any clarifications if required, the Bidders have to go through the contact details given in the tender document.

(iv) Bidders should get ready in advance the bid documents to be submitted as indicated in the tender document/schedule in PDF formats.

21.4 SUBMISSION OF BIDS

(i) Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. All other information have been furnished at Sl. No.6 (a) of the e-Tender Call Notice.

(ii) While submitting the bids online, the Bidder shall read the terms & conditions (of MSTC portal) and accepts the same in order to proceed further to submit their bid.

(iii) In the e-tender system, after uploading the Bid, the Bidder need not to send any documents (hard copy) to the tender inviting authority before opening of Technical Bid. After opening of the bid, the authenticity of the uploaded documents will be verified by the tender inviting authority.

(iv) The Bidder shall digitally sign and upload the required bid documents one by one as indicated in the tender details according to specified part.

(v) Bidders shall note that the very act of using DSC for downloading the tender document and uploading their offers is deemed to be a confirmation that they have read all sections and pages of the tender document without any exception and have understood the complete tender document and are clear about the requirements of the tender document.

(vi) Bidders shall submit their bids through online e-tendering system to the Tender Inviting Authority (TIA) well before the bid submission end date & time (as per Server System Clock). The TIA will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the Bidders.

(vii) After the bid submission (i.e. after Clicking “Final Submission” in the portal), the Bidders shall take print out of system generated acknowledgement number and keep it as a record of evidence for online submission of bid.

(viii) Bidder should follow the server time being displayed on Bidder’s dashboard at the top of the tender site, which shall be considered valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system.

(ix) All bids submitted by the Bidders would be encrypted using PKI (Public Key Infrastructure) encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer256 bit encryption technology.

22. QUALIFYING REQUIREMENT

The Bidder(s) shall furnish documentary proof as below for fulfilling qualifying criteria as above failing which their offer may be summarily rejected:

a) Scanned copy of Firm’s valid Licence/Registration.

b) Scanned Copies of Similar Nature of assignment(s), Completion Certificate(s) from Client as per Clause 4(b) having Date of Commencement & Completion, Actual Date of Completion, Contract Value, Actual Payment Received , Contact address of the organisation/ Contact person with Mobile No., Land Phone No., FAX No., Postal Address etc who has issued such certificate(s).

c) Scanned Copies of Audited Balance Sheet/Profit & loss account/ Certificate from Chartered Accountant for last three years ending 31st March 2018. Scanned copy of original TDS Certificate for the relevant works as per Clause 4(b), must be furnished if the work certificate is from any private organisation from the above purpose.

d) Scanned Copy of Permanent Account Number (PAN) Card,

e) Scanned copy of Power of Attorney certificate on Stamp Paper is to be submitted in case an authorised representative needs has to sign the tender document.

f) Self signed copies of Acknowledgement towards deposit of EMD & Tender Fee. This verified acknowledgement will be a part of agreement in case of the successful Bidder and will be used for refund of EMD in case of unsuccessful Bidder.

g) Application letter as per Annex- I

h) Proposal Security (Earnest Money Deposit) of **Rs.3,00,000/- (Rupees Three Lakh only)** only should be deposited through NEFT/RTGS or by Banker's cheque/ Bank Draft/ Pay Order payable to Kolkata Port Infrastructure Development Limited and payable at Kolkata within 3 working days of last date of submission of bid at the office of the Chief Engineer, Kolkata Port Trust, for **Kolkata Port Infrastructure Development Limited**, 15 Strand Road, Kolkata 700001, as mentioned in Clause No.3.1(B) Sl. No.4 of e-TCN. In the event of party withdrawing his proposal before the expiry of 180 days from the due date of submission of proposal, the party shall be cancelled and the amount payable by the Proposal Security shall become forthwith payable to Employer and decision of the Employer shall be final in that behalf. The Proposal Security of unsuccessful party will be discharged /returned as promptly as possible, but not later than 60 days after the expiration of period of proposal validity prescribed by the employer. The Proposal Security in respect of successful party will be released after furnishing of the necessary Performance Guarantee.

i) A forwarding letter confirming validity of the proposal for 180 days and detailing contents of the proposal including list of enclosed documents (with page number).

j) An undertaking that qualification, experience and minimum number of man power proposed to be deployed shall be as stipulated in the proposal document.

k) The Bidders shall submit an undertaking as Per Annexure-I, along with their bids stating that they have gone through, all Documents, Annexures, all Corrigenda & Addendums hosted by Kolkata Port Infrastructure Development Limited on Website and accordingly submitted their bid.

l) A statement supported by documentary evidence establishing fulfilment of all the Minimum Eligibility Criteria by the Bidder/s.

m) Details in respect of background of the party/ies past experience, organizational structure, key personnel, certificates from clients in respect of assignments executed in past, current assignments, CVs of key personnel and details of associate/s likely to be involved in executing this assignment. (The Clients certificate in respect of assignments executed in the past and current assignments in progress should be in English language only, along with the authenticated signature and seal of the client only).

n) Details in respect of proposed approach and methodology, site appreciation, team composition and experience for execution of the "Services" covering broadly all aspects of "Terms of Reference" enclosed at Clause 51 to this proposal Documents.

o) The Tender Document and compilation of queries/ answers if any with each page initialled by the authorized signatory in token of having been read and accepted by the party/ies.

p) Proposed work programme for the execution of the services, illustrated with bar chart of activities. The composition of the team, the assigned tasks and their timing should be brought out clearly using bar charts and flow diagrams.

q) Manning Schedule to be provided for the service, supported by bar diagrams showing the time proposed for each key professional staff.

r) Undertaking as per Annexure-VII.

NOTE: FIRM(S) MUST NOT INDICATE DIRECTLY OR INDIRECTLY THEIR FINANCIAL PROPOSAL ANY WHERE IN PART OF TECHNICAL PROPOSAL. ANY SUCH DISCLOSURE SHALL RESULT IN SUMMARILY REJECTION OF WHOLE OF THE PROPOSAL OF THE CONCERNED PARTY/IES.

23. ABOUT BOQ: The unit rates in Format for Financial Bid shall be quoted strictly in figures only and macros must be enabled to see the word representation of figures.

24. BID VALIDITY: The validity of offer shall be 180 days from the date of opening of tender. A bid valid for a shorter period may be rejected by the Purchaser as being non responsive. In exceptional circumstances, prior to expiry of the original tender validity period, the Kolkata Port Infrastructure Development Limited may request the Bidder, in writing, for a specified extension in the period of validity. The Bidder may refuse the request without forfeiting its EMD (bid security). The Bidder agreeing to the request will neither be required nor be permitted to modify its tender.

25. EARNEST MONEY DEPOSIT: -

25.1 The Bidder shall deposit EMD of Rs.3,00,000.00 (Rupees Three lakh only) only through NEFT/RTGS or by Banker's cheque/ Bank Draft/ Pay Order payable to Kolkata Port Infrastructure Development Limited and payable at Kolkata within 3 working days of last date of submission of bid at the office of the Chief Engineer, Kolkata Port Trust, for, Kolkata Port Infrastructure Development Limited, 15 Strand Road, Kolkata 700001, as mentioned in Table No.3.1 (B).

25.2 Any Bid not accompanied with proper EMD shall be rejected summarily as being non-responsive and the Price Bid will not be opened.

25.3 The EMD of the unsuccessful Bidders will be returned without interest, after finalisation of tender to the A/C from which the tender paper cost and EMD will be deposited should be in the name of Contractor/Authorised person of the firm

who have digitally signed the Bid. Refund of EMD in respect of unsuccessful Bidders will also be made to that specific account of the Bidder as per the following.

a) Proposal rejected during scrutiny: Two weeks after the date of intimation of rejection of proposal.

b) Unsuccessful Proposals: One month after award of assignment to successful Bidder.

c) Successful Proposal: Two weeks after furnishing of Performance Security and signing of formal agreement.

25.4 The EMD (bid security) will be forfeited:

a) If the documents submitted by a Bidder proves to be fake at any point of time during execution of work.

b) If the Bidder adopts corrupt or fraudulent practices and try to influence the Department during tender processing.

c) In case of a successful Bidder, if the Bidder fails to Sign the Agreement or to deposit the PSD within the specified time limit.

25.5 Performance Security Deposit (PSD):

10% (Ten percent) of the Contract value shall be deposited either in the form of a D.D or B.G from any Nationalised Bank located at **Kolkata** in favour of Kolkata Port Infrastructure Development Limited as Performance Security Deposit (PSD) on acceptance of the tender and before issue of Work Order which will be released after two months of successful & satisfactory completion of the entire job assigned to the Bidder with a further claim period of three months. Kolkata Port Infrastructure Development Limited reserves the right to seek extension of the validity of the PSD, if considered necessary, and the contractor will be duty bound to do so. In case, the contractor fails to extend the validity as requested by Kolkata Port Infrastructure Development Limited, the PSD will be encashed.

26. SUBMISSION OF OFFER: -

26.1 The tender shall be submitted online in Two Part system duly scanned and digitally signed by the authorized representative of the Bidder as follows:(A) Part -1 (Technical Bid)

Online bids should be submitted containing original scanned copy of following document in Part-1.

i) Scanned copy / Acknowledgement of Tender fee deposited.

ii) Scanned copy / Acknowledgement of Earnest Money Deposit (EMD).

ii) Online bids should be submitted containing original scanned copies of the documents listed out at Sl. No.2 above under the heading “QUALIFYING REQUIREMENT”.

(B) Part-2 (PRICE BID)

After filling the Technical Bid, bidder should click ‘save’ for recording their Technical bid. Once the same is done, the Commercial Bid link becomes active and the same has to be filled up and then bidder should click on “save” to record their Commercial bid. Then once both the Technical bid & Commercial bid has been saved, the bidder can click on the “Final submission” button to register their bid

27. SUBMISSIONS, OPENING & EVALUATION:

27.1 The bid should be submitted online at website <https://www.mstcecommerce.com/eprochome/kopt> only, by the due date mentioned in e-Tender Notice. The Server Date & Time as appearing on the website <https://www.mstcecommerce.com/eprochome/kopt> shall only be considered for the cut-off date and time for submission of bids. Offers sent through post, telegram, fax, telex, e-mail, and courier or by any other mode will not be considered. In case of date of opening is declared as holiday tender will be opened on next working day.

27.2 Each Bidder shall submit only one bid for one package. A bid is said to be complete if accompanied by all the documents as per clause 6. The system shall consider only the last bid submitted through the e-Procurement portal. Incomplete and conditional bids shall be rejected outrightly. A bid shall be deemed complete only if “FINAL SUBMISSION” is made.

27.3 In the e-Procurement Portal, the bid is allowed to be modified any number of times before the final date and time of submission. The Bidder shall have to log on to the system and resubmit the bids as asked for by the system including the price bid. In doing so, the bids already submitted by the Bidder will be removed automatically from the system and the latest bid only will be admitted. But the Bidder should avoid modification of bid at the last moment to avoid system failure or malfunction of internet or traffic jam or power failure. If the Bidder fails to submit his modified bids within the designated time of receipt, the bid already in the system shall be taken for evaluation.

27.4 For this tender withdrawal of bid is not allowed.

27.5 Only those Bidders shall be considered qualified by Kolkata Port Infrastructure Development Limited, who submit requisite EMD, Tender Fee &

documents, accept all the terms & conditions of the Tender document unconditionally and meet the qualifying requirement stipulated in the Tender document. The decision of the Kolkata Port Infrastructure Development Limited shall be final and binding in this regard.

27.6 The Bidder shall bear all cost associated with the preparation & submission of its bid and the Kolkata Port Infrastructure Development Limited will in no case be responsible or liable for these cost, regardless of the conduct or outcome of the tendering process.

27.7 Bid opening dates are specified during tender creation or can be extended vide corrigendum. Any addendum/corrigendum shall also be notified in the said website <https://www.mstcecommerce.com/eprchome/kopt>

27.8 The Bid openers; who have been pre-defined shall log on to the portal with their respective DSC. Unless all the Officers who have been declared as Opening officers, log on the portal with their DSC the Tender cannot be opened

27.9 After evaluation of bid, all the Bidders will get the information regarding their eligibility on website.

27.10 Date of Price Bid opening would be intimated to the Prequalified Bidders through e-Procurement Portal after Technical Evaluation is completed.

27.11 The Price Bid of the technically qualified Bidders will be opened & evaluated on the notified date & time by the Bid Openers with their Digital Signature Certificate (DSC) in the presence of Bidders or their authorized representative who wish to be present. The Financial bid of the Bidders shall be opened one by one by the bid Openers. The Bidders can view bid opening remotely on their personalized dash board under “Bid Opening (Live)” link.

27.12 The Comparative statement of the tender shall be prepared manually by Kolkata Port Infrastructure Development Limited to decide the relative positions of the tenderer. The lowest tenderer will be decided based on QCBS system and not by quoted price.

27.13 After evaluation of bid, all the Bidders will get the information regarding their eligibility on website. Thereafter, e-mail confirmation will be sent to all successful Bidders. The Bidders can check the same from the portal. The Bidder will get the information regarding the status of their Technical and Financial bid put together and ranking of Bidders on website.

28. AWARD OF CONTRACT (AOC).

28.1 The Bidder whose bid has been accepted will be notified for the award by the Kolkata Port Infrastructure Development Limited prior to expiration of the Bid validity period through the “Letter of Intent”, which will state the sum that the Kolkata Port Infrastructure Development Limited will pay to the Contractor in consideration of the execution, completion by the Contractor as prescribed in the Contract.

28.2 The Work Order will constitute the formation of the Contract until the Formal Agreement is signed.

28.3 The Bidder shall promptly check their e-mailbox registered with MSTC Portal for receipt of any information/clarification/ correspondence in respect of their bid. Kolkata Port Infrastructure Development Limited shall not be responsible for non-receipt/failure of e-mail to the Bidders.

28.4 If any of the information furnished by the Bidder is found to be incorrect, the Bid/ contract is liable to be rejected/terminated and the EMD will be forfeited.

28.5 Kolkata Port Infrastructure Development Limited reserves the right to cancel the tender without assigning any reason thereof.

28.6 Conditional offers are liable for rejection.

28.7 Bids from those Bidders who have not submitted their offer as per e-Tender Notice will not be considered.

29. FRAUD AND CORRUPTION:

29.1 **Kolkata Port Infrastructure Development Limited** will reject a proposal for award if it is found that the Bidder recommended for award has been engaged in corrupt or fraudulent practices in competing for the contract in question.

29.2 Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited & the tenders submitted by the contractors who resort to canvassing will be liable for rejection

29.3 The details of work to be carried out and its scope are given in the “Tender Document” of these documents, which also indicate a brief description of the Project where work is to be executed. The tenderers are advised to study the same carefully before tendering and they shall be deemed to have full acquainted themselves with the same.

29.4 The Bidders; in their own interest, are advised to inspect and examine the site and its surrounding and satisfy themselves, before submitting their tenders,

in respect of the site conditions including but not restricting to the following which may influence or effect the work or cost thereof under the contract.

29.5 The Contractor shall be debarred for any period of time as decided by the Kolkata Port Infrastructure Development Limited for the following reasons.

(i) If the contractor fails to deposit PSD within the stipulated period as stated in the letter of intent.

(ii) If the contractor fails to commence the work on or before the scheduled date stated in the work order.

(iii) Violates conditions of contract.

29.6 The Contractor shall be de-listed from the Contractor List for the following reasons:

(i) If the contractor fails to execute the work or executed it unsatisfactorily.

(ii) If found to have submitted forged/false certificate/documents during the enlistment/tender for any work.

(iii) If abandons the work during execution at any stage.

(iv) Has already been debarred for other reasons by TIA.

(v) Any other reason which in view of enlisting authority is adequate for delisting the contractor.

30. TIME SCHEDULE:

The time allowed for carrying out the work is **7 (seven) Months** . The tenderer shall also submit along with his tender a bar chart showing commencement and completion times of various sections of the proposed works including supply and delivery of all important items of his assignment.

31. TRANSFER OF TENDER DOCUMENTS:

Transfer of tender documents processed by one intending tenderer to another is not permissible. Tenders should be furnished by the contractors/firms in whose favour registration has been done. Tender(s) furnished in any other name(s) than mentioned in the tender paper will be rejected outright.

32. INCOME TAX :

Acknowledgement for filling of Returns under Income Tax Rules may be uploaded for last 3 years ending on 31st March 2018.

33. TAXES AND DUTIES:

33.1 The prices quoted shall be inclusive of all statutory taxes and duties and/or other charges levied by any Central/ State/local authorities but excluding GST. GST shall be paid by Kolkata Port Infrastructure Development Limited extra on actual on production of documentary evidence and shall not be considered for evaluation of the bids.

33.2 Supplier/service provider to confirm that the GST amount charged in invoice is declared in its returns and payment of taxes is also made.

33.3 The Supplier/ Service Provider agrees to comply with all applicable GST laws, including GST acts ,rules, regulations, procedures, circulars & instructions there under applicable in India from time to time and to ensure that such compliance is done within the time prescribed under such laws. Supplier/Service Provider should ensure accurate transaction details, as required by GST laws, are timely uploaded in GSTN. In case there is any mismatch between the details so uploaded in GSTN by Supplier/ Service Provider and details available with Kolkata Port Infrastructure Development Limited, then payments to Supplier/Service Provider to the extent of GST relating to the invoices/s under mismatch may be retained from due payments till such time Kolkata Port Infrastructure Development Limited, is not sure that accurate tax amount is finally reflected in the GSTN to Kolkata Port Infrastructure Development Limited's Account and is finally available to Kolkata Port Infrastructure Development Limited, in terms of GST laws and that the credit of GST so taken by Kolkata Port Infrastructure Development Limited, is not required to be reversed at a later date along with applicable interest. (Clause may be vetted by Finance)

33.4 Kolkata Port Infrastructure Development Limited, has the right to recover monetary loss including interest and penalty suffered by it due to any non-compliance of tax laws by the supplier/service provider. Any loss of input tax credit to Kolkata Port Infrastructure Development Limited, for the fault of supplier shall be recovered by Kolkata Port Infrastructure Development Limited, by way of adjustment in the consideration payable.

33.5 Supplementary invoices/Debit note/credit note for price revisions to enable Kolkata Port Infrastructure Development Limited, to claim tax benefit on the same shall be issued by you for a particular year before September of the succeeding Financial Year.

33.6 The purchase order/ work order shall be void, if at any point of time you are found be to a black listed dealer as per GSTN rating system and further no payment

34. TAX RECOVERIES AT SOURCE:

Income Tax, or any other taxes, duties, service charges, rents, etc. as may be deductible would be deducted at source from the running payments of the contractor/ firm by Kolkata Port Infrastructure Development Limited at the time of effecting payments as contained in the provisions of Income-Tax Act and other enactment and provisions of local bodies in force from time to time.

35. RETIRED GOVERNMENT OR COMPANY OFFICERS:

No Engineer of Gazetted rank or other gazetted officer employed in Engineering or Administrative duties in Engineering Department of the Kolkata Port Trust or the State/Central Government or the Kolkata Port Infrastructure Development Limited is allowed to work as a employee of contractor/contractor for the period of two years after his retirement from Government service or from the employment of the Kolkata Port Infrastructure Development Limited without the previous permission of the State/Central Government/ Kolkata Port Infrastructure Development Limited, as the case may be. The contract, if awarded, is liable to be cancelled if either the contractor or any of his employee is found at any time to be such a person, who had not obtained the permission of the State/Central Government or the Kolkata Port Infrastructure Development Limited as aforesaid, before submission of tender or engagement in the contractor's service as the case may be.

36. SECURITY REQUIREMENTS:

Where the works are to be carried out within the prohibited area of the Port, the contractor(s) is required to obtain necessary permits/passes for his men and materials and vehicle for entering the Security Zone at his own cost on deposit of required fees with Kolkata Port Infrastructure Development Limited.

He is also required to comply with the Port Security Requirement as may be notified from time to time.

37. LEGAL JURISDICTION:

All disputes are subject to exclusive jurisdiction of courts at Kolkata, only.

38. SIGNING OF THE CONTRACT:

The successful tenderer shall be required to execute an agreement in the pro-forma attached with the tender documents as ANNEXURE with Stamp paper of proper value within 15 days from the date of issue of the notice of acceptance of tender. In the event of failure on the part of successful tender to sign the agreement within the above stipulated period the Earnest Money deposited by him be forfeited and the acceptance of the tender shall be considered as cancelled.

39. GENERAL TENDER TO FORM PART OF AGREEMENT:

This general Tender Notice, Instructions to tenderers shall be deemed to form part of the Agreement.

Sd/-

**CHIEF ENGINEER, KOLKATA PORT TRUST,
FOR KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED.
15 STRAND ROAD, KOLKATA 700001**

NOTICE INVITING PROPOSAL

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40. NOTICE INVITING PROPOSAL

Kolkata Port Infrastructure Development Limited (The Authority) invites e-Tenders in two part system from experienced Firms for Consultancy Services for Preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environment Impact Assessment and Environment Management Plan (EIA &EMP for Development of an extended port gate system at Balagarh, West Bengal. The salient features are as under.

40.1. THE AUTHORITY:

Kolkata Port Infrastructure Development Limited (KPIDL), a wholly owned subsidiary of Kolkata Port Trust, was incorporated under The Companies Act 2013 for the purpose to construct, operate, build, develop and maintain port related infrastructure including but not limited to rail, road, air, sea, river, streams, waterways, over and under bridges, civil and other infrastructures, accommodation and conveyance along with other related facilities (hereinafter to be called the Authority).

40.2 THE PROJECT:

Kolkata Port Infrastructure Development Limited seeks the services of a qualified firm (hereinafter to be called the Consultant) for preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environment Impact Assessment and Environment Management Plan (EIA &EMP) for development of an extended port gate system at Balagarh, West Bengal.

40.3 The Consultancy proposal is to be submitted in two part system. The first part to contain "Technical proposal" and second part the "Financial proposal".

The objective of this consultancy service is to provide qualitative consultancy services for preparation of Detailed Project Report for brown/green field project.

It is the responsibility of the consultants to obtain various clearances from the State as well as Central Government and other statutory bodies.

40A. Eligible Bidders:

40A.1 The Bidder may be a single entity or a group of entities (hereinafter referred to as Consortium), coming together for providing the Services. The term Bidder used hereinafter would therefore apply to both a single entity and a consortium.

40A.2 The Tenderer shall satisfy the Minimum Eligibility Criteria as under:

a) The tenderer should have National/International experience in providing consultancy services in respect of Preparation of Detailed Project Report for

development of Port facilities including Engineering Surveys & Investigations, Planning and Designing of Port layouts, Berthing structures including Dredging, Cargo Handling Equipment etc.

b) The Bidder should have experience in preparation and completion of Detailed Project Report (DPR) with project cost as mentioned below.

i) One single eligible project of 196 crores. (or)

ii) Two individual eligible projects of 123 crores (or)

iii) Three individual eligible projects of 98 crores of estimate cost each.

Note: (1) In case of consortium the combined experience of the consortium members shall be taken into consideration. However, the above mentioned project values should be of individual projects only.

(2) The executed/ongoing Project cost as specified by the bidder (in case of currency other than Indian Rupees) shall be calculated based on the currency rate prevailing on the date of opening of the bid for evaluation purpose.

c) The tenderer should have an average annual turnover of at least Rs.10 crore from consultancy assignments during the last three financial years

d) The tenderer must submit names / qualification, experience of the experts/ key personnel who would be engaged for this assignment alongwith with CVs as indicated in Terms of Reference.

Note: Indian subsidiary of an International company can submit the bid by using the experience / references of their parent company to fulfil the Minimum Eligibility Criteria, provided the bidder gives authorization from parent company. The party must submit, with its Technical Proposal, the documentary evidence regarding fulfilment of all the above criteria.

41.0 JOINT VENTURES / CONSORTIUM AND OTHER FORMS OF ASSOCIATION

In case the tender is submitted in joint venture/consortium, the Bidder shall submit the following confirmation along with their offer submitted with this tender.

i) All joint venture agreements / consortium agreements, technical collaboration agreement shall ensure that all parties of the joint venture/consortium are individually and jointly responsible for the tender conditions and such agreements are legally valid.

- ii) Joint venture/consortium should be in the nature of legally acceptable agreements and such agreements should be notarized.
- iii) Such joint venture/consortium agreement should contain explicitly the scope and responsibilities of all the partners in the joint venture/consortium in terms of financial and technical commitments/contribution. The JV/consortium should be equally, severally and jointly responsible.
- iv) One of the members of the consortium shall be authorized as being in-charge (lead member), and this authorization shall be evidenced by a power of attorney duly signed by the authorized signatories of the consortium Members as per the format enclosed in the tender document as (Annexure-VIA/VIB).
- v) The validity of the joint venture/consortium agreement entered upon on the award of Letter of Acceptance (LOA) by Kolkata Port Infrastructure Development Limited should continue for the entire period of contract as specified in the tender. All such agreements shall be irrevocable for the above periods.
- vi) Firms with at least 26% equity holding each shall be allowed to jointly meet the eligibility criteria.
- vii) Where the bidder is a consortium the average annual financial turnover of the individual members forming the consortium shall be submitted.
- viii) The entity processing the tender must be a member of the consortium submitting the tender.
- ix) It is clarified that an unsuccessful bidder or JV/Consortium shall not be permitted to join a successful JV/Consortium whose bid is accepted at a later date.
- x) In case of a Consortium, the combined Technical and Financial Capability of those members who have and shall have share of at least 26% (twenty six per cent) each, should satisfy the above conditions of eligibility, provided that each such member shall, for the entire period of the contract, hold share not less than 26%.

41.1 FURTHER CONDITIONS FOR JV/CONSORTIUM:

Intending tenderer(s), as Consortium, is eligible to participate in the tender. The term “Tenderer” used in this document would apply to either a Single Entity or a group of entities, i.e. a Consortium. Further, the Tenderer may be a natural person, private entity, government owned entity or any combination of them with a formal intent to enter into an agreement or under an existing agreement to form a Consortium. A Consortium shall be eligible for consideration subject to the conditions set out in this tender document.

i) The Tenderer shall not have a conflict of interest that affects the Tendering Process. Any Tenderer found to have a **Conflict of Interest** shall be disqualified. A Tenderer shall be deemed to have a **Conflict of Interest** affecting the Tendering Process, if:

ii) The Tenderer, its Member or Associate (or any constituent thereof) and any other Tenderer, its Member or any Associate thereof (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding of a Tenderer, its Member or an Associate thereof (or any shareholder thereof having a shareholding of more than 5 per cent of the paid up and subscribed share capital of such Tenderer, its Member or Associate, as the case may be) in the other Tenderer, its Member or Associate is less than 5 per cent of the subscribed and paid up equity share capital thereof; provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in section 4A of the Companies Act 1956, or any of its subsequent amendment. For the purposes of this Clause, indirect shareholding held through one or more intermediate persons shall be computed as follows:

iii) Where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (the “Subject Person”) shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and

iv) Subject always to sub-clause (iii) above, where a person does not exercise control over an intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis ; provided, however, that no such shareholding shall be reckoned under this sub-clause.

v) if the shareholding of such person in the intermediary is less than 26% of the subscribed and paid up equity shareholding of such intermediary;

OR

- vi) A constituent of such Tenderer is also a constituent of another Tenderer;

OR

- vii) Such Tenderer, or any Associate thereof receives or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Tenderer, or any Associate thereof or has provided any such subsidy, grant, concessional loan or subordinated debt to any other Tenderer, its Member or any Associate thereof;

OR

- viii) Such Tenderer has the same legal representative for purposes of this Tender as any other Tenderer; **OR**

- ix) Such Tenderer, or any Associate thereof has a relationship with another Tenderer, or any Associate thereof, directly or through common third party/parties, that puts either or both of them in a position to have access to each others' information about, or to influence the Tender of either or each other.

- x) A Tenderer shall be liable for disqualification if any legal, financial or technical adviser of Kolkata Port Infrastructure Development Limited in relation to the Tender is engaged by the Tenderer, its Member or any Associate thereof, as the case may be, in any manner for matters related to or incidental to the Tender. For the avoidance of doubt, this disqualification shall not apply where such adviser was engaged by the Tenderer, its Member or Associate in the past but its assignment expired or was terminated 6 (six) months prior to the date of issue of this Tender. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the date of commercial operation of the contract.

Explanation: In case a Tenderer is a Consortium, then the term Tenderer, as used above, shall include each Member of such Consortium.

Note: Notwithstanding anything to the contrary contained in this tender document, in the event of any member of any Consortium suffering from a Conflict of Interest, the offer of such consortium shall be treated as disqualified. However, in the event of similar situation arising / detected after placement of LOI, the same shall have to be addressed and resolved by the Consortium, failing which the contract, if entered into, shall be terminated.

In this regard, it must be borne in mind that suppression of such Conflict of Interest, if detected later, shall not absolve the Consortium of its responsibility and appropriate action shall be initiated in terms of the provision of the tender.

The Tenderer(s) shall have valid documents as listed in various clauses of this tender document including those given at Clause 6.0 and submit the same in the manner as stipulated.

41.2 Technical & Financial Capability.

The tenderer (whether a single entity or a consortium) must satisfy pre-qualification criteria as stipulated at Clause- 4.0.

41.3 Assessment of eligibility:

41.3.1 In case of a Consortium, the combined Technical and Financial Capability of those members who have and shall have share of at least 26% (twenty six per cent) each, should satisfy the above conditions of eligibility, provided that each such member shall, for the entire period of the contract, hold share not less than 26% (twenty six per cent).

41.3.2 The entity claiming the capability should have held, in the company owning the eligibility, a minimum of 26% equity during the entire period for which the eligible experience is being claimed.

41.3.3 Experience of any activity relating to an eligible activity shall not be claimed by more than one member of a consortium. In other words, no double counting by a consortium in respect of the same experience shall be permitted in any manner whatsoever.

41.3.4 The Tenderer shall submit a Power of Attorney as per format given at **Annexure-VIA** or **VIB** as the case may be, authorizing the signatory of the Tenderer to submit the tender.

41.3.5 Where the 'Successful Tenderer' is a 'Consortium', it shall be required to comply with the following additional requirements:

a) Members of the Consortium shall nominate one member as the 'Lead Member'. The nomination(s) shall be supported by a Power of Attorney, as per the format at **Annexure-V**, signed by all the other members of the Consortium;

b) Members of the Consortium shall enter into a binding Joint Bidding Agreement (JBA) (substantiated in the form specified at **Annexure-VIII**,

for the purpose of submitting Tender. The JBA, to be submitted along with the Tender, shall, inter alia:

- d) Clearly outline the proposed roles and responsibilities, if any, of each member; Commit the minimum stake to be held by each member;
- e) Commit the minimum stake to be held by each member;
- f) Include a statement to the effect that all members of the Consortium shall be liable and responsible jointly and severally for all obligations of Kolkata Port Infrastructure Development Limited in relation to the contract throughout the contract period.
- g) Except as provided under the Tender Document, including its Addendum, if any, there shall not be any amendment to the said JBA without the prior written consent of Kolkata Port Infrastructure Development Limited.

41.3.6 The Single Entity participating in the tender or all the members of the Consortium participating in the tender must not have been debarred by the Central/State Government or any Entity controlled by them or any other legal authority for participating in the tender/contract/agreement of whatever kind. No undertaking in this regard shall be given by the Tenderer in the Covering Letter as per Annexure-I.

41.3.7 A Tenderer including any Consortium Member or Associate shall, in the last 3 (three) years ending on the day preceding to the day of issue of the tender, have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award against the Tenderer, Consortium member or Associate, as the case may be, nor has been expelled from any project or contract terminated by any public entity for breach by such Tenderer, Consortium Member or Associate as per **Annexure-I**.

41.3.8 In computing the Technical capability and Financial Capacity of the Tenderer/Consortium Members, The Technical Capability and Financial Capacity of their respective Associates would also be eligible hereunder.

NOTE: For purposes of this tender, 'Associate' means, in relation to the Tenderer/Consortium Member, a person who controls, is controlled by, or is under the common control with such Tenderer/Consortium Member. As used in this definition, the expression 'control' means, with respect to a person which is

a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty percent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person by operation of law.

41.4 Change in composition of the Consortium

41.4.1 Change in the composition of a Consortium shall not be permitted by Kolkata Port Infrastructure Development Limited either during the 'Techno-commercial Evaluation Stage' [i.e., from the 'date of issuance of Tender.' up to the 'date of notification of the techno-commercially valid tenders'] or during the 'Price-Evaluation Stage' [i.e., from the 'date of notification of the techno-commercially valid tenders' up to the 'date of placement of Letter of Intent (LoI)']. Changes in consortium may be considered after submission of draft DPR at the discretion of Kolkata Port Infrastructure Development Limited.

41.4.2 The reason for such change with proof, if applicable, shall be submitted along with the application. Request for change without any valid reason will not be entertained by Kolkata Port Infrastructure Development Limited.

41.4.3 The Lead Member continues to be the Lead Member of the Consortium;

41.4.4 In case of substitution, the substitute is at least equal, in terms of Technical & Financial Capability, to the Consortium Member who is sought to be substituted. In this regard, documents shall have to be furnished to establish that the proposed member is in possession of experience and having financial health at least equal to that of the substituted member during the period as stipulated in the pre-qualification criteria of the tender. (ii). In case of removal of any member without substitution, the remaining member(s) shall fulfil the pre-qualification criteria of the tender. (iii). In case of induction of any additional member(s), documents shall have to be furnished to establish experience and financial health of the proposed additional member.

41.4.5 The new Member(s) expressly adopt(s) the Tender already made on behalf of the Consortium as if it/they were a party to it originally, and is/are neither a Tenderer/Member/Associate of any other Consortium participating in this tender nor a single entity having participated in this tender.

41.4.6 Approval for change in the composition of a Consortium shall be at the sole discretion of Kolkata Port Infrastructure Development Limited and must be approved by Kolkata Port Infrastructure Development Limited in writing.

Note: If the Tenderer is a Consortium, then the entire Consortium may be disqualified / rejected. If such disqualification / rejection occurs after the

tenders have been opened and the Lowest Tenderer gets disqualified / rejected, then the Authority reserves the right to take any such measure as may be deemed fit at the sole discretion of Kolkata Port Infrastructure Development Limited, including annulment of the Tendering Process.

In case the applicant is a Joint venture / consortium it is to be limited to three partners subject to each of them satisfying some part or all Minimum Eligibility Criteria. The Proposal shall be accompanied by a certified copy of legally binding Joint Venture agreement (format prescribed in Annex-V) signed by all firms to the joint venture/consortium confirming the following:

42. INSTRUCTIONS AND PROCEDURE OF PROPOSAL

42.1 INTRODUCTION:

42.1.1 Background:

i) Kolkata Port is the earliest major port in the country still remains the premier port which has been rightly called the gateway to Eastern India and is the guiding factor to trade and commerce of vast hinterland comprising the entire Eastern India including Bihar and Eastern Uttar Pradesh and land-locked Himalayan countries i.e. Nepal and Bhutan. The Commissioners for the Port of Kolkata ran the port till January 1975 when Major Port Trusts Act, 1963, came into force.

ii) Kolkata Port is the only riverine Major Port in India. It has two dock systems - Kolkata Dock System at Kolkata and Haldia Dock Complex at Haldia situated at 232 kms and 125 kms up-stream from the Sea respectively.

iii) The traffic at the Kolkata Dock System has been seeing a steady growth in the past 5 years, container being the major share of cargo. The Port's present volume of cargo itself had been straining the city's road network. This has made the local traffic authorities to impose time restrictions on the movement of cargo vehicles on the city's roads. The cargo volumes which are expected to outgrow its capacity and the Port may be left struggling to handle the excess volume or it may face the prospect of losing it altogether unless an alternative plan is in position.

iv) World Bank suggested development of extended gate at a place away from the city. All the activities of the port like Customs Examination, Stuffing/De-stuffing of containers, Aggregation of LCL Loads etc. can be done at an extended gate for both imports and exports and movement of containers from the extended gate to the main port can be done by railway system or by barges in river or both.

v) Port has identified a location called Balagarh on the Inland Waterway-1, about 83 kilometers from its main Docks (45 Nautical Miles upstream of Kolkata). Balagarh would offer a natural draft of minimum 3.0 m for barges carrying about 3000 tons of cargo.

vi) The Port owns about 300 acres of land on this island, another 300 acres of adjacent land is owned by Calcutta Electric Supply Corporation and the remaining area is under the control of the State Government. KoPT is planning to use about 100 acres of land for its present project. Remaining areas can be used for creation of an Industrial Park along with other non-polluting industries.

42.1.2 Accordingly, KoPT engaged Indian Ports Association for undertaking a detailed feasibility study with cost benefit analysis for the project. IPA submitted its final report in January 2018 which is Annexed to this tender (Appendix-F).

Components of Capital works as recommended by Indian Ports Association:

PHASE I- AT BALAGARH ONLY		
	WORKS	COST (In Rupees crores)
CIVIL WORKS	One berth (120 m x 20 m) with approaches, Bank protection, Dredging/ yard and truck parking, storage sheds ((5000 m2)/Buildings, security Compound wall and Gates/Water supply and Sewage systems.	74.19
Mechanical & Electrical Works	1 MHC, 1 20 CBM Hopper,1 Grab,1 reach stacker,1 spreader, Illumination with high mast, Fire fighting system.	30.86
Environmental works	3% of Civil and mechanical works	3.15
PHASE II WORKS		
	AT BALAGARH	AT KOLKATA

	WORKS	COST (Rs. Cr)	WORKS	COST (Rs. Cr)
CIVIL WORKS	1 more berth with approaches, Bank protection, Dredging/ yard and truck parking, storage sheds ((5000 m2)/Buildings, security Compound wall and Gates, Water supply and Sewage.	63.10	1 berth, Bank protection, Dredging/ yard and truck parking	26.17
PHASE II WORKS (Continued)				
	AT BALAGARH	AT KOLKATA		
Mechanical & Electrical Works	2 MHC with Grab, spreaders, 2 reach stackers, 1 empty container handler/ power supply, communication, security & fire fighting.	60.70	1 MHC , Grab, spreaders, hopper, power supply, etc.	25.60
Environmental works	3% of Civil and mechanical works			

42.1.3 However, Kolkata Port Infrastructure Development Limited intends to execute the project with minor modifications of the recommendations of Indian Ports association as follows:

Instead of constructing the proposed jetty at Kolkata in the second phase, a suitable floating crane will be hired at an annual cost of approx. Rs. 10 crore for lighterage of containers / break bulk at Sagar / Diamond Harbour from mother vessel to barges and carried directly to Balagarh.

42.2 To obtain adequate information on the local conditions and to understand regarding the scope of work to be carried out in full, the Bidders shall visit the project site before submitting a proposal. The programme of visit shall be informed well in advance to Kolkata Port Infrastructure Development Limited authorities to make appropriate arrangement to visit the related areas. Consultants must fully acquaint themselves of local conditions and take them in to account in preparing their proposal.

42.3 Pre-Proposal/Tender Meeting and Amendment to Proposal Document:

42.3.1 The consultants or his official representative is advised to attend a Pre-proposal/ Tender meeting which will be convened at the office of the **Kolkata Port Infrastructure Development Limited**, 15 Strand Road, Kolkata 700001 on 07.08.2018 at 11:00 hours.

42.3.2 The purpose of the meeting will be to clarify issues and to answer queries on any matter that may be raised at that stage relating to the subject project.

42.3.3 Bidders requiring any clarification of the proposal document must notify the same online not later than 6.8.2018 at 17:30 hours. The reply to the queries shall be furnished by the employer online. No correspondence shall be made by post or facsimile.

42.3.4 The compilation of questions raised and answers given shall be furnished expeditiously to all Bidders on website. Any modification of the tender documents which may become necessary as a result of the pre-tender meeting shall be made by the Employer exclusively through the issuance of an addendum in website and not through the minutes of the pre-tender meeting.

42.3.5 At any time before the submission of proposals, the Employer may, for any reasons, whether at its own initiative or in response to a clarification requested by an invited consulting firm, modify the documents by amendment. The amendment will be notified queries to be uploaded on Website to all invited consulting firm and will be binding on them. The Employer may at its discretion extend the deadlines for the submission of proposals.

42.4 Scope of the Proposal :

Kolkata Port Infrastructure Development Limited, intends to invite bids from experienced Firm(s) to provide consultancy services for Preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environment Impact Assessment and Environment Management Plan (EIA &EMP) for Development of an extended port gate system at Balagarh, West Bengal, refer Terms of Reference (TOR) as in Tender Document, hereinafter referred to as "the Services".

43. OTHER TERMS & CONDITIONS :

43.1 Preparation and Submission of Proposal

43.1.1 The Proposal and all related correspondence and documents should be written in the English language. Supporting documents and printed literature furnished by Bidder with the Proposal may be in any other language provided that they are accompanied by appropriate translations of the pertinent passages in the English language. Supporting documents, which are not translated into English, may not be considered. For the purpose of interpretation & evaluation of the Proposal, the English language translation shall prevail.

43.1.2 “Technical Proposal”

Consultants are expected to examine all terms and instructions included in the document. Failure to provide all requested information will be at consultant's own risk and may result in rejection of proposal. The technical proposal shall contain the documents as listed at Clause No.4.0 of Tender Document.

43.1.3 "Financial Proposal".

Bidder/s shall indicate the total lump sum charges/fees (in Indian Rupees) to be paid by the Employer for this service/ assignment in the Financial Proposal format enclosed as Annex -III in the Proposal Document. This lump sum charges/fees shall be inclusive of all taxes, incidentals, overheads, travelling expenses, printing and binding of reports, expenditure related to presentations to be made during the execution of assignment, sundries and all other expenditure for execution of this services as per "**Terms of Reference**" of this tender document and also the tasks the consultant may think should be carried out in order to meet the objectives of the assignment. The Employer will pay prevalent GST to consultant separately.

Note:

- a) The lump sum fees/charges quoted by the Bidder shall be paid as stage- wise payments as prescribed in Financial Proposal (Annex -II)
- b) Income Tax and Professional Tax, any other tax as per Statutory Provisions of Govt. of India and Kolkata State shall be deducted by the Employer from each invoice. A certificate in this regard shall be furnished by the Employer.

43.1.4 Proposal Due Date

43.1.5 Online proposal should be submitted upto 13:00 hours Indian Standard Time (IST) on **27.08.2018** in the manner and form as detailed in this Proposal

Documents. Proposals submitted by facsimile transmission, telex or e-mail will not be acceptable.

43.1.6 Kolkata Port Infrastructure Development Limited, at its sole discretion, may extend the Proposal Due Date by issuing an Addendum if any.

44.0 Payment for Consultancy services (Fees in Indian Rupees):

The Consultancy charges/fees for Consultancy services shall be expressed in Indian Rupees only and the payment shall also be made in Indian Rupees by the Employer.

45.0 Time for completion:

The time period for the assignment is **7 (seven) months** including providing comments on Draft Reports not exceeding 10 days. If assignment is completed in all respect before scheduled period, the contract of consultancy may be foreclosed. In case of delay of assignment, the contract of consultancy may be extended suitably, at the discretion of Employer.

The assignment may be foreclosed at any stage, at the discretion of Employer without assigning any reasons whatsoever. Consultant does not reserve any right to claim compensation whatsoever for foreclosure of consultancy contract by Employer. In case of foreclosure, percentage payment due up to the completed stage will be made as indicated in the Financial Proposal. In case assignment forecloses in the middle of any indicated stage as per financial proposal, pro-rata payment shall be made for the completed services as agreed mutually.

NOTE: EMPLOYER for the purpose of this contract will be Kolkata Port Infrastructure Development Limited, and / or its authorized officer.

46. Scrutiny and Evaluation of Proposals:

46.1 Preliminary Scrutiny:

In the first instance the Tender Committee of Kolkata Port Infrastructure Development Limited, appointed for opening of proposals shall ascertain the availability of proper Proposal Security. In case a proposal is received without the requisite and proper Proposal Security, it shall be summarily rejected and the second stage Bid of such proposal containing Financial Proposal shall not be opened.

46.2 Responsiveness of Proposals:

The proposals received on time, accompanied by the EMD and cost of Tender document as specified in this tender will only be examined for responsiveness.

46.3 Scrutiny of Technical Proposals:

Responsive bids shall be examined in detail for their technical contents. Compliance to detailed Terms of Reference taking into account proposed Approach and Methodology, Experience of Bidder, proposed work plan for implementation, team composition etc. with reference to adequacy, acceptability and understanding of the Bidders shall be checked.

In the process of this examination, some clarifications may become necessary. These shall be sought and furnished in writing. However, the basis of proposal shall not be permitted to be changed/ altered either to fulfil minimum eligibility criteria or to make a non-responsive proposal responsive or to qualify for meeting the technical proposal parameters. The proposals which are found deficient or defective or unacceptable due to any reason shall be treated as non-responsive.

46.4 Opening and evaluation of second part viz. financial Proposal:

Financial Proposal of responsive Bidders who are found acceptable on scrutiny of technical contents and satisfy the criteria for evaluation, as specified in Clause-4 of Proposal Document will be opened on line. The date and venue of opening of financial proposal will be conveyed to qualified Bidders.

46.5 Financial proposal with any counter conditions or ambiguous remarks shall be rejected.

47. Award of Assignment /Services:

Prior to the expiration period of proposal validity, the Employer will notify the successful consultant who submitted the lowest financial proposal among the qualified Bidders in technical evaluation shall be uploaded on Website and invite it to negotiate the Contract if required. The party selected for award of assignment shall be issued a Letter of Award by Employer. This letter along with written acknowledgement of the successful party shall constitute contract between the party/ies with Employer, till signing of formal agreement.

47.1 Confirmation of receipt:

Consultants shall acknowledge the Employer by facsimile/ post/courier the receipt of Letter of award and confirm the acceptance of the proposal.

47.2 Performance Security:

Within 21 days of issue of letter of award from the Employer, the successful Firm(s) shall furnish to the Employer a Performance Security in the form of a Bank Guarantee of a nationalized bank having branch at Kolkata for an amount equivalent to 10% of the award cost of assignment as per the draft annexed (Annex - IV) to the Proposal Document. Failure of the successful party to lodge the required bank guarantee shall constitute sufficient grounds for the

termination of contract and enforcement of Bank Guarantee towards Proposal Security.

The performance security shall remain in force until six months from the date of issue of completion certificate of assignment and will be released thereafter. The obtaining of such guarantee (and the cost of guarantee), shall be at the expense of the party/ies. EMD will be refunded without any interest after submission of Performance Security.

47.3 Signing of Agreement :

Within one month of date of issue of Letter of Award and after submission of Bank Guarantee towards performance security (as per clause 47.2 of this document) successful party shall simultaneously sign formal agreement as prescribed in Annex-V of Proposal Document

47.4 Extension of validity of proposal:

If it becomes necessary, Kolkata Port Infrastructure Development Limited, may request the parties, in writing, to extend validity of proposals. The parties shall have the right to refuse such extension without forfeiting their proposal security. In case a party extends the validity then it shall also extend the validity of its Proposal Security for corresponding period.

48. CRITERIA FOR EVALUATION:

48.1 Technical Proposal Evaluation (Stage-1)

For the purpose of Qualification, the Bidders should satisfy the minimum eligibility criteria as prescribed in "Notice Inviting Proposal/Tender". In addition the Bidder may note the following.

48.1.1 Details in respect of **Clause 4.0** of information to the bidders for qualifying requirement and as specified in **Clause 22** are to be furnished.

48.1.2 Kolkata Port Infrastructure Development Limited, would evaluate the Technical Proposal/Tender in order to qualify Bidders for Technical Stage. Bidders who qualify the minimum eligibility criteria as brought out in the Notice inviting Proposal/Tender and as detailed in **Clause-4.0** of information to the bidders Qualifying requirement only will be considered for Price Bid stage evaluation namely, Financial Proposal evaluation.

48.1.3 If the Bidder is a consortium, evaluation will be made in line with stipulations in clause 4.0 of Notice inviting proposal.

48.1.4 A two stage procedure will be adopted in evaluating the proposals: (i) a Technical evaluation, which will be carried out prior to opening any financial proposal and (ii) a financial evaluation On each of the parameters under the

technical score, the Bidder would be required to achieve a minimum of 60% of the Technical Score assigned to that parameter so as to get included in the computation of the Total Technical Score for the Bidder and to be qualified. The maximum achievable Total Technical Score for every Bidder would be 100. The party/ies who have secured minimum Total Technical score of 70 points will be declared as qualified for opening of Financial Proposal.

48.1.5 The evaluation committee/Tender Committee appointed by the Employer will carry out its evaluation applying the evaluation criteria and point system specified below:

48.1.6 The scoring criteria to be used for evaluation shall be as follows.

Sl No	Parameter	Maximum Marks	Criteria
1	Relevant Experience of the bidder	40	60% of the maximum marks will be awarded for one eligible assignment as defined under Clause-3(b) Experience and Financial criteria under e-Tender Call Notice and 40%* for additional eligible assignments. One eligible assignment means one work of 80% /two works of 50% each / three works of 40% each. Evaluation will be based on the quality of submissions. 60% of the score will be awarded to an Applicant/ Key Personnel for fulfilling the eligibility criteria of a minimum number of Eligible Assignments and only projects exceeding the eligibility criteria shall qualify for scoring the balance 40%* on Proportionate basis. However, for assigning scores in respect of the size and quality of Eligible Assignments, all Eligible Assignments of the Applicant/Key Personnel shall be considered.
2	Proposed Methodology and Work Plan	5	
3	Relevant Experience of the Key Personnel [Total of (a) to (g)]	55	
a	Team Leader cum Project Coordinator	20	
b	Technical Expert	10	
c	Mechanical Expert	5	
d	Traffic Expert	5	
e	Economist / Financial Expert	5	
f	Environmental Expert	5	
g	Geotechnical Expert	5	
	Grand Total (1+2+3)		

* While awarding marks for the number of Eligible Projects, the Applicant or Key Personnel, as the case may be, that has undertaken the highest number of Eligible Assignments shall be entitled to the maximum score for the respective category and all other competing Applicants or respective Key Personnel, as the case may be, shall be entitled to a proportionate score.

Note: The values of Projects indicated for the purpose of eligibility criteria for experience under Clause-4.0 of e-TCN are not applicable for the experience of key personnel under above Clause No.48.1.6.

48.1.7 The consultant shall submit the required credentials along with his technical submission for fulfilling the minimum Eligibility Criteria specified in the document.

48.2 Evaluation of Financial Proposal

Financial bid shall be opened on a date to be fixed later and intimated to all the responsive and eligible Bidders to enable them to be present in the opening if they so wish and the bids will be opened in the office of the (Kolkata Port Trust). The price bid of all the responsive and eligible Bidders shall be opened.

48.3 After opening of financial proposals, the lowest financial proposal (FM) will be given a financial score (SF) of 100 points. The financial scores of other proposals will be computed as follows:

$$SF = 100 \times FM/F$$

(F = Amount of financial proposal)

Proposals will finally be ranked according to their combined Technical (ST) and Financial

(SF) scores as follows:

$$S = ST \times Tw + SF \times Fw$$

Where S is the combined score, and Tw and Fw are weight assigned to Technical Proposal and Financial Proposal that shall be 80% and 20%, respectively. The qualified bidder who secures highest combined score would be declared as the successful Bidder. In the event that two or more bidders secure same combined score, the work will be awarded to the lowest price bidder.

Example for Score Evaluation.

- ❖ Suppose L1 bidder quotes Rs.80/-, it shall be treated as FM.
- ❖ In this case, 'F' is also Rs.80/-.
- ❖ As per the formulae

$$SF = 100 \times FM/F$$

(F = Amount of financial proposal)

Proposals will finally be ranked according to their combined Technical (ST) and Financial (SF) scores as follows:

$$S = ST \times Tw + SF \times Fw$$

Applying the formulae, Financial Score for L1 bidder,

$SF = 100 \times 80/80 = 100$ (SF shall be treated as 100 points for L1 bidder which = $100 \times 20/100 = 20$ (points to be taken)).

❖ If a person quotes Rs.96/- (Say L2)

Applying the formulae, Financial Score for L2 bidder,

$SF = 100 \times 80/96 = 83.33$ (SF shall be treated as 83.33 points for L2 bidder which = $83.33 \times 20/100 = 16.6$ (points to be taken)).

49. GENERAL CONDITIONS OF CONTRACT

49.1 General Provisions

49.1 .1 Definitions

Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

(a) "Employer" means Board of Trustees of Kolkata Port Infrastructure Development Limited, a wholly owned subsidiary of Kolkata port, incorporated under The Company's Act, 2013 with the purpose to construct, operate, build, develop and maintain port related infrastructure including but not limited to rail, road, air, sea, river, streams, waterways, over and under bridges, civil and other infrastructures, accommodation and conveyance along with other related facilities.

(b) "Applicable Law" means the laws and any other instruments having the force of law in India, as they may be issued and in force from time to time;

(c) "Contract" means the Contract signed by the Parties, to which these General Conditions of Contract are attached, together with all the documents listed in letter of award;

(d) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Clause General Condition 49.2.1;

(e) "Foreign Currency" means currency in US Dollars or the currency of the home country of Consultant;

(f) "GC" means these General Conditions of Contract;

(g) "Government" means the Government of India;

(h) "Local Currency" means Indian Rupees;

(i) "Member", in case the Consultants consist of a joint venture of more than one entity, means any of these entities, and "Members" means all of these entities;

(j) "Personnel" means persons hired by the Consultants or by any Sub-consultant as employees and assigned to the performance of the Services or any part thereof;

"Foreign Personnel" means such persons who at the time of being so hired had their domicile outside India; "Local Personnel" means such persons who at the time of being so hired had their domicile inside India; and "Key Personnel" means the personnel referred to the in Clause General Condition 49.4.2 (a) ;

(k) "Party" means the Employer or the Consultants, as the case may be, and Parties means both of them;

(l) "Services" means the work to be performed by the Consultants pursuant to this Contract for the purposes of the Project, as described in Annexe- I hereto;

(m) "Sub-consultant" means any entity to which the Consultants subcontract any part or the Services in accordance with the provisions of Clause General Condition 49.3.6; and

(n) "Third Party" means any person or entity other than the Government, the Employer, the Consultants or a Sub-consultant.

(o) "Contract Sums" means gross amounts of consultant's original proposal in Indian Rupees with tax, duties, fees and other imposition inclusive of all cost, all types of subsoil investigation and environmental monitoring works if any.

(p) "Approved / approval" means the approval in writing.

49.1.2 Relations between the Parties

Nothing contained herein shall be construed as establishing a relation or master and servant or of agent and principal as between the Employer and the Consultants. The Consultants, subject to this contract, have complete charge of Personnel performing the Services and shall be fully responsible for the services performed by them or on their behalf hereunder.

49.1.3 Law Governing the Contract

This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law in India.

59.1.4 Language

This Contract has been executed in the language English, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this contract.

49.1.5 Headings

The headings shall not limit, alter or affect the meaning of this Contract.

49.1.6 Notices

49.1.6.1 Any notice, request or consent required or permitted to be given or made pursuant to this Contract shall be in writing. Any such notice, request or consent shall be deemed to have been given or made when delivered in person to an authorised representative of the party to whom the communication is addressed, or when sent by registered mail, telex, telegram or facsimile to such

Party at the address given in the proposal document for issue of proposal document.

49.1.6.2 Notice will be deemed to be effective as follows:

- (a) in the case of personal delivery or registered mail, on delivery;
- (b) in the case of telexes, 24 hours following confirmed transmission;
- (c) in the case of telegrams, 24 hours following confirmed transmission; and
- (d) in the case of facsimiles, 24 hours following confirmed transmission.

49.1.6.3. A Party may change its address for notice hereunder by giving the other Party notice of such change pursuant to the provisions listed in Clause General Condition 49.1.6.2 .

49.1.7 Location

The Services shall be performed at such locations are specified in Annexe- I hereto and, where the location of a particular task is not so specified, at such locations, whether in India or elsewhere, as the Employer may approve.

49.1.8 Authorized Representatives

Any action required or permitted to be taken, and any document required or permitted to be executed, under this Contract by the Employer or the Consultants may be taken or executed by the authorized representative specified in bid document.

49.1.9 Taxes and Duties

The Consultants and their personnel (domestic consultant/personnel and foreign consultant/personnel) shall pay the taxes, custom duties, fees, levies and other impositions levied under the existing, amended or enacted laws during life of this Contract and the Employer shall perform such duties in regard to the deduction of such tax as may be lawfully imposed.

49.2 Commencement, Completion, Modification and Termination of Contract

49.2.1 Effectiveness of Contract

This Contract shall come into force and effect on the date of the Employer's notice to the Consultants instructing the Consultants to begin carrying out the Services. This notice shall constitute agreement between Employer and the consultant till formal agreement has been signed.

49.2.2 Termination of Contract for Failure to Become Effective

If this Contract has not become effective within three months or such other time period as the party may agree in writing after date of the Contract signed by the Parties, either Party may, by not less than four (4) weeks' written notice to the other Party, declare this Contract to be null and void, and in the event of such declaration by either Party, neither Party shall have any claim against the other Party with respect hereto.

49.2.3 Commencement of Services

The Consultants shall begin carrying out the Services within 15 days. The completion period of this assignment is as per clause 2.11 of the other terms and conditions.

49.2.4 Expiration of Contract

Unless terminated earlier pursuant to Clause General Condition 49.2.9 hereof, this Contract shall expire when services have been completed and confirmed by the Employer by issuing completion certificate at the end of seven months.

49.2.5 Entire Agreement

This Contract contains all covenants, stipulations and provisions agreed by the Parties. No agent or representative of either Party has authority to make, and the Parties shall not be bound by or be liable for, any statement, representation, promise or agreement not set forth herein.

49.2.6 Modification

Modification of the terms and conditions of this Contract, including any modification of the scope of the Services, may only be made by written agreement between the Parties.

Pursuant to Clause General Condition 50.7.2 hereof, however, each Party shall give due consideration to any proposals for modification made by the other Party.

49.2.7 Force Majeure

49.2.7.1 Definition

(a) For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party, and which makes a Party's performance of its obligations hereunder impossible or so impractical as reasonably to be considered impossible in the circumstances, and includes, but is not limited to, war, riots, civil disorder, earthquake, fire explosion, storm, flood or other adverse weather conditions, strikes, lockouts or other industrial action (except

where such strikes, lockouts or other industrial action are within the power of the Party invoking Force Majeure to prevent), confiscation or any other action by government agencies.

(b) Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's sub-consultants or agents or employees, nor

(ii) any event which a diligent Party could reasonably have been expected to both (A) take into account at the time of the conclusion of this Contract and (B) avoid or overcome in the carrying out of its obligations hereunder.

(c) Force Majeure shall not include insufficiency of funds or failure to make any payment required hereunder.

49.2.7.2 No Breach of Contract

The failure of a Party to fulfil any of its obligations hereunder shall not be considered to be a breach of, or default under, this Contract insofar as such inability arises from any event of Force Majeure, provided that the Party affected by such an event has taken all reasonable precautions, due care and reasonable alternative measures, all with the objective of carrying out the terms and conditions of this Contract.

49.2.7.3 Measures to be taken

(a) A Party affected by an event of Force Majeure shall take all reasonable measures to remove such Party's inability to fulfil its obligations hereunder with a minimum of delay.

(b) A Party affected by an event of Force Majeure shall notify the other Party of such event as soon as possible, and in any event not later than fourteen (14) days following the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give notice of the restoration of normal conditions as soon as possible.

(c) The Parties shall take all reasonable measures to minimize the consequences of any event of Force Majeure.

49.2.7.4 Extension of Time

Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

49.2.7.5 Consultation

Not later than thirty (30) days after the Consultants, as the result of an event of Force Majeure, have become unable to perform a material portion of the

Services, the Parties shall consult with each other with a view to agreeing on appropriate measures to be taken in the circumstances.

49.2.6 Suspension

The Employer may, by written notice of suspension to the Consultants, suspend all payments to the Consultants hereunder if the Consultants fail to perform any of their obligations under this Contract, including carrying out of the Services, provided that such notice of suspension (i) shall specify the nature of the failure, and (ii) shall request the Consultants to remedy such failure within a period not exceeding thirty (30) days after receipt by the Consultants of such notice of suspension.

49.2.7 Termination

49.2.8.1 By the Employer

The Employer may, by not less than thirty (30) days written notice of termination to the Consultants for the occurrence of any of the events specified hereunder of this Clause General Condition 49.2.9.1, terminate this Contract.

(a) If the Consultants fail to remedy a failure in the performance of their obligations hereunder, as specified in a notice of suspension pursuant to Clause General Condition 49.2.8 hereinabove, within thirty (30) days of receipt of such notice of suspension or within such further period as the Employer may have subsequently approved in writing:

(b) If the Consultants become (or, if the Consultants consist of more than one entity, if any of their Members becomes) insolvent or bankrupt or enter into any agreements with their creditors for relief of debt or take advantage of any law for the benefit of debtors or go into liquidation or receivership whether compulsory or voluntary;

(c) if the Consultants fail to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause General Condition 4.8 hereof;

(d) If the Consultants submit to the Employer a statement which has a material effect on the rights, obligations or interests of the Employer and which the Consultants know to be false.

(e) if, as a result of Force Majeure, the Consultants are unable to perform a material portion of the Services for a period of not less than sixty (60) days; or

(f) If the Employer, in its sole discretion and for any reason whatsoever, decides to terminate this contract.

(g) If the Consultant, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the contract.

For the purpose of this clause:

"Corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the selection process or in contract execution.

"Fraudulent practice" means a misrepresentation of facts in order to influence a selection process or the execution of a Contract to the detriment of the borrower, and includes collusive practice among Consultants (prior to or after submission of proposals) designed to establish prices at artificial non-competitive levels and to deprive the borrower of the benefits of free and open competition.

In case the contract is terminated, the balance amount of advance fee if any, paid earlier shall be paid back by the Consultant to Employer within thirty days of the termination letter, failing which the same shall be recovered by encashing the existing Bank Guarantee submitted by Consultant.

49 .2.8.2 By the Consultants

The Consultants may, by not less than thirty (30) days' written notice to the Employer, such notice to be given after the occurrence of any of the events specified hereunder of this Clause General Condition 49.2.9.2, terminate this Contract;

(a) If the Employer fails to pay and money due to the Consultants pursuant to this Contract and not subject to dispute pursuant to Clause 49.8 hereof within forty-five (45) days after receiving written notice from the Consultants that such payment is overdue;

(b) If the Employer is in material breach of its obligations pursuant to this Contract and has not remedied the same within forty-five (45) days (or such longer period as the Consultants may have subsequently approved in writing) following the receipt by the Employer of the Consultants notice specifying such breach;

(c) If, as the result of Force Majeure, the Consultants are unable to perform a material portion of the Services for a period of not less than sixty (60) days; or

(d) If the Employer fails to comply with any final decision reached as a result of arbitration pursuant to Clause General Condition 49.8 hereof.

49.2.8.3 Cessation of Rights and Obligations

Upon termination of this Contract pursuant to Clause General Condition 49.2.2 or General Condition 49.2.9 hereof, or upon expiration of this Contract pursuant to Clause General Condition 49.2.4 hereof, all rights and obligations of the Parties hereunder shall cease, except;

- i) Such rights and obligations as may have accrued on the date of termination or expiration;
- ii) The obligation of confidentiality set forth in Clause General Condition 49.3.3 hereof;
- iii) Any right which a Party may have under the Applicable Law.

49.2.9.4 Cessation of Services

Upon termination of this Contract by notice of either Party to the other pursuant to Clauses General Condition 49.2.9.1 or General Condition 49.2.9.2 hereof, the Consultants shall, immediately upon dispatch or receipt of such notice, take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures for this purpose to a minimum. With respect to documents prepared by the Consultants and equipment and materials furnished by the Employer, the Consultants shall proceed as provided, respectively, by Clause General Condition 49.3.8 or General Condition 49.3.9 hereof.

49.2.9.5 Payment upon Termination

Upon termination of this Contract pursuant to Clauses General Condition 49.2.9.1 or General Condition 49.2.9.2 hereof, the Employer shall make the payments to the Consultants provided after offsetting against these payments any amount that may be done from the Consultant:

- i) Remuneration pursuant to Clause General Condition 49.6 hereof for Services satisfactorily performed prior to the effective date of termination;
- ii) Reimbursable expenditures pursuant to Clause General Condition 49.6 hereof for expenditures actually incurred prior to the effective date of termination; and
- iii) Except in the case of termination pursuant to paragraphs (a) through (g) of Clause General Condition 49.2.9.1 hereof, reimbursement of any reasonable cost incident to the prompt and orderly termination of the Contract including the cost of the return travel of the Consultants' personnel and their eligible dependents.

49.2.9.6 Disputes about Events of Termination

If either Party disputes whether an event specified in paragraphs (a) through (g) of Clause General Condition 49.2.9.1 or in Clause 49.2.9.2 hereof has occurred, such Party may, within forty-five (45) days after receipt of notice of termination from the other Party, refer the matter to arbitration pursuant to Clause General Condition 49.8 hereof, and this Contract shall not be terminated on account of such event except in accordance with the terms of any resulting arbitral award.

49.3. Obligations of the Consultants

49.3.1 General

50.3.1.1 Standard of Performance

The Consultants shall perform the Services and carry out their obligations hereunder with all due diligence, efficiency and economy, in accordance with generally accepted professional techniques and practices, and shall observe sound management practices, and employ appropriate advanced technology and safe and effective equipment, machinery, materials and methods. The Consultants shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Employer, and shall at all times support and safeguard the Employer's legitimate interest in any dealings with sub-consultants or Third Parties.

49.3.1.2 Law Governing Services

The Consultants shall perform the Services in accordance with the Applicable Law and shall take all practicable steps to ensure that any sub-consultants, as well as the Personnel and agents of the Consultants and any sub-consultants, comply with the Applicable Law. The Employer shall advise the Consultants in writing of relevant local customs and the Consultants shall, after such notifications respect such customs.

49.3.2 Conflict of Interests

49.3.2.1 Consultants not to Benefit from Commissions, Discounts etc.

The remuneration of the Consultants pursuant to Clause General Condition 49.6 hereof shall constitute the Consultants' sole remuneration in connection with this Contract or the Services and, the Consultants shall not accept for their own benefit any trade commission, discount or similar payment in connection with activities pursuant to this Contract or to the Services or in the discharge of their obligations hereunder, and the Consultants shall use their best efforts to ensure that any sub-consultants, as well as the Personnel and agents of either of them, similarly shall not receive any such additional remuneration.

49.3.2.2 Procurement Rules of the Employer

If the Consultant as part of the Services, have the responsibility of advising the Employer on the procurement of goods, works or services, the Consultants shall comply with any applicable procurement guidelines of the Employer or the agencies funding such procurement and shall at all times exercise such responsibility in the best interest of the Employer. Any discounts or commissions obtained by the Consultants in the exercise of such procurement responsibility shall be for the account of the Employer.

49.3.2.3 Consultants and Affiliates not to engage in certain Activities

The Consultants agree that, during the term of this Contract and after its termination, the Consultants and any entity affiliated with the Consultants, as well as any sub-consultant and any entity affiliated with such sub-consultant; shall be disqualified from providing goods, works or services (other than the Services and any continuation thereof) for any project resulting from or closely related to the Services.

49.3.2.4 Prohibition of Conflicting Activities:

Neither the Consultants nor their sub-consultants nor the Personnel of either of them shall engage, either directly or indirectly, in any of the following activities:

(a) during the term of this Contract, any business or professional activities in India which would conflict with the activities assigned to them under this Contract; or

(b) after the termination of this Contract, such other activities objectionable to Employer.

49.3.3 Confidentially

The Consultants, their sub-consultants and the Personnel of either of them shall not, either during the term or within two (2) years after the expiration of this Contract, disclose any proprietary or confidential information relating to the Project, the Services, this Contract or the Employer's business or operations without the prior written consent of the Employer.

49.3.4 Liability of the Consultants

Limitation of the Consultants' Liability towards the Employer (a) Except in case of gross negligence or wilful misconduct on the part of the Consultants or on the part of any person or firm acting on behalf of the Consultants in carrying out the Services, the Consultants, with respect to damage caused by the Consultants to the Employer's property, shall not be liable to the Employer.

(i) For any indirect or consequential loss or damage; and

(ii) For any direct loss or damage that exceeds (A) the total payments for Professional Fees and Reimbursable Expenditures made or expected to be made to the Consultants hereunder, or (B) the proceeds the Consultants may be entitled to receive from any insurance maintained by the Consultants to cover such a liability, whichever of (A) or (B) is higher.

(b) This limitation of liability shall not affect the Consultants' liability, if any, for damage to Third Parties caused by the Consultants or any person or firm acting on behalf of the Consultants in carrying out the Services.

49.3.5 Insurance to be Taken Out by the Consultants.

The Consultants (i) shall take out and maintain, and shall cause any sub-consultants to take out maintain, at their (or the sub-consultants', as the case may be) own cost but on terms and conditions approved by the Employer, insurance against the risks, and for the coverage, as mentioned below, and (ii) at the Employer's request, shall provide evidence to the Employer showing that such insurance has been paid. The risks and the coverage shall be as follows:

(a) Third Party Motor Vehicle Liability Insurance as required under extant Motor Vehicles Act in respect of motor vehicles operated in India by the Consultants or their Personnel or any Sub-consultants or their Personnel for the period of Consultancy.

(b) Third Party Liability Insurance with a minimum coverage for Rs. 5 lakh for the period of consultancy.

(c) Employer's Liability and Workers' Compensation Insurance in respect of the Personnel of the Consultants and of any Sub-consultant, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate; and

(d) Insurance against loss of or damage to:

(i) Equipment purchased in whole or in part with funds provided under this Contract,

(ii) The Consultants' property used in the performance of the Services, and

(iii) Any documents prepared by the Consultants in the performance of the Services.

49.3.6 Consultants' Actions requiring Employer's prior Approval

The Consultants shall obtain the Employer's prior approval in writing before taking any of the following actions:

(a) Appointing such members of the Personnel as are not listed in Appendix- A ("Consultants' sub-consultants' and Key Personnel");

(b) entering into a subcontract for the performance of any part of the Services, it being understood (i) that the selection of the sub-consultant and the terms and conditions of the subcontract shall have been approved in writing by the Employer prior to the execution of the subcontract, and (ii) that the Consultants shall remain fully liable for the performance of the Services by the sub-consultant and its Personnel pursuant to this Contract;

(c) any other action objectionable to the Employer.

49.3.7 Reporting Obligations

The Consultants shall submit to the Employer the reports and documents specified in clause 49.9.4, within the time periods set forth in the said clause .

49.3.8 Documents Prepared by the Consultants to be the Property of Employer
All plans, drawings, specifications, designs, reports and other documents prepared by the Consultants in performing the Services shall become and remain the property of the Employer, and the Consultants shall, not later than upon termination or expiration of this Contract, deliver all such documents to the Client, together with a detailed inventory thereof. The Consultants may retain a copy of such documents. The Consultants shall not use these documents for purposes unrelated to this Contract without the prior written approval of the Employer.

49.3.9 Equipment and Materials Furnished by the Employer

Equipment and materials made available to the Consultants by the Employer, or purchased by the Consultants with funds provided by the Employer, shall be the property of the Employer and shall be marked accordingly. Upon termination or expiration of this Contract, the Consultants shall make available to the Employer an inventory of such equipment and materials and shall dispose of such equipment and materials in accordance with the Employer's instructions. While in possession of such equipment and materials, the Consultants, unless otherwise instructed by the Employer in writing, shall insure them in an amount equal to their full replacement value.

49.4. Consultants' Personnel

49.4.1 General

The Consultants shall employ and provide such qualified and experienced Personnel as are required to carry out the Services.

49.4.2 Description of Personnel

(a) The titles, agreed job descriptions, minimum qualification and estimated periods of engagement in the carrying out of the Services of each of the Consultants' Key Personnel are described in Appendix A. If any of the Key Personnel has already been approved by the clients his/her name is listed as well.

(b) If required to comply with the provisions of Clause General Condition 49.3.1.1 of this Contract, adjustments with respect to the estimated periods of engagement of Key Personnel set forth in Appendix A may be made by the Consultants by written notice to the Employer, provided that such adjustments shall not alter the originally estimated period of engagement of any individual by more than 10% or one week, whichever is larger. Any other such adjustments shall only be made with the Employer's written approval.

(c) If additional work is required beyond the Terms of reference specified in Clause 51, the estimated periods of engagement of Key Personnel set forth in Appendix- A may be increased by agreement in writing between the Employer and the Consultants.

49.4.3 Approval of Personnel

The Key Personnel and Sub-consultants listed by title as well as by name in Appendix A are hereby approved by the Employer. In respect of other Key Personnel which the Consultants propose to use in the carrying out of the Services, the Consultants shall submit to the Employer for review and approval a copy of their biographical data. If the Employer does not object in writing (stating the reasons for the objection) within twenty-one (21) calendar days from the date of receipt of such biographical data such Key Personnel shall be deemed to have been approved by the Employer.

49.4.4 Working Hours, Overtime, Leave, etc.

(a) Working hours and holidays for Key Personnel are set forth in Appendix B hereto.

(b) The Key Personnel shall not be entitled to be paid for overtime nor to take paid sick leave or vacation leave. The Consultants' remuneration shall be deemed to cover these items. All leave to be allowed to the Personnel shall be outside the staff-months of service set for in Appendix A. Any taking of leave by Personnel on account of unforeseen circumstances shall be with prior approval of the Employer and the Consultants shall ensure that absence for leave purposes will not delay the progress and adequate supervision of the Services. Further, no fee shall be payable to the Consultant for such leave periods and suitable deductions from the bills shall be made on this account.

49.4.5 Removal and/or Replacement of Personnel

(a) Except as the Employer may otherwise agree, no changes shall be made in the Key Personnel. If, for any reason beyond the reasonable control of the Consultants, it becomes necessary to replace any of the Personnel, the Consultants shall forthwith provide as a replacement a person of equivalent or better qualifications. The upper limit of substitution on account of various reasons including on health ground should normally not exceed 25% of the total key personnel as given in Appendix A.

(b) If the Employer (i) finds that any of the Personnel has committed serious misconduct or has been charged with having committed a criminal action, or (ii) has reasonable cause to be dissatisfied with the performance of any of the Personnel, then the Consultants shall, at the Employer's written request specifying the grounds therefore, forthwith provide as a replacement a person with qualifications and experience acceptable to the Employer.

(c) Any of the Personnel provided as a replacement under Clauses (a) and (b) above, the rate of remuneration applicable to such person as well as any reimbursable expenditures (including expenditures due to the number of eligible dependents) the Consultants may wish to claim as a result of such replacement, shall be subject to the prior written approval by the Employer. Except as the Employer may otherwise agree, (i) the Consultants shall bear all additional travel and other costs arising out of or incidental to any removal and/or replacement, and (ii) the remuneration to be paid for any of the Personnel provided as are placement shall not exceed the remuneration which would have been payable to the Personnel replaced. Further for Key Personnel replaced for the second time, the remuneration payable shall not exceed 90% of the remuneration which would have been payable to the originally proposed Key Personnel. Also, if the total replacement of Key Personnel exceeds 25%, the remuneration payable for Key Personnel shall not exceed 90% of the remuneration which would have been payable to the originally proposed Key Personnel.

49.4.6 Resident Manager / Team Leader

The person designated as Team Leader in Appendix - A shall serve in that capacity. The Consultants shall ensure that at all times during the Consultants performance of the Services in India a resident project manager, acceptable to the Employer, shall take charge of the performance of such Services.

49.5. Obligations of the Employer

49.5.1 Assistance and Exemptions

The Employer shall use its best efforts to ensure that the Government shall:

(a) provide the Consultants, Sub-consultants and Personnel with work permits and such other documents as shall be necessary to enable the Consultants, Sub-consultants or Personnel to perform the Services;

(b) assist for the Personnel and, if appropriate, their eligible dependents to be provided promptly with all supporting papers for necessary entry and exit visas, residence permits, exchange permits and any other documents required for their stay in India;

(c) Facilitate prompt clearance through customs of any property required for the Services;

(d) Issue to officials, agents and representatives of the Government all such instructions as may be necessary or appropriate for the prompt and effective implementation of the Services;

(e) Assist the Consultants and the Personnel and any Sub-consultants employed by the Consultants for the Services for any requirement to register or obtain any

permit to practice their profession or to establish themselves either individually or as a corporate entity according to the Applicable Law;

(f) grant to the Consultants, any Sub-consultant and the Personnel of either of them the privilege, pursuant to the Applicable Law, of bringing into India reasonable amounts of foreign currency for the purposes of the Services or for the personal use of the Personnel and their dependents and of withdrawing any such amounts as may be earned therein by the Personnel in the execution of the Services; and

(g) Provide to the Consultants, Sub-consultants and Personnel any such other assistance as may be required time to time.

49.5.3 Payment

In consideration of the Services performed by the Consultants under this Contract, the Employer shall make to the Consultants eligible payments and in such manner as is provided by Clause General Condition 49.6 of this Contract.

49.6 Payments to the Consultants

49.6.1 Cost Estimates

The Employer shall pay the Consultant for normal Services in accordance with the Conditions and with the details stated in Annex-II of Financial Proposal, and shall pay for Additional Services if any ordered by the Employer in writing at rates and prices which are given in or based on those in Annex -II so far as they are applicable but otherwise as agreed mutually.

49.6.2 Remuneration and Reimbursable Expenditures

It is understood that the fee quoted by Consultants cover (A) such salaries and allowances as the Consultants shall have agreed to pay to the Personnel as well as factors for social charges and overhead, and (B) the cost of back supporting by home office staff not included in the Personnel listed in Appendix - A and (C) the Consultants' fee, (D) bonuses or other means of profit-sharing, if any, and (E) all other expenditure involved in providing the services as per the agreement which are not specifically stated herein above.

49.6.3 Currencies of Payment:

a) All payments by the Employer under this contract will be made only in Indian Rupees.

b) The Fee quoted by the Consultant shall be inclusive of but not limited to specific requirements, such as on account of:

i) Expatriate staff employed directly on the work

- ii) Social, insurance, medical and other charges relating to such expatriate staff and foreign travel expenses;
- iii) Depreciation and use of imported plant and equipment, including spare parts, required for the works
- iv) Foreign insurance and freight charges for plant and equipment, including spare parts etc.
- v) Overhead expenses, fees and financial charges arising outside India in connection with the works

49.6.4 Mode of Billing and Payment:

Billing and payments in respect of the Services shall be made as follows:-

- (a) No advance payment shall be paid to the Consultant.
- (b) As soon as practicable and not later than fifteen (15 days) after the end of each calendar month during the period of the Services, the Consultants shall submit to the Employer, in duplicate, itemized statements and other appropriate supporting materials, of the amounts payable pursuant to clauses 55 for such month. The payment is as per Financial Proposal (Annex-II) and shall become due and payable as and when the task assigned in such stages completed in all respect.
- (c) The payment for the interim running account bills (R.A. Bill) shall be made to the Consultant within 30 days of date of certification of the bill by the Employer. For the final bill, the payment shall be made within 45 days of the day of certification of the bill by the Employer provided that there should not be any disputed item. If bills are in order and there are no disputed items, the bills shall be certified by the Employer within seven working days of the receipt of the bill by the Employer. In case Employer feels the submitted bill is not in line with the agreement, the same shall be returned to consultants promptly within seven days to resubmit the bill in acceptable form or withdraw the bill if it is disputed or beyond the scope of agreement. Only such portion of a monthly statement that is not satisfactorily supported may be withheld from payment. Should any discrepancy be found to exist between actual payment and costs authorized to be incurred by the Consultants, the Employer may add or subtract the difference from any subsequent payments.
- (d) The final payment under this Clause shall be made only after the final report and a final statement, identified as such, shall have been submitted by the Consultants and approved as satisfactory by the Employer. The Services shall be deemed completed and finally accepted by the Employer and the final report and final statement shall be deemed approved by the Employer as satisfactory forty five (45) calendar days after receipt of the final report and final statement by the

Employer unless the Employer, within such forty five (45) day period, gives written notice to the Consultants specifying in detail deficiencies in the Services, the final report or final statement. The Consultants shall thereupon promptly make any necessary corrections, and upon completion of such corrections, the foregoing process shall be repeated. Any amount which the Employer has paid or caused to be paid in accordance with this Clause in excess of the amounts actually payable in accordance with the provisions of this Contract shall be reimbursed by the Consultants to the Employer within thirty (30) days after receipt by the Consultants of notice thereof. Any such claim by the Employer for reimbursement must be made within twelve (12) calendar months after receipt by the Employer of a final report and a final statement approved by the Employer in accordance with the above.

49.7 Fairness and Good Faith

49.7.1 Good Faith

The Parties undertake to act in good faith with respect to each other's right under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.

49.7.2 Operation of the Contract

The Parties recognize that it is impractical in this Contract to provide for every contingency which may arise during the life of the Contract, and the Parties hereby agree that it is their intention that this Contract shall operate fairly as between them, and without detriment to the interest of either of them, and that, if during the term of this Contract either Party believes that this Contract is operating unfairly, the Parties will use their best efforts to agree on such action as may be necessary to remove the cause or causes of such unfairness, but no failure to agree on any action pursuant to this Clause shall give rise to a dispute subject to arbitration in accordance with Clause 49.8 hereof.

49.8. Settlement of Disputes

49.8.1 Amicable Settlement

The Parties shall use their best efforts to settle amicably all disputes arising out of or in connection with this Contract or the interpretation thereof.

49.8.2 Dispute Settlement

Disputes shall be settled by arbitration in accordance with the following provisions: All disputes in respect of subject contract shall be settled by arbitration in accordance with the Arbitration and conciliation Act, 1996 or any statutory amendment thereof. The arbitral tribunal shall consist of 3 arbitrators, one each to be appointed by the Employer and Project Management Consultant. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the

parties and shall act as presiding Arbitrator. The language of Arbitration shall be English.

Only questions and disputes as were raised during the execution of the work till its completion and not thereafter shall be referred to arbitration. However, this would not apply to the questions and disputes relating liabilities of the parties after completion of the work.

While invoking arbitration the contractor shall give a list of disputes with amounts in respect of each dispute along with the notice for appointment of Arbitrator.

If the Consultant does not make any demand for appointment of Arbitrator in respect of any claims in writing as aforesaid within 180 days of receiving the intimation from Engineer-in-Charge that final bill is ready for payment, the claim of Consultant shall be deemed to have been waived and absolutely barred and the Employer shall be discharged and absolved of all liabilities under the contract. It is also a term of this contract that if any fees are payable to the Arbitrator these shall be paid equally by both parties. The arbitration proceeding shall take place in Kolkata only. However, all disputes are subject to exclusive jurisdiction of courts at Kolkata, only.

49.9. Liquidated damages:

49.9.1 Liquidated Damages for error/ variation:

In case any error or variation is detected in the reports submitted by the Consultant and such error or variation is the result of negligence or lack of due diligence on the part of the Consultant, the consequential damages thereof shall be quantified by the Authority in a reasonable manner and recovered from the Consultant by way of deemed liquidated damages, subject to a maximum of 50% (fifty percent) of the Agreement Value.

49.2 Liquidated Damages for delay:

In case of delay in completion of Services, liquidated damages not exceeding an amount equal to 0.1% (zero point one percent) of the Agreement Value per day, subject to a maximum of 10% (ten percent) of the Agreement Value will be imposed and shall be recovered by appropriation from the Performance Security or otherwise. However, in case of delay due to reasons beyond the control of the Consultant, suitable extension of time shall be granted without levying Liquidated Damages (LD).

49.9.3 Encashment & appropriation of Performance Security:

The Authority shall have the right to invoke and appropriate the proceeds of the Performance Security, in whole or in part, without notice to the Consultant in the event of breach of this Agreement or for recovery of Liquidated Damages specified in this Clause- 49.9.

49.9.4 Penalty for deficiency in Services:

In addition to the Liquidated Damages not amounting to penalty, as specified in Clause- 49.9, warning may be issued to the Consultant for minor deficiencies on its part. In the case of significant deficiencies in Services causing adverse effect on the project or on the reputation of the Authority, other penal action including debarring for a specified period may also be initiated as per policy of the Authority. The time period for the various stages of services as indicated in financial proposal, is as under.

Deliverable	Description of Deliverable	Timeline (from date of LOA)
1	Inception Report	0.5 month
2	Draft Appraisal Report	1 month
3	Appraisal Report	1.5 months
4	Draft Detailed Project Report	3 months
5	Final Detailed Project Report	4 months
8	Draft Bid Documents	6 months
9	Final Bid Documents & Rapid EIA/EMP and Environmental Clearance	7 months

50. If any additional copy of report is required by any authority the same may be provided without any additional cost.

51. TERMS OF REFERENCE (ToR): GENERAL

51.1 Kolkata Port Infrastructure Development Limited, a wholly owned subsidiary of Kolkata port, incorporated under The Company's Act, 2013 with the purpose to construct, operate, build, develop and maintain port related infrastructure including but not limited to rail, road, air, sea, river, streams, waterways, over and under bridges, civil and other infrastructures, accommodation and conveyance along with other related facilities (hereinafter to be called the Authority), seeks the services of a qualified firm (hereinafter to be called the Consultant) for Preparation of Detailed Project Report (DPR), Rapid EIA study, preparation of EMP and preparation of bid documents for the Project for Development of an extended port gate system at Balagarh.

51.2 The Consultant shall be guided in its assignment by the Model Concession Agreement (the "MCA") including Construction Standards, Operations &

Maintenance Standards, Safety Standards and Performance Standards for Port Projects through **EPC Contract**.

51.3 The Consultant shall assist the Authority during pre-bid meeting by furnishing clarifications as required for the structuring, documentation and award of the Project.

51.4 The Consultant shall also participate in the pre-bid conferences with the Bidders of the Project and assist the Authority in clarifying the financial and legal aspects arising from the Bid Documents.

51.5 The Consultant shall make available the Technical Expert and other Key Personnel to attend and participate in meetings, conferences and discussions with the Authority from time to time.

The study comprises preparation of Detailed Project Report and Bid Documents for award of the work of development, undertaking Rapid Environment Impact Assessment study followed by preparation of Environment Management Plan for development of the proposed extended port gate at Balagarh, West Bengal. The consultant shall also be responsible for obtaining environment approval from appropriate authority (ies).

52. Scope of work :

Further the scope of work includes:

52.1 i) Preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environmental Impact Assessment and Environment Management Plan (EIA & EMP), for Development of an extended port gate system at Balagarh, West Bengal as detailed in the Tender Document. DPR is to be based on *the feasibility report of IPA subject to the following additional conditions.*

- 1. The project to be considered excluding the jetty at Kolkata at a total cost of Rs. 321.25 Crore through internal resources.**
- 2. In addition hiring of a suitable crane for lighterage for container/break bulk at Sagar /diamond Harbour at an annual cost of approx. Rs 10 Crores has also been considered while assessing the viability of the project.**
- 3. *IRR of the said report of IPA to be updated as per present conditions.***
- 4. *Any other study as may be necessary has to be carried out for successful completion of the DPR preparation.***
- 5. *ERR to be ascertained for the project.***

6. *Revalidation of Traffic and revenue to be ascertained.*

(ii) Providing & submitting detailed design and drawings

(iii) Preparing and submitting proposal for approval of KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED for the estimate for all the works included in scope of work based upon CPWD/PWD scheduled of Rates (SOR) and standard Rate Analysis, Market rates etc and total program / bar chart / CPM.

(iv) Preparation of tender documents preparing scrutiny Report and assist in selecting the Contractor after opening of tender documents.

52.2 Topographical survey to cover Details of terrain, contour plan with slope drainage pattern of the site and surrounding area. Assessment of filling required, sources of filling materials and transportation details etc.

52.3 Identification of port boundary with geographical coordinates, identification of locations for the jetties, with centreline and base geographical coordinates.

52.4 Conducting further bathymetry/ hydrographical/ topographic surveys and other field investigations, along with model studies for identifying the suitable location for the jetties. Prepare maps using appropriate scales.

52.5 Examining the navigational aspects of the approach channel, proposed length and width of the channel to be maintained, requirement of dredging with disposal plan and its stability, reclamation, bank protection and river training measures.

52.6 Geo-technical study in the form of bore holes for collection of subsoil data required for planning & designing marine structures and onshore structures. The numbers/spacing of boreholes shall be in such a way to get sub-soil data representation of the location and collection of samples. In case of dredging works, the numbers & arrangement of boreholes shall cover all dredge areas and the testing of samples, analysis and classification of soil shall be in accordance with the guidelines laid down by Ministry of Shipping and PIANC (1984) Classification to suit the dredging contractor.

52.7 Preparation of master plan of the proposed Terminal including the rail-road connectivity to the nearest junction point. This will include examination of present proposal of Indian Port Association.

52.8 Detail Structural Design & Drawing of all the facilities like berth, Jetty, Approach Trestle, Yard, Roads etc. The Technical Bid document to cover detail Technical specification for construction /execution.

52.9 Details of land use break-up for the proposed project area including provision for Rehabilitation & Resettlement (R&R).

52.10 A detailed traffic and transportation study is to be made for existing and projected passenger & cargo traffic in connection with the rail-road connectivity of the proposed project site.

52.11 Details of human resource plan, cargo-handling and evacuation plan.

52.12 Details of power requirement, availability and distribution details.

52.13 Details of water requirement & availability including treatment details. Treatment Details of treated waste water & disposal. Assessment of solid waste generation, treatment and its disposal.

52.14 Risk assessment and disaster management plan including emergency evacuation during natural and manmade disasters.

52.12 Report of IPA may be reviewed in respect of cost of the project (capital cost & recurring cost) and cost towards Implementation of environmental management plan should be clearly spelt out.

53. Scope of work for Rapid Environmental Impact Assessment study and preparation of Environment Management Plan.

53.1 The consultant, if not himself an accredited EIA Consultant of MoEF & CC for Port & Harbour sector, shall engage one such reputed consultant to carry out all the activities leading to final Environmental Clearance.

53.2 The EIA consultant must be experienced in dealing such type of projects having creditable track record.

53.3 Necessary assistance in the form uploading of the application, preparation of presentation material, printing and submitting of documents as per requirement of projects proponent is to be provided.

53.4 Necessary specific study as per the Terms of Reference (ToR)/ additional ToR is to be carried out without any extra cost. This will include any specific study to be carried out by reputed agency/institute, as suggested in ToR.

53.5 EIA study will be inclusive in all respect as per the EIA notification 2006 and amendment thereof.

53.6 EIA consultant will assist project proponent in all respect for public hearing and will remain present during the same. Necessary support will be provided to the Kolkata Port Trust in all manners to obtain Environmental Clearance. (EC). The application for Environment Clearance will be made only after finalization of project planning in all respect.

53.7 Preparation of entire **Bid document on EPC mode** for a successful bid process management.

53.8 Project Time schedule & financial analysis (bid evaluation).

54. Activities and Deliverables:

54A. Inception Meeting and Report

The Consultant will conduct an inception meeting with the Authority. The objective of this meeting will be to appraise the Authority with the complete plan of activities proposed by the consultant for the assignment. The meeting would cover the following points:

- Review of the Authority's perspective for the Project.
- Review of time line of activities / milestones going forward.
- Review of the team organization and detailed functions of the team members.
- Discussion and finalization of a communication strategy whereby all concerned will be regularly involved and consulted throughout the assignment.
- Any specific issue requiring immediate attention of Authority

Deliverables:

- i. Detailed methodology and time schedule for the said consultancy assignment.
- ii. A communication strategy
- iii. Progress report to date
- iv. A brief report on the Identification of key issues relevant from the Authority's perspective and/or issues that might affect Authority's interest in the Project and contain recommendations with respect to mitigation of Authority concerns on such issues
- v. Presentation to Authority

Timeframe: **2 weeks from date of LOA**

54B. Draft Appraisal Report:

Submission of Draft Appraisal Report and Presentation to Authority.

Timeframe: **Within one Month from date of LOA**

54C. Appraisal Report:

Submission of Appraisal Report and Presentation to Authority.

Timeframe: **Within one and half Month from date of LOA**

54D. Draft Detail Project Report (DPR): Submission of Draft Detail Project Report (DPR) and Presentation to Authority

Timeframe: **3 months from LOA.**

54E. Final Detail Project Report (DPR): Submission of Detail Project Report (DPR): (i) incorporating all the suggestions from Authority (ii) Reply for all the Queries of Authority (iii) Soft copy of report and all the data in GIS format and Presentation to Authority.

Timeframe: **4 months from LOA..**

54F . EIA Study for Environmental clearance :

- I) Preparation of EIA and EMP report as per ToR condition.
- i) Preparation of presentation Slides for ToR, Public consultation & EC.

Timeframe: **7 months from LOA.**

54G. Draft Bid Documents: Submission of Draft Bid Documents and Presentation to Authority

Timeframe: **6 months from LOA.**

54H. Final Bid Documents: Submission of Final Bid Documents and Presentation to Authority

Timeframe: **7 months from LOA.**

55. Payment Schedule:

Delive rable	Description of Deliverable	Timeline (from date of LOA)	Payment ** (% of total
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			fees)
1	Inception Report	0.5 month	10%
2	Draft Appraisal Report	1 month	10%
3	Appraisal Report	1.5 months	10%
4	Draft Detail Project Report (DPR)	3 months	25%
5	Final Detail Project Report (DPR)	4 months	10%
6	EIA/EMP and Environmental Clearance	7 months*	15%
7	Draft Bid Documents	6 months	10%
8	Final Bid Documents	7 months	10%

Time frame is excluding time taken by Authority in providing comments on Draft Reports not exceeding 10 days.

*Additional time for EIA study will be allowed if stipulated so by the relevant Authority without any extra payment.

** The payment for a deliverable will be made after acceptance of the same by Authority.

56. Other terms and Conditions:

- i. Draft reports (Hard & Soft copy) shall be submitted in ten copies for getting the Authority's remarks/ suggestions.
- ii. Final reports (Hard & Soft copy) shall be submitted in twenty copies after incorporating all the Authority's remarks/ suggestions, if any.
- iii. The expenditure incurred for complying the above two points shall be suitably included in the basic cost of the services.

- iv. The Consultant shall have to visit Authority for presentations as and when required by Authority from time to time and the expenditure for the same shall be suitably included in the basic cost of the services.
- v. In the event of discontinuance of the contract during occurrence of any activity, though the activity is not fully completed, the payment due for the activity shall be paid on pro-rata basis as assessed by the Authority and Authority's decision in this regard shall be final.

E Tender No.

ANNEXE-I

APPLICATION LETTER

(On the Letter head of the Bidder)

Date :

Kolkata Port Infrastructure Development Limited
15, Strand Road,
Kolkata-700001

Subject: Preparation of Detailed Project Report (DPR) and Bid Documents including Rapid Environment Impact Assessment and Environment Management Plan (EIA & EMP), for Development of an extended port gate system at Balagarh, West Bengal

Sir,

- 1) I/we, _____ (Name of tenderer) having examined the Tender Document and understood its contents, hereby submit our tender for at, Kolkata Port Infrastructure Development Limited.
- 2) All information provided in the tender including Addenda and in the Appendices are true and correct and all documents accompanying such tender are true copies of their respective originals.
- 3) I/We shall make available to Kolkata Port Infrastructure Development Limited(hereinafter referred to as KPIDL) any additional information it may find necessary or require to supplement or authenticate the Tender
- 4) I/we acknowledge the right of KPIDL to reject our tender without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.
- 5) I/we also certify the following
 - a. I/we / any of the consortium member (as the case may be) have not been debarred by the Central/State Govt. or any entity controlled by them or any other legal authority for participating in any tender / contract / agreement of whatever kind

- b. I/we certify that in the last three years, I/We/any of the consortium members or our / their associates have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award, nor been expelled from any project or contract by any public authority/entity nor have had any contract terminated by any public authority / entity for breach on our part.
- 6) I/we declare that :
 - a. I/we have examined and have no reservations to the Tender Document, including the Addenda and all corrigenda issued by KPIDL thereon
 - b. I/we hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any corrupt, fraudulent or coercive practices to influence the evaluation process of the tender.
- 7) I/we understand that KPIDL reserves the right to accept or reject any tender and to annul the tendering process and reject all tenders at any time without any liability or any obligation for such acceptance, rejection or annulment without assigning any reason thereof.
- 8) _____(Name of Tenderer) hereby undertakes that I/we will abide by the decision of KPIDL in the matter of examination, evaluation and selection of successful tenderer and shall refrain from challenging or questioning any decision taken by KPIDL in this regard.
- 9) We are enclosing our Proposal including Technical Proposal in one original plus one copy and Financial Proposal with the details as per the requirements of the Proposal Documents, for your evaluation

Thanking you,

Yours faithfully,

Signature of Power of Attorney Holder(s).....

Name:

ANNEXE II
FINANCIAL PROPOSAL

From :

To

Kolkata Port Infrastructure Development Limited
15, Strand Road,
Kolkata-700001

Subject: Preparation of Techno-Economic Feasibility Report (TEFR), Detailed Project Report (DPR) and Bid Documents including Environment Impact Assessment and Environment Management Plan (EIA & EMP) for Development of an extended Port Gate system at Balagarh, West Bengal

1. I/We have perused the Proposal Document for subject assignment containing Terms of Reference in Annex-I and other details and am/are willing to undertake and complete the assignments as per terms and conditions stipulated in the 'Proposal Document'.

2. Our price offer is inclusive of all taxes, incidentals, overheads, travelling expenses, printing and binding of reports, expenditure related to presentation to be made during the execution of the Consultancy Service, sundries and all other items involving expenditure for execution of this assignment covering scope of work as stipulated in "Terms of Reference" (**Clause 51** to the NIT) and excluding prevalent GST. The amount to be quoted towards Consultancy works shall be filled in the **BoQ format** attached to the tender document (Appendix E). This offer is valid for a period of **180 days** from the due date of submission of the proposal document.

3. The above quoted gross amount should be the total of 2 parts namely :

(i) Preparation of TEFR.

(ii) Preparation of DPR , EIA including obtaining Environment Clearance and preparation of Bid Document

4. I/We also agree to accept the stage-wise and percentage-wise payments as detailed below.

4.1 Stages of payment for the services are as under:

Deliverable	Description of Deliverable	Timeline (from date of LOA)	Payment ** (% of total fees)
1	Inception Report	0.5 month	10%
2	Draft Appraisal Report	1 month	10%
3	Appraisal Report	1.5 months	10%
4	Draft Detail Project Report (DPR)	3 months	25%
5	Final Detail Project Report (DPR)	4 months	10%
6	EIA/EMP and Environmental Clearance	7 months*	15%
7	Draft Bid Documents	6 months	10%
8	Final Bid Documents	7 months	10%

* Excluding time taken by Authority in providing comments on Draft Reports not exceeding 10 days.

** The payment for a deliverable will be made after acceptance of the same by Authority.

*****. As such works at item No 6 to 8 shall be undertaken only after further confirmation of KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED.**

NOTE:

i. All the payment under this contract will be made only in Indian Rupees. The fees shall be quoted in Indian Rupees only. The consultants shall be paid for the services rendered as per the TOR as per payment schedule given above. The

prices quoted shall be inclusive of any statutory levies and/or other charges levied by any Central/ State/local authorities but excluding GST which shall be paid extra at applicable rates at the time of supply of goods/services.

ii. Any modifications required regarding inclusion of a new studies or modification to existing studies envisaged in the scope of Model Studies may be done by the employer during the preparation of DPR and the payment terms of which can be finalized by mutual consent or Employer may take up the same separately and the results and conclusion of the same shall be taken for finalizing and completion of DPR. The DPR submitted by the consultant shall meet the norms of Banks for financing of the Projects.

Signature of Power of Attorney Holder(s).....

Name:

.....

Witness's

Signature_____

Signature_____

Name_____

Name_____

Address_____

Address_____

ANNEXE- III

PROFORMA OF BANK GUARANTEE

(PERFORMANCE BOND)

(In lieu of Cash Security Deposit) To be issued by the Kolkata Branch, as the case may be of any Nationalised Bank of India on Non-judicial Stamp Paper worth Rs.50/- or as decided by the Authority

To

THE KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED

15 Strand Road,

Kolkata

Pin -700001

BANK

GUARANTEE

NO.....DATE.....

Name of Issuing
Bank.....

Name of Branch.....

Address.....

In consideration of the Kolkata Port Infrastructure Development Limited,, Kolkata Port Infrastructure Development Limited, a Special Purpose Vehicle (SPV) with share of Kolkata Port Trust (KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED) and Govt. Of West Bengal having agreed to exempt.....a Proprietary / Partnership /Limited / Registered Company, having its Registered office at(hereinafter referred to as the "Contractor") from cash payment of Security Deposit / Payment of Security Deposit through deduction from the Contractors' bills under the terms and conditions of a contract made between the Trustees and the Contractor for.....(write the name of the work as per LOA) in terms of the Letter of Intent No.....dated(hereinafter referred to as the 'Contract'), for the due fulfilment by the contractor of all the terms and conditions contained in the said contract, on submission of a Bank Guarantee for (Rs.....), we.....Bank.....Branch....., ,

do, on the advice of the contractor hereby undertake to indemnify and keep indemnified the Trustees to the extent of the said sum of Rs.....(Rupees.....). We,

.....

..... Bank.....Branch,

further agree that if a written demand is made by the KPIDL through any of its officials for honouring the Bank Guarantee constituted by these presents, We ,..... Bank..... Branch, shall have no right to decline to cash the same for any reason whatsoever and shall cash the same and pay the sum so demanded to the Trustees within a week from the date of such demand by an A/c Payee Banker's Cheque drawn in favour of "KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED" without any demur. Even if there be any dispute between the contractor and the KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED, this would be no ground for us (Name of Bank).....Branch, to decline to honour the Bank Guarantee in the manner aforesaid. The very fact that We..... Bank.....Branch, decline or fail or neglect to honour the Bank Guarantee in the manner aforesaid shall constitute sufficient reason for the KPIDL to enforce the Bank Guarantee unconditionally without any reference, whatsoever, to the contractor.

2. We..... Bank.....Branch, further agree that a mere demand by the Trustees at any time and in the manner aforesaid is sufficient for us..... Bank.....Branch, to pay the amount covered by this Bank Guarantee in full and in the manner aforesaid and within the time aforesaid without reference to the contractor and no protest by the contractor, made either directly or indirectly or through Court, can be valid ground for us..... Bank.....Branch, to decline or fail or neglect to make payment to the KPIDL in the manner and within the time aforesaid.

3. We Bank.....Branch, further agree that the Bank Guarantee herein contained shall remain in full force and effect, during the period that is taken for the due performance of the said contract by the contractor and that it shall continue to be enforceable till all the dues of the KPIDL under and/or by virtue of the terms and conditions of the said contract have been fully paid and its claim satisfied and/ or discharged in full and/or till the KPIDL certify that the terms and conditions of the said contract have been

fully and properly observed/fulfilled by the contractor and accordingly, the Trustees have discharged the Bank Guarantee, subject however, that this

guarantee shall remain valid upto and inclusive ofdays of.....20..... and subject also to the provision that the KPIDL shall

have no right to demand payment against this guarantee after the expiry of 6 (six) calendar months from the expiry of the aforesaid validity period up to.....or any extension thereof made by us.....Bank.....Branch, in further extending the said validity period of this Bank Guarantee on Non-Judicial Stamp paper of appropriate value, as required/determined by the Trustees, only on a written request by the KPIDLto the contractor for such extension of validity of this Bank Guarantee.

4.

We.....Bank.....Branch, further agree that, without our consent and without affecting in any manner our obligations hereunder, the KPIDLshall have the fullest liberty to vary from time to time any of the terms and conditions of the said contract to extend the time for full performance of the said contract including fulfilling all obligations under the said contract or to extend the time for full performance of the said contract including fulfilling all obligations under the said contract by the contractor or to postpone for any time or from time to time any of the powers exercisable by the KPIDLagainst the contractor and to forebear or enforce any of terms and conditions relating to the said contract and we..... Bank..... Branch shall not be relieved from our liability by reason of any such variation or extension being granted to the contractor or for any fore-bearance, act or commission on the part of the KPIDLor any indulgence by the KPIDLto the contractor or by any such matter of thing of whatsoever nature, which under the law relating to sureties would, but for this provision have effect of so relieving usBankBranch.

5. We, Bank.Branch, lastly undertake not to revoke this Bank Guarantee during its currency except with the previous consent of the Trustees in writing.

SIGNATURE.....

NAME.....

.

DESIGNATION.....

(Duly constituted attorney for and on behalf of)

BANK.....
.....

BRANCH.....(OFFICIAL SEAL OF THE BANK)

ANNEXE-IV

FORM OF AGREEMENT

THIS AGREEMENT is made on the _____ day of 2016 between Kolkata Port Infrastructure Development Limited, 15 Strand Road, Kolkata, 700001, hereinafter called "the Employer of the one part and (Name of Consultant)_____. Mailing address of the consultant_____.
_____hereinafter called "the consultant" of the other part.

WHEREAS the Employer is desirous that certain tasks be performed viz. Proposal for Consultancy Services for Preparation of Techno-Economic Feasibility Report (TEFR), Detailed Project Report (DPR) and bid documents for Development of an extended Port Gate system at Balagarh, West Bengal and has accepted a proposal by the "Consultant" as referred in the assignment NOW THIS AGREEMENT WITNESSETH as follows:

1. In this agreement words and expression shall have the same meaning as are respectively assigned to them in the Conditions of Proposal Document hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:

a) The Proposal Document for Consultancy Services for Preparation of Techno-Economic Feasibility Report (TEFR), Detailed Project Report (DPR) and Bid Documents including Environment Impact Assessment and Environment Management Plan (EIA &EMP) for Development of an extended Port Gate system, West Bengal as issued by the Employer.

b) All amendments to the Proposal Document for Consultancy Services for Preparation of Techno-Economic Feasibility Report (TEFR), Detailed Project Report (DPR) and Bid Documents including Environment Impact Assessment and Environment Management Plan (EIA &EMP) for Development of a Deep-Sea Port at Tajpur, West Bengal as issued by the Employer prior to submission of the bids.

a) Acceptance letter issued by the Employer vide No._____ dated_____ and all correspondence exchanged between the Employer and the consultant upto the date of issue of acceptance letter as specifically referred to in the said acceptance letter.

3. In consideration of the payment to be made by the Employer to the Consultant as hereinafter mentioned, the Consultant hereby covenants with the Employer to

execute and complete the works in conformity in all respects with the provisions of the contract.

4. The Employer hereby covenants to pay the consultant in consideration of the execution, completion, of the works the consultancy charges/fees at the times and in the manner prescribed in financial proposal.

IN WITNESS WHEREOF the parties hereto have caused their respective Common Seals to be hereunto affixed (or have hereunto set their respective hands and seals) the day and year first above written.

SIGNED, SEALED AND DELIVERED

By the said

By the said

Name_____

Name_____

on behalf of the Consultant

on behalf of the Employer

in the presence of:

in the presence of:

Name_____

Name_____

Address_____

Address_____

ANNEXURE - V

FORMAT IN CASE OF JOINT VENTURE/CONSORTIUM AGREEMENT

(To be submitted on stamp paper)

This Joint venture/consortium agreement is made at _____on _____day of_____2017 between M/s. _____ (please indicate the status viz. Proprietor, firm, Company) represented through its proprietor /partner or Director (hereinafter referred to as “first Party”) and M/s. _____ (Please indicate the status viz. Proprietor, Firm, Company) represented through its proprietor /partner or Director (hereinafter referred to as “Second Party”) WHEREAS the First party is engaged in the business of _____

AND WHEREAS THE Second Party is engaged in the business of _____

AND WHEREAS both the parties are desirous of entering into a joint venture /consortium for carrying on the work of KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITEDin connection with work of _____(please mention the work of the tender).

AND WHEREAS the First Party and Second Party have agreed to form joint venture/consortium for execution of subject works.

NOW THIS DEED WITNESSED AS UNDER:

a. That under this Joint Venture/consortium Agreement the work will be done jointly by the first party and second party in the name and style of M/s_____.

b. It is further agreed by the Joint Venture/consortium Partner that _____of M/s. _____has been nominated as Lead Partner for the execution of the works.

c. That all the parties shall be liable jointly, equally and severally for the satisfactory execution of the contract in all respect in accordance with terms and conditions of the contract and the lead partner shall be authorised to incur liabilities and receive instruction for and on behalf of any and all the partners and parties of the Joint Venture/consortium and the entire execution of the contract including payment shall be done exclusively with the lead partner.

d. THE PROPOSED PARTICIPATION SCOPE OF ACTIVITIES TO BE PERFORMED AND RESPONSIBILITIES OF EACH:

The proposed administrative arrangement, participation, scope of activities to be performed and responsibilities for the execution of the work of the each party shall be as under:

First Party:

Second Party:

e. The turnover and experience of each party is as under:

First Party:

Second Party:

f. Subject to Clause-4, the parties shall depute their experienced staff as required for the works and plants, equipment, machinery etc. as requires for execution of works, will be deployed by each Joint Venture/consortium partners for execution of the contract.

g. In the event of default by any partner in the execution of the part of the contract, the Lead Partner will have the authority to assign the work to any other party acceptable to the Kolkata Port Trust to ensure the satisfactory execution of that part of the contract.

h. The Registered Office of the Joint Venture/Lead Partner of the consortium shall be at _____

i. The Joint Venture/consortium shall regularly maintain in the ordinary course of business a true and correct account of all its incoming and outgoing and also of its assets and liabilities in proper books or account which shall ordinarily be kept at place of business and after Completion of above mentioned work all account shall be taken.

j. Opening and operation of Bank Account:

The Joint Venture/consortium shall open and maintain bank account(s) at _____ The Lead Partner as mentioned in Clause (2) above shall have the power to receive the payments on behalf of the Joint Venture/consortium and to give discharge on behalf of the Joint Venture/consortium.

IN WITNESS WHEREOF the Parties hereto have signed hereunder at _____ on this _____ day of _____

Party of First Part

Party of Second Part

Witness:

1)

2)

Annexure-VI (A)

POWER OF ATTORNEY

Format For Power Of Attorney For Lead Member Of Consortium

(To be executed before Notary Public on a Non-Judicial Stamp Paper of at least Rs 10)

Dated: -----

TO WHOMSOEVER IT MAY CONCERN Mr.....(Name of the Person(s)), domiciled at (Address), acting as.....(Designation and name of the company), and whose signature is attested below, is hereby appointed as the Lead member and authorised on behalf of ----- -(Name of the applicant) to provide information and respond to enquiries etc. as may be required by the Employer for the project of (Project title).....and is hereby further authorised to sign and file relevant documents in respect of the above.

(Attested signature of Mr.....) For..... (Name & designation of the member of joint venture/Consortium)

- Individual power of attorney for signing the joint venture/Consortium shall be submitted in the above format separately by each applicant.

Annexure-VI (B)

Format For Power Of Attorney For Lead Member Of Consortium

(To be executed before Notary Public on a Non-Judicial Stamp Paper of at least Rs 10)

POWER OF ATTORNEY

Whereas KPIDL(“the Authority”) has invited tenders from interested parties for “.....” (Tender No.).

Whereas,,, And (collectively the “ Consortium”) being members of the Consortium are interested in bidding for the Tender in accordance with the terms and conditions of the Tender Document and other connected documents in respect of the said tender, and

Whereas, it is necessary under the Tender Document for the members of the Consortium to designate one of them as the Lead Member with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium’s bid for the Tender and its execution.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS

We, M/s. having our registered office at, M/s..... having our registered office at, M/s. having our registered office at, and M/s. having our registered office at, [the respective names and addresses of the registered office] (hereinafter collectively referred to as the “Principals”) do hereby designate, nominate, constitute, appoint and authorize M/s. having its registered office at, being one of the members of the Consortium, as the Lead Member and true and lawful attorney of the Consortium (hereinafter referred to as the “Attorney”). We hereby irrevocably authorize the Attorney to conduct all business for and on behalf of the Consortium and any one of us during the bidding process and, in the event the Consortium is awarded the Contract, during the execution of the contract, and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the pre-qualification of the Consortium and submission of its bid(s) for the tender,

including but not limited to signing and submission of all applications, bids and other documents and writings, participate in Pre Bid and other conferences/meetings, respond to queries, submit information/ documents, sign and execute contracts and undertakings consequent to acceptance of bid(s) of the Consortium and generally to represent the Consortium in all its dealings with the Authority, and/or any other Government Agency or any person, in all matters in connection with or relating to or arising out of the Consortium's bid(s) for the tender and/or upon award thereof till the Agreement is entered into with the Authority.

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us / Consortium.

IN WITNESS HEREOF WE HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS
DAY OF20**

For

.....

(Name & Title)

For

.....

(Name & Title)

For

.....

(Name & Title)

Witnesses:

1.

2.

.....

(To be executed by all the members of the Consortium)

ANNEXURE VII

Preparation of Techno-Economic Feasibility Report (TEFR), Detailed Project Report (DPR) and Bid Documents including Environment Impact Assessment and Environment Management Plan (EIA &EMP) for Development of an extended Port Gate system at Balagarh, West Bengal

UNDERTAKING

We hereby give an undertaking that I/We have not made any payment or illegal gratification to any person/authority connected with the bid process so as to influence the bid process and have not committed any offense under the Prevention of Corruption Act in connection with the above subject bid.

Signature of Bidder with Stamp and date

ANNEXURE-VIII

Joint Bidding Agreement

(To be executed on Non-Judicial Stamp Paper of at least Rs. 60/-)

THIS JOINT BIDDING AGREEMENT is entered into on this the day of 20...

AMONGST

1. {..... Limited, a company incorporated under the Companies Act, 1956} and having its registered office at (hereinafter referred to as the “**First Part**” which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

2. {..... Limited, a company incorporated under the Companies Act, 1956} and having its registered office at (hereinafter referred to as the “**Second Part**” which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

3. {..... Limited, a company incorporated under the Companies Act, 1956 and having its registered office at (hereinafter referred to as the “**Third Part**” which expression shall, unless repugnant to the context include its successors and permitted assigns)}

AND

4. {..... Limited, a company incorporated under the Companies Act, 1956 and having its registered office at (hereinafter referred to as the “**Fourth Part**” which expression shall, unless repugnant to the context include its successors and permitted assigns)}

The above mentioned parties of the FIRST, SECOND, {THIRD and FOURTH} PART are collectively referred to as the “**Parties**” and each is individually referred to as a “**Party**”

WHEREAS,

- A. [KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED, a Special Purpose Vehicle (SPV) with share of Kolkata Port Trust (KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED) and Govt. Of West Bengal is in the ratio of 74:26 (hereinafter to be called the Authority) and having Principal Office at 15, Strand Road, Kolkata-700001 (hereinafter referred to as the “**KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED**” which expression shall, unless repugnant to the context or meaning thereof, include

its administrators, successors and assigns) has invited offers by its Request through NIT No. dated(the “**TENDER DOCUMENT**”) for selection of successful tenderer for the contract as proposed in the said tender document.

- B. The Parties are interested in jointly bidding for the Project as members of a Consortium and in accordance with the terms and conditions of the tender document and other documents in respect of the work, and
- C. It is a necessary condition under the tender document that the members of the Consortium shall enter into a Joint Bidding Agreement and furnish a copy thereof with the Offer.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and Interpretations

In this Agreement, the capitalised terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the tender document.

2. Consortium

- 2.1. The Parties do hereby irrevocably constitute a consortium (the “**Consortium**”) for the purposes of jointly participating in the Tendering Process for the Work.
- 2.2. The Parties hereby undertake to participate in the Tendering Process only through this Consortium and not individually and/ or through any other consortium constituted for this work, either directly or indirectly or through any of their Associates.

3. Covenants

The Parties hereby undertake that in the event the Consortium is declared the successful tenderer and awarded the contract, it shall incorporate a special purpose vehicle (the “**SPV**”) under the Indian Companies Act 1956 for entering into an Agreement with the KoPT and for performing all its obligations as the successful tenderer in terms of the Agreement for the Project.

4. Role of the Parties

The Parties hereby undertake to perform the roles and responsibilities as described below:

- a) Party of the First Part shall be the Lead member of the Consortium and shall have the power of attorney from all Parties for conducting all business for and on behalf of the Consortium during the tendering process and till all the obligations of the SPV shall become effective;
- (a) Party of the Second Part shall be {the Technical Member of the Consortium ;}
- (b){Party of the Third Part shall be the Financial Member of the Consortium; and}

(c) {Party of the Fourth Part shall be the Operation and Maintenance Member/ Other Member of the Consortium.}

[Note: Status of the members in (b), (c) and (d) are only illustrative. More / less parties may form the Consortium and changes may be made accordingly to the JBA]

5. Joint and Several Liability

The Parties do hereby undertake to be jointly and severally responsible for all obligations and liabilities relating to the work and in accordance with the terms of the tender document till completion of the contract.

6. Shareholding in the SPV

6.1. The Parties agree that the proportion of shareholding among the Parties in the SPV shall be as follows:

First Party:

Second Party:

{Third Party:}

{Fourth Party:}

6.2. The Parties undertake that a minimum of 26% (twenty six per cent) of the subscribed and paid up equity share capital of the SPV shall, at all times till completion of two years from the date of commencement of the contract, be held by the Parties of the First, {Second and Third} Part whose experience and net-worth have been reckoned for the purposes of pre-qualification in terms of the tender document.

6.3. The Parties undertake that they shall collectively hold at least 51% (fifty one per cent) of the subscribed and paid up equity share capital of the SPV at all times till completion of two years from the date of commencement of the contract.

6.4. The Parties undertake that they shall comply with all the requirements as stipulated in the tender document vide N.I.T. No. dated

7. Representation of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

- a) Such Party is duly organised, validly existing and in good standing under the laws of its incorporation and has all requisite power to enter into this Agreement with KoPT;
- b) The execution, delivery and performance by such Party of this Agreement has been authorised by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/ power of attorney in favour of

the person executing this Agreement for the delegation of power and KoPT to execute this Agreement on behalf of the Consortium Member is annexed to this Agreement, and will not, to the best of its knowledge:

- i. Require any consent or approval not already obtained;
 - ii. Violate any Applicable Law presently in effect and having applicability to it;
 - iii. Violate the memorandum and articles of association, by-laws or other applicable organisational documents thereof;
 - iv. Violate any clearance, permit, concession, grant, license or other governmental authorization, approval, judgment, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or
 - v. Create or impose any liens, mortgages, pledges, claims, security interests, charges or Encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;
- c) this Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it; and
- d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Affiliates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfilment of its obligations under this Agreement.

8. Termination

This Agreement shall be effective from the date hereof and shall continue in full force and effect until the Financial Close of the contract is achieved under and in accordance with the terms of the tender, in case the contract is awarded to the Consortium. However, in case the Consortium is either not pre-qualified for the work or does not get selected for award of the contract, the Agreement will stand terminated in case the Tenderer is not pre-qualified or upon return of the Earnest Money by the KPIDL to the Bidder, as the case may be.

9. Miscellaneous

9.1. This Joint Bidding Agreement shall be governed by laws of India.

9.2. The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior written consent of the KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED

For and on behalf of

LEAD MEMBER by:

(Signature)

(Name)

(Designation)

(Address)

SIGNED, SEALED AND DELIVERED

For and on behalf of

SECOND PART by

(Signature)

(Name)

(Designation)

(Address)

SIGNED, SEALED AND DELIVERED

For and on behalf of

THIRD PART by:

(Signature)

(Name)

(Designation)

(Address)

SIGNED, SEALED AND DELIVERED

For and on behalf of

FOURTH PART by

(Signature)

(Name)

(Designation)

(Address)

In the presence of:

1.

2.

Notes:

1. The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by the Applicable Law and the charter documents of the executants (s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
 2. Each Joint Bidding Agreement should attach a copy of the extract of the charter documents and documents such as resolution / power of attorney in favour of the person executing this Agreement for the delegation of power and KoPT to execute this Agreement on behalf of the Consortium Member.
 3. For a Joint Bidding Agreement executed and issued overseas, the document shall be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney has been executed.
-

APPENDIX - A

KEY PERSONNEL AND SUB-CONSULTANT

The Project Team shall include, but not be limited to, at least the following Key Experts:

(a) Team Leader Cum Project Coordinator	
Educational Qualification	Graduate/ Post Graduate in Civil Engineering
Essential Experience	Minimum 25 years' experience for Graduates or 22 years experience for Post Graduates including Ports & Harbour Engineering, Port Management and exposure to preparation of TEFR /DPR development of Port projects involving Breakwaters, dredging, reclamation, cargo terminals, connectivity and Structuring of Port projects etc. He should have led the study teams for minimum five similar Assignments. He shall be a full time employee of the lead firm.
(b) Technical Expert	
Educational Qualification	Graduate/ Post Graduate in Civil Engineering
Essential Experience	Minimum 20 years' experience for Graduates or 17 years' experience for Post Graduates including Planning and Designing of Port Layouts & Marine Structures, Dredging, CargoTerminals, Estimating, Scheduling of works and Port operation sand experience in preparation of detailed engineering of marine structures like breakwaters, berths. He should have worked as a Technical Expert for minimum five similar Assignments. He shall be a full time employee of the lead firm.
(c) Mechanical Expert	
Educational Qualification	Post Graduate/Graduate in Mechanical Engineering.

Essential Experience	Minimum 20 years' experience for Graduates or 17 years' experience for Post Graduates in Equipment Planning Operational systems of Cargo Handling systems. He should have worked as a Mechanical Expert for minimum three similar Assignments.
(d) Traffic Expert	
Educational Qualification	Post-Graduation in Engg. or Mathematics or Economics or Statistics or MBA (Finance/ logistics)
Essential Experience	Minimum 15 years in traffic surveys and studies, traffic forecast of different cargoes for planning of Port facility, vessel trend analysis for cargo transportation, computation of No. of vessel movements etc. on Port projects or any of the projects in the Transport Sector like Airports, Road & railways etc. He should have worked as a Traffic Expert for minimum three similar Assignments.
(e) Economist / Financial Expert	
Educational Qualification	M.B.A in Finance or Chartered accountant with exposure to Port logistics
Essential Experience	Minimum 15 years as financial expert in Ports and or Shipping Companies, Tariff setting, Economic & Financial Viability Analysis, funding pattern etc. He should have worked as Economist / Financial Consultant for minimum three similar Assignments.
(f) Environmental Expert	
Educational Qualification	Master's Degree in Environmental Engineering or Masters Degree in Environmental Science or Degree in Civil Engineering with Master's Degree in Environmental Sciences
Essential Experience	Minimum 10 years' experience in environmental studies or social studies relevant to Port projects and or infrastructure projects in Transport Sector like Sea ports, Airports, Road and Railways etc, conversant in preparation of EIA/EMP Reports, or Social studies etc. He should have worked as an Environmental Expert for minimum three similar Assignment.
(g) Geotechnical Expert	
Educational Qualification	Master Degree in Geotechnical Engineering

Essential Experience	Minimum 15 years in Geotechnical Assessment of site, Formulation of parameters for design etc. Geotechnical Design of marine structures. He should have worked as a Geotechnical Expert for minimum three similar Assignments.
----------------------	--

Note: (1) The consultant shall provide sufficient technical experts / staff to complete this assignment in time. In case progress of assignment demands additional personnel to cope with the situation, Consultants have to deploy additional personnel at no extra cost to the Employer.

(2) The consultant should upload all the scanned copies of the certificates of the Key Personnel along with their CV in support of their qualification

APPENDIX - B

HOURS OF WORK FOR KEY PERSONNEL

Working hours of key personnel shall normally be 8 hours a day and six days a week. Hours of key personnel should broadly match with those of Client. However, the consultant has to complete the job in prescribed time frame and client shall not make any payment for any overtime except in case of work arising from clients variation orders.

APPENDIX - C

FORM FOR REFUND OF EARNEST MONEY DEPOSIT

1. Name of the Contractor :	
2. Name of the work :	
3. Bank Acknowledgement with other details :	
4. Reasons for the refund :	
5. Amount of the E.M.D. (In INR)	

Passed for Rs..... only.

Authorised Signatory,

Kolkata Port Infrastructure Development Limited

Received Rs.....(Rupees) only.

Signature of the Contractor

With full Address

(Affix a revenue stamp)

APPENDIX - D

On Non-judicial Stamp Paper of at least Rs.50/-

INTEGRITY PACT

Between

Kolkata Port Infrastructure Development Limited (KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED) hereinafter referred to as "The Principal/ Employer"

And

.....hereinafter referred to as "The Bidder/Contractor".

Preamble

The principal intends to award, under laid down organizational procedures, contract/s for.....The Principal values full compliances with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/ transparency in its relations with its Bidder(s) and/ or contractor(s).

In order to achieve these goals, the Principal will appoint an Independent External Monitor (IEM) appointed by the principal, will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

NOW, THEREFORE

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence / prejudiced dealings prior to, during and subsequent to currency of the contract to be entered into with a view to :-

Enabling the PRINCIPAL / EMPLOYER to get the contractual work executed and / or to obtain / dispose the desired said stores / equipment at a competitive price in conformity with the defined specifications / scope of work by avoiding the high cost and the distortionary impact of corruption on such work / procurement /disposal and Enabling BIDDERS /CONTRACTORS to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will abstain from bribing and other corrupt practices and the PRINCIPAL/EMPLOYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

Section 1- Commitments of the Principal/employer.

(1) The Principal commits itself to take measures necessary to prevent corruption and to observe the following principles:-

- a. No employee of the Principal, personally or through family members, will, in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
- b. The Principal will, during the tender process, treat all Bidder(s) with equity and reason. The Principal will, in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
- c. The Principal will exclude from the process all known prejudiced persons.

(2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the Indian Penal Code (IPC)/ Prevention of Corruption (PC) Act, or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions.

Section 2- Commitments of the Bidder(s)/Contractor(s)

(1) The Bidder(s)/Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

- a. The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- b. The Bidder(s)/Contractor(s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non- submission of bid or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- c. The Bidder(s)/Contractor (s) will not commit any offence under the relevant IPC/PC Act; further the Bidder(s)/Contractor(s) will not use improperly, for purpose of competition or personal gain, or pass on to others, any

information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details including information contained or transmitted electronically.

d. The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the Agents/representative in India, if any. Similarly the Bidder(s)/Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any. Further details as mentioned in the “**Guidelines on Indian Agents of Foreign Suppliers**” shall be disclosed by the Bidder(s)/Contractor(s). Further, as mentioned in the Guidelines, all the payments made to the Indian Agent/representative have to be in Indian Rupees only. Copy of the Guidelines on Indian Agents of foreign Suppliers is annexed and marked as **Annexure-P**.

e. The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

(2) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 - Disqualification from tender process and exclusion from future contracts.

If the Bidder(s)/Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/Contractor(s) from the tender process or take action as considered appropriate.

Section 4 - Compensation for Damages.

(1) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand the recover the damages equivalent to Earnest Money Deposit / Bid Security.

(2) If the Principal has terminated the contract according to Section 3 or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages of the contract value or the amount equivalent to Performance Bank Guarantee.

Section 5- Previous transgression.

(1) The Bidder declares that no previous transgressions occurred in the last 3 years from the date of signing the Integrity Pact with any other Company in any

country conforming to the anti corruption approach or with any other Public Sector Undertakings /Enterprise in India, Major Ports, / Govt. Departments of India that could justify his exclusion from the tender process.

(2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as considered appropriate.

Section 6- Equal treatment of all Bidders / Contractors/ Subcontractors.

(1) The Bidder(s)/ Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.

(2) The Principal will enter into agreements with identical conditions as this one with all Bidders, Contractors and subcontractors.

(3) The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section7 - Other Legal actions violating Bidder(s)/Contractor(s)/ Sub contractor(s).

The actions stipulated in this Integrity pact are without prejudice to any other legal action that may follow in accordance with provisions of the extant law in force relating to any civil or criminal proceedings.

Section 8- Role of Independent External Monitor (IEM).

(a) The task of the monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.

(b) The monitors shall not be subject to instructions by the representatives of the parties and shall perform their functions neutrally and independently.

(c) Both the parties accept that the Monitors have the right to access all the documents relating to the contract.

(d) As soon as the Monitor notices, or has reason to believe, a violation of this pact, he will so inform the authority designated by the Principal and the Chief Vigilance Officer of Kolkata Port Trust.

(e) The BIDDER / CONTRACTOR(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the PRINCIPAL including that provided by the BIDDER / CONTRACTOR. The demonstration of a

valid interest, unrestricted and unconditional access to his contract documentation, if any. The same is applicable to Sub-contractors. The Monitor shall be under contractual obligation to treat the information and documents of the Bidder / Contractor / Subcontractor(s) with confidentiality.

(f) The Principal / Employer will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor, the option to participate in such meetings.

(g) The Monitor will submit a written report to the designated Authority of Principal / Employer / Chief Vigilance Officer of Kolkata Port Trust within 8 to 10 weeks from the date of reference or intimation to him by the Principal / Employer / Bidder / Contractor and should the occasion arise, submit proposals for correcting problematic situation. BIDDER / CONTRACTOR can approach the Independent External Monitor (s) appointed for the purposes of this Pact.

(h) As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or to take corrective action, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

(i) If the Monitor has reported to the Principal substantiated suspicion of an offence under the relevant IPC/PCA and the Principal / Employer has not, within reasonable time, taken visible action to proceed against such offence or reported to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

(j) The word 'Monitor' would include both singular and plural.

Section 9 - Facilitation of Investigation:

In case of any allegation or violation of any provisions of this Pact or payment of commission, the PRINCIPAL / EMPLOYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER / CONTRACTOR shall provide necessary information and documents in **English** and shall extend all possible help for the purpose of such examination.

Section 10 - Pact Duration:

The pact begins with when both parties have legally signed it and will extend up to 2 years or the complete execution of the contract including warranty period

whichever is later. In case bidder / contractor is unsuccessful this Integrity Pact shall expire after 6 months from the date of signing of the contract.

If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged / determined by the appropriate Authority of KOLKATA PORT INFRASTRUCTURE DEVELOPMENT LIMITED

Section 11- Other provisions:

(1) This agreement is subject to Indian law. Place of performance and jurisdiction is the Registered Office of the Principal in Kolkata.

(2) Changes and supplements as well as termination notices need to be made in writing in English.

(3) If the Contractor is a partnership or a consortium, this agreement must be signed by all partners of consortium members.

(4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

For & on behalf of the Principal)
Bidder/Contractor)

(For & on behalf of

(Office Seal)

(Office Seal)

Place.....

Date.....

Witness 1:

(Name & Address) _____

Witness 2:

(Name & Address) _____

APPENDIX E

Bill of Quantity

E Tender No. KoPT/Kolkata Dock System/CE/99/18-19/ET/232

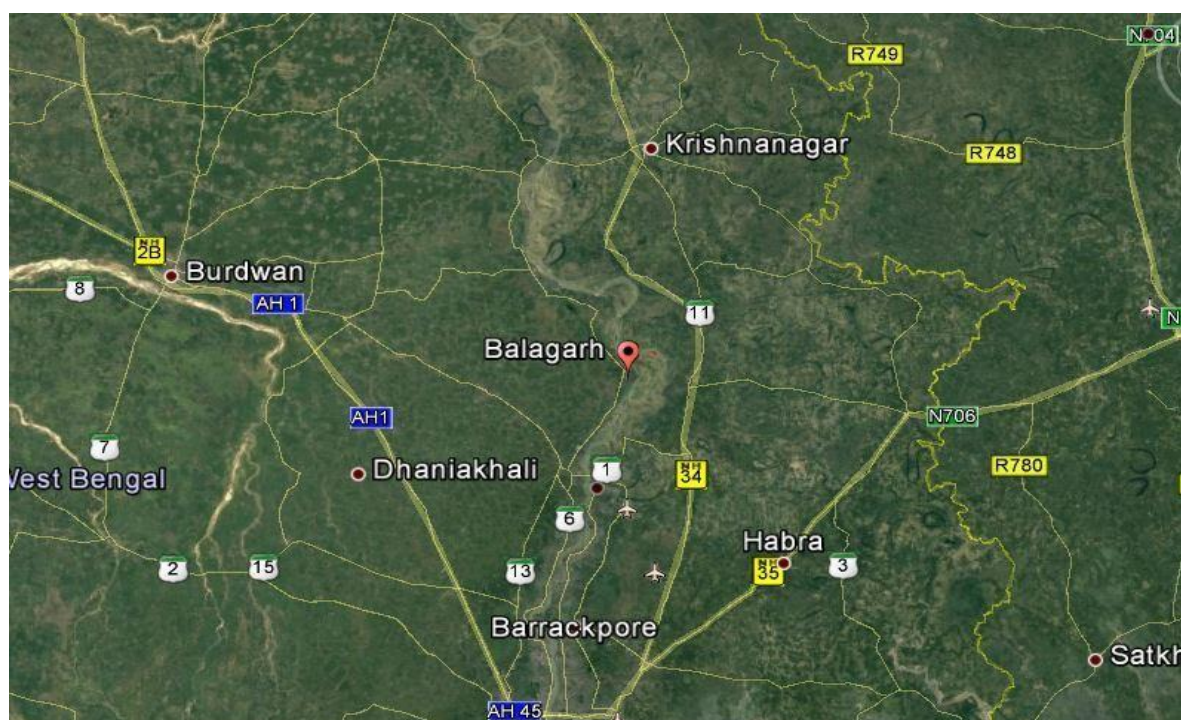
Item No	Description	Amount (In INR)*
1	Preparation of Techno-Economic Feasibility Report (TEFR), Detailed Project Report (DPR) and Bid Documents including Environment Impact Assessment and Environment Management Plan (EIA &EMP) for Development of an extended Port Gate system at Balagarh, West Bengal.	
	In Words	

*The price offer is inclusive of all taxes, incidentals, overheads, travelling expenses, printing and binding of reports, expenditure related to presentation to be made during the execution of the Consultancy Service, sundries and all other items involving expenditure for execution of this assignment covering scope of work as stipulated in "Terms of Reference" (clause 51 of this tender document) and excluding prevalent GST. This offer is valid for a period of **180 days** from the due date of submission of the proposal document.

Signature of Power of Attorney Holder(s).....

Name:

Feasibility Study for Extended Gate System at Balagarh For Kolkata Port



INDIAN PORTS ASSOCIATION
NBCC Place, Bhisham Pitamah Marg,
Lodi Road, New Delhi

JANUARY 2018

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EXECUTIVE SUMMARY

- To grapple the anticipated increase in traffic and to resolve the problem of restricted movement of outgoing cargo, the Kolkata Port plans to shift part of its operation to another extended site and accordingly, the Port has identified a location called Balagarh on the Inland Waterway-1, about 85 kilometers from its main Docks. Balagarh is a riverfront with a depth of around 3.0 metres. The Port proposes to develop a barge terminal and associated facilities at this place initially for handling container and pulses.
- The Port's plan is to discharge containers and pulses from mother vessels into barges in stream and bring the barges to Balagarh for unloading and further onward movement. Similarly, it will load export containers on barges at Balagarh and take them to stream for loading on mother vessels. The Port is also looking at the possibility of using the facility for any other new cargoes that may have the potential to be handled at this site, like LNG and ro-ro traffic.
- The bulk pulses/peas traffic and containers will be handled at Balagarh barge terminal that can be diverted from KDS. The pulses/peas traffic is almost stable at the level of around 5 lakh tonnes and Balagarh has annual throughput potential of about 60% of the same. With regard to containers, the traffic potential for Balagarh barge terminal over the period 2019-20 to 2034-35, in lakh TEUs are as given below.

Time period/ Volume	2019-2020	2024-25	2034-35
In lakh TEUs	2.23	2.51	3.06

- The proposed location for the Extended Gate Facilities is the Balagarh Island which is situated in the Balagarh village of Hoogly District in West Bengal. It is a river island flanked by the main Hoogly river and its branch.
- Considering all the hydraulic parameters as well as satellite image analyses, the suitable location for construction of jetty has been identified, in order of preference. The protrusion of the jetty will be around 25-30 m towards the river from the high bank.
- Based on discussions with the barge operators it is concluded that vessels with 90m length, 18m beam and draft of 4m are likely to be deployed in future for cargo and container transport between Kolkata/Balagarh and Diamond Harbour/Sagar Island. The displacement tonnage of this vessel is to the order of 5000t and DWT to the order of 4000. Accordingly, the design vessel with the following parameters is considered for planning the barge terminal facilities, Length: 90m, Beam:

18m, Draft: 4m. DWT: 4,000, Displacement Tonnage: 5,000 tonnes

- The southern bank of the river branch flanking the Island has straight stretch for a distance of about 600m. This straight stretch is almost at the middle of the Island and the flow lines at this location are almost parallel to the shoreline. The water depth at this location varies from 2m to 6.6m. The access distance from the main river is less than a km. This location can accommodate up to five berths against the projected requirement of three berths.
- It is proposed to start the operations with one Mobile harbor Crane (MHC) and to take action for placing the second MHC in position by the time the container traffic reaches 50,000 TEUs.
- The berth proposed is of continuous type so that there would be operational flexibility for the cargo handling equipment installed on the berth. Initially one berth would be constructed for a length of 120m and additions would be made in modules of 120m according to the building up of traffic. Considering the requirement of operating MHCs and cargo carrying vehicles and hoppers the berth would be with a width of 20m. The structure of the berth is proposed to be in the form of open piled jetty. 1000 mm dia bored cast-in-situ concrete piles are proposed.
- The capital cost of the project is estimated at Rs. 140.44 Crores under Phase- 1 and Rs. 234.74 Crores under Phase-2 totaling to Rs. 375.18 Crore. The detailed estimate is attached as Annexure 9.1 and 9.2 respectively. The summary break-up of the estimate is given as under:

(Rs. in crores)

S. No.	Particulars	Phase-I	Phase-II	TOTAL
I.	Civil Works	74.19	89.27	163.46
II.	Mechanical Works	27.84	81.62	109.46
III.	Electrical Works	3.02	4.68	7.70
IV.	Environmental Work	3.15	5.27	8.42
	TOTAL	108.20	180.84	289.04
a	Detailed Engineering & Project Supervision @ 7%	7.57	12.66	20.23
b.	Contingencies @ 3%	3.25	5.43	8.68
c	Goods and Service Tax @ 18%	21.42	35.81	57.23
	TOTAL CAPITAL COST	140.44	234.74	375.18
ADD :	Miscellaneous Capital Cost as per TAMP Guidelines @ 5%	7.02	11.74	18.76
	GROSS CAPITAL COST	147.46	246.48	393.94

- The annual operation and maintenance cost of the Project without escalation (At Constant prices) for the Phase- 1 development and at the end of Phase- II is estimated at Rs. 20.14 Crores and Rs.51.98 Crores respectively based on TAMP Guidelines for fixation of up-front tariff.
- Accordingly, the estimated annual revenue has been assessed based on Upfront Tariff Guidelines 2008. The details are as under:

S. No.	Particulars	Unit	2020-21	2023-24	2026-27
1.	Estimated Throughput Containers Peas and Pulses	Lakh TEUs Lakh Tonnes	0.62 3.03	1.85 3.03	2.46 3.03
2.	Handling Rate Containers Peas and Pulses	Rs. per TEU Rs. per Ton	2867.05 540.04	2867.05 540.04	2867.05 540.04
3.	Revenue on Handling Charges	Rs. in lakhs	3413.89	6940.36	8689.26
4.	Estimated GRT	Lakh GRT hrs	53.31	124.33	159.59
5.	Berth hire charges	Rs./ GRT hr	10.40	10.40	10.40
6.	Revenue on Berth hire	Rs. in lakhs	554.42	1293.03	1659.74
7.	Total Estimated Income	Rs. In Lakhs	3,968.31	8,233.40	10,349.00

- Sensitivity analysis has also been carried out to gauge the impact of increase in cost and reduction of revenue earnings on the viability of the proposal. The results of the analysis are :

Sl. No.	Pre-Tax Project IRR at Constant prices	Phase-II	
		Balagarh	Barge Berth- KDS
1	Base case	17.24%	23.67
2	Capital Cost up by 10%	15.75%	21.70
3	Revenue down by 10%	16.28%	22.66
4	Annual O&M Cost up by 10%	14.61%	20.46
5	Combined effect of Sl. no. 2, 3 & 4	12.35%	17.73

- The financial viability for implementation of the project Balagarh undertaken by port with commercial loan for 20 years with moratorium period of five years has been assessed, and the outcome of the analysis are hereunder.

Sl. No.	Pre-Tax Equity IRR at Constant prices	Balagarh Only
1	Base case	40.14%
2	Capital Cost up by 10%	36.25%
3	Revenue down by 10%	36.98%
4	Annual O&M Cost up by 10%	30.69%
5	Combined effect of Sl. no. 2, 3 & 4	21.84%

SECTION 1

PROJECT BACKGROUND

Kolkata Dock System

- 11 Port of Kolkata, is only riverine port among all the Major Ports in India. It serves a vast hinterland comprising the States of West Bengal, Bihar, Uttar Pradesh, Madhya Pradesh, Punjab, Haryana, Rajasthan, Assam, other North Eastern States and the two neighboring landlocked countries viz. Nepal and Bhutan.
- 12 Kolkata Port, the oldest Indian port, has two sets of infrastructure for handling seaborne cargo traffic. One is the 147-year-old Kolkata Dock System (KDS) and the other the relatively recently developed, 40-year-old satellite port, Haldia Dock Complex (HDC). KDS predominantly handles container, liquid cargo and break bulk cargo, while HDC mainly handles bulk items including liquid and dry bulk commodities. The components physical infrastructure of KDS include:
- Kidderpore Dock (KPD) with 17 Multi-purpose berths and 1 berth for passenger-cum-cargo vessels, 6 Buoys/Moorings and 3 Dry Docks
 - Netaji Subhas Dock (NSD) with 1 heavy lift berth (with 200 tonnes shore based Cantilever Crane), 10 berths including 4 dedicated Container Berths, 1 Liquid Cargo Berth, 4 multi-purpose berths, 2 Buoys/Moorings and 2 Dry Docks
 - Budge Budge with 6 Petroleum Wharves
 - Anchorages at Sandheads, Saugor and Diamond Harbour
- 13 The following picture shows the locations of the two dock systems of KDS:



Kidderpore Dock (KPD)

- 14 The KPD comprises two dock basins separated by a bascule bridge. KPD I has 10 berths and KPD II has 8 berths as shown in the following picture. The entrance to basin is through twin locks. The available berthing facilities are listed in the Table hereunder.

KIDDERPORE DOCK

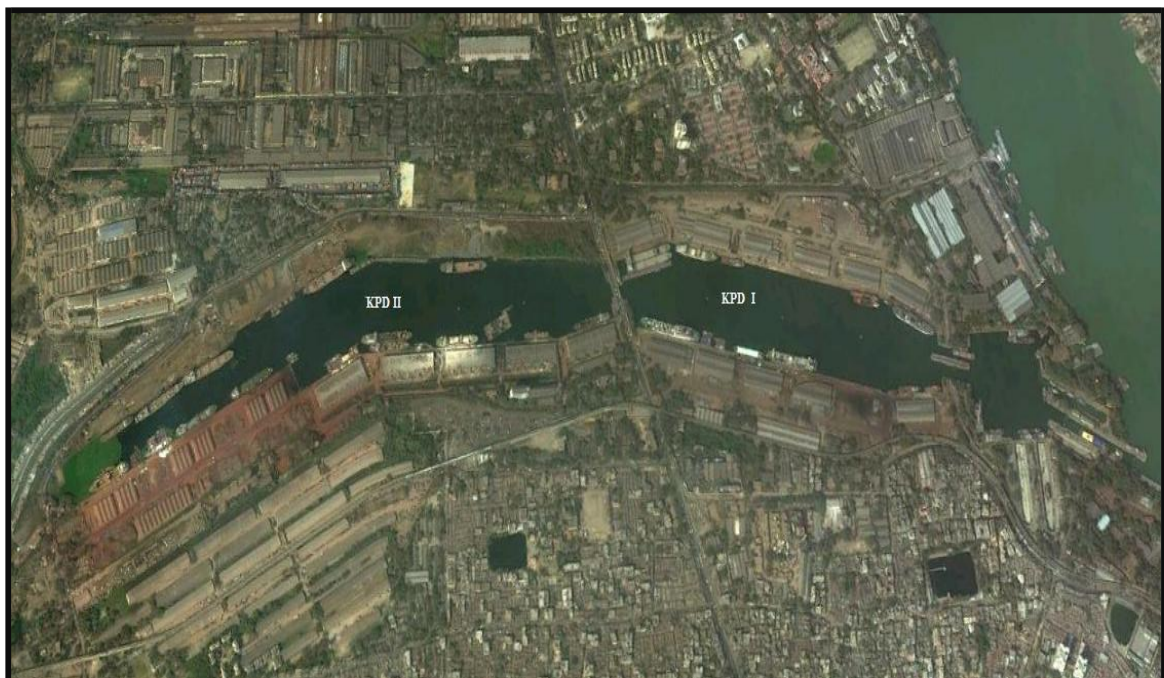
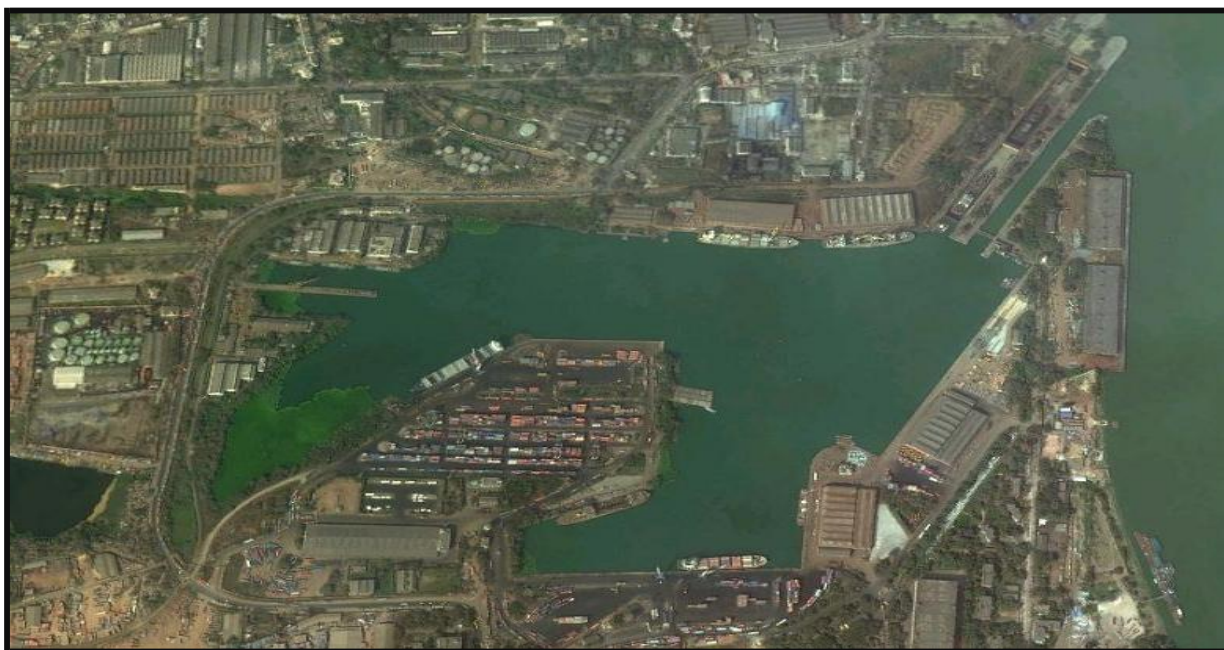


Table 1- Details of Berthing Facilities Available at KPD

Sl. No.	Berth No.	Length (m)	Water Depth (m)	Commodity Handled
KPD I				
1	1	133	8.0	General Cargo
2	3	128	8.7	General Cargo
3	4	136	8.5	General Cargo
4	5/7	229	8.7	General Cargo
5	6	118	8.2	General Cargo
6	8	128	8.5	General Cargo
7	9	108	8.7	General Cargo
8	10	161	8.5	General Cargo
9	11	151	8.5	Passenger
10	12	143	8.6	General Cargo
KPD II				
1	22	151	8.7	General Cargo
2	23	147	8.7	General Cargo (Grain Silos)
3	24	152	8.7	General Cargo
4	25	169	8.5	General Cargo
5	26	185	8.4	General Cargo
6	27	195	8.2	General Cargo/Log, Heavy lift
7	28	195	8.4	General Cargo/Log, Heavy lift
8	29	185	8.4	General Cargo/Log, Heavy lift

Netaji Subhas Dock (NSD)

1.5 The NSD comprises a dock basin with a single lock entrance and has 10 berths and 2 dry docks as shown in the following picture. The available berthing facilities are listed in the Table hereunder:



NETAJI SUBHAS DOCK

Table 2 - Details of Berthing Facilities Available at NSD

Sl. No.	Berth No.	Length (m)	Water Depth (m)	Commodity Handled
1	1	200	8.2	General Cargo
2	2	187	8.5	General Cargo
3	3	183	8.7	General Cargo
4	4	181	8.6	Container
5	5	182	8.6	Container
6	7	192	8.7	Container
7	8	225	8.0	Container
8	12	152	8.0	Liquid cargo/POL
9	13	174	8.4	General Cargo
10	14	174	7.2	General Cargo

Budge Budge Oil Jetties

1.6 Amongst the earliest handling facilities that were constructed on the River Hooghly, the Oil Jetties at Budge Budge continue to be operational. There are 6 jetties of different sizes with associated storage facilities.

Table 3 - Details of Facilities Available at Budge Budge Petroleum Wharves

Sl. No.	Berth No.	Length (m)	Water Depth (m)	Commodity Handled
1	1BB	189	13.7	Liquid Bulk
2	2BB	95	11.1	Liquid Bulk
3	3BB	146	11.2	Liquid Bulk
4	5BB	189	12.3	Liquid Bulk
5	7BB	140	10.7	Liquid Bulk
6	8BB	177	9.1	Liquid Bulk

Anchorage at Diamond Harbour, Sagor and Sandheads

- 1.7 Round the year, lighterage operation is undertaken at Sandheads, Sagor and Diamond Harbour. Though, there is no restriction on the dimensions of the mother vessel handled at Sandheads, LOA of vessel is restricted to 275 metres at Sagor and 200 metres at Diamond Harbour. Depths at these anchorages have been stable over the years. However, lighterage operations at Sandheads is undertaken near Eastern Channel Light Vessel during fair weather and the operation is shifted to off Kanika Sand within the extended western limit of KoPT in foul weather.
- 1.8 The Virtual Jetty at Sagor has been functional for loading and unloading operations in all seasons and takes care of Panamax size vessels with draft of 10.5 mtrs. Four mooring buoys have been placed in 2004 at four sides to tie-up the ship, so that the barges/small vessels can tie-up alongside for stable loading/unloading operation. The location of the mooring buoys is at a distance of about 1000m from the western bank of Sagor Island.
- 1.9 The main advantages of the lighterage operations are:
- Better flexibility in vessels operation,
 - No more waiting for favorable tide
 - No restrictions on dimension of vessels
 - Variable draft depending on the location but stable over the years
 - Shorter navigable distance from Sandheads
 - Reduction in turn round time of vessels.

- 1.10 KDS is well connected with the rest of the country by a network of National Highways (NH 2, 6 & 34), State Highways, Railways and Inland Waterways. KDS is connected to Eastern Railway through Sealdah and Budge Budge Sections. The main Inland Waterways connected to KDS include National Waterway No. 1 (the River Ganga) and National Waterway No.2 (the River Brahmaputra).

Need for Barge Terminal at Balagarh

- 1.11 The traffic at the Kolkata Dock System has been seeing a steady growth in the past 5 years. While this is a cause for cheer, it is also a matter of concern for Kolkata Port Trust. The Port feels the increasing container and other general cargo volumes may outgrow its capacity and the Port may struggle to handle the excess volume or lose it altogether. Therefore, desires want to have a plan in place to stave off such an eventuality.
- 1.12 In the Port's view evacuation will become a key challenge for handling the increasing traffic. The Port's present cargo volume itself had been straining due to city's road network. This has made the local traffic authorities impose time restrictions on the movement of cargo vehicles on the city's roads. The Port is afraid that the continued impeded import delivery may strangle its storage facilities with a cascading effect on other areas of operation.
- 1.13 So, to grapple with the anticipated increase in traffic and to resolve the problem of restricted movement of its outgoing cargo the Port wants to shift part of its operation to another site. A site well away from the Port and the city and that has enough space to handle the diverted traffic. The Port plans to steer away to this site the cargoes that need not go through the city's harried traffic to get out or get in.
- 1.14 Container and pulses are two major cargoes the Port handles in KDS. So, initially, the Port plans to shift part of these cargoes to the chosen complementary location
- 1.15 For the extended site, the Port has identified a location called Balagarh on the inland waterway-1, about 85 kilometers from its main Docks. Balagarh is a riverfront with a depth of around 3.0 metres. The Port owns about 300 acres of land at this site. If necessary, it can acquire another 300 acres of adjacent land, belonging to Calcutta Electric Supply Corporation and the State Government. The Port proposes to develop at this place a barge terminal and associated facilities initially for handling container and pulses.

- 1.16 The Port's plan is to discharge containers and pulses from mother vessels into barges in stream and bring the barges to Balagarh for unloading and further handling. Similarly, it will load export containers on barges at Balagarh and take them to stream for loading on mother vessels. The Port is also looking at the possibility of using the facility for any other new cargoes that may have the potential to be handled at this site, like LNG and ro-ro traffic.
- 1.17 Kolkata Port Trust has entrusted to Indian Ports Association the work of preparation of the Feasibility Report for Extended Gate System at Balagarh. The scope of work for the study, as indicated by the Port, is given below.
- 1.18 **The Scope of the study is to:**
- i. Examine the current traffic trend and the expected growth in the traffic of the predominant cargoes presently handled at KDS,
 - ii. To see whether the anticipated growth in the predominant cargoes will outstrip the related capacities in the Docks and so would justify setting up a barge terminal at Balagarh,
 - iii. Based on origin-destination of cargoes assess approximately how much of them could be shifted to Balagarh
 - iv. Check whether besides container and pulses there is scope for handling LNG and Ro-Ro traffic at Balagarh
 - v. Assess the equipment and flotilla (tugs, mooring boats, etc.) support required at the proposed jetty for efficient cargo handling and barge handling.
 - vi. Evaluate capacity of the proposed jetty, likely commodity wise
 - vii. Distribution of cargo, no. of barges likely to be handled and average parcel size of cargo.
 - viii. Assess land area required for creation of storage facilities, arterial road, aggregation and evacuation facilities and other infrastructure for creation of assessed cargo handling capacity.
 - ix. Work out preliminary design of the proposed port facilities
 - x. Estimate cost of the project with break-up.
 - xi. Assess the economic & financial viability of the Project.
- 1.19 IPA team visited Kolkata Port from 12-02-2017 to 16-02-2017 and held detailed discussions with the concerned officials of the Port. Subsequently, from 03-4-2017 to 09-4-2017, the IPA team visited Kolkata Port and had detailed discussions with various stake holders and the port officials. It also visited many operational areas including Balagarh, anchorage points at Diamond Harbour and the KDS docks during the above visits.

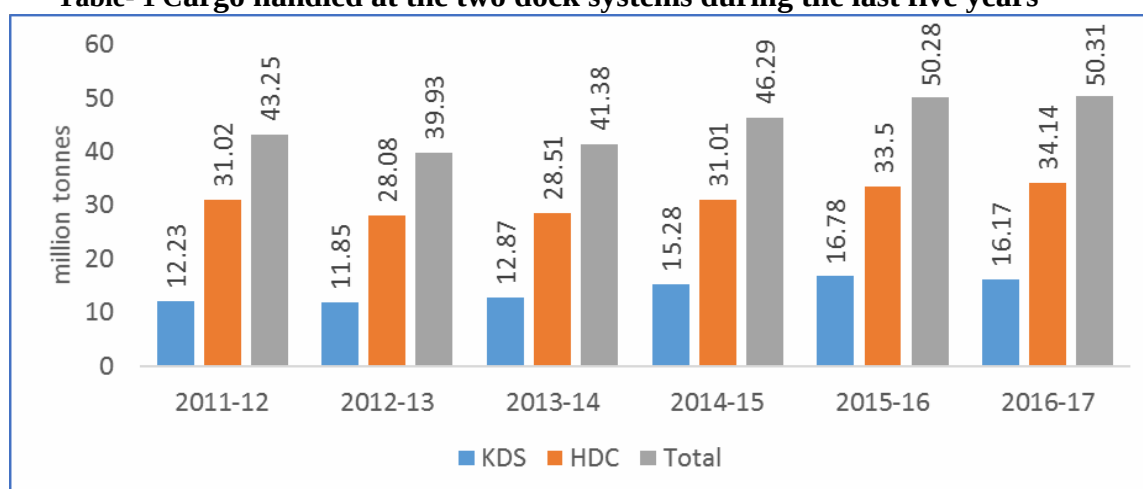
SECTION 2

TRAFFIC ANALYSIS AND FORECAST

2.1 Past Traffic

2.1.1. The total cargo traffic handled at Kolkata Port during 2016-17 increased to 50.31 million tonnes from 50.28 million tonnes in 2015-16. In 2016-17, out of which 16.17 million tonnes of traffic was handled at KDS and 34.14 million tonnes at HDC. The traffic of entire Kolkata Port including Kolkata Dock System and the extended arm Haldia Dock Complex has been growing at a CAGR of 5 % in the past 4 years. The cargo handled at the two dock systems during the last five years is shown below:

Table- 1 Cargo handled at the two dock systems during the last five years



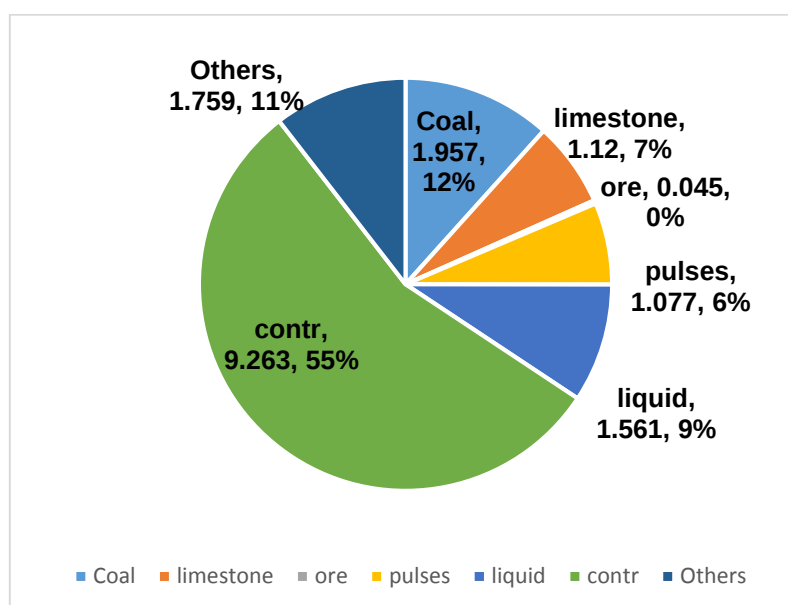
(*) Includes transshipment traffic

Source: Administration Reports of KoPT

2.1.2 The salient observations on the traffic are:

- As regards Kolkata Dock System, which is the focus of this study, its traffic has been increasing at a CAGR of 5.85 % in the same 4-year period. The major cargoes the KDS handles are container, pulses, coal, ores, fly ash, vegetable oil and other liquids.
- These cargoes together contribute to 74% of the total traffic. Of these items, coal and ores are handled at anchorages and taken to HDC. Fly ash export is handled at IWT jetties. Vegetable oil and other liquids are handled at Budge Budge. Thus, of the major cargoes like pulses and container are handled in the Docks.
- Pulses are discharged mostly at anchorages into barges and barges come to Kidderpore Dock for unloading and further handling. Container traffic is handled almost exclusively at NSD. As container and pulses are thus the two major cargoes that are handled in KDS and must go through the city's traffic these items have been taken up for assessing their feasibility to shift to Balagarh.

Commodity-wise Cargo Handled at KDS in 2015-16



2.2 Container

2.2.1 Container Operations at KDS

2.2.1.1. The KDS comprises two docks: Netaji Subash Dock and Kidderpore Dock. Both are lock-operated, with NSD having a longer and wider lock channel. NSD can handle vessels up to 172.2 m (565') length, 24.4 m (80') width and 7.5 m (24' 6") draft. Kidderpore Dock can take vessels up to 157 m (515') length, 21.3 m (70') and 7.5m (24' 6") draft.

2.2.1.2. NSD, where 90% of container traffic is handled, has 10 berths. Out of them, five berths 3, 4, 5, 7 and 8 are exclusively used for container ships. At berths 4, 5 and 8, ships work with mobile harbour cranes. At berths 3 and 7, container vessels operate with their onboard gear because the condition of wharves at these berths is not conducive for Mobile Harbour Cranes (MHC) to operate. The Port has outsourced to Bharat Kolkata Container Terminals Pvt Ltd, a unit of PSA International (BKCT) the entire ship-to-shore and back-end container handling operations including yard and receipt/delivery operations. They provide all the equipment including MHC for ship to shore, tractor-trailers, RTGs for Quay & yard operation and reach stackers for receipt/dispatch and rail-handling operations. For storage, the Docks has 3000 TEUs ground slots and containers are stacked to an average 3.5 high. For ICD movement, the Port has right inside the terminal two sidings, each capable of servicing half a rake.

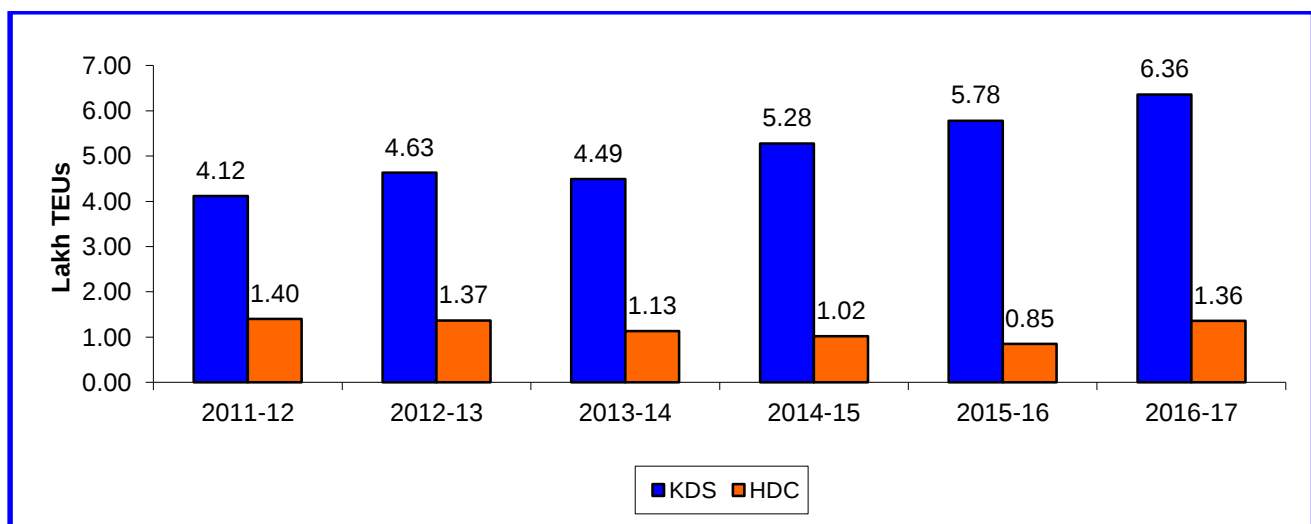
2.2.2 Container Traffic at KDS

2.2.2.1 In container traffic, Kolkata Port ranks fourth in the country amongst Major Ports. The container traffic in KDS has been increasing year on year in the last five years, except for a slide in 2013-14. The total number of containers handled at KoPT during 2016-17 increased to 772,000 TEUs from 663,000 TEUs in 2015-16 registering a growth of 6.94 per cent. Total containerized cargo tonnage also increased to 12.35 million tonnes in 2016-17 from 10.63 million tonnes in 2015-16. During the six five years' container traffic in KDS has been continuously growing. Container traffic handled at KDS and HDC during the last five years are shown in the following table and chart:

Table - 2 Container traffic handled at KDS and HDC during the last five years

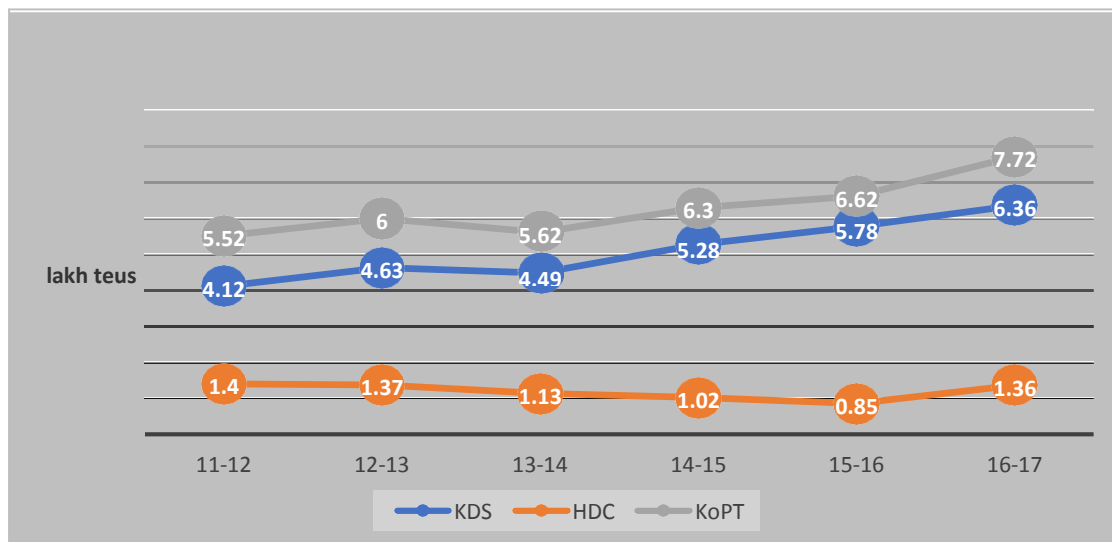
(Figures in 000's)

Year	Tonnage			TEUs		
	KDS	HDC	Total	KDS	HDC	Total
2011-12	6,818	2,619	9,437	412	140	552
2012-13	6,960	2,869	9,829	463	137	600
2013-14	7,063	2,230	9,293	449	113	562
2014-15	8,110	1,958	10,068	528	102	630
2015-16	9,263	1,376	10,639	578	85	663
2016-17	9,887	2,467	12,354	636	136	772
CAGR	7.72	-1.19	5.53	9.07	-0.58	6.94



2.2.2.2. In the previous year of 2016-17, there has been a significant rise in the overall container traffic of KoPT (including HDC and KDS). In the above year, the container traffic of HDC has shown a sudden upturn, shooting from 0.85 lakh TEUs in 2015-16 to 1.36 lakh TEUs, a jump of 60%, whereas at KDS it has also risen from 5.78 to 6.36 lakh TEUs, a rise of 19%, and the overall KoPT traffic rose from 6.62 to 7.72 lakh TEUs, representing a growth of 14.25%.

KDS, HDC and KoPT Container traffic



2.2.2.4. Thus, for the entire KoPT, if we take only the last year (2016-17), the rise is 16%; if we consider the 5 years prior to 2016-17 the CAGR is 3.7% and if we take the last 6 years including 2016-17 the CAGR comes to 5.53%. Thus, as the increase in 2016-17 is exceptionally steep, and maybe a positive aberration, it cannot be concluded that the increase of this magnitude will continue. Hence, realistically, we can assume a 4% CAGR for the next 8 years, up to 2024-25, for the entire Kolkata Port including KDS

2.3 Pulses/Peas Traffic at KDS

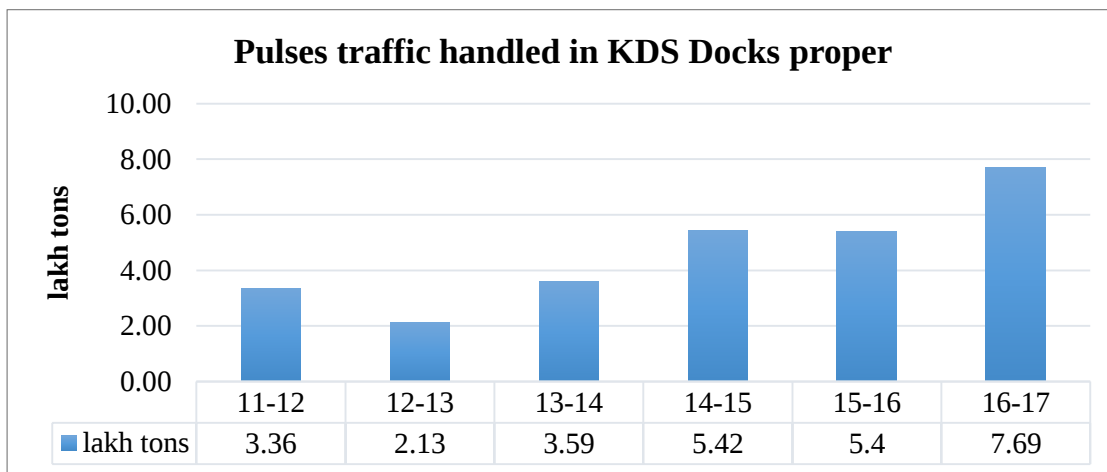
2.3.1 Overview

Pulses and peas imported in India comprises yellow peas, lentils, chick peas and green peas. Of this, about 75% is yellow peas, 10% lentils and the balance is chick peas, green peas and other pulses. Yellow peas are imported predominantly from Canada and to a lesser extent from Ukraine, Baltic nations like Lithuania, Latvia, and East European countries like Romania and Bulgaria. India sources 80% of its yellow peas and 70% of its lentils from Canada. Yellow peas and lentils are cheap and come in bulk form. Chick peas and green peas are costlier and are moved in containers. Since, the study is

concerned with what comes to Kolkata Dock System in bulk form, therefore analysis is limited to only yellow peas and lentils traffic handled in KDS.

2.3.2 Pulses/ Peas traffic in Kolkata Dock System

Bulk pulses and peas come to India through several ports including Mumbai, JNPT, Mundra, Hazira, Tuticorin, Kolkata and Visakhapatnam. Kolkata receives the second highest volume after Mumbai Port. For reasons of economies of scale, yellow peas and lentils usually come in bigger parcels and deeper-drafted ships. As KDS cannot handle these ships, the vessels discharge the entire cargo into barges at anchorage points at Diamond Harbour or Sagar. The barges then come to Kidderpore Dock for unloading. On an average KDS has been handling a quantity of more than 0.5 million tons of pulses/peas a year in the last 3 years, from 2014-15. In the years before that, the volumes had been in the range of 0.3 million tonnes. The pulses/peas traffic handled by KDS in the last five years is shown below:



2.4 Modal Split of Traffic at KDS during 2015-16

2.4.1 In terms of modal split of cargo, more than 93% of the inbound cargo for KDS is transported through roads, followed by railways (4%). In case of outbound cargo also the roads are the dominant mode of transportation with a share of 59% followed by inland waterways (20%). The heavy traffic congestion at KDS roads can be attributed to huge share of roads in both inbound and outbound traffic at the port. Modal Split of Traffic at KDS During 2015-16 is presented in the table below.

2.4.2 Since containers are the predominant commodity handled at KDS we have analyzed the modal mix specifically for the container traffic at the port. During 2015-16, both the inbound and the outbound container cargo was transported either through rail or road. No such cargo was transported through inland waterways. More than 90% of the container cargo was carried through road.

Table - 3 Volume of cargo handled by rail, Road, IWT & Pipelines

(Figures in 000's)

Particulars	Rail	Road	Pipeline	IW	Total
Inbound	250	5,871	113	6	6,240
Outbound	848	6,162	1,448	2,084	10,542
Total	1,098	12,033	1,561	2,090	16,782

2.5 Number of Vessels

2.5.1 Total number of cargo vessels handled at KDS during the last five years is presented in the table – 5 table below.

Table -4 Number of Cargo Vessels Handled at KDS (#)

Commodity Group	2011-12	2012-13	2013-14	2014-15	2015-16	CARG(%)*
Liquid Bulk	239	245	246	251	257	1.83
Dry Bulk (DB)	60	38	67	117	124	19.90
Break Bulk (BB)	319	288	266	259	254	-5.54
Container	577	633	651	674	793	8.27
Ro-Ro	8	12	11	13	14	15.02
Total/Overall	1203	1216	1241	1314	1442	4.63

(#) Excludes Pas

(*) Compound Annual Rate of Growth between 2011-12 and 2015-16.

2.5.2 Broad commodity-wise average DWT and parcel size of vessels which called at KDS during the last three years are shown in the table below.

Table – 5 Average DWT and Parcel Size of Vessels Handled at Kolkata Dock System

Commodity Group	2013-14	2014-15	2015-16
Liquid Bulk			
-Av. DWT	13737	11610	11339
-Av. Parcel Size (tonnes)	4623	4902	5352
-Parcel Size as % of DWT	33.65	42.22	47.19
Dry Bulk			
- Av. DWT	41892	36473	35654
- Av. Parcel Size (tonnes)	7592	7599	7744
- Parcel Size as % of DWT	18.12	20.83	21.71
Break Bulk *			
- Av. DWT	10792	12488	12030
- Av. Parcel Size(tonnes)	2943	2392	2200
- Parcel Size as % of DWT	27.27	19.15	18.28
Container			
- Av. DWT	11151	11468	11410
- Av. Parcel Size (tonnes)	10855	11771	11627
- Parcel Size as % of DWT	97.35	102.64	101.90

Overall			
- Av. DWT	13132	13722	13410
- Av. Parcel Size (tonnes)	7931	8557	8741
- Parcel Size as % of DWT	60.39	62.36	65.18

(*) Excludes Passenger–cum–cargo vessels

Source: Annual Administration Reports of KoPT

2.5.3. The above data reveal that during the last three years there has been a steady increase in both the average DWT and the average parcel size of vessels carrying overall traffic.

2.6 Traffic Forecast

2.6.1. Future Prospects for container traffic at KDS

- Kolkata, due to its proximity, is a gateway port for cargoes of West Bengal, Bihar, Orissa, Jharkhand, Assam, Nepal and North-Eastern states.
- Of these, only West Bengal shows healthy volumes and robust growth in both import and export. Its share in the total container traffic is 66.37 %.
- Next is Nepal where imports volume is increasing but lags very much in export. Its share in import is 22% but in export negligible, and its overall cargo is about 13%.
- Orissa's import is insignificant. Export is looking up but at the lower end, it is around 15,000 TEUs a year. Its overall share is 4.62%.
- Jharkhand and Bihar put together form only 3.59% overall. Of the North Eastern states, only Assam's volume is comparatively good at 1.78 % whereas all other states put together are in fractions. Thus, except West Bengal and Nepal no other regions are showing significant promise.
- As of Nepal, though its import has been rising year on year, the rate of increase has been falling. Given its political climate, social problems, natural calamities, etc., no significant trade development can be expected there in the foreseeable future.
- Nepal's import through Kolkata Port at present ranks at number 2 with about 22% share. However, in the years to come Nepal's import through Kolkata may decline. Until now Kolkata Port had a monopoly over Nepal cargo. However, now the Government of Nepal has designated Visakhapatnam as another port for its seaborne cargo. Meanwhile, CONCOR is also setting up a direct line from Vizag to Birgunj ICD in Nepal to facilitate quicker movement of containers. These developments are likely to affect Nepal's cargo handled by Kolkata Port.
- In West Bengal's case, many of its upcoming projects are in the heavy industry sector including power, cement, fertilizer and steel. Such projects mostly require import of raw materials and fuels

like, coal and ores and fertilizer raw materials. These materials move in bulk and not in container. Most Steel products are not containerized and they move in break bulk form. Other exports of West Bengal which are substantial and showing sustained growth are mica, cast iron goods, metal and metal products, iron & steel and silicon.

- Kolkata Port is closer in terms of sea routes to Far Eastern countries like China, Japan, South Korea, Malaysia, Philippines and Indonesia and back home to North Indian industrial belt where most of the manufacturing takes place. So, organically, Kolkata should be the Port for cargoes imported or exported from Far Eastern countries to and fro from places like Delhi, Punjab, Haryana, UP, etc. However, both ship owners and cargo owners overwhelmingly prefer the West Coast ports, namely, JNPT, Mundra or Pipavav. Ship owners throng them because of their ability to service bigger, heavier vessels and turn them around quickly. To cargo interests, the USPs of these ports are large number of mainline vessel calls that saves them double handling, high frequency of calls that give prompt connection to their exports, and regular and faster connectivity to almost all the ICDs. That's why, just 4 ports – JNPT, Mundra, GPPL in the West coast and Chennai in the East coast – handle 96% of the total container traffic of the country and majority to northern region.
- Besides, there is not much difference between Kolkata and the West coast ports in the distance to North Indian ICDs, as the following table shows.

Table -6 Distance in Kilometers

Port	Tughlakabad	Dadri	Ludhiana	M'dabad	Ballabgarh	Agra	Kanpur	Madhosingh
JNPT	1446	1472	1706	1575	1425	1330	1336	1453
Mundra	1124	1143	1321	1265	1140	1100	1356	1626
Pipavav	1215	1232	1466	1355	1230	1190	1446	1717
Kolkata	1442	1412	1686	1310	1420	1270	1018	744

2.7 Projection of Container Cargo

Projections of container cargo for KDS could be arrived at by the following two alternative approaches:

- 2.7.1 On taking into account the above factors it is estimated that KDS's container traffic will grow at a CAGR of 4% up to 2020, come down to 3% over the next 5 years up to 2025, and then flatten out at 2% over the next 10 years until 2035. Accordingly, the container traffic forecast for KDS is as below. Base: 2015-16 traffic at 5.78 lakh TEUs.

Table – 7 Container Traffic Forecast

Timeline	2017-18	2018-19	2019-20	2024-25	2034-35
TEUs in lakhs	6.61	6.87	7.14	8.28	10.09

2.7.2 Scope of container traffic at Balagarh

2.7.2.1 The following table shows the composition of KDS's containerized cargo in terms of origin/destination, as per 2015-16 traffic.

Table – 8 KDS's containerized cargo in terms of origin/destination

(In TEUs)

State	Import	Export	Total	Percentage
West Bengal	147,874	180,702	328,576	66
Nepal	62,621	1,066	63,687	13
Orissa	9,389	13,489	22,878	5
Jharkhand	6,285	9,163	15,454	3
Bihar	1,339	976	2,315	0
Assam	2,553	6,243	8,796	2
UP	4,905	539	5,444	1
Delhi	19,543	513	20,056	4
All other NE	243	8	251	0
Rest	25,141	2,457	27,598	6
Total	279,893	215,156	495,049	100

2.7.2.2 The break-up reveals the following:

- West Bengal has the largest share in import and export. Out of it, cargoes of Northern part of W Bengal can be channelized to Balagarh. However, it has to be ascertained what proportion of total W Bengal traffic constitutes North Bengal volume
- Nepal has the 2nd largest volume in import, & in overall traffic and 5th largest in export. In 15-16, 33% of its import or about 20600 TEUs and 70% its export or 700 TEUs went or came by rail. The train runs directly from the NSD terminal.
- These containers will continue to prefer NSD because they move directly from the terminal.
- Even after the Eastern Dedicate Freight Corridor becomes operational, Nepal containers may opt for Docks line for the following reason. Today the trains that move to Birgunj in Nepal come to

a place called Raxaul in Bihar. This is the last point on the Indian side. The train then crosses over to Birgunj. So, any ICD train that goes to Nepal has to come to Raxaul in Bihar. But the EDFC has only one station in Bihar, which is Son Nagar, it is about 350 kms from Raxaul by road and there is no direct link to it as of today. Hence, EDFC is not of much value for Nepal unless a special connection is made from Son Nagar to Raxaul.

- Balance about 46,000 containers of Nepal use road. These containers can handle at Balagarh.
- Jharkhand and Bihar containers can use Balagarh but their volume as of today is just 3.5%. Nearly 75% of Assam containers are export and 30% of them come by rail from their ICD at Amingaon. Balance export and entire import containers can be considered for Balagarh, which comes to about 6,800 TEUs.
- When Eastern DFC becomes functional we can expect 50% each of UP and Delhi containers to use Balagarh.
- The rest of the North East states put together handle less than 300TEUs.
- Thus, as per 2015-16 traffic, following quantum of containers may have potential to come to Balagarh:
 - At a reckoning that 25% of North Bengal's containers constitute 25% of West Bengal's volume, the figure is about 82000TEUs
 - About 68% of Nepal's road containers: 46000TEUs
 - 100% of Jharkhand and Bihar containers: 17000TEUs
 - Assam's 75% export and entire import that comes to 6800TEUs
 - About 50% of Delhi containers that comes to 10000TEUs
 - About 50% of UP containers at 2500TEUs
 - Miscellaneous at 3000TEUs
- Thus, a total of about 1.67 lakh TEUs (sum of the above) or about 30% of 2015-16 traffic can be considered for Balagarh. Assuming the same proportion at 2016-17 container traffic, which is 6.36 lakh TEUs, the volume for Balagarh comes to 1.91 lakh TEUs. Extrapolating this figure to 2020-21 (the likely year of commissioning of Balagarh terminal) at a CAGR of 4% the likely container traffic at Balagarh in that year 2020-21 will be 2.23 lakh TEUs
- On the above basis and at a growth of CAGR 3% from 2021-22 to 2024-25 and at 2% from 2025-26 to 2034-35 the traffic expected at Balagarh over the period 2020-21 to 2034-35 is:

Base: KDS's 16-17 traffic of 6.36 lakh TEUs

Time period	2019-2020	2024-25	2034-35
In lakh TEUs	2.23	2.51	3.06

2.7.2.3

Observations and Suggestions on handling container traffic at Balagarh Traffic

- The traffic projection for Balagarh is based on the geography of the origin/destination of cargoes in relation to Balagarh. It is subject to cargo interests of these hinterlands willing to shift to Balagarh.
- In the stakeholders' meeting held on 5 April'17, there were few representations from shippers/receivers of containerized cargo to give their views on operating out of Balagarh, and hence the disclaimer.

2.7.2.4. Operations and logistics

A. For ship operators, Balagarh operation may have two issues, if containers are shifted to Balagarh from anchorage points at Diamond Harbor or Sagar Anchorage Points:

- Discharging in stream may take more time due to limited anchorage points and slow operation.
- Segregating Balagarh containers on board will be time-consuming and cumbersome.

B. Cargo owner's will have two main issues:

- One additional handling if through stream and two additional handlings if through Docks.
- Ship operators will charge them additional freight or separate barge handling charges and extra THC.

C. Evacuation and Dwell Time of Import Containers

- There was an evacuation crisis in Sep-Oct 2016 when Kolkata Traffic Police had put a severe curb with effect from 24th September 2016, on the movement of cargo vehicles on the city's roads, limiting them to 10 hours a day, from 10 pm to 8 am. Subsequently, following a series of measures taken by the Kolkata Port Trust for streamlining the traffic flow on the approach roads outside the Docks including better housekeeping, rationalized parking of trailers etc., the Police eased the restriction. Now they allow movement also during day time, from 12 noon to

5 pm, thus increasing the total hours to 15. However, the situation has chances for becoming vulnerable in future due to the combined influence of increase in port traffic and increase in city traffic.

- Evacuation easiness has a direct and visible impact on import dwell time. This is evident from the fact that import's dwell time has come to an impressive, and even enviable, level of 4 days when the

D. Dwell Time of Export Containers

- Export containers in KDS have a longer dwell time of 6.3 days. Evacuation does not influence the dwell time of export containers because their dwell time starts after they enter the terminal.
- Today, 85% of the export containers handled by KDS are factory-/house-stuffed boxes. They straightaway stream into the terminal in an un-ready condition. They get ready at the terminal after customs examination or customs seal checking. This takes time and this may be contributing to the long dwell time
- To reduce export's dwell time, the Port may allow only customs-ready house-stuffed containers into the Port. For this, the Port may create a customs-approved 'downloading' yard in the immediate outskirts of the Port. The unready house-stuffed containers may be received their first where facilities may be provided for their handling. There, shippers may complete the customs formalities and get the containers ready in all respects. They can then move them to the Docks under customs seal. This way the containers arriving at the terminal will be in a ready-to-ship condition and so will stay shorter time at the terminal.

The above step should reduce the dwell time of export containers to less than 4 days' evacuation system was streamlined.

E. ICD containers

- The Port has two sidings in the terminal for rail movement of containers. However, each siding can receive only half a rake and only one half rake can be serviced at a time due to limited space for reach stacker operation. Further, due to shortage of engines the rakes donot clear quickly. Because of these handicaps, moving containers by rail takes about 1½ times more than by road. As a result, disproportionate of containers move by road. Although about 30% of KDS containers are long-haul outstation containers only 13% of upcountry containers were moved by rail during 2015-16. It should be possible to attract more traffic to rail mode if container handling and rake placement system is improved. This will in turn ease the pressure on roads.

2.7.2.5. Proposed operation for Balagarh

Two methods have been envisaged for container barge operation at Balagarh

I. Method 1: Stream handling

In this method, mother vessels will discharge containers on barges using ship's gear or floating crane at anchorage points in Diamond Harbour or Sagar Anchorage Points. The barges will go to Balagarh where their containers will be offloaded for subsequent storage and delivery. The reverse process will take place for exports.

Advantages

- Vessels can avoid the hassle of steaming 75 kms from Diamond Harbour to the Docks, wait for the tide and go through the lock to berth and unberth.
- They can save not only time but also cost on berth hire charges, pilotage and towage for the movements between Diamond Harbour and the Docks.
- Bigger vessels with heavier load can come as Diamond Harbour supports vessel up to 200 metre length and 9.0 metre draft, compared with the limitation of 172 m length, 24.4 m width and 7.5 metre draft at NSD.
- It avoids one extra handling of containers compared to handling by the next method. (through the Docks.)

Disadvantages

- A berth is a more stable, secure and safe environment for working cargo, especially containers. At anchorage, the process of handling containers may be slow and tedious, especially during night.
- There are 3 anchorage points at Diamond Harbour and 4 at Sagar. They have to cater to a variety of cargoes and needs. Bulk items including coal, ores, pulses, etc. are discharged exclusively at anchorages. Besides, anchorages are necessary for essential activities like receiving fresh water, stores and bunkers, handling hazardous cargo, lightening, etc. Hence, container ships may have to sometime wait for anchorage points.
- The operation will entail double handling of containers: 1. On mother vessel and 2. On barge. From mother vessels, containers will have to be discharged in to two sets of barges. One going to Balagarh and another to the Dock, NSD. So, Balagarh and NSD containers will have to be identified and picked up on board. Barges will have to be marshalled to the right sequence to receive the containers. This may create operational difficulties unless containers have been loaded in the right configuration and sequence in the vessel at the port of loading. Therefore,

stowage planning of vessel at the load port should be done meticulously keeping in view the selected unloading/loading requirements.

II. Method 2: Dock Handling

Here, the vessels will as usual come to NSD and discharge containers at the berth (on quay). Containers will go to the yard. There, Balagarh containers will be segregated and then loaded on barges. Barges will leave for Balagarh for further handling. Barges will be handled either in the Dock or at a dedicated barge berth to be constructed at the KDS premises.

Advantages

- Vessel can discharge containers as they come regardless of where they are going to be delivered from finally – the Dock or Balagarh.
- Stable and secure environment for operation
- Good output to gearless vessels as mobile harbor cranes give an average output of 20 moves per hour per crane and 2 cranes can work at a time

Disadvantages

- Triple handling for Balagarh containers: 1. Unloading from mother ship 2. loading on barge at NSD or dedicated barge berth and 3. discharging from barge at Balagarh
- Extra time and extra cost
- Barges may encounter restricted movements through the lock as ships will get preference.

2.7.2.6 Conclusions on Container Traffic from Traffic Perspective

- Transloading operation for containers is not an established operation, but such operations have been carried out in Kolkata Port successfully on several occasions in the past when partial or entire ship load was moved through barges from Sagar/Diamond Harbour to overcome the draft restrictions. The diversion of container operation to Balagarh by the transshipment operation would increase the total cost of container transport, due to the cost of extra two handlings in barges and barge cost. At the same time, if vessels can carry additional load by taking and 1.5 m at Sagar as compared to Kolkata, then the reduced freight cost can compensate the cost of double handling to a great extent. Because of this the trade would be selective for this option with reference to the relative benefit accruing on account of total cost of transportation including waiting time cost of vehicle for taking delivery from the Dock, storage cost of cargo till its delivery and transport cost to final destination. As such it is prudent to expect that the projected traffic of containers to Balagarh would be achieved and stabilized only over a period of time.

- Presently, transloading operation is carried out by ships' gears. Therefore, a floating crane of adequate capacity may require to be hired to cater to gearless vessels as well to allow continuous flow of containers throughout the year. A better option may be to create a proper berth at Diamond Harbour with mechanical cargo handling facilities which can presently be used only for movement of top up/ lightered containers by barge. Since KoPT is already in possession of sufficient land, there would be no difficulty for storage of transit cargo. After the Diamond Harbour-Joka highway is widened, already under consideration of NHAI, the berth can be utilized to its full potential. This will then encourage larger container vessels with higher draft to visit the facility and load/unload the entire consignment at Diamond Harbour itself. Part of this cargo will also move by barges to Balagarh, Phalta and other suitable IWAI jetties at Haldia, Kolkata, Sahibgunj and Varanasi by the river along the National Waterway-1.

2.7.3 Scope of Pulses traffic at Balagarh

2.7.3.1. Modus operandi of handling pulses-peas at Balagarh

- Mother vessel discharges cargo into barges at anchorage points at Diamond Harbour or at Sagar Anchorage Points.
- Barges move to Balagarh where they discharge their cargo for further movement including storage and dispatch.
- The operation is an established and standard activity in KDS as vessels have been discharging peas/pulses into barges for many years in stream with barges coming to Kidderpore Dock for offloading.
- The difference now is part of the peas-laden barges will go to Balagarh.
- Now ships have to discharge pulses into 2 sets of barges – one going to Docks and the other going to Balagarh.
- The commodity is the same and there usually is no difference in quality. Hence no sorting of the commodity location-wise will be necessary at the time of transloading from ship to barges.
- Only the quantity needs monitoring. This also will pose no problem. At the load port, they can load cargoes for Dock and Balagrah in different holds, as far as possible.
- Thus, vessel can discharge from designated holds into appropriate barges, as the cargo comes.

2.7.3.2 Scope for handling pulses-peas at Balagarh

- Pulses/peas handled in KDS are distributed across all parts of West Bengal, Orissa, Bihar, Jharkhand and entire North Eastern States.
- No firm figures are available as to the proportion of pulses/peas going outside Kolkata. However, a rough estimate puts it at 50-60%. Most of the commodity goes upcountry by road except for Guwahati and Dimapur.
- At the above proportion, about 2.5 to 3 lakh tonnes per annum can be diverted to Balagarh.

2.7.3.4. Observations on handling pulses at Balagarh

- No steep increase in pulses traffic is expected in the future. It is presumed that it will continue to stay at around 0.5 million tons per annum at KDS
- Sizable quantity of pulses/peas handled at KDS is meant for many upcountry destinations. So, their diversion to Balagarh may be welcomed by consignees.
- The operation is an established activity, going on for several years.
- Per ton cost of handling pulses/peas will marginally increase because of extra barging distance. This may be offset by the saving in road freight due to proximity of Balagarh to the connecting points of upcountry destinations. Besides, because of quicker turnaround of barges at Balagarh vis a vis KDS, there are chance for lower barge cost.

2.7.3.4 Conclusion on Peas/Pulses traffic from traffic perspective

- About 50-60 % of the commodity or about 2.5 to 3.0 lakh tons is estimated to be for various hinterlands including UP, Uttarakhand, Bihar, Jharkhand, Assam and other North eastern states. Hence, this much quantity need not come to Kidderpore Dock.
- When the barges come to Kidderpore Dock they suffer inordinate delay due to locks and Bascule bridge operations.
- So, diversion of 50% of cargo to Balagarh will result in early discharge at least of outstation cargo and quicker turnaround of barges.
- In the stakeholders' meeting, the response from pulses/peas trade was overwhelmingly favorable for shifting the cargo to Balagarh.
- Generally, peas/pulses are a speculative commodity. Balagarh has vast amount of space and at a rural location where land is not a premium, So the traders can store the cargo at cheaper cost which in turn may bring down the retail cost of the commodity. Thus, as far as peas/pulses are concerned diverting the upcountry portion of the cargo to Balagarh will bring benefits to all the stakeholders including importers, vessel operators, barge operators and the Port.

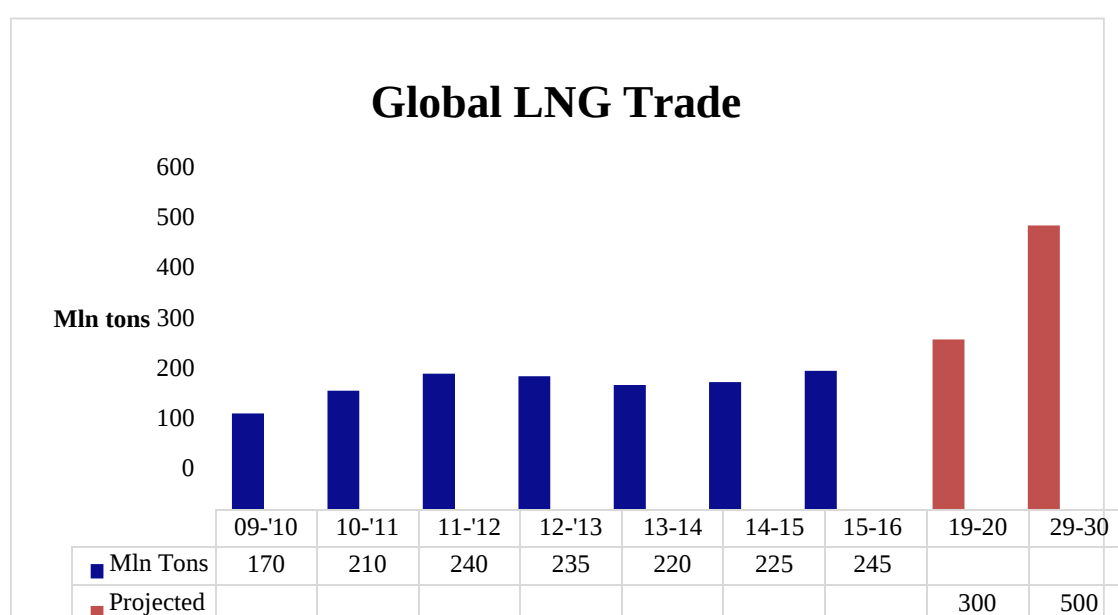
2.8. Scope for Handling LNG at Balagarh

2.8.1. LNG Characteristics

LNG is a natural gas condensed to liquid state. The condensation is done by cooling the gas below its boiling point which is -160°C . The condensed form of natural gas is called Liquefied Natural Gas or LNG. Liquefied natural gas will occupy just $1/600^{\text{th}}$ of the space than gaseous natural gas. It can be moved by regular maritime transport, like any other cargo, in huge quantities and with great ease and efficiency. LNG is a clean and safe fuel. When it burns, it produces far less carbon di oxide, oxides of nitrogen and Sulphur, and particulate matters than other fossil fuels. It is safer than other liquid hydrocarbons like petrol and diesel. In the 53 years since its marine transportation started there has been hardly any serious incident or explosion in LNG terminals. It is as fuel efficient as petrol and more fuel efficient than diesel. It is cheaper than other liquid hydrocarbons such as diesel, naphtha and furnace oil used in the manufacturing industries.

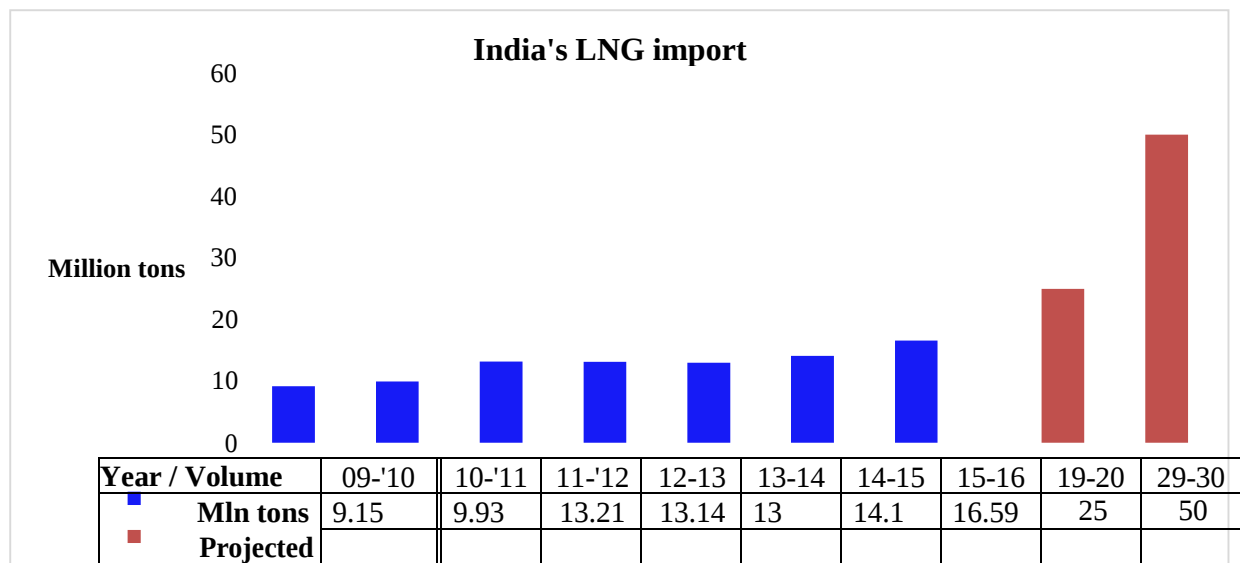
2.8.2. LNG Trade

Global LNG trade has been doubling in volume every 10 years in the last 2 decades. It grew from 53 million tonnes in 1990 to 100 million tonnes in 2000, and reached 217 million tons in 2010. After a dramatic climb to 240 million tons in 2011 it slipped for a few years but picked up again to touch 245 million tons in 2015. With the curve bending in 2015, and liquefaction capacities on the supply side and regasification capacities on the demand side expanding furiously across the feeding and consuming parts of the world the global LNG trade is predicted to increase at an annual rate of 5% during the next 15 years, reaching 300 million tons by 2020 and 500 million by 2030.



2.8.3. Indian Scenario

India was a late entrant to LNG scene. Its first import of LNG began in 2004, squarely 40 years after world's first shipment took place. However, the country's import has seen significant growth since then except for a slippage for 2 years in between. In 2011-12 it registered an increase of 33% over the previous year but fell back in the following two years. However, the volume once again picked up in 15-16 to increase 17.7%. Given the country's emphasis on energy security at low cost and least pollution, which LNG addresses in its entirety. LNG import by India is set to increase substantially in the coming decades. The prediction is it will reach 25 million tons by 2020 and double to 50 million tons by 2030.



2.8.4. LNG Players

The chief LNG producing countries in the world are Qatar, Malaysia, Nigeria, Indonesia and Australia which together have exported 70% of the total volume in 2015-16. Among the importing countries Japan and South Korea are on the top, and China and India are at a distant 3rd and 4th place respectively. As of 2015-16 Japan's share of total trade is 34%, South Korea 13.2 %, China 7.9 % and India 5.6 %. Given the size of their population and their ravenous appetite for cost-effective and clean energy, China and India are expected to ramp up their consumption steeply and close ranks with Japan and South Korea in the not distant future.

2.8.5. LNG Production and Distribution

LNG production and distribution entails elaborate, extensive and expensive infrastructure and facilities.

2.8.5.1. LNG extraction and Purification

The starting point of LNG trade is the extraction of natural gas from reservoirs deep down the earth. The extracted gas passes through a pre-treatment plant to get rid of its impurities like sulphur, water, carbon di oxide, etc.

2.8.5.2. LNG export operation

From now on everything happens at the LNG terminal. The gas purified in the previous stage now enters the exporting terminal through pipelines. At the export terminal, a liquefaction plant liquefies the gas. This is LNG. After that, LNG moves by pipeline directly from liquefaction plant to the LNG-receiving vessel at the jetty. Or, if there is no immediate vessel, the liquefied gas is put in storage in special double-walled, insulated tanks. When an LNG carrier arrives at the terminal afterwards, LNG is pumped from the storage tank into the vessel through terminal pipelines. Thus, an LNG export terminal will have liquefaction plant to liquefy the gas received from the gas field, special tanks to store the liquid, pipelines to convey the liquid to the vessel and loading arms to load the cargo into the vessel.

2.8.5.3. LNG Import Operation

When the vessel comes at the other end, at the import terminal, the LNG is pumped out of the vessel. The exiting cargo follows one of 2 paths. In the first, the LNG enters a regasification plant where it is turned back into gas. Alternatively, the LNG is put into temporary storage in the same liquid state in special, double-walled tanks. Afterwards, it will go to the regasification plant for conversion back into gas. The regasified material too may follow 2 paths. It may immediately enter the pipeline to go to the customers or may sit in storage until the customer is ready to receive it.

2.8.6 LNG Terminals in India

LNG TERMINALS, INDIA



Source: Interfax

FIG. 2

There are at present 4 LNG terminals in the country with a total capacity of 21 million tons. A dozen more are coming up or in planning state and 3 of the existing ones are expanding their capacity. With these developments, the country's total terminal capacity is set to reach about 92 million tons by 2020. The map below shows the presently operating and some of the upcoming terminals and their operators. The following table gives a complete picture of the present, upcoming and planned terminals with their location, type and capacity.

Location	State	Capacity(mtpa)	Type	Status
Dahej	Gujarat	10/15*	Onshore	Functioning
Hazira	Do	5	Do	Do
Dabol	Maharashtra	1/5*	Do	Do
Kochi	Kerala	5	Do	Do
Kakinada	AP	3.5	FSRU#	2018
Ennore	Tamil Nadu	5/10*	Onshore	2019
Mangalore	Karnataka	2.5	Do	2018
Mundra	Gujarat	5	Do	2017
Gangavaram	AP	5	Do	2018
Pipavav	Gujarat	5	FSRU	2018
Haldia	W Bengal	4	Do	2019
Mumbai Port	Maharashtra	5	Do	2020
Jaigarh	Do	8	Onshore	2018
Chhra	Gujarat	5	Do	2018
Dhamra	Odisha	5	Do	NK
Digha	W Bengal	4	FSRU#	2019
		* when augmented	# floating storage cum regasification unit	

2.8.7. LNG Applications

2.8.7.1. Use of LNG for Industries

In India LNG is used predominantly by power, fertilizer and refinery industries and to a lesser extent by petrochemicals and steel industry

2.8.7.2. Use of LNG in Road Transportation

There is a move to use LNG in road transportation including public transport and goods haulage, but it is still some way to go due to the followings:

- LNG usage in road transport is yet to be approved.
- Usage in road transport will require special facilities and equipment at roadside refueling stations and in trucks, including the following:
 - Double-walled storage tanks to retain LNG in liquid state
 - Special cryogenic fueling equipment to handle the -160⁰c liquid
 - Trucks fitted with special dual fuel engines to also use LNG
 - the truck's fuel tank adapted for LNG usage

These requirements will make the use of LNG in road transportation initially expensive. But the payback in the long run would be substantially more than the initial capital cost because of the following reasons:

- Cost-effective fuel compared with diesel
- Less polluting than other liquid hydrocarbons

Various initiatives have been taken to use LNG in road transport among which the following are worth mentioning:

- The first LNG-powered bus was launched in Kerala in Nov 2016 on a trial basis
- Tata Motors have been asked to manufacture 100 LNG-compatible trucks
- These trucks will run on trial basis on Kochi-Mangalore highway. It will have LNG storage tanks and re-fuelling stations would be established along the highway
- There is a similar proposal to develop LNG-fueling stations along Mundra-Delhi corridor (1200 km) for supplying LNG to heavy duty vehicles.

Although usage of LNG in road transport is still in an experimental stage the signs are that it would become a reality sooner or later.

2.8.7.3. Use of LNG for domestic and commercial consumption

As of today, piped natural gas (PNG) to households is supplied through City Gas Distribution (CGD) system. But CGD is limited to tier 1 and tier 2 cities. This is due to lack of pipeline infrastructure to tier 3 cities, small towns and villages. LNG can overcome this deficiency because it can be carried by road tankers to small places instead of pipeline transport and distributed through the following process. Road tankers will uptake the LNG from a base depot, travel to small places and fill their refueling tanks periodically. Micro regasification plants established there will convert LNG to gas and distribute it to homes, restaurants and other commercial establishments through local pipelines.

LNG imported at Kochi terminal is supposed to be distributed to industries in Kerala, Mangalore and Bengaluru by pipeline. As the pipelines are still not ready LNG from Kochi terminal is going to be transported to the distant customers through LNG road tankers fitted with cryogenic bullet tanks.

2.8.7.4. Use of LNG as a bunkering fuel in barges

This is actively pursued by the Government and may commence by the end of 2018.

2.8.7.5. Scope of Balagarh to Handle LNG Traffic

- Barge Bunkering: Among the applications listed above barge bunkering offers a great opportunity to Balagarh. Balagarh could become a major LNG bunkering terminal for barges on Inland Waterway 1, in view of the above Government of India took various initiatives as explained below:
- Recently, the Government of India mooted a proposal to use LNG as a fuel for barges, initially for the barges plying on Inland Waterway 1(Ganga).
- The Government has asked IWAI and Petronet LNG to operationalize the plan and start LNG - powered barge navigation on NW1 from December2018.
- Petronet LNG has been tasked to design, construct and operate LNG unloading, storing and bunkering facilities on the National Waterways. For this, Petronet LNG plans to establish a base LNG depot at Haldia and filling stations at Sahibganj in Jharkhand, Patna in Bihar and Ghazipur in Uttar Pradesh. The present barges will have to be retrofitted and/or new barges with LNG compatible engines will have to be procured for LNG fueling which would be capital-intensive. IWAI has to take initiative to convince barge owners/operators of the benefits of LNG, including its fuel efficiency and low carbon emission, and persuade them to switch over to LNG from diesel by retrofitting the existing barges and/or new procurement.

2.8.7.6 It is however not clear how LNG will be transported from mother vessel to base station and from base station to filling stations. Nevertheless, whatever is the methodology and logistics of the operation, the Government's initiative presents a great opportunity for Balagarh. Balagarh, being on a prime location on NW1 route and having land area away from residential area, has the potential to serve as a base station and/or filling station for LNG bunkering. There are 4 ways of barge bunkering at Balagarh, as detailed below:

- i. **Storing LNG in tank and feeding from it to barges.** Small scale LNG ships/barges will receive LNG from mother vessel at the nearest deep water LNG terminal. This may be at Dhamra Port. From the main port the small LNG carriers will come to Balagarh where it will be pumped in to storage tanks. LNG will go through terminal pipelines to the bunkering jetty

for barge bunkering through special steel braided flexible stainless steel hoses.

- ii. **Bunker Barges:** A variant of the above method is LNG-laden barge can feed the barges at the jetty directly, instead of routing LNG through the tank. This barge to barge bunkering of LNG is done in Japan.
- Using Road Tankers for Storage Tank Filling – Road tankers will bring LNG from base depot and fill the tank at Balagarh. The rest of the process will be as at (a) above.
 - Using Road Tankers – Road tankers with LNG can come to the jetty and directly fuel the barges using the above type of flexible hose. This will obviate the use of storage tank.

2.8.7.7 Other LNG scopes for Balagarh

Establishment of full infrastructure at Balagarh for LNG barge bunkering including development of storage tanks and other support facilities will enable Balagarh to operate as an LNG hub and distribute LNG to commercial users and roadside refueling stations, through road tankers. The above activities do not involve regasification and therefore, the capital cost and operating cost to the operator will come down to that extent.

2.8.8 Conclusion on LNG Traffic Potential

The proposal for using LNG for various purposes in the region is yet to be firmed up. Transportation, storage and distribution system would depend on the total volume of traffic etc for evolving optimum and attractive solutions. The comprehensive facilities to be developed are highly specialised and sophisticated and lead role is to be taken by the LNG supplying and distributing agencies. Therefore, it would not be prudent to make a terminal investment proposal at this nascent stage of development. However, while preparing the development plan of barge terminal at Balagarh, adaptability would be built in keeping in view this future potential.

2.9 Scope for Ro-Ro Traffic at Balagarh

- 2.9.1. In the Ro-Ro transport system, the trucks along with the crews are taken in the barge and transported to the destination so that there would be seamless travelling. As such the truck and crews would be idling during the barge transit period. This idling cost of truck and crews would add to the transportation cost. Further, the effective cargo carrying capacity of the barge would be less since a substantial area inside the barge would be occupied by the unproductive volume of the truck. The advantage in this case is that Lift-on/Lift-off (Lo-Lo) operation of cargo in the barge and unloading/loading operations of the truck would be eliminated.

2.9.2. Further, the berth time of barges would be reduced substantially since the unloading/loading operations through the Ro-Ro can be completed in a few minutes' time. Accordingly, this mode of operation is generally employed in the case offering across waterways where Lo-Lo operation at the terminal is not cost effective both on the considerations on barge holding cost and barge unloading/loading cost. The projected traffic for Balagarh terminal comprise of dry bulk and containers which are to be unloaded and stored at the terminal for completing the various process before dispatching to the destinations. Therefore, the terminal would have to be equipped with cargo handling cranes. This crane, otherwise idling could be made available for other cargoes brought at the berth. In this case the cost of Lo-Lo operation would be substantially less than the idling cost of truck and crews during the barge transit period. In view of the above details it is seen that Ro-Ro operation is not a feasible operation for the identified cargoes for Balagarh Terminal.

2.10 Summary of Traffic Potential for Balagarh

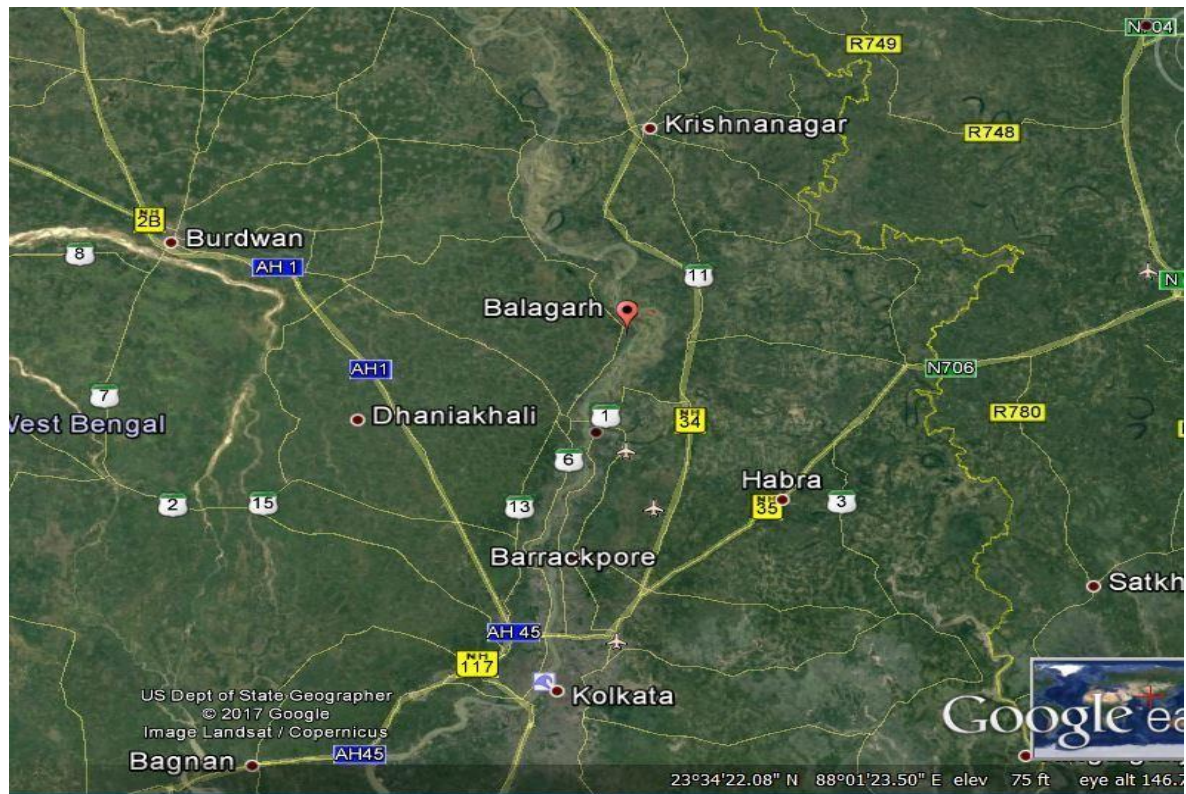
2.10.1 From the foregoing details it is concluded that the firmed up cargoes for the Balagarh barge terminal are the bulk pulses/peas traffic and containers that can be diverted from KDS. As concluded earlier, pulses/peas traffic is almost stable and Balagarh has annual throughput potential of around 3.0 lakh tonnes. With regard to containers, the container traffic potential for Balagarh barge terminal over the period 2019-20 to 2034-35, in lakh TEUs are as given below.

Time period	2019-2020	2024-25	2034-35
In lakh TEUs	2.23	2.51	3.06

SECTION 3

SITE INFORMATION

3.1. The proposed location for the Extended Gate Facilities is the Balagarh Island which is situated in the Balagarh village of Hoogly District in West Bengal. It is a river island flanked by the main Hoogly river and its branch. The location is north of Kolkata Port and the distance along the NW-1 is about 82 km from Kolkata Port and 164 km from Diamond Harbour. An Index map and pictorial view of the location is placed below.



3.2 General Features

3.2.1 Balagarh is a remote village mainly with farm lands and agriculture activities. Only village road system is available and the existing roads are not suitable for the plying of heavy commercial vehicles. There are no major industries in the locality. The main industrial activity at this location is brick manufacturing using the sediment recovered from the river bed. The Balagarh Island has a total area of about 900 acres, about 300 acres each owned by Kolkata Port Trust, State Government and Calcutta Electricity Supply Company. After the commissioning of Farakka Barrage in 1975, the KoPT acquired about 300 acres of area in the island and used for dumping of dredged material from the river during Silt Trap Dredging which was carried out for the purpose of port channel conservation during the years from 1975 to 1985. This has increased the height of the island by more than 3m and it is now substantially above high flood level. on the northern side Connectivity and services & utilities are to be established from the nearby available locations to meet the requirements of the identified projects.

3.3 Connectivity

3.3.1 Road Access

Road access to Balagarh village is from State Highway No.6 (SH6). The distance from SH6 to the Island is about 3 km and to the proposed location is about 5 km. The access from the SH6 is through Dhara Para road for a distance of about 1.50 km beyond which there is no developed road to reach the proposed project location. It is seen that a connecting bridge from the main land was constructed to the Island by the Calcutta Electricity Supply Company (CESC) in connection with their project for establishing a power plant in the Island. However, this bridge is in the unfinished condition and connecting roads are yet to be established from the SH6. The nearest highway is NH-2 from Kolkata to Delhi. The nearest access location to this NH is at Sekhpur which is at a distance of about 70 km from the proposed project location, comprising of 5km from project location to State Highway No.6 (SH-6), 19 km along SH-6 to reach SH-13 and 46km along SH-13 to reach Sekhpur. The distance from the NS dock of Kolkata Port to the junction at Sekhpur is about 95km.

3.3.2 Railway Connectivity

The nearest railway line is the Howrah – Delhi Main Line (electrified double track) in the Eastern Railways. There is a railway station at Balagarh and the distance from the station to the proposed project location is about 6 km. The nearest railway marshalling yard is at Bandel which is at a distance of 30 km from Balagarh station.

3.3.3 Waterways

National Waterway No.1 (NW-1) passes adjacent to the site. The site can be accessed through a branch of the Hoogly river which passes by the side of the site and the deviation required is less than a km from Chainage 217 of NW-1.

3.3.4 Utilities and Services

There is no power and water supply connection at the proposed site. The existing electrical substation is at a distance of about 5 km from the project site.

3.4 Environmental Data

3.4.1 Rainfall

This region is mainly exposed to southwest monsoon from June to September and an average monthly rainfall of over 250mm is experienced (July and August are the wettest months having monthly rainfall as high as 400mm). During northwest monsoon from November to February, monthly average rainfall of less than 50mm is experienced. The average annual rainfall is around 1500mm and the average number of rainy days in a year with rainfall of 25mm or more is about 20.

3.4.2 Temperature

At Balagarh, there is a seasonal variation in the temperature. April and May are hotter month, whereas December and January are colder months. The highest temperature is of the order of 45⁰ C during the month of May and the lowest temperature is in the order of 7⁰ C during the month of December. Design range of effective temperature is $\pm 25^{\circ}\text{C}$.

3.4.3 Visibility

It is learnt that visibility at Balagarh is better compared to that at Kolkata, as the area is free from industrial smoke. At times due to heavy rainfall visibility would be affected adversely during the southwest monsoon. On an average, fog is reported on 5-7 days in each month from November to February during mornings.

3.4.4 Wind

For the purpose of design of the berth, wind loads have been considered with the following wind velocities.

- Basic wind speed = 50m/sec
- Wind speed in operating condition = 24m/sec

3.4.5 Earthquake

The area falls under Seismic Zone-IV and accordingly would be considered in the design.

3.4.6 Flood and Tide Levels

This stretch of river is under the dual effect of upland discharge and astronomical tide propagated from the sea through the river. The location is in the upper tidal compartment with predominant effect from river discharge and supplementary effect from tide. The upland flows from catchment areas during the monsoon and the feeder canal discharge during the dry season play the major role in the morphology of the stretch. It is observed that ebb dominates (around 10 hrs.) in this region compared to flood (around 2 hr.). The flood is very weak compared to ebb. The daily water level fluctuation in tune with the tide is remarkable during the monsoon period with range around 2m. In the periods of normal monsoon flood level reaches up to 5.0 m with respect to local datum, 4.60m levels being a most common occurrence. In extreme cases such as in the year 2000 when severe flood occurs, the water level rises up by about 7m with respect to local datum. The lowest water level occurs during dry season and the mean value is in the order of 1.80m with reference to local datum.

3.4.7 Water Current

The intensity of water current in the area is mainly influenced by the upland flow. It would be the maximum during the peak monsoon period and minimum during the dry season. The maximum current velocity during the normal monsoon period at the ebb is in the order of 2m/sec. In the extreme cases of flood in the river the current velocity at the ebb would be in the order of 3.5m/sec.

3.4.8 Scour Depth

The river bed comprises of predominantly fine sand which susceptible for drifting by water current. The depth in the river branch adjacent to the project site due to bed scour is now reached -6.60m at certain pockets. In the main river in the region there are pockets with depth of -8.1m due to scour process.

3.4.9 Geo-Technical Data

Site specific geo-technical investigations have not been carried. Based on the information gathered from the personnel conversant with the nearby locality the geo-technical particulars of the area are as detailed hereinafter.

- Up to -5.0m : Soft to moderately stiff grey clayey silt with fine sand
- -5.0m to 15.0m: Moderately stiff grey clayey silt with fine sand
- -15.0m to -27.0m: Grey micaceous silty sand
- -27.0m to -35.0m: Hard mottled brown/grey silty clay
- -35.0m to -46.0m: Hard laminated silty clay with lenses of sand Below -
46.0m : Medium to dense sand with lenses of clay and silt

SECTION 4

GEOMORPHOLOGICAL STUDY OF BALAGARH CHANNEL

4.1. The Balagarh region, situated at the right bank of Hugli River, encompasses an island with more than 300 acres' vacant land which is supposed to be used for the port activities. The island is existing since last 70 years or more and after commissioning of Farakka Barrage in 1975, the island was used for dumping of dredged material from the river during Silt Trap Dredging carried out by Kolkata Port Trust during years from 1975-76 to 1984-85 in order to arrest movement of additional sediment into the port reaches. This has increased the height of the island by more than 3m on the northern side. The Hugli River in this region is narrow (width is about 300m.), and it falls in the upper tidal compartment where the tidal effect is not significant and its dampening is more pronounced. (Fig.1).

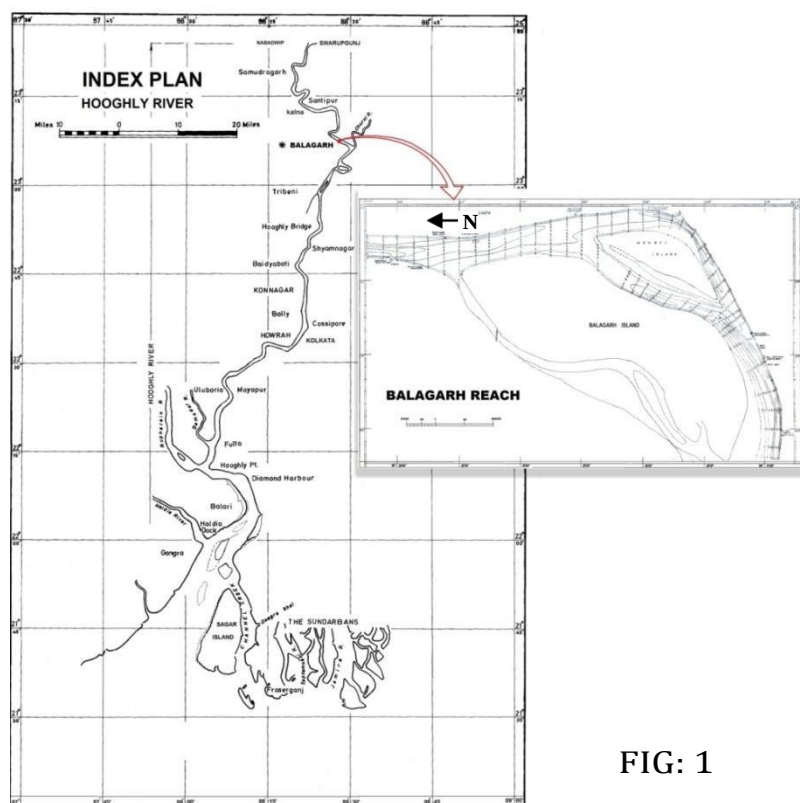


FIG: 1

4.2. It is observed from bathymetric surveys that the main flow is hugging the left bank far off the Balagarh Island and its Eastern Channel where the jetties (2 Nos.) are proposed to be constructed has become a secondary one receiving much less flow from upstream. As a result, its bathymetric changes with time is quite noticeable. However, recently, it is evident from Fig.2 that flood has produced deep cul-de-

sac at some places in this channel.

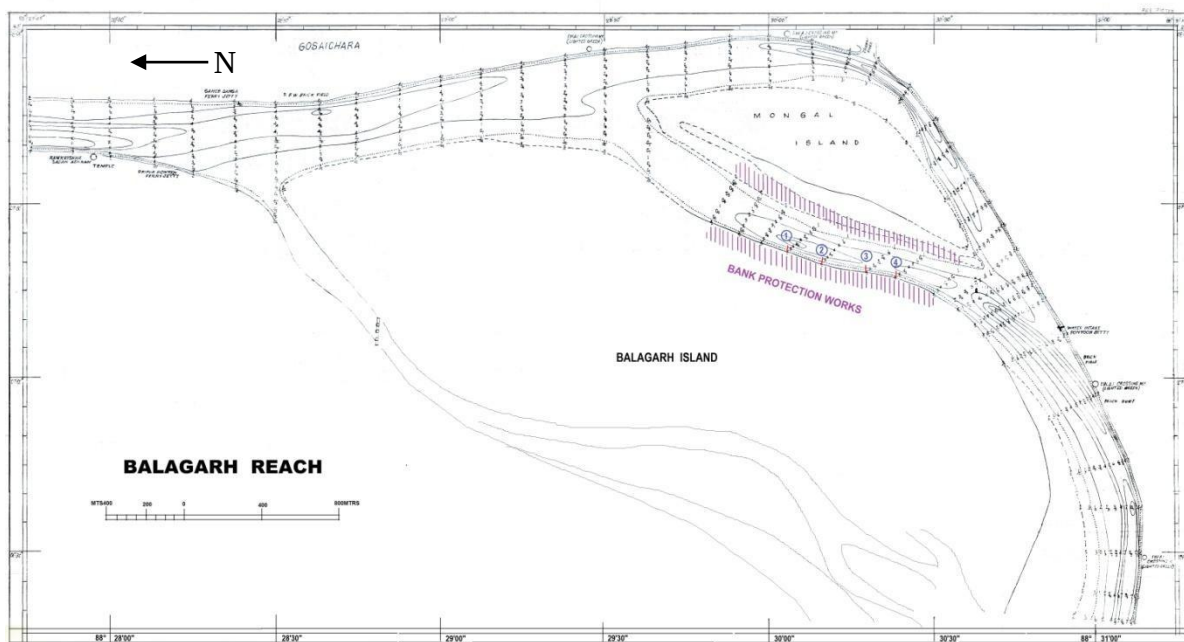


FIG: 2

4.3 This region becomes governed more by upland discharge than by tides. Therefore, to study the geomorphology of this region, following parameters were considered.

- Hydrological/Hydraulic parameters such as velocity, width, discharge etc.
- Geo-technical parameters such as nature of suspended and bed-load materials, sub-soil characteristics upto a depth of 15m from surface.
- Bathymetric survey charts over a period of about 21years.
- Remote Sensing or Satellite Image analysis over a period of 20years.

‘c’ & ‘d’ are mainly aimed to determine the morphological changes including erosional history at the proposed location.

a) Hydrology

4.4 This region in the upper tidal compartment, suffers from sedimentation and dampening of the semi-diurnal, in- equal tides with periodicity of 12hr.24mins. that have small impact on the morphology of this region. The flood tide is of around 2hrs. duration while the ebb occupies the rest of the period. The water level fluctuates remarkably during the monsoon. It is evident from Fig.3 that the water level during the monsoon of 2016 varied between 3.0m and 5.0 m in this stretch with respect to local datum which is about 1.0m above MSL(Mean Sea Level). Inextremecasessuchasin2000 when severe flood occurred, the water level rose up by about 7m with respect to local datum. Hourly water level collected during August, 2014 to November, 2014 in this region (Ranaghat, opposite to Balagarh Island) is furnished in Table-1.

4.5. The width in the zone of interest varies from 150m to 240m. Because of considerably low depth in the northern part of the proposed zone, hydrological observations were conducted at three locations near to this region on 7th August 2014 and on 18th February 2015, deploying ADCP (Acoustic Doppler Current Profiler) in the main conveyance of the river. It is observed that ebb dominates (around 10 hrs.) in this region compared to flood (around 2 hr.). The flood was very weak compared to ebb. The observed maximum velocity during flood on 7th August 2014 was in the tune of 1.15 m/s and corresponding discharge was 770 cumec (27,192 cusec). During ebb, the maximum velocity obtained in this stretch was in the tune of 1.76 m/s and the discharge was 1640 cumec (57,917 cusec). The salinity of the river water in this section was found to be 0.05 ppt.

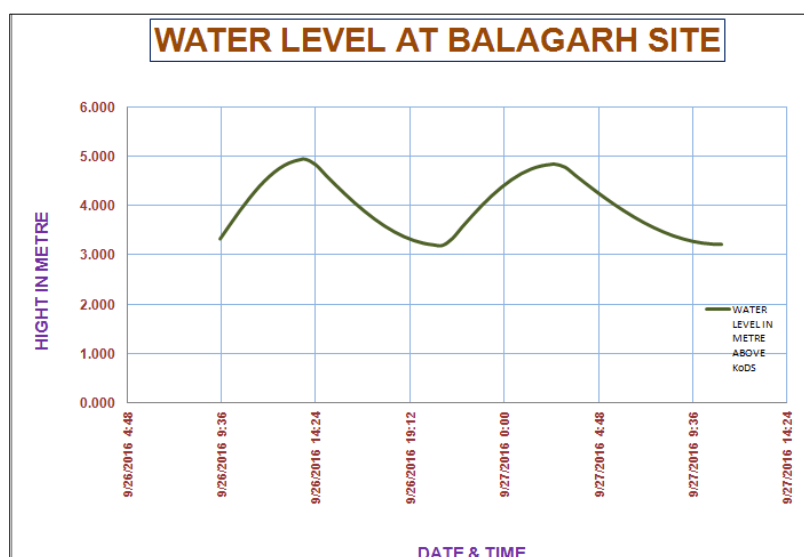


Table: 1, Water Level (in m) with respect to date and time

Ranaghat													
Date	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
20/8/2014	3.686	3.616	3.546	3.486	3.336	3.346	3.676	4.036	4.166	4.206	4.096	4.016	3.936
21/8/2014	4.016	3.946	3.886	3.836	3.756	3.706	4.036	4.276	4.546	4.496	4.436	4.356	4.266
22/8/2014	4.346	4.296	4.236	4.166	4.096	4.036	3.996	3.956	4.016	4.296	4.586	4.616	4.576
23/8/2014	4.336	4.266	4.136	4.016	3.886	3.746	3.636	3.516	3.416	3.306	3.426	3.796	4.276
24/8/2014	3.486	3.414	3.342	3.270	3.198	3.126	3.036	2.986	3.206	3.486	3.766	3.726	3.676
25/8/2014	3.806	3.736	3.656	3.536	3.436	3.356	3.286	3.226	3.186	3.516	3.836	4.016	4.076
26/8/2014	3.916	3.826	3.746	3.666	3.576	3.486	3.426	3.356	3.326	3.496	3.836	4.056	4.236
27/8/2014	4.356	4.266	4.136	4.016	3.886	3.746	3.636	3.516	3.416	3.306	3.426	3.796	4.276
28/8/2014	3.956	3.836	3.716	3.576	3.486	3.386	3.306	3.216	3.146	3.086	3.286	3.486	3.626
Ranaghat													
Date	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
29/8/2014	3.656	3.606	3.566	3.526	3.476	3.416	3.346	3.316	3.221	3.156	3.206	3.356	3.496
30/8/2014	3.666	3.606	3.546	3.486	3.436	3.526	3.776	4.016	4.096	4.096	4.046	3.966	3.886
31/8/2014	3.682	3.708	3.734	3.761	3.787	3.813	3.839	3.865	3.891	3.918	3.944	3.970	3.996
1/9/2014	3.546	3.486	3.426	3.366	3.316	3.406	3.626	3.876	3.956	3.976	3.906	3.826	3.736

2/9/2014	3.846	3.786	3.696	3.606	3.586	3.546	3.636	4.026	4.276	4.276	4.196	4.066	4.016
3/9/2014	4.096	4.058	4.019	3.981	3.943	3.904	3.866	3.816	3.766	3.716	3.676	3.596	3.576
4/9/2014	3.436	3.416	3.446	3.596	3.726	3.766	3.756	3.716	3.666	3.616	3.576	3.526	3.486
5/9/2014	3.406	3.386	3.356	3.336	3.396	3.566	3.726	3.786	3.746	3.696	3.646	3.586	3.536
6/9/2014	3.576	3.516	3.456	3.396	3.346	3.436	3.686	3.926	4.006	4.006	3.956	3.876	3.796
7/9/2014	3.826	3.766	3.676	3.606	3.536	3.466	3.526	4.046	4.316	4.316	4.236	4.116	4.056
8/9/2014	4.096	3.996	3.896	3.786	3.706	3.606	3.576	3.896	4.326	4.566	4.526	4.446	4.346
9/9/2014	4.276	4.166	3.956	3.926	3.856	3.716	3.606	3.746	4.116	4.516	4.546	4.446	4.386
10/9/2014	4.556	4.246	4.136	4.006	3.896	3.786	3.706	3.686	3.816	4.106	4.506	4.536	4.476
11/9/2014	4.396	4.306	4.196	4.036	3.906	3.776	3.656	3.546	3.696	3.926	4.206	4.636	4.936
12/9/2014	4.436	4.256	4.126	4.006	3.876	3.736	3.616	3.486	3.876	3.976	4.086	4.186	4.546
13/9/2014	4.266	4.176	4.046	3.926	3.796	3.656	3.546	3.426	3.326	3.216	3.336	3.706	4.186
14/9/2014	3.906	4.006	3.886	3.766	3.656	3.546	3.426	3.296	3.176	3.086	3.236	3.456	3.736
15/9/2014	3.426	3.626	3.646	3.546	3.476	3.386	3.246	3.146	3.056	2.976	2.896	2.846	2.706
16/9/2014	3.036	3.216	3.396	3.376	3.296	3.246	3.146	3.056	2.966	2.866	2.806	2.766	2.706
17/9/2014	2.716	2.826	2.996	3.126	3.156	3.086	3.026	2.966	2.886	2.836	2.786	2.746	2.696
18/9/2014	2.656	2.636	2.656	2.766	2.886	2.996	3.086	3.066	2.996	2.936	2.846	2.816	2.766
19/9/2014	2.786	2.716	2.686	2.666	2.756	2.896	3.066	3.136	3.156	3.196	3.096	3.036	2.996
20/9/2014	3.016	2.946	2.876	2.816	2.666	2.676	3.006	3.366	3.496	3.536	3.426	3.346	3.266
21/9/2014	3.346	3.276	3.216	3.166	3.086	3.036	3.366	3.606	3.876	3.826	3.766	3.686	3.596
22/9/2014	3.676	3.626	3.566	3.496	3.426	3.366	3.326	3.286	3.346	3.626	3.916	3.946	3.906
23/9/2014	3.666	3.596	3.466	3.346	3.216	3.076	2.966	2.846	2.746	2.636	2.756	3.126	3.606
24/9/2014	2.816	2.744	2.672	2.600	2.528	2.456	2.366	2.316	2.536	2.816	3.096	3.056	3.006
25/9/2014	3.136	3.066	2.986	2.866	2.766	2.686	2.616	2.556	2.516	2.846	3.166	3.346	3.406
26/9/2014	3.246	3.156	3.076	2.996	2.906	2.816	2.756	2.686	2.656	2.826	3.166	3.386	3.566
27/9/2014	3.686	3.596	3.466	3.346	3.216	3.076	2.966	2.846	2.746	2.636	2.756	3.126	3.606
28/9/2014	3.286	3.166	3.046	2.906	2.816	2.716	2.636	2.546	2.476	2.416	2.616	2.816	2.956
29/9/2014	2.986	2.936	2.896	2.856	2.806	2.746	2.676	2.646	2.551	2.486	2.536	2.686	2.826
30/9/2014	2.996	2.936	2.876	2.816	2.766	2.856	3.106	3.346	3.426	3.426	3.376	3.296	3.216
1/10/2014	2.916	2.856	2.796	2.736	2.686	2.776	2.996	3.246	3.326	3.346	3.276	3.196	3.106
2/10/2014	3.216	3.156	3.066	2.976	2.956	2.916	3.006	3.396	3.646	3.646	3.566	3.436	3.386
3/10/2014	3.466	3.428	3.389	3.351	3.313	3.274	3.236	3.186	3.136	3.086	3.046	2.966	2.946
4/10/2014	2.806	2.786	2.816	2.966	3.096	3.136	3.126	3.086	3.036	2.986	2.946	2.896	2.856
5/10/2014	2.776	2.756	2.726	2.706	2.766	2.936	3.096	3.156	3.116	3.066	3.016	2.956	2.906
6/10/2014	2.946	2.886	2.826	2.766	2.716	2.806	3.056	3.296	3.376	3.376	3.326	3.246	3.166
7/10/2014	3.196	3.136	3.046	2.976	2.906	2.836	2.896	3.416	3.686	3.686	3.606	3.486	3.426
8/10/2014	3.466	3.366	3.266	3.156	3.076	2.976	2.946	3.266	3.696	3.936	3.896	3.816	3.716
9/10/2014	3.646	3.536	3.326	3.296	3.226	3.086	2.976	3.116	3.486	3.886	3.916	3.816	3.756
10/10/2014	3.926	3.616	3.506	3.376	3.266	3.156	3.076	3.056	3.186	3.476	3.876	3.906	3.846
11/10/2014	3.766	3.676	3.566	3.406	3.276	3.146	3.026	2.916	3.066	3.296	3.576	4.006	4.306
12/10/2014	3.806	3.626	3.496	3.376	3.246	3.106	2.986	2.856	3.246	3.346	3.456	3.556	3.916
13/10/2014	3.636	3.546	3.416	3.296	3.166	3.026	2.916	2.796	2.696	2.586	2.706	3.076	3.556
14/10/2014	3.276	3.376	3.256	3.136	3.026	2.916	2.796	2.666	2.546	2.456	2.606	2.826	3.106
15/10/2014	2.796	2.996	3.016	2.916	2.846	2.756	2.616	2.516	2.426	2.346	2.266	2.216	2.076

Ranaghat													
Date	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
16/10/2014	1.806	1.986	2.166	2.146	2.066	2.016	1.916	1.826	1.736	2.216	2.156	2.116	2.056
17/10/2014	2.066	2.176	2.346	2.476	2.506	2.436	2.376	2.316	2.236	2.186	2.136	2.096	2.046
18/10/2014	2.006	1.986	2.006	2.116	2.236	2.346	2.436	2.416	2.346	2.286	2.196	2.166	2.116
19/10/2014	2.136	2.066	2.036	2.016	2.106	2.246	2.416	2.486	2.506	2.546	2.446	2.386	2.346

20/10/2014	2.366	2.296	2.226	2.166	2.016	2.026	2.356	2.716	2.846	2.886	2.776	2.696	2.616
21/10/2014	2.696	2.626	2.566	2.516	2.436	2.386	2.716	2.956	3.226	3.176	3.116	3.036	2.946
22/10/2014	3.026	2.976	2.916	2.846	2.776	2.716	2.676	2.636	2.696	2.976	3.266	3.296	3.256
23/10/2014	3.016	2.946	2.816	2.696	2.566	2.426	2.316	2.196	2.096	1.986	2.106	2.476	2.956
24/10/2014	2.166	2.094	2.022	1.950	1.878	1.806	1.716	1.666	1.886	2.166	2.446	2.406	2.356
25/10/2014	2.486	2.416	2.336	2.216	2.116	2.036	1.966	1.906	1.866	2.196	2.516	2.696	2.756
26/10/2014	2.596	2.506	2.426	2.346	2.256	2.166	2.106	2.036	2.006	2.176	2.516	2.736	2.916
27/10/2014	3.036	2.946	2.816	2.696	2.566	2.426	2.316	2.196	2.096	1.986	2.106	2.476	2.956
28/10/2014	2.636	2.516	2.396	2.256	2.166	2.066	1.986	1.896	1.826	1.766	1.966	2.166	2.306
29/10/2014	2.336	2.286	2.246	2.206	2.156	2.096	2.026	1.996	1.901	1.836	1.886	2.036	2.176
30/10/2014	2.346	2.286	2.226	2.166	2.116	2.206	2.456	2.696	2.776	2.776	2.726	2.646	2.566
31/10/2014	2.596	2.641	2.686	2.731	2.776	2.694	2.611	2.529	2.446	2.364	2.281	2.199	2.116
1/11/2014	2.116	2.226	2.336	2.446	2.556	2.666	2.776	2.666	2.556	2.446	2.336	2.226	2.116
2/11/2014	2.096	2.066	2.193	2.319	2.446	2.573	2.699	2.826	2.683	2.540	2.397	2.254	2.111
3/11/2014	2.112	2.097	2.081	2.066	2.220	2.374	2.528	2.682	2.836	2.662	2.489	2.315	2.141
4/11/2014	2.121	2.108	2.095	2.082	2.069	2.056	2.256	2.456	2.656	2.856	2.756	2.656	2.556
5/11/2014	2.221	2.188	2.155	2.122	2.089	2.056	2.216	2.376	2.536	2.696	2.856	2.756	2.656
6/11/2014	2.224	2.196	2.167	2.139	2.111	2.082	2.054	2.257	2.460	2.663	2.866	2.756	2.656
7/11/2014	2.556	2.484	2.413	2.341	2.269	2.197	2.126	2.054	2.257	2.460	2.663	2.866	2.755
8/11/2014	2.436	2.401	2.366	2.330	2.295	2.260	2.225	2.189	2.154	2.305	2.455	2.606	2.756
9/11/2014	2.665	2.601	2.538	2.474	2.411	2.347	2.283	2.220	2.156	2.309	2.461	2.614	2.766
10/11/2014	2.666	2.612	2.557	2.503	2.448	2.394	2.339	2.285	2.230	2.176	2.236	2.296	2.356
11/11/2014	2.546	2.566	2.523	2.479	2.436	2.393	2.349	2.306	2.263	2.219	2.176	2.206	2.255
12/11/2014	2.356	2.245	2.566	2.517	2.469	2.420	2.372	2.323	2.274	2.226	2.177	2.210	2.225
13/11/2014	2.454	2.547	2.676	2.626	2.576	2.526	2.476	2.425	2.375	2.325	2.275	2.225	2.265
14/11/2014	2.541	2.621	2.651	2.676	2.617	2.568	2.519	2.470	2.421	2.372	2.323	2.274	2.225
15/11/2014	2.425	2.487	2.549	2.610	2.672	2.612	2.553	2.493	2.434	2.374	2.314	2.255	2.195
16/11/2014	2.221	2.195	2.291	2.387	2.484	2.580	2.676	2.600	2.524	2.448	2.372	2.296	2.220
17/11/2014	2.501	2.326	2.222	2.195	2.316	2.437	2.557	2.678	2.602	2.525	2.449	2.372	2.296
MAX	4.556	4.306	4.236	4.166	4.096	4.036	4.036	4.276	4.546	4.566	4.586	4.636	4.936
MIN	1.806	1.986	2.006	1.950	1.878	1.806	1.716	1.666	1.736	1.766	1.886	2.036	2.046

4.6 The typical velocity curve, stick diagram and discharge summary of 2015 of the measuring section lines are shown in figures and tables below. Locations of the measuring section lines are shown in the Figure. The observed maximum Ebb velocity on 18th February 2015 was in the tune of 1.44 m/s with corresponding discharge of 1,030 cumec (36375cusec). The discharge was found to be 1,100cumec(38847cusec) with corresponding velocity of 1.19 m/s whereas the maximum velocity was in the order of 1.22m/s with corresponding discharge of 1,020 cumec (36021 cusec).

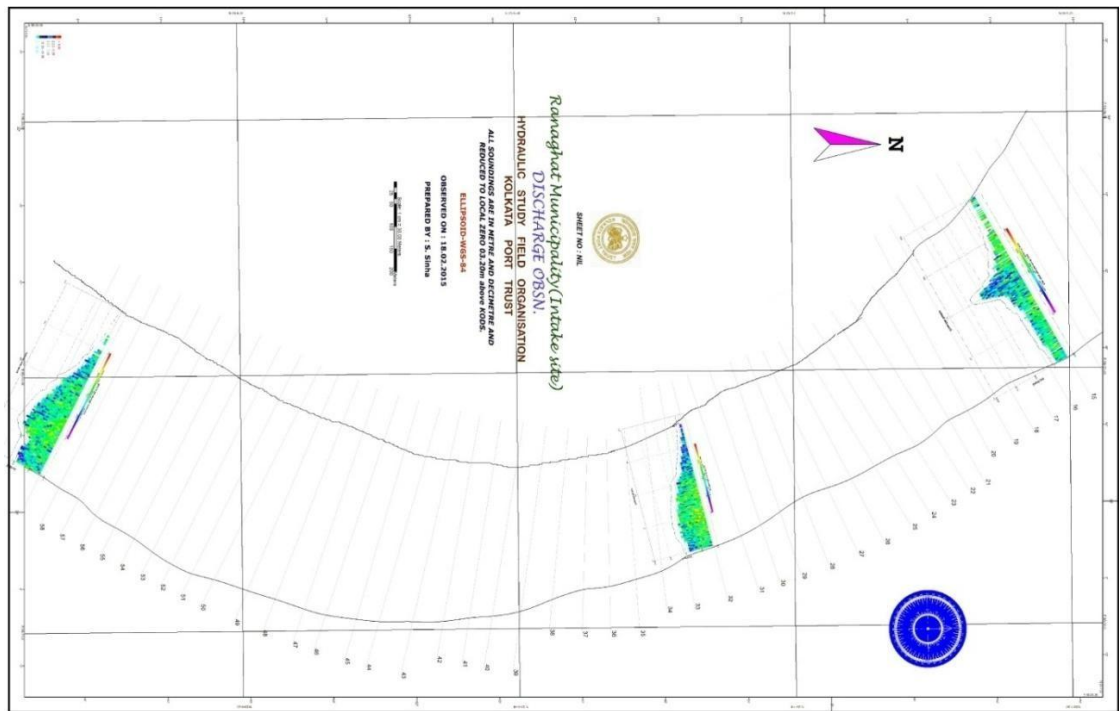


FIG:4

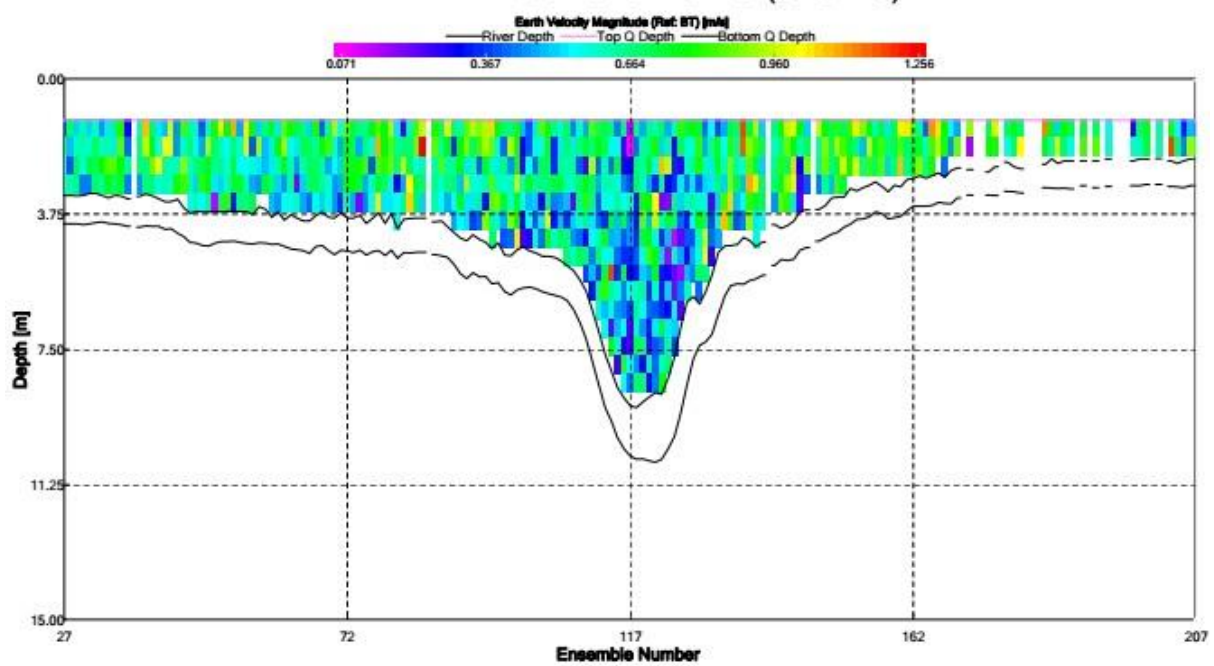


FIG:5

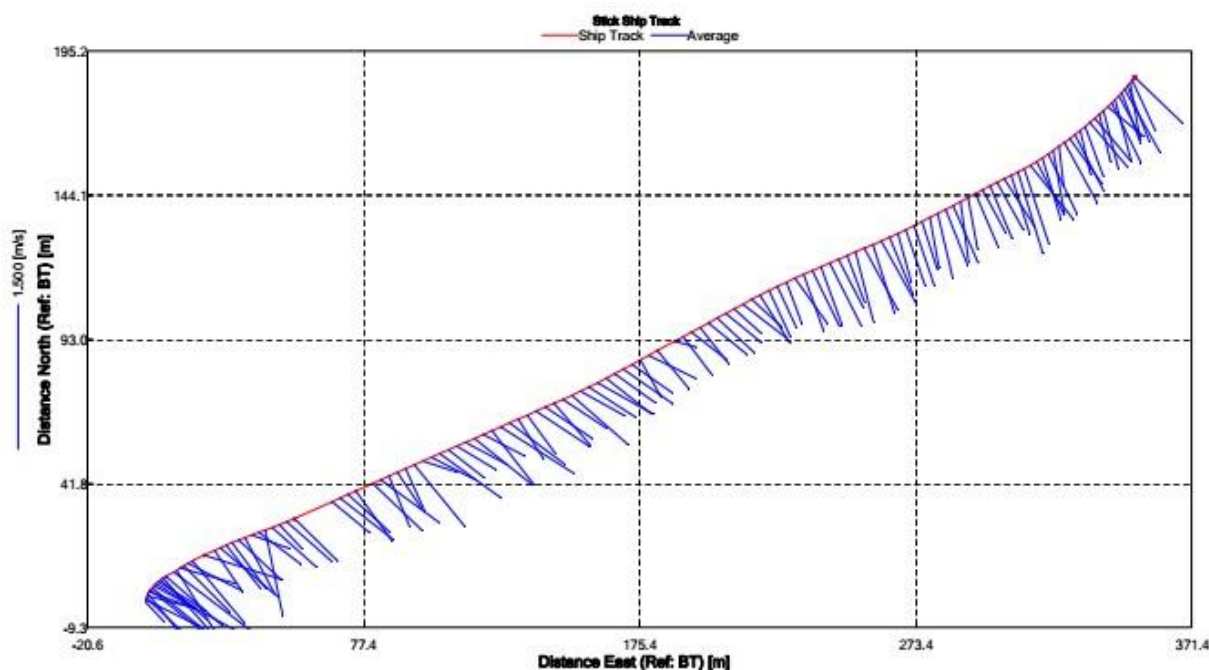


FIG:6

Table:2 Velocity & Discharge measurement by ADCP

Station Number: RANAGHATCS-15				Meas. No: 0														
Station Name:				Date: 02/17/2015														
Party:		Width: 422.9 m		Processed by:														
Boat/Motor:		Area: 2022.6 m²		Mean Velocity: 0.544 m/s														
Gage Height: 0.000 m		G.H.Change: 0.000 m		Discharge: 1,100 m³/s														
Area Method: Avg. Course		ADCP Depth: 0.500 m		Index Vel.: 0.00 m/s		Rating No.: 1												
Nav. Method: Bottom Track		Shore Ens.:10		Adj.Mean Vel: 0.00 m/s		Qm Rating: U												
MagVar Method: None (0.0°)		Bottom Est: Power (0.1667)		Rated Area: 0.000 m²		Diff.: 0.000%												
Depth Sounder: Not Used		Top Est: Power (0.1667)		Control1: Unspecified														
				Control2: Unspecified														
				Control3: Unspecified														
Screening Thresholds:						ADCP:												
BT 3-Beam Solution: YES				Max. Vel.: 1.19 m/s		Type/Freq.: Rio Grande/600 kHz												
WT 3-Beam Solution: NO				Max. Depth: 11.0 m		Serial #: 0												
BT Error Vel.: 0.10 m/s				Mean Depth: 4.78 m		Bin Size: 50 cm												
WT Error Vel.: 1.07 m/s				% Meas.: 52.17		BT Mode: 5												
BT Up Vel.: 0.30 m/s				Water Temp.: 25.0 °C		WT Mode: 1												
WT Up Vel.: 1.50 m/s				ADCP Temp.: 22.0 °C		WV : 254												
Use Weighted Mean Depth: YES						Firmware: 10.16												
						Blank: 25 cm												
						BT Pings: 1												
						WT Pings: 1												
Performed Diag. Test: NO				Project Name: RANAGHATCS-15_0.mmt														
Performed Moving Bed Test: NO				Software: 2.03														
Performed Compass Test: NO																		
Meas. Location:																		
Tr.#		Edge Distance		#Ens.	Discharge						Width	Area	Time		Mean Vel		% Bad	
		L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins
000	L	12.0	12.0	181	306	587	218	10.2	7.43	1129	419.8	2004.7	16:48	16:51	2.26	0.56	10	0
001	R	15.0	14.0	150	283	560	205	13.2	8.66	1069	426.0	2040.5	16:51	16:54	2.68	0.52	6	0
Mean		13.5	13.0	165	294	573	211	11.7	8.05	1099	422.9	2022.6	Total	00:05	2.47	0.54	8	0
SDev		2.12	1.41	22	16.4	18.9	9.73	2.13	0.866	42.0	4.4	25.3			0.30	0.03		
SD/M		0.16	0.11	0.13	0.06	0.03	0.05	0.18	0.11	0.04	0.01	0.01			0.12	0.05		

The stick diagrams indicate more or less uniform direction of flows.

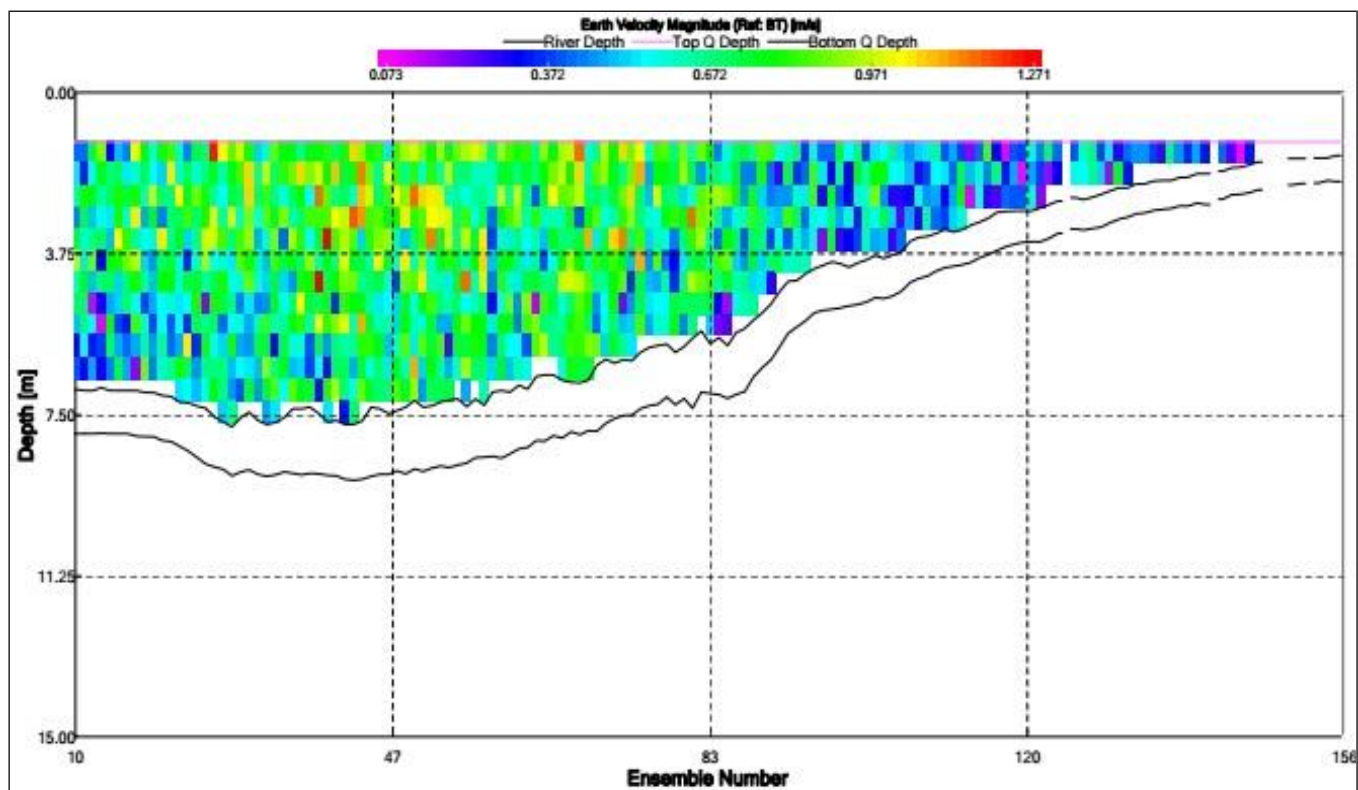


FIG:7

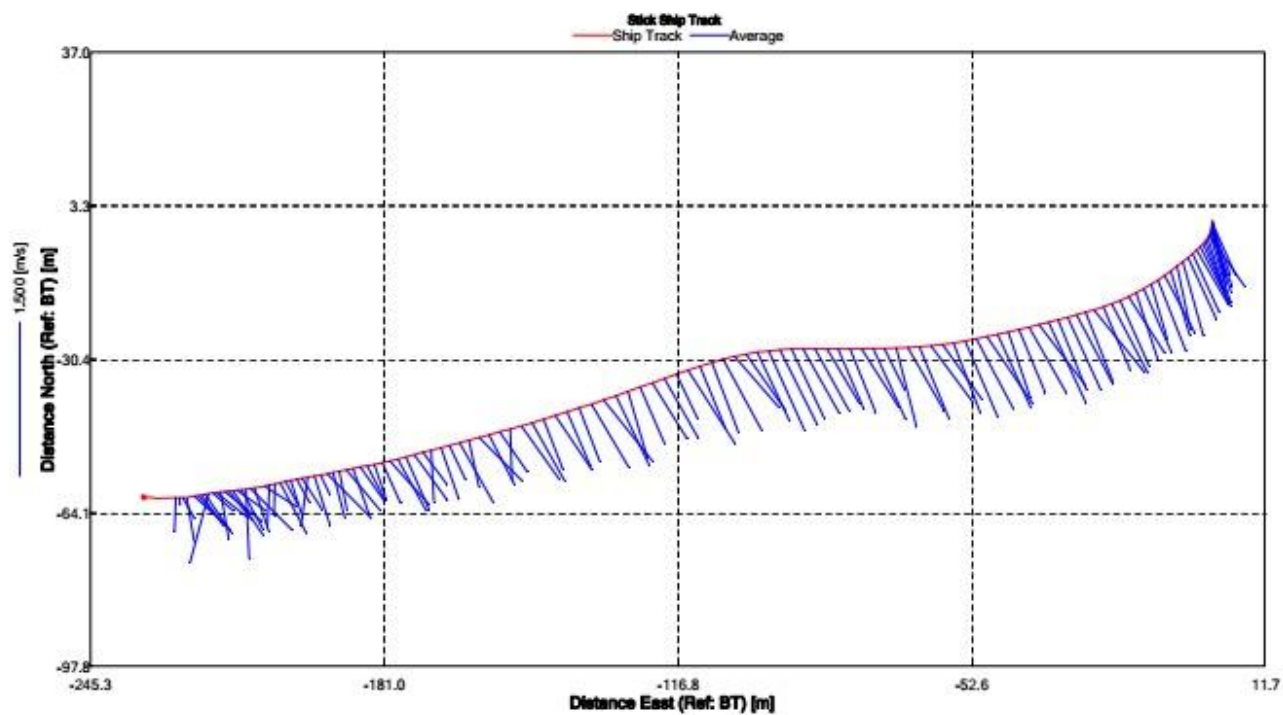


FIG:8

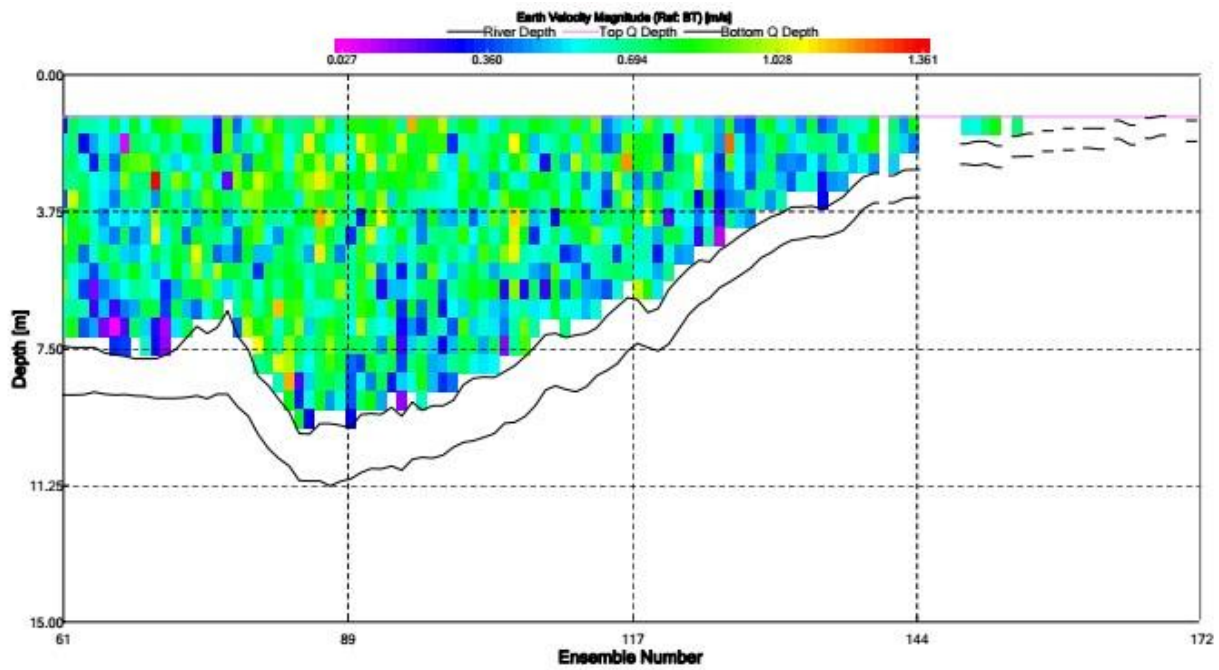


FIG:9

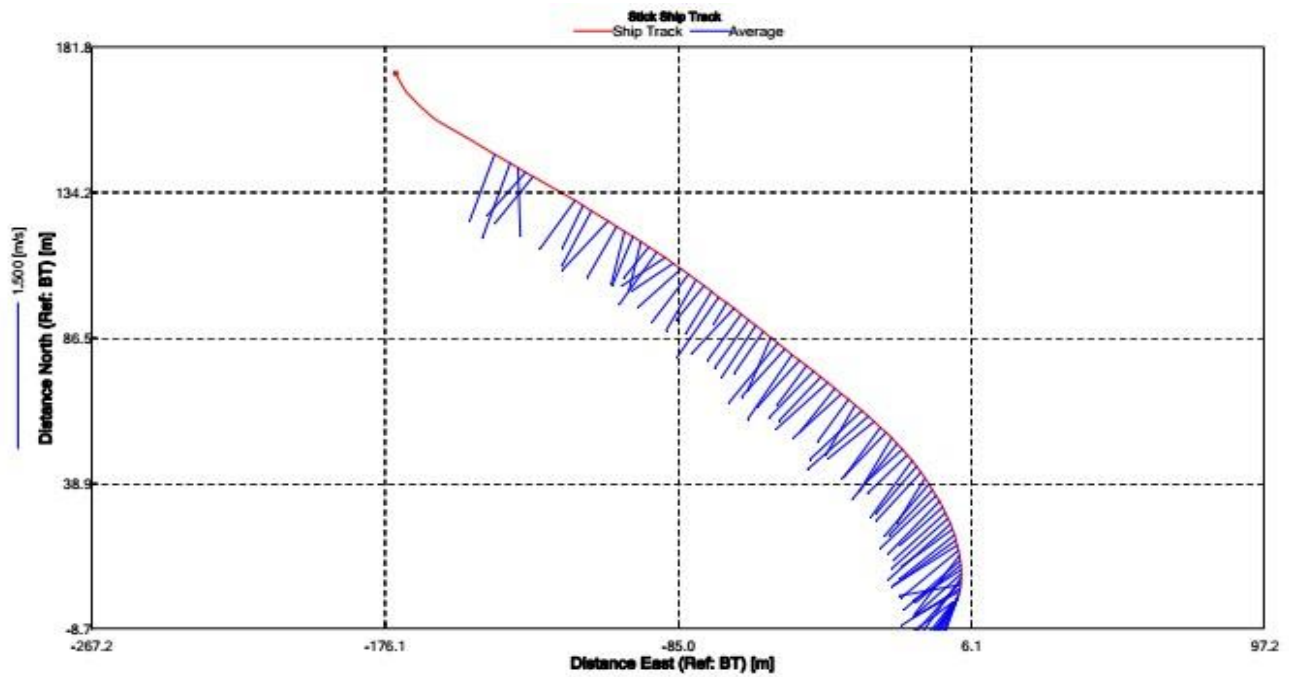


FIG:10

Table:3

Station Number: RANAGHATCS-60										Meas. No: 0								
Station Name:										Date: 02/17/2015								
Party:				Width: 513.6 m				Processed by:										
Boat/Motor:				Area: 1892.9 m²				Mean Velocity: 0.541 m/s										
Gage Height: 0.000 m				G.H.Change: 0.000 m				Discharge: 1,020 m³/s										
Area Method: Avg. Course				ADCP Depth: 0.500 m				Index Vel.: 0.00 m/s				Rating No.: 1						
Nav. Method: Bottom Track				Shore Ens.:10				Adj.Mean Vel: 0.00 m/s				Qm Rating: U						
MagVar Method: None (0.0°)				Bottom Est: Power (0.1667)				Rated Area: 0.000 m²				Diff.: 0.000%						
Depth Sounder: Not Used				Top Est: Power (0.1667)				Control1: Unspecified										
								Control2: Unspecified										
								Control3: Unspecified										
Screening Thresholds:								ADCP:										
BT 3-Beam Solution: YES				Max. Vel.: 1.22 m/s				Type/Freq.: Rio Grande/600 kHz										
WT 3-Beam Solution: NO				Max. Depth: 11.3 m				Serial #: 0				Firmware: 10.16						
BT Error Vel.: 0.10 m/s				Mean Depth: 3.70 m				Bin Size: 50 cm				Blank: 25 cm						
WT Error Vel.: 1.07 m/s				% Meas.: 54.68				BT Mode: 5				BT Pings: 1						
BT Up Vel.: 0.30 m/s				Water Temp.: 25.0 °C				WT Mode: 1				WT Pings: 1						
WT Up Vel.: 1.50 m/s				ADCP Temp.: 22.2 °C				WV : 254										
Use Weighted Mean Depth: YES																		
Performed Diag. Test: NO										Project Name: RANAGHATCS-60_0.mmt								
Performed Moving Bed Test: NO										Software: 2.03								
Performed Compass Test: NO																		
Meas. Location:																		
Tr.#	Edge Distance		#Ens.	Discharge						Width	Area	Time		Mean Vel		% Bad		
	L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins	
000	L	12.0	250	112	162	547	138	20.2	165	1032	486.1	1813.5	16:21	16:23	2.31	0.57	21	0
001	R	15.0	260	111	179	570	121	36.3	105	1011	561.1	1972.3	16:23	16:25	2.29	0.51	41	0
Mean		13.5	255	111	170	558	129	28.3	135	1021	513.6	1892.9	Total	00:04	2.30	0.54	31	0
SDev		2.12	7.07	1	12.2	16.1	11.7	11.4	42.8	14.8	67.1	112.3			0.01	0.04		
SD/M		0.16	0.03	0.01	0.07	0.03	0.09	0.40	0.32	0.01	0.13	0.06			0.01	0.07		

Remarks:

4.7 In the dry season of 1993, velocity observations were carried out in this region. It was observed that along the northern bank of the Balagarh Island, the maximum ebb velocity at the upstream end was 0.4 m /sec and at the mid- way of the island where the jetty location is proposed, it was 0.7m/sec.

4.8 Float Observation

Proto- type float - observations were carried out by dropping a series of floats from pre- determined positions on specific section lines from the upstream of the study area during post-monsoon of 2014 (on 19.02.2015). The float-ways observation has been plotted which indicate that the flow is more or less sympathetic to the morphology of the river reach. It is clear from the flow- lines diagrams (Fig.10) that the flows are optimally aligned with the river shape. The proto- type flow lines corroborate the velocity of surface flow of study area. The most significant observation is the parallel movement of flow filaments from the upstream to downstream part of the river.

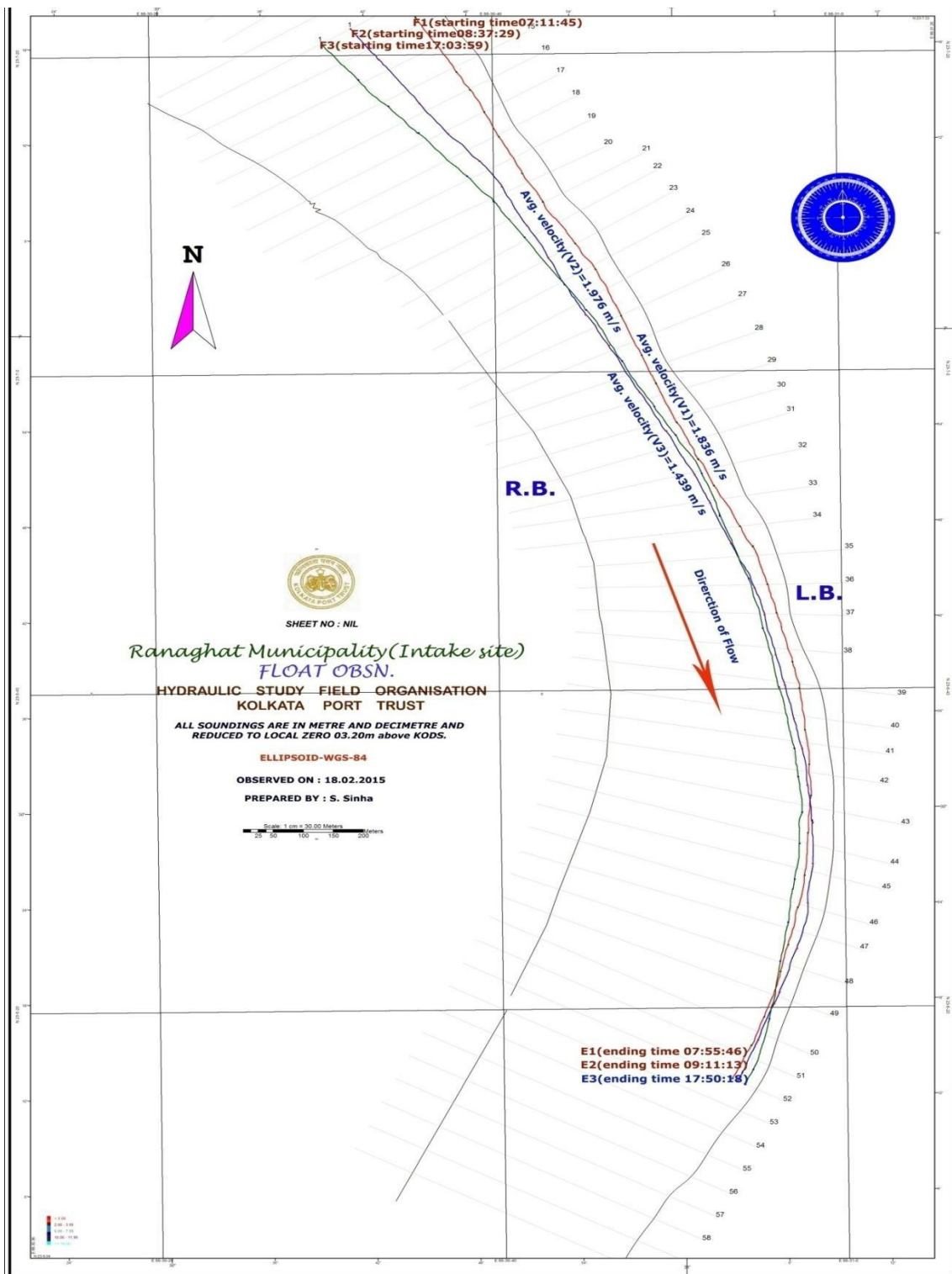
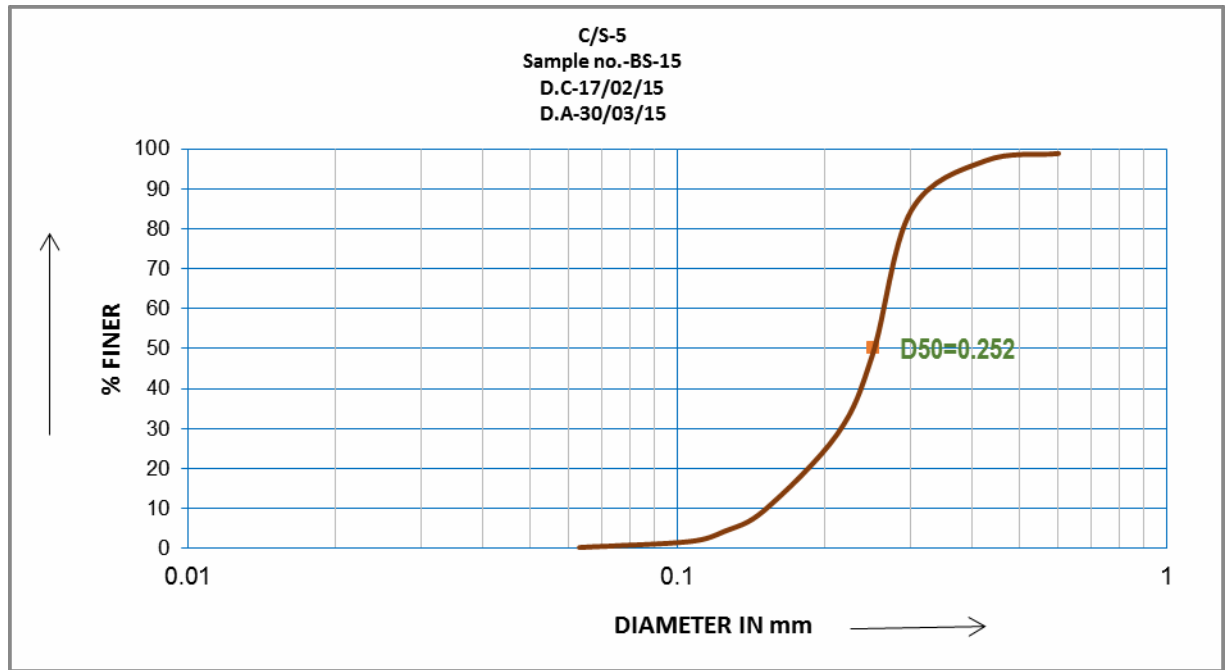
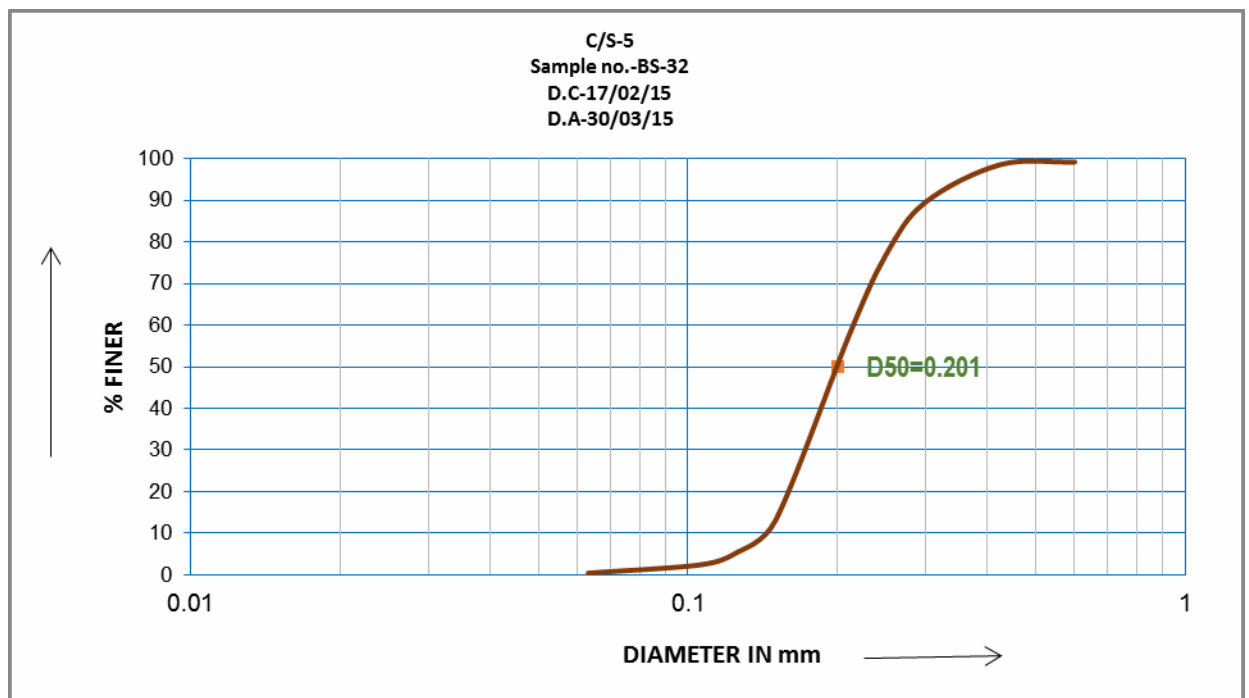


FIG:10

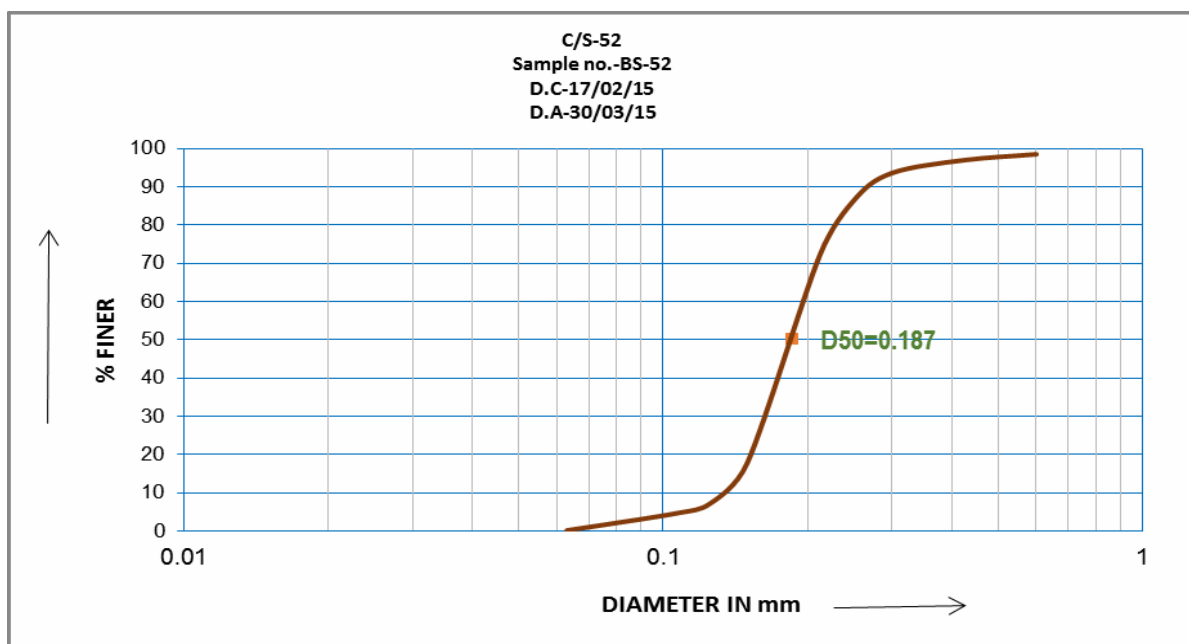
It is observed that during non-monsoon period, the water is more or less silt-free (0.004 gm/l to 0.007 gm/l) and the D-50 of the bed material varies from 0.17mm. to 0.25 mm. that indicates fine to medium coarse sand in the bed material (FIG:11 to FIG:13)



Grain size distribution curve (Feb' 2015) FIG:11



Grain size distribution curve (Feb' 2015)
FIG:12



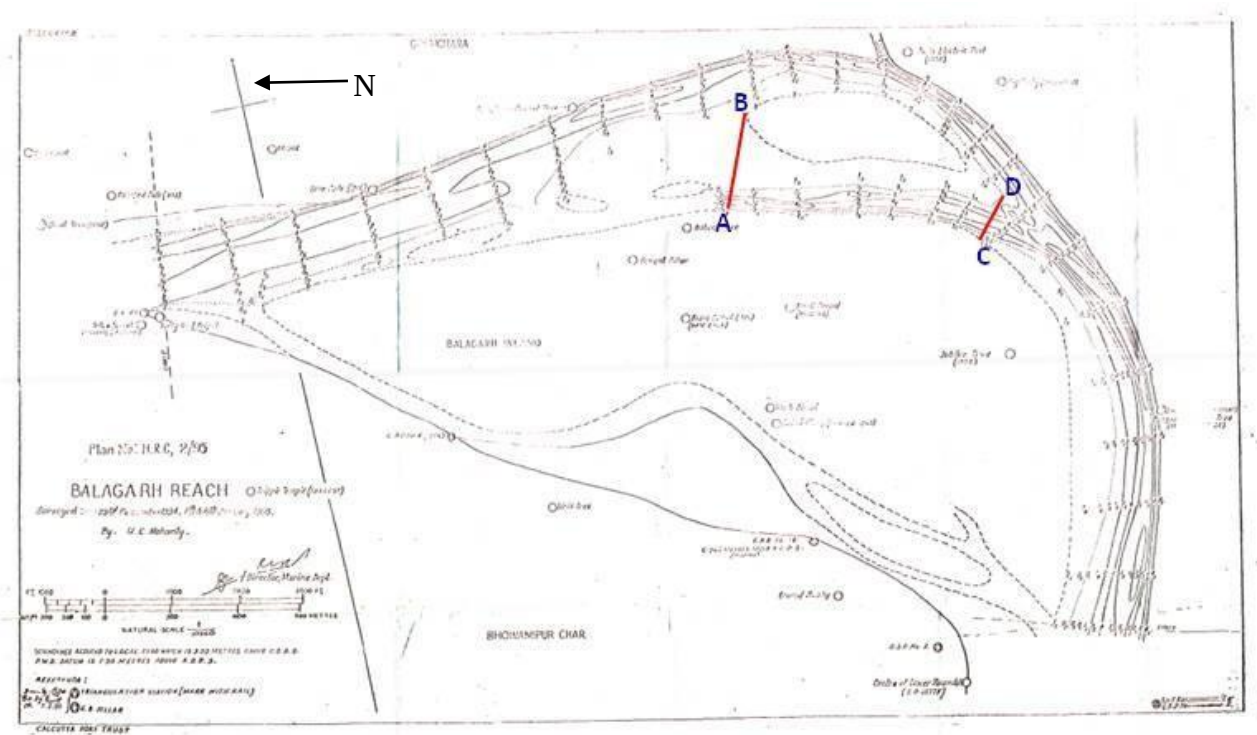
Grain size distribution curve
(Feb' 2015)
FIG:13

4.8.1 Geo-technically the river flows over a typically alluvial bed with migrating bed and bank configuration. No extensive sub-soil data is available with KoPT, however, some data collected under a programme of soil investigation near the ferry crossing, upstream of the island show the following characteristics:

Bank level	Characteristics
(0m)to -5.0m	Soft to moderately stiff grey clayey silt With some fine fine sand
-5.0m to-15.0m	Loose to medium dense yellowish/light Grey silty fine sand, predominantly Sand with a patch of clayey silt deposit At -13.5m depth.

4.10 Bathymetric survey charts

The bathymetric survey charts over a period of 21 years brazenly indicate that the depth fluctuates noticeably in the channel with respect to years. Mostly the northern part is affected, may be due to entrance of low ebb flow causing more sedimentation which ultimately impedes the propagation of flood from the downstream part. (Fig.14a to 14f) Therefore, the effect of flood is pronounced upto the middle portion of the channel from downstream (Fig.2). Recently, it is observed that pockets of deep water body have developed.



JANUARY- 1995

FIG:14a

DBM of Balagarh creek of Post 1995

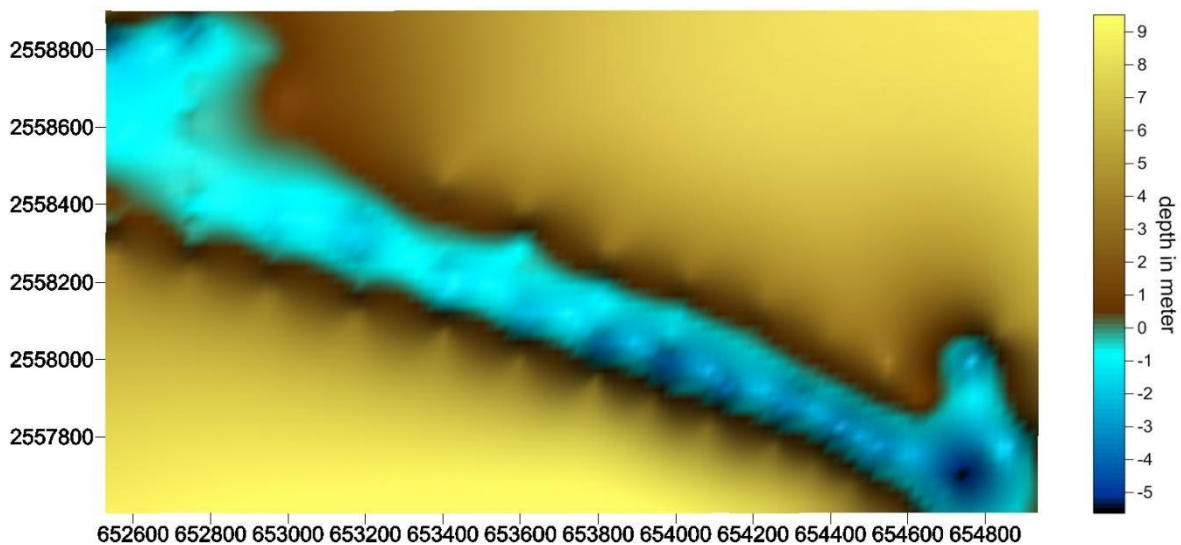
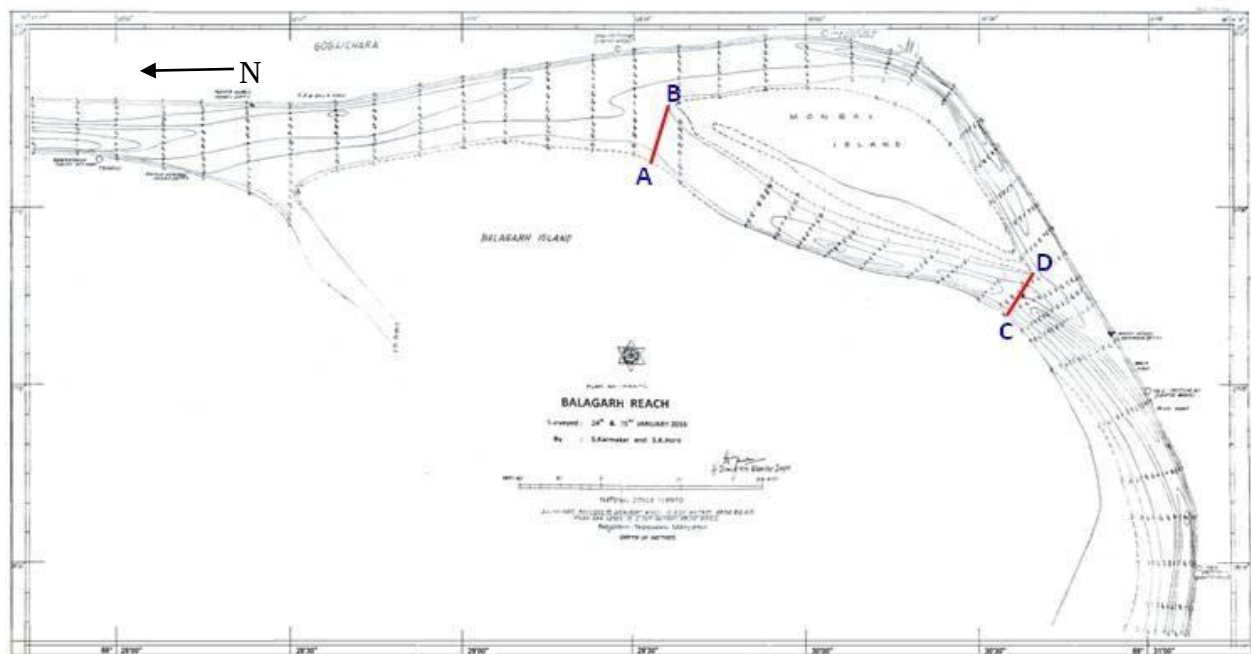


FIG:14b

DBM (Digital Bathymetric model) of Post-monsoon 1995 indicates that the depth of the creek channel is much towards the southern part while the northern part and the middle portion is shallower.



JANUARY- 2016

FIG:14e

DBM of Balagarh creek of Post 2015

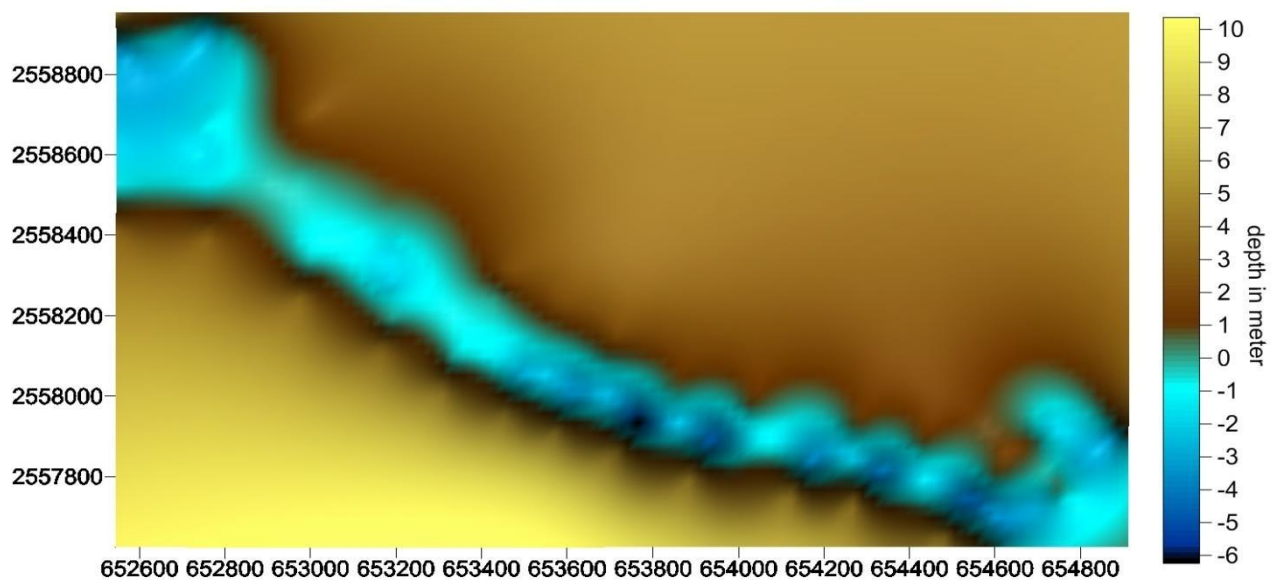


FIG:14f

The middle part and the southern part has become deeper compared to the northern part.

c) Satellite Image analyses

The IRS - LISS-III satellite images are used of the seasons of post- monsoon 2001, 2003, 2005, 2007, 2009 and IRS-P6 LISS-IV satellite images are used of the seasons of post-

monsoon 2011, 2013 and 2014 for studying Bank line change and land use pattern of the area. Bank line changes of the region have been examined from the images. The study area is the eastern part of Balagarh island. It is evident that nominal changes took place during the period of 2003 to 2017 at the study area. (Fig.15). The morphology of the Balagarh island and its changes with time are shown in Fig.16 to Fig. 23

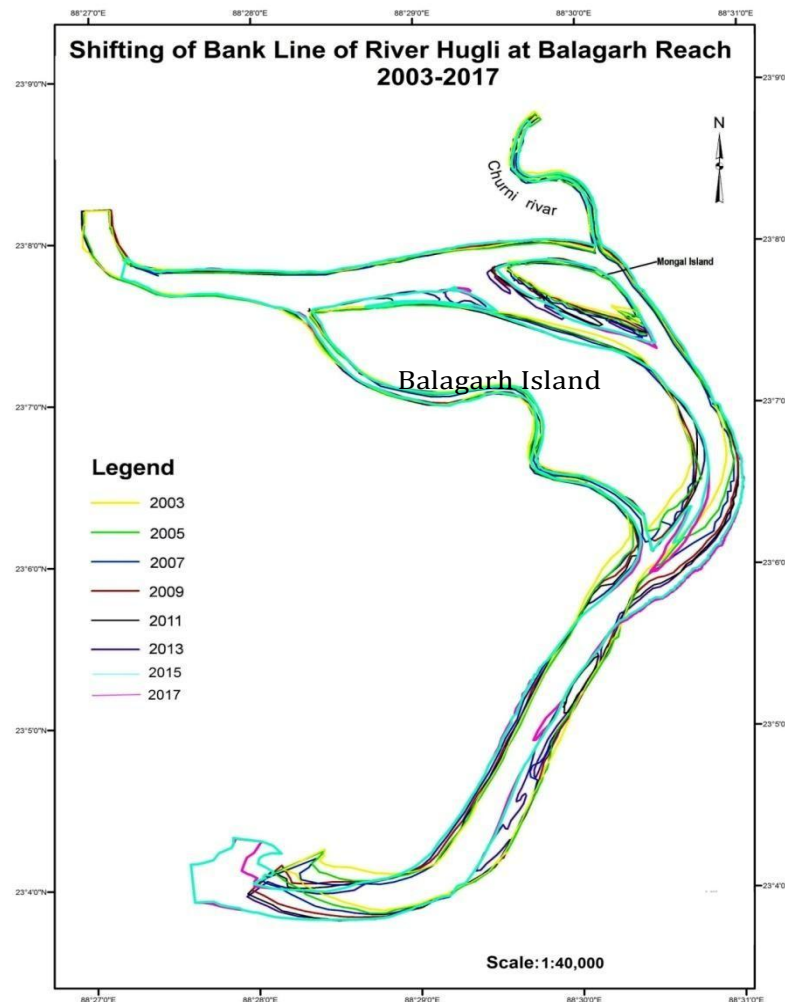


Fig. 15

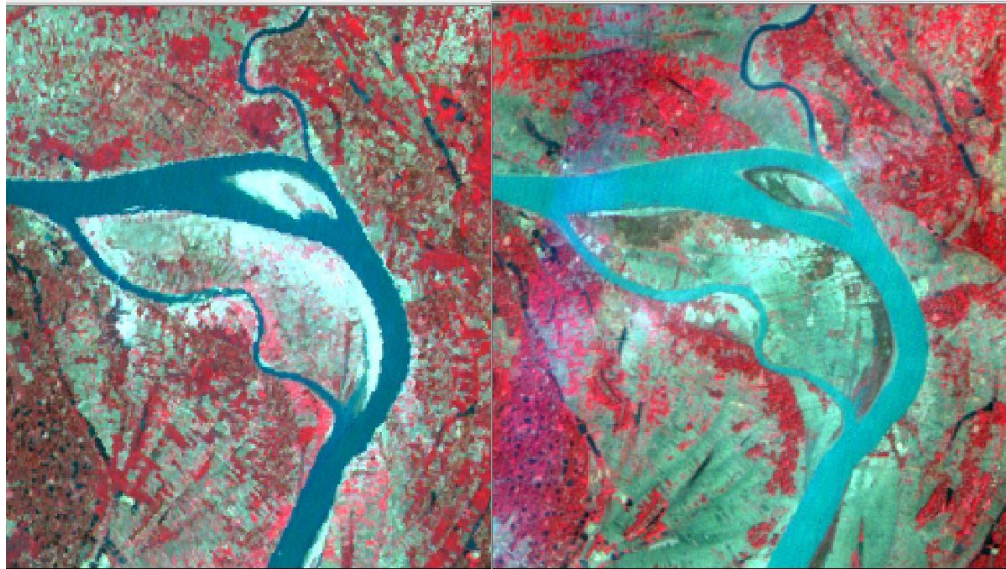


FIG:16, 2001

FIG:17,2003



FIG:18, 2005



FIG:19,2007



FIG:20,2009



FIG:21,2011



FIG:22,2013

FIG:23,2014

Year	Description
2001	Domination of bare sand can be noticed along the left bank of Balagarh Island and in the Mongal Island.
2003	Bare sandy surfaces have become laden with moisture with few traces of vegetation.
2005	Vegetation cover has increased in both the Islands. Slight bulge of siltation can be noticed in the southern portion of the Balagarh Island.
2007	Domination of agriculture in the Balagarh Island is visible from the image of 2007.
2009	Sedimentation along the right bank of Mongal Island can be noticed.
2011	Thin line of sedimentation can be noticed at the upstream end of Balagarh Island, along the left bank of the same.
2013	Growth of vegetation is observed at the newly grown part of Balagarh of 2011. Another sign of sedimentation is visible towards downstream.
2014	Both the islands have increased in size due to sedimentation.

4.11 Four classes were delineated in the images namely; Vegetation with Settlement, Agricultural Land, Bare Land, Shallow water body and River. The land cover maps were prepared for the year 2001, 2003, 2005, 2007, 2011, 2013 and 2014.

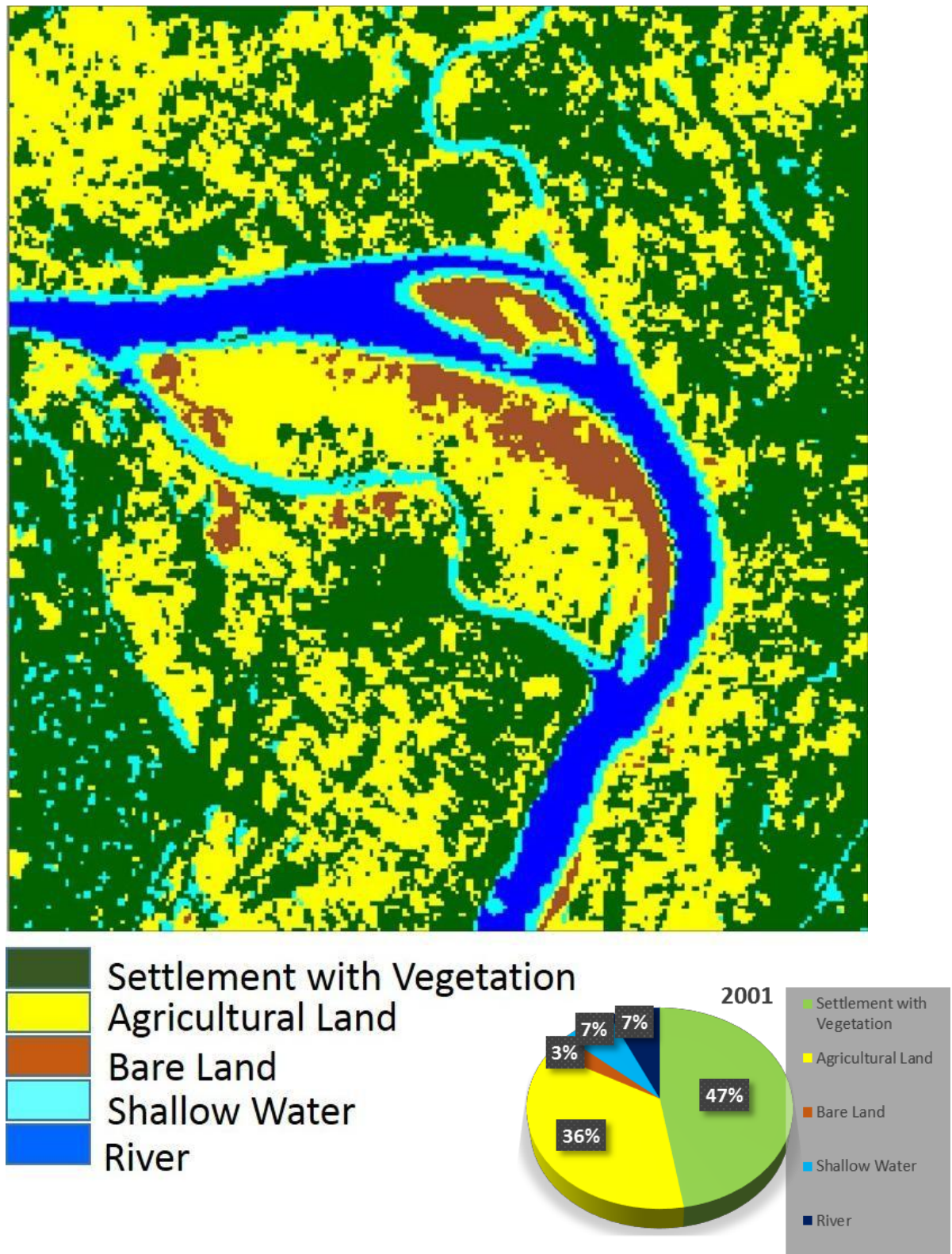


FIG:24, Land Cover map of 2001

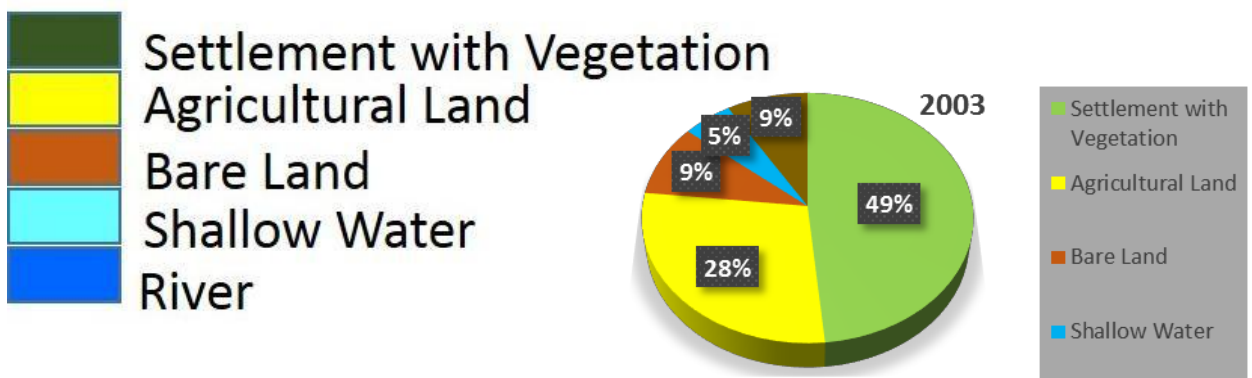
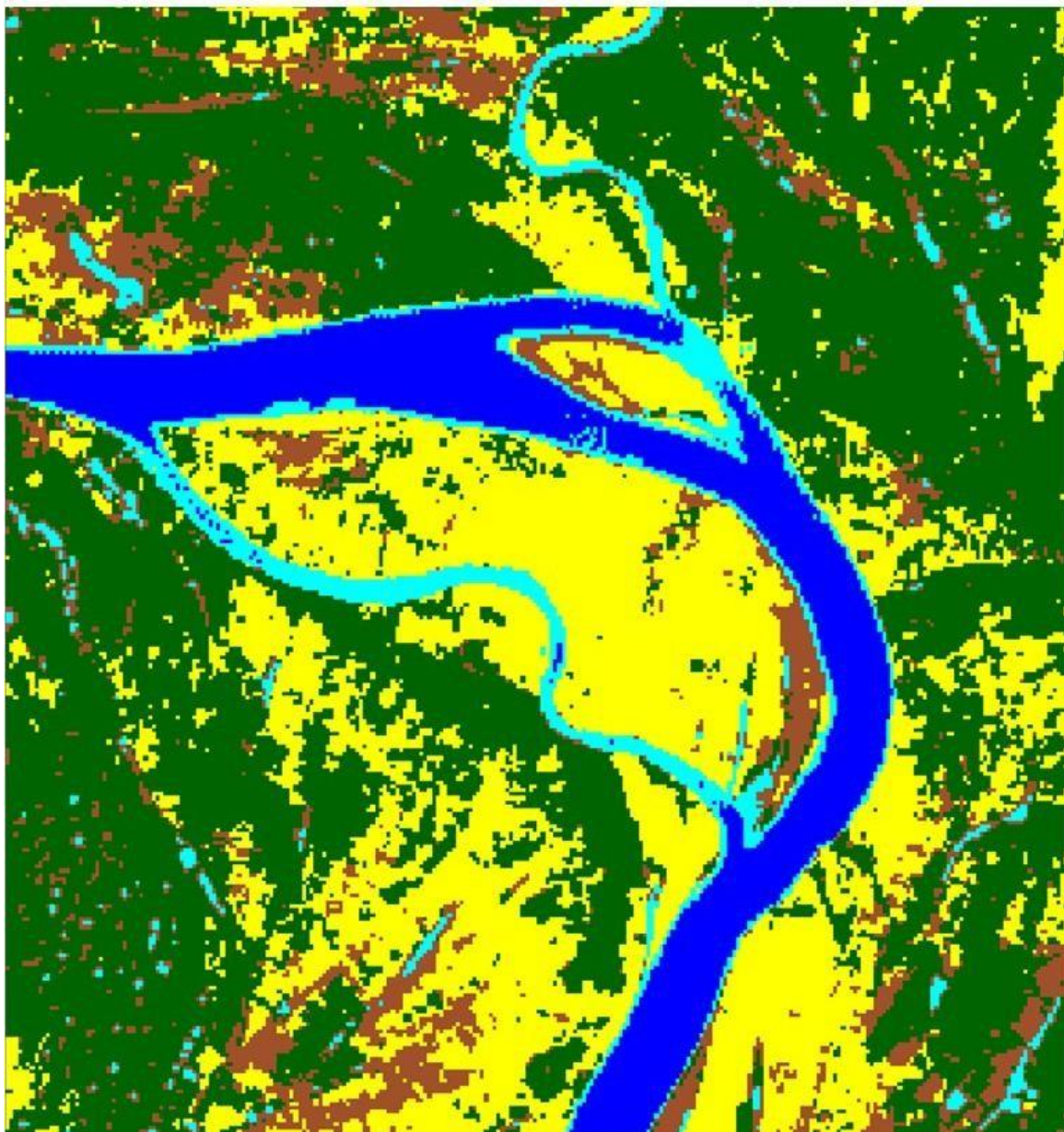


FIG:25, Land Cover map of 2003

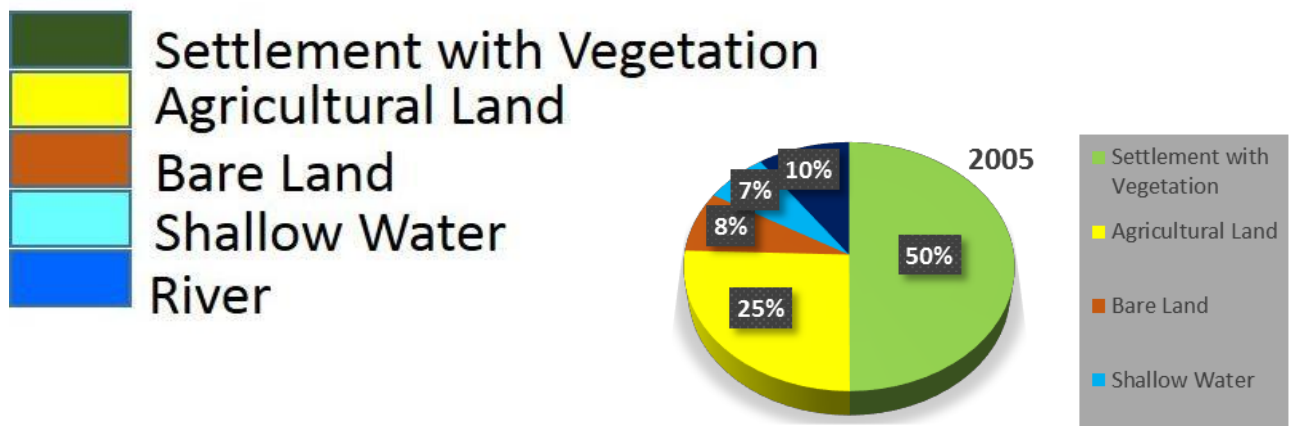
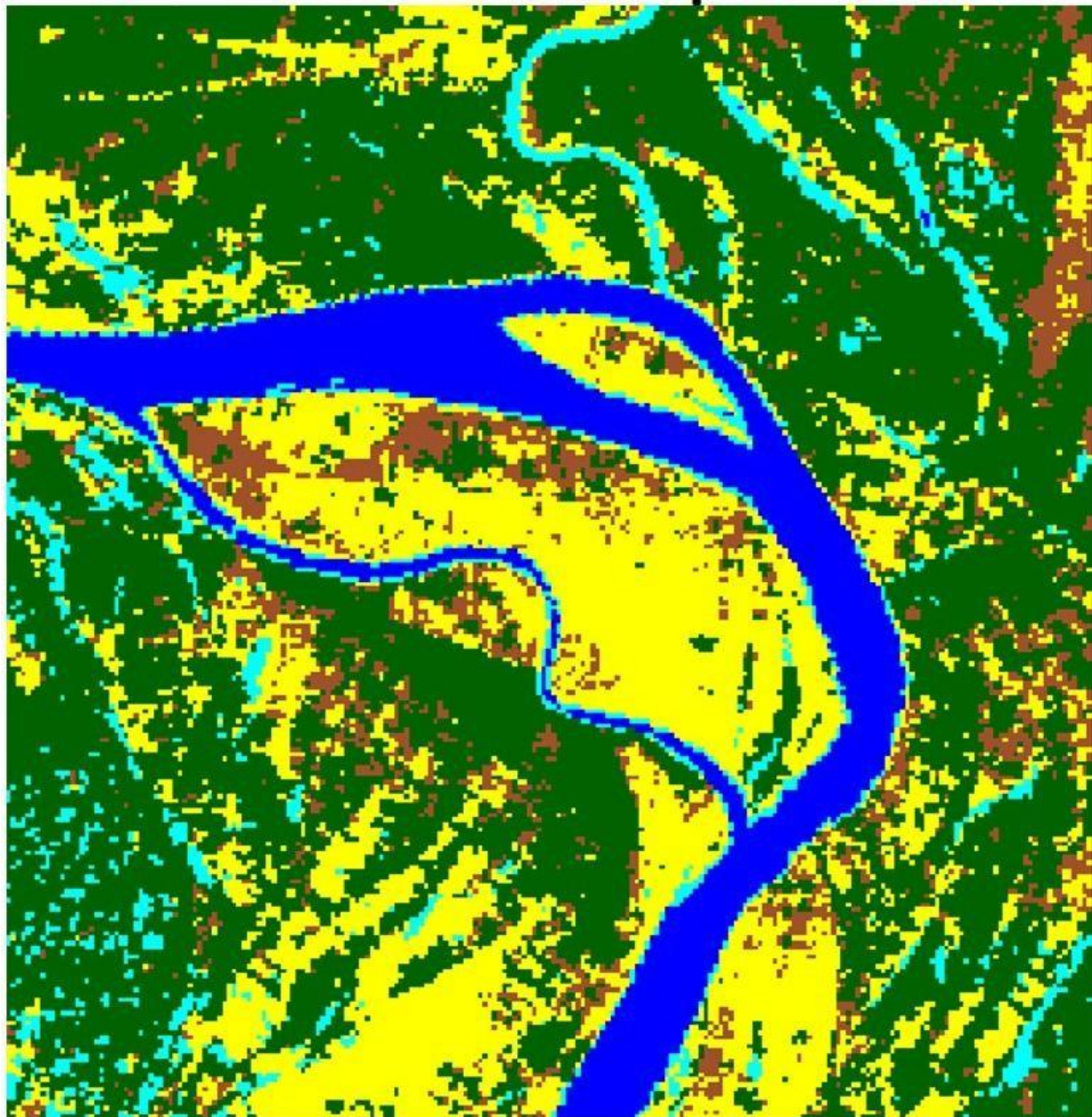


FIG:26, Land Cover map of 2005

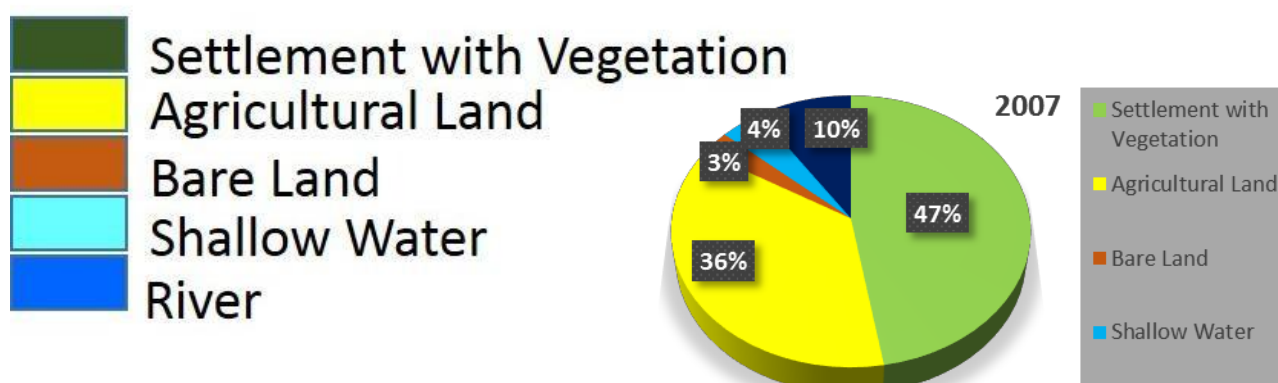
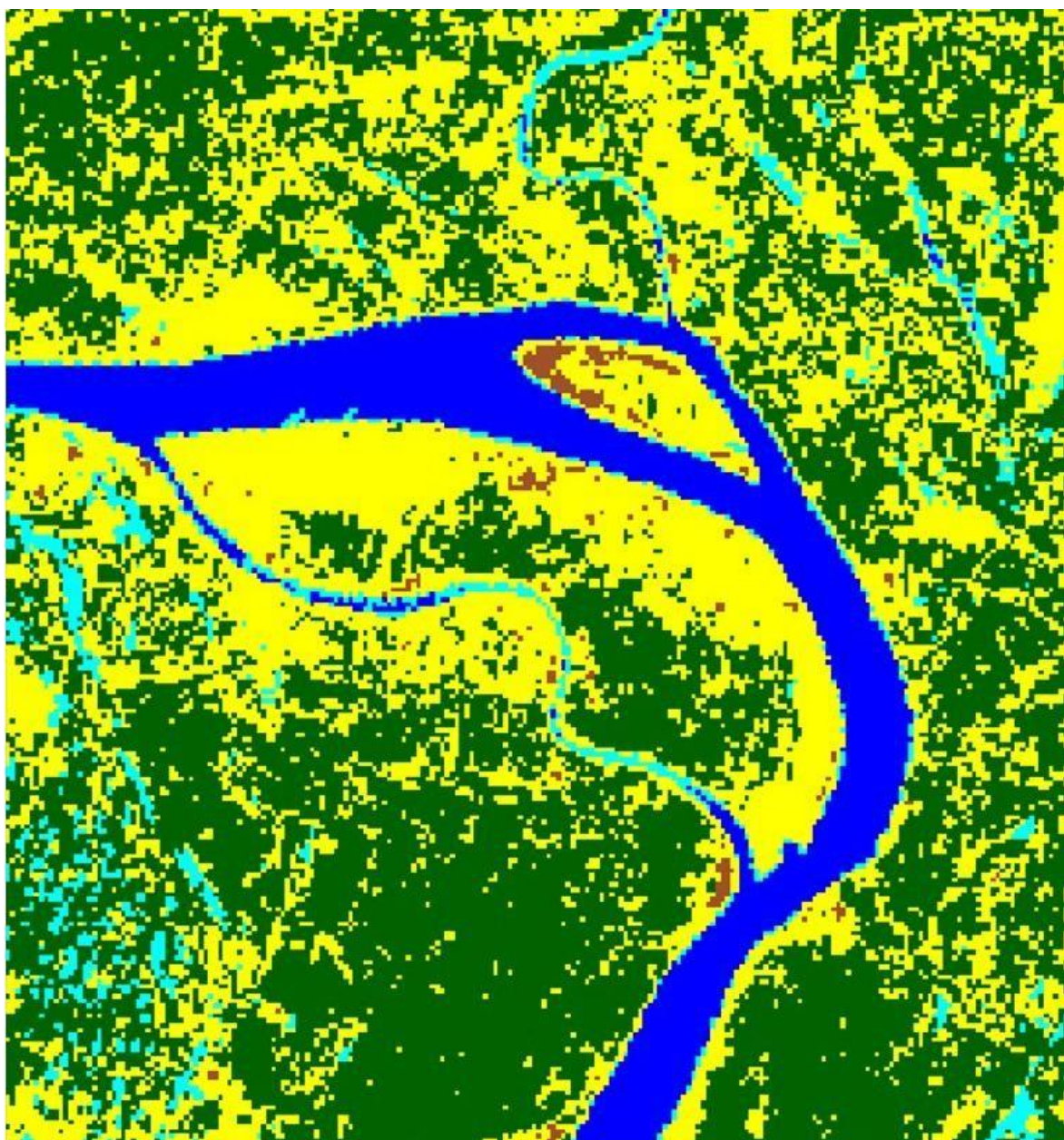


FIG:27, Land Cover map of 2007

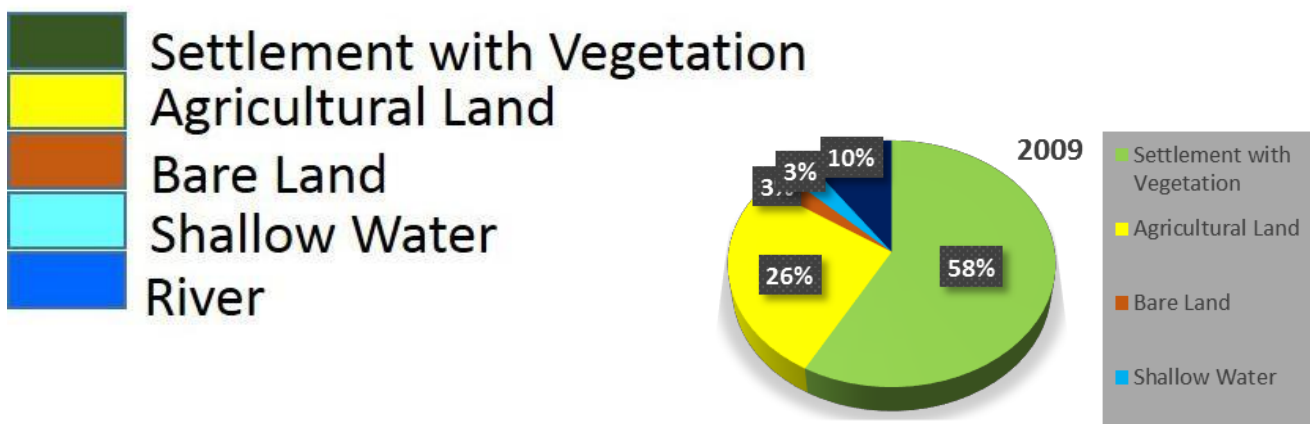
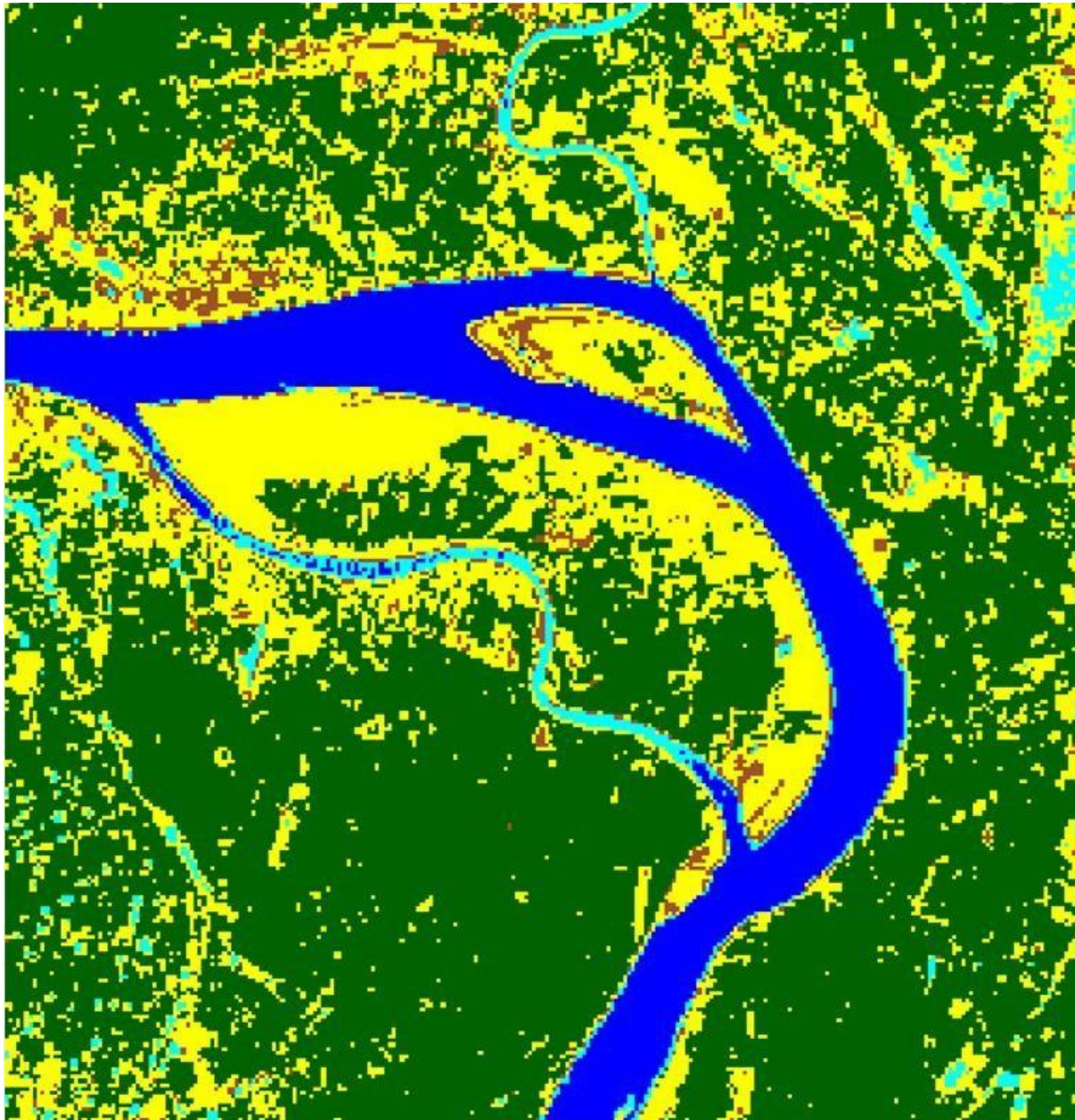


FIG:28, Land Cover map of 2009

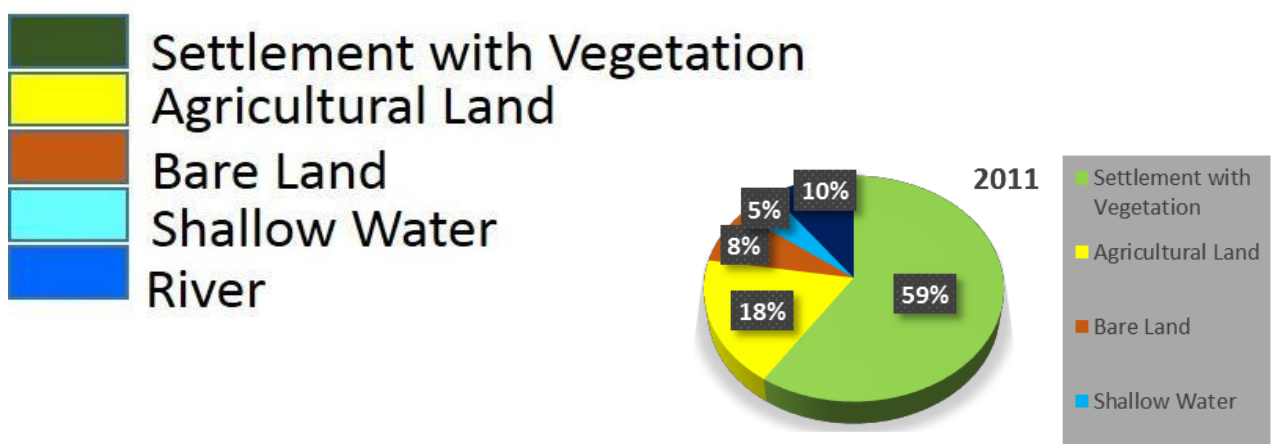
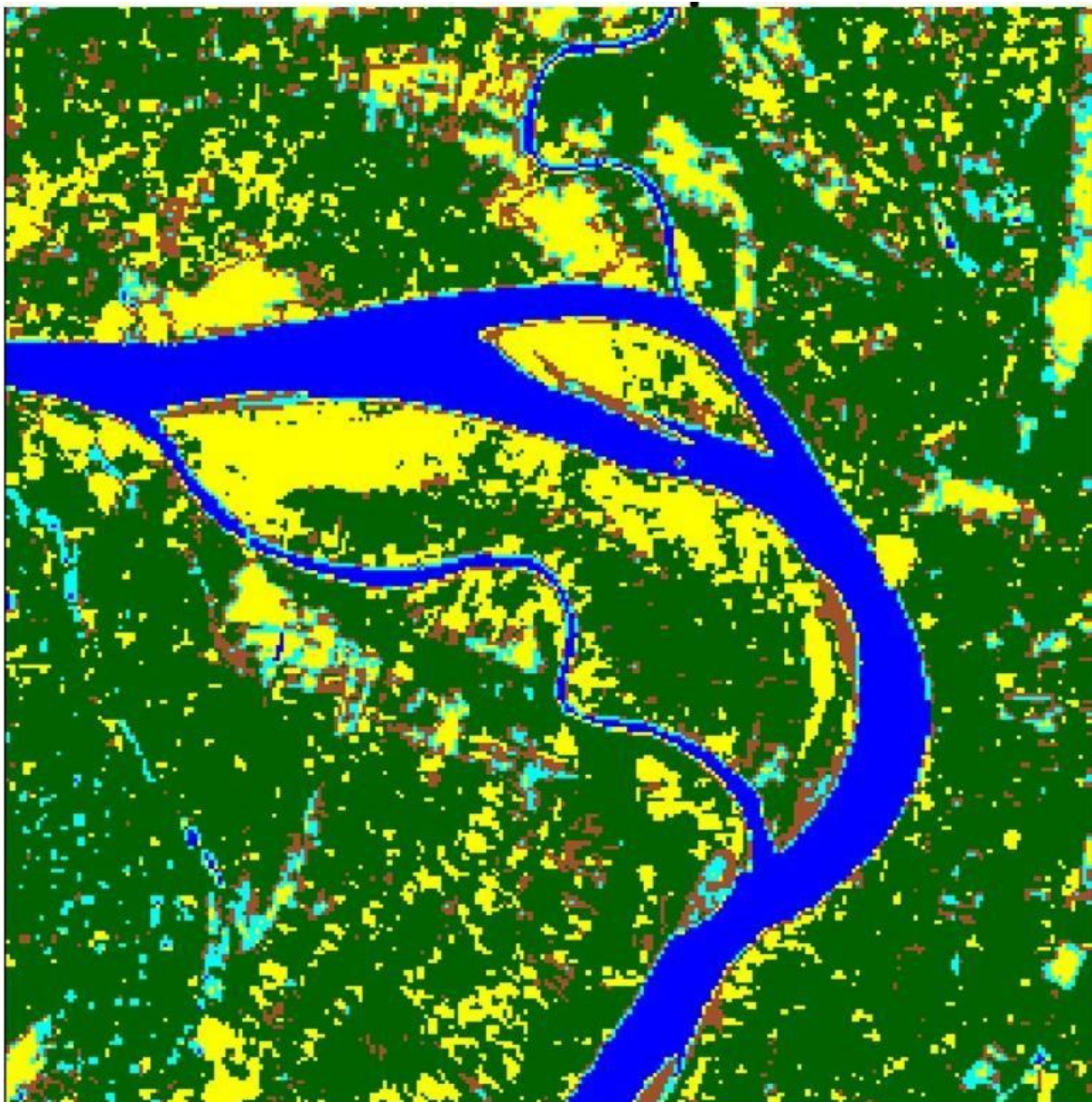


FIG:29, Land Cover map of 2011

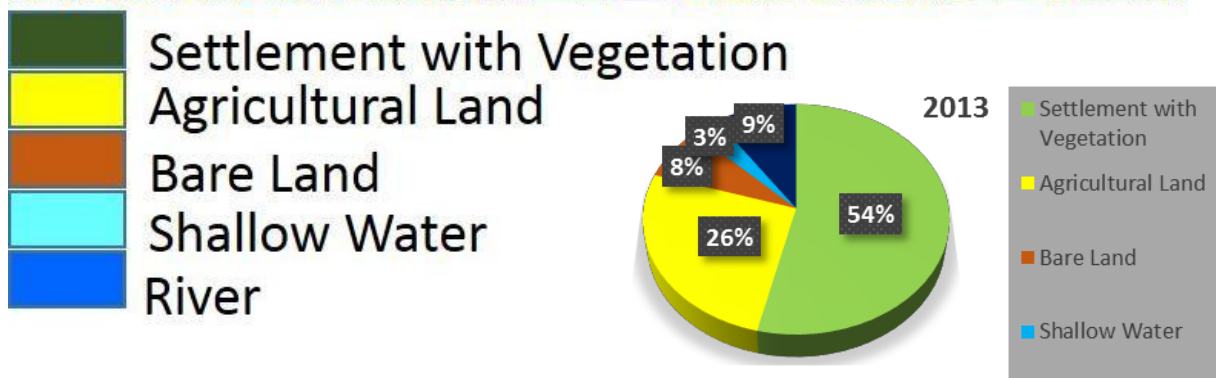
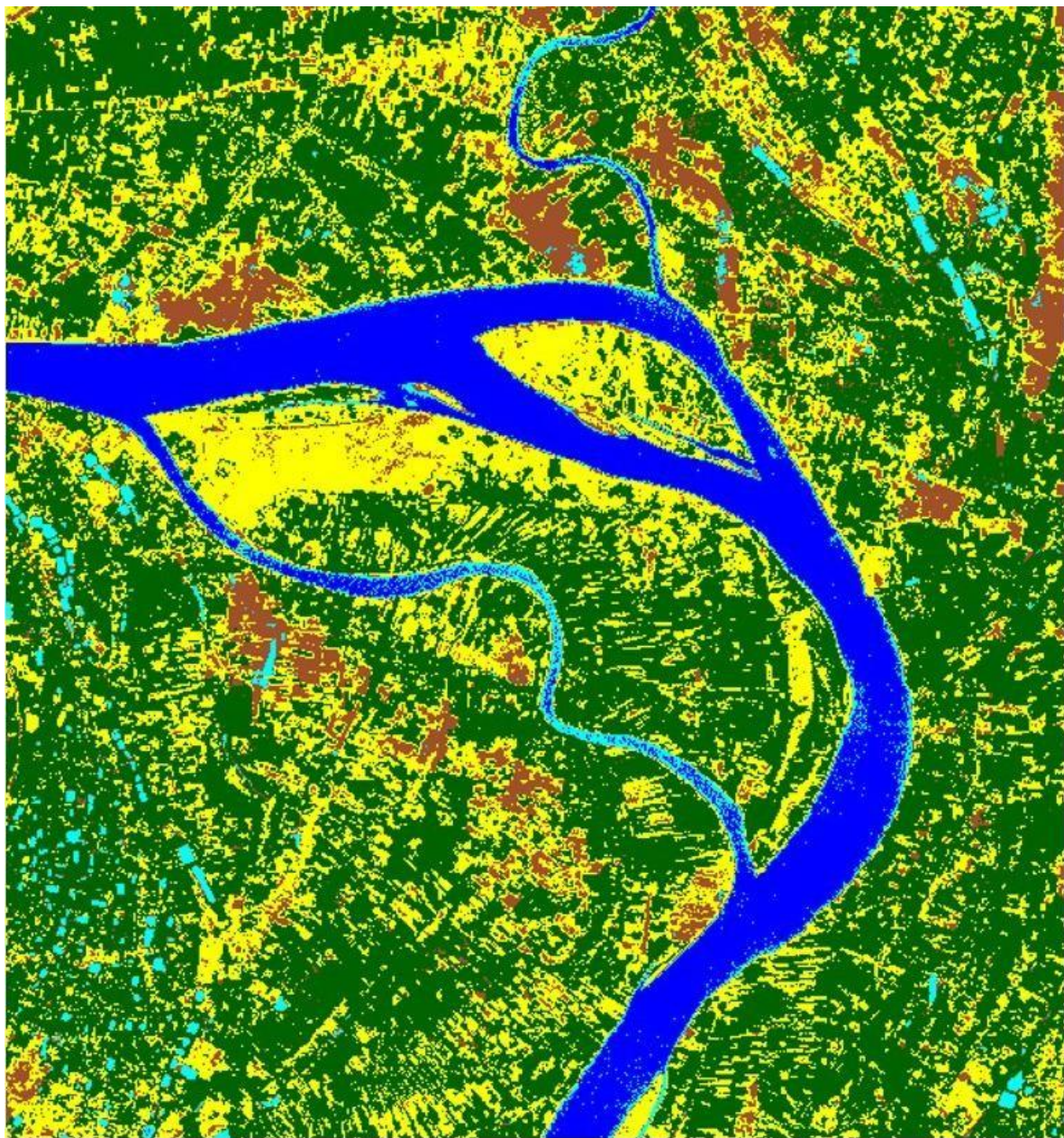


FIG:30, Land Cover map of 2013

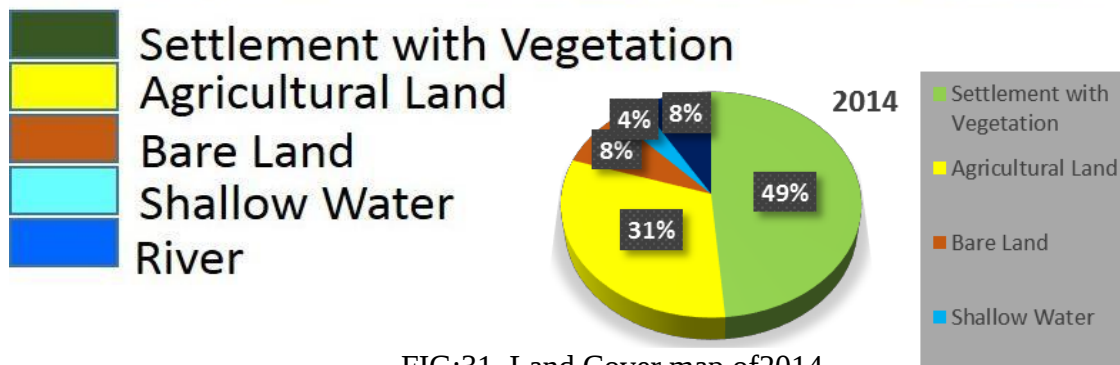
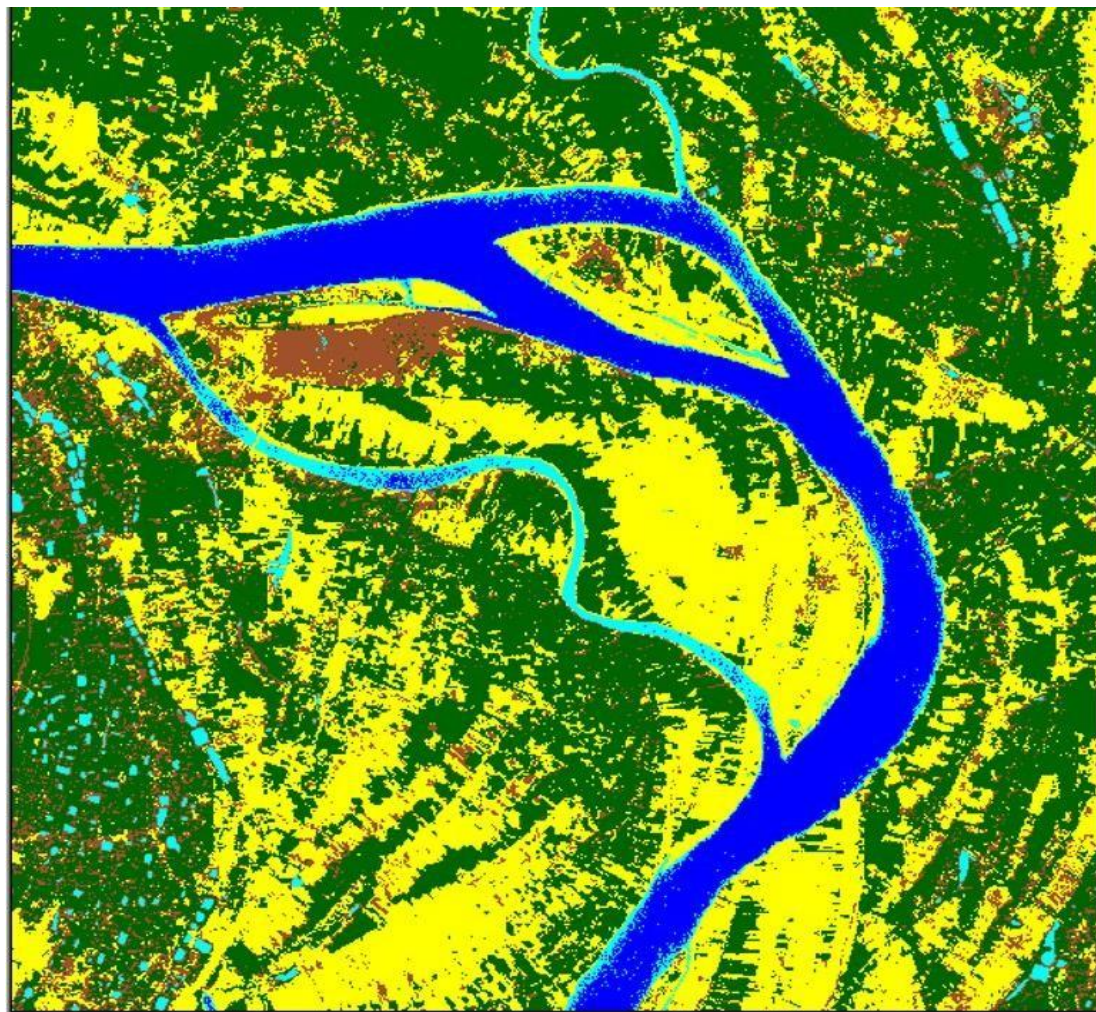


FIG:31, Land Cover map of 2014

4.12 From the land use map, the percentage of land sharing by different morphological activities has been designed. As in the land cover maps, the percentage of the area is computed into five main types these are Settlement with vegetation, Agriculture land, Bare land, Shallow water and river, in the pie-diagrams. From the pie-diagrams showing the percentage of land sharing by different morphological activities, it is seen that percentage of land covered by last two classes (i.e. shallow water and river) has remained more or less same all through the years. Interchanging pattern can be noticed in between the other three classes.

4.13 Discussion

4.13.1 From the foregoing analyses, it is evident that the stretch of the river, situated at the Eastern part of Balagarh Island is around 2 Km. long with varying width from around 150m to 240m. The northern part of the stretch is quite shallow, maximum depth is around 1.0m, while the southern part is influenced by flood cul-de-sac resulting in deep water pocket where maximum depth is 6.6m. (Fig.) with respect to local datum. The north bank of the island has a slope of 1: 1.9 at the upstream end, 1: 3.79 at mid-way and 1: 0.75 at a location off Mangal island. Tentative location of jetties have been shown in Fig.2 in order of preference. Distance between two jetties i.e. Jetty no. 1 and 2 has been kept 160m, similarly the same between jetty no. 3 and 4 has also been kept 160m so that barge can easily be docked at jetty. In front of the jetty, the width of the water way is around 80m to 120m which appears to be good enough for turning of barges.

4.13.2 Furthermore, it is observed that only a stretch of around 800m at the northern part of the channel may be dredged to a depth of 2 m below chart datum so that the main ebb flow gets a passage to flush out the sediment from this stretch towards downstream and the flood also gets a thoroughfare through this area. If this phenomenon happens, this channel will automatically be maintained and a consistent draft of 3.5m will be available in the channel all along the jetty. It is also calculated that about 0.14 Mm^3 of sediments may be dredged one time to make a passage of 2m at the northern part of the channel. It is necessary to make configuration of the bank on both side of the channel intact by protection works for about 1.3km. stretch on the Eastern part of Balagarh island and western part of the Mongal island. Present bathymetry of the river over the study area shows morphological stability of the reach. The hydrological observations indicate steady flow pattern in this reach

4.14 Recommendations:

The recommendation is confined from morphological, hydrological and hydraulic consideration. From the above studies and discussions, the following recommendations are made:

- Considering all the hydraulic parameters and the desk studies as well as satellite image analyses, the suitable location for construction of jetty has been shown in fig.2 in order of preference.
- The protrusion of the jetty will be around 25-30 m towards the river from the high bank.
- During and after construction of the jetties, the area should be kept under close supervision through hydrographic surveys/ hydrological observations at regular intervals.
- The satellite interpreted data also depict favorable environment for the proposed jetty considering the morphological stability and connectivity.

- It is also observed from the synthesis of all data that the required draft i.e. 3.5m throughout the year will be available from the proposed location.
- It may be mentioned that the entire Bhagirathi-Hugli River system, particularly, the proposed study area is very much under the influence of upland discharge.
- Dredging may not be a regular phenomenon. Very small quantity of dredging as and when required basis may serve the purpose.
- Bank-protection works on both sides of the channel in sensitive areas are required to maintain the favorable channel configuration in the long run.

SECTION 5

INFRASTRUCTURE PLANNING

5.1 Cargo Profile

5.1.1 The traffic study has examined the current traffic trend and the expected growth in the traffic of the predominant cargoes presently handled at KDS and quantum of cargoes that could be shifted to Balagarh. As container and pulses are thus the two major cargoes that are handled in KDS and goes through the congested city traffic these items identified and the traffic study concludes their feasibility to shift to Balagarh. The Port also is looking at the possibility of using the facility for any other new cargoes that have potential to be handled at this site. But for the present the potential is confined to the two main cargoes viz, Pulses and containers. However, the future needs of handling LNG and Ro-Ro would be kept in view while preparing the layout of the proposed facilities. As such the infrastructure and equipment planning consider these two types of cargoes with provision to handle breakbulk.

5.2 Traffic Volume Projections

5.2.1. Containers

5.2.1.1 The traffic study has concluded that 30% of the container traffic handled in 2015-16 at KDS viz., 1.67 Lakh TEUs has the potential to move to Balagarh. Based on similar assumption, the potential container traffic for Balagarh, out of 6.36 lakh TEUs handled in KDS during 2016-17 works out to 1.91 lakh TEUs. Extrapolating this figure to 20-21 (the likely year of commissioning of Balagarh terminal) at a CAGR of 4% the likely container traffic at Balagarh during 2020-21 would be 2.23 lakh TEUs

5.2.1.2 On the above basis and at a growth of CAGR 3% from 2021-22 to 2024-25 and at 2% thereafter the traffic expected at Balagarh has been projected in the traffic study as under.

Timeline	2020-2021	2024-25	2034-35
In lakh TEUs	2.23	2.51	3.06

5.2.2. Pulses/Peas

Presently, the volume of traffic at KDS is 0.5 Million tonnes and the traffic study concludes that this traffic would stay at around this volume in near future. Of this about 60 % of cargo is expected to be attracted to Balagarh. Since most of the commodity goes upcountry by road except to Guwahati and

Dimapur, their diversion to Balagarh will not have any objection from consignees. As such, about 3.0 lakh tonnes per annum is considered for handling in Balagarh. The entire quantity of pulses will be imports and in the form of bulk and most cargo is expected to be evacuated by road after bagging which activity will be done by the user agencies.

5.3 Present Mode of Handling

5.3.1 Containers

Presently container traffic is handled almost exclusively at NSD. The Port intends to discharge containers and pulses from mother vessels into barges at Diamond Harbour/ Sagar Anchorage Points and bring the barges to Balagarh for unloading. Similarly, it will load export containers onto barges at Balagarh and ferry them for loading onto mother vessels at Diamond Harbour/Sagar Island. Until the transloading operation of containers is fully established at Diamond Harbour/Sagar Island the Balagarh containers would be handled through NSD.

5.3.2 Pulses

Presently in Kolkata Port, vessels discharge yellow peas and lentils into barges at anchorages at Diamond Harbour or Sagar Anchorage Points. For reasons of economies of scale, yellow peas and lentils usually come in bigger parcels and deeper-drafted ships. As KDS cannot handle these ships, the vessels discharge the entire cargo into barges at anchorages at Diamond Harbour or Sagar Anchorage Points. The barges then come to Kidderpore Dock to discharge their contents for further handling.

5.3.3 Existing Transloading Operations for Pulses

The Mother vessel discharges cargo into barges at anchorage point at Diamond Harbour or Sagar Anchorage Points. The barges then move to Kidderpore Dock for offloading. The present transloading operation of pulses at Diamond harbor is captured in the following pictures.







5.4 Proposed Mode of Handling

5.4.1 Pulses

In the proposed mode of handling pulses, the Mother vessels will continue to discharge pulses into barges at anchorage point at Diamond Harbour or Sagar Anchorage Points. The Barges then move to Balagarh where they discharge their cargo for further processing including storage and dispatch. This operation is considered to be an established activity as vessels have been discharging peas/pulses into barges for many years in stream with barges coming to Kidderpore Dock for offloading. The difference now is part of the peas-laden barges will go to Balagarh. In other words, in the proposed system, the ships have to discharge pulses into 2 sets of barges – one going to Docks and the other going to Balagarh. Since the commodity is the same and there being no difference in quality, no sorting of the commodity location-wise will be necessary at the time of transloading from ship to barges. Only the quantity needs monitoring.

5.4.2 Containers

Two methods have been envisaged for barge operation for Balagarh containers

Method 1: Stream handling

In this method, mother vessels at Diamond Harbour or Sagar Anchorage Points would discharge containers on barges using ship's gear or floating crane. The barges will go to Balagarh where their containers will be offloaded for subsequent storage and delivery. The reverse process will take place for exports.

Method 2: Dock handling

Here, the vessels will as usual come to NSD and discharge containers at the berth (on quay). Containers will go to the yard. Then the Balagarh containers will be segregated and then loaded on barges. Barges will leave for Balagarh for further handling. Barge handling would be done initially in NSD using the existing facilities and when traffic builds up dedicated barge terminal would be provided by the side of the river for avoiding locks for barge movement.

5.5 Planning of Anchorages

5.5.1 For Pulses Vessels

Presently the anchorages for handling vessels carrying pulses are well established and there is expected to be no issue for continued handling of barges at anchorage in Diamond harbor and this mode of operation will be continued for transloading of pulses for Balagarh.

5.5.2 For Container Vessels

Identification of anchorages at Diamond Harbour for transloading of containers is to be done with due care since container handling would be possible only where/when water area is within a wave height of 0.5 meters. Such a condition is prevalent at Diamond harbor throughout the year.

5.6 Planning of Barge Terminal at Balagarh

5.6.1 General

The barge terminal at Balagarh is to be planned, designed and constructed for servicing the barges carrying the cargo and the cargoes with facilities for unloading/loading, storage and dispatch/receipt. In operational requirements the terminal should have facilities similar to Inland Container Depot (ICD) including Custom bonded area and Custom clearance. For evolving appropriate planning, a study of the requirements of the barges and cargo are made in the subsequent paras.

5.6.2 Waterway Capacity Analysis

On a study of the bathymetric charts of the Hoogly river from the Kolkata Port to Balagarh, it is seen that minimum 4m natural water depth is available below chart datum (BCD) up to Tribeni which is at chainage 193 km of NW-1, the location of Kolkata Port being at Chainage 135 km of NW-1. Beyond this location, upto the location of the site minimum 3.0m depth is available in the river. It may be possible to achieve 4.0m depth in this stretch by marginal dredging in a few pockets between the turning points of the river from one concave configuration to the other. The Inland Waterway Authority of India (IWAI) has mandated for maintaining the NW-1 upto Faraka at 3.0m depth for a width of 45m. It is also noted that tidal effect is available in a limited scale beyond Balagarh and a tidal advantage of 0.30 to 0.50m can be utilized for the navigation. As such it is seen that vessels with draft upto 3.50m can be safely navigated along NW-1 upto Balagarh, after leaving allowance for under keel clearance of about 0.30m. In future, it would be possible to operate barges with 4m draft without any dredging.

5.6.3 Design Barge Size

Barges are in operation in Kolkata Port for trans-loading of bulk cargoes imported in large size vessels. Maximum size of barges now employed for the bulk cargo transport between Diamond Harbour/Sagar Island and Kolkata Port is of 3000 dwt with cargo carrying capacity of about 2700 tonnes. The length, beam and draft of these vessels are 80m, 15m and 3.50m respectively. It is understood that specially designed barges of higher capacity would be deployed for the transport of cargo in future due to economies of scale. Based on discussions with the barge operators it is concluded that vessels with 90m length, 18m beam and draft of 4m are likely to be deployed in future for cargo and container

transport between Kolkata/Balagarh and Diamond Harbour/Sagar Island. The displacement tonnage of this vessel is to the order of 5000t and dwt to the order of 4000. Accordingly, the design vessel with the following parameters is considered for planning the barge terminal facilities.

- Length : 90m
- Beam : 18m
- Draft : 4m
- DWT : 4,000
- Displacement Tonnage : 5,000 tonnes

5.6.4 Crane for Handling Between Barge and Berth

5.6.4.1 Barge berths are proposed to be designed for multi-purpose operation, that is to say it would have the capability to handle bulk cargo/containers as per the requirements. As such the cargo handling equipment provided on the berth should have the flexibility/capability for handling bulk cargo/containers as per the requirements. In this connection it is specifically considered that the equipment provided for transfer of cargo between barge and berth should have the capacity to handle 40 feet containers from the extreme location of the barge, that is to say the crane should have minimum out reach of 17m from the berthing line with a lifting capacity of not less than 31t (maximum weight of 40 feet ISO container being 30.48 tonnes) under automatic spreader for the smooth handling of containers. Based on a study of different types of cranes in use for handling between barge and berth it is concluded that Mobile Harbour Cranes (MHC) are the versatile equipment for this type of operation. The handling of bulk cargo can be changed to container handling by the simple replacement of the grab with spreader.

5.6.4.2 From a study of the lifting capacity and outreach parameters of various brands of MHCs available in the market it is concluded that Liebherr 280 type (64t) or similar capacity MHCs are required for handling 40 feet containers at an outreach of 17m from the berthing line. Accordingly, this type of crane is considered for the planning and design of berth.

5.6.5 Gross Average Crane productivity

The proposed crane could achieve a rated 15 cycles per hour in barge operation. The pay load capacity of the proposed grab is 20t. In the actual operation all grabs would not be full and there would be loss of operation time due berthing and unberthing of barges, crew changes, break down etc and gross average productivity would be about 50% of the theoretical capacity. Accordingly, gross average productivity of the crane per day works out to 3600 t ($0.50 \times 24 \text{ hrs} \times 15 \text{ cycles} \times 20 \text{ t}$) for bulk cargo

handling. In the case of containers gross average productivity achievable is $\frac{2}{3}$ rd of the theoretical capacity. As such gross average productivity of the crane per day works out to 240 boxes ($\frac{2}{3} \times 24 \text{ hrs} \times 15 \text{ cycles}$) or 360 TEUs for container handling, the box ratio being 1:1.

5.6.6 Estimated Crane and Berth Requirements

As per the Traffic Study the projected traffic is as given below.

Year	2020-2021	2024-25	2034-35
Pulses in lakh tonnes	3.0	3.0	3.0
Containers in lakh TEUs	2.23	2.51	3.06

The acceptable berth occupancy is considered as 70%. Accordingly, the effective crane days available in a year works out to 255.50 days (0.70×365). Further, it is considered that on an average 1.50 cranes can be effectively worked on a berth and it considers this on economies of operations of berths and barges. On the above reckonings the number of cranes and berths required progressively are worked out as given below.

Year	2020-2021	2024-25	2034-35
Crane days for Pulses	83.33	83.33	83.33
Crane days for Containers	619.44	697.22	850
Total Crane days	702.77	780.55	933.33
Number of Cranes	2.75 Say 3	3.05 Say 3	3.65 Say 4
Number of berths	2	2	3

5.6.7 Berth Dimensions

The berth requires length on either of the barge for holding the mooring lines as well as for marginal lateral shifting of barge for ease of crane operation/berthing maneuvers. Based on the operational requirement gathered from barge operators additional 15m berth length is considered on either side of the barge. Accordingly, the berth length required for one barge with 90m length is 120m (barge length 90m + 2x clearance 15m).

The berth shall have adequate width for the simultaneous operation of MHC and 40 ft container trailers. A width of 20m has been proposed for the berth based on the following assessment.

- Crane base width (out to out of Outriggers) : 12.50m
- Clearance from outrigger edge to riverside edge of berth : 1.00m
- Vehicle Path : 6.00m
- Rear side kerb : 0.50m
- Total : 20.00m

Thus the proposed size for each berth is 120m x 20m.

5.6.8 Type of Berth structure

Two types of structures (a) Quay wall and (b) open piled structure have been considered for berth construction and open piled type construction has been chosen on the technical considerations of imposing minimum disturbance to the hydraulic regime of the river and minimizing the risk from river bed scour. The open piled structure would be more adaptable for deep scour situations since the process would not impose any significant effect on the structure but for the strain for the structure due increased overhang.

5.6.9 Connecting Bridge

Bridges with carriageway of 10m are have been proposed for connecting the berth to the land. 30m length has been considered for the bridge for keeping the propeller action area and berth face sufficiently away from the river bank with intention of conserving the existing river bank with least disturbance.

5.6.10 Berth Location

The southern bank of the river branch flanking the Island has straight stretch for a distance of about 600m. This straight stretch is almost at the middle of the Island and the flow lines at this location are almost parallel to the shoreline. The water depth at this location varies from 2m to 6.6m. The access distance from the main river is less than a km. This location can accommodate up to five berths against the projected requirement of three berths. The location has been identified as depicted in the google image below.



Proposed location of Barge berths in Balagarh

5.6.11. Container Storage Yard

- Basic considerations in the planning of container storage area are as detailed below.

Particulars	Loaded Containers	Empty containers
Distribution Ratio to Total Traffic	80%	20%
Average dwell time (days)	5	15
Handling equipment	Reach stacker	Empty handler
Maximum stack height	3.0	6.0
Average stack height	2.5	4.8
Average area per ground slot (m ²)	45	30

- On the basis of the above container storage required has been calculated as given below.

Year	Projected Traffic (TEUs)			Estimated Ground Slots (Nos.)		Area required (m ²)		
	Total	Loaded	Empty	Loaded	Empty	Loaded	Empty	Total
2020-21	223000	178400	44600	978	382	44010	11460	55470
2024-25	251000	200800	50200	1100	430	49500	12900	62400
2034-35	306000	244800	61200	1341	524	60345	15720	76065

5.6.12. Storage Sheds for Pulses

The proposed mode of operation is to unload the cargo in bulk from barges, convey and store in sheds and bag in the shed before dispatching the same. The shed should have adequate facilities for storage in bulk, cleaning, bagging etc. The area requirement is estimated as detailed below.

Projected annual throughput	: 3 lakh tonnes
Average dwell time	: 15 days (speculative cargo)
Maximum quantity to be stored at a given time	: $300000 \div (365/15) = 12330$ tonnes
Average storage height per tonne	: 2m
Maximum stack height	: 4 m
So, net covered area required	: $12330 \times 2/4 = 6165 \text{ m}^2$
Add 15% towards cleaning/bagging area	: 925 m^2
Add 40% towards circulation space	: $0.40 \times (6165 + 925) = 2836 \text{ m}^2$
Total area for sheds	: $6165 + 925 + 2836 = 9926 \text{ m}^2$
	Say $10,000 \text{ m}^2$

It is proposed to provide two sheds each of 5000 m^2 (200m x 25m). The land area required for accommodating the two sheds with space for vehicle circulation / vehicle holding for loading operation is about 23000 m^2 (230m x 100m).

5.6.13. Terminal Road

There will be a main road running for the full length of custom bonded area of the terminal. The carriageway of the road would be minimum 10m width for the smooth operation of the container carrying vehicle.

5.6.14. Truck Parking Area

In the initial stage of development parking area will be provided for 20 numbers 40 ft trailers and 35 numbers trucks. Further area for 80 numbers 40 ft trailers and 15 numbers trucks would be added at appropriate time as per requirement. Area requirement is estimated as detailed below.

- Area per slot for 40ft trailer 110
- Area per slot of truck 80
- Total area required in initial stage development: $20 \times 110 + 35 \times 80 = 5000 \text{ m}^2$
Say, 0.50 hectares
- Total area on full development : $100 \times 110 + 50 \times 80 = 15000 \text{ m}^2$
Say, 1.50 hectares

5.6.15. Container Freight Station

A Container Freight (CFS) is required for the stuffing/de-stuffing operation of LCL container. It is proposed to provide the CFS outside the terminal through private agencies for which port land would be leased to the party. The land area requirement for the CFS facility is estimated as given below.

a. CFS Shed space

- Expected traffic of LCL : 15% of 2.23 lakh TEUs per annum
= 33450 TEUs per annum
- Average cargo weight per TEU : 15tonnes
- Annual Cargo quantity : 501750tonnes
- Average dwell time of LCL cargo : 10days
- Cargo requiring space at any given time : $501750 \times 10 / 365 = 13\,747$ tonnes
- Stowage factor of LCL cargo including broken stowage : 2
- Stacking height : 4m
- Net shed space required : $13747 \times 2 / 4 = 6874\text{m}^2$
- Standard circulation space required in shed : 40%
- Gross shed space required : $1.40 \times 6874 = 9624\text{m}^2$
Say, **10000m²**

b. Circulation space around CFS

Based on experience circulation space required around the shed including the area required for grounding containers for stuffing/de-stuffing operations and holding vehicles for loading/unloading operations is equivalent to 120% of shed area.

- Circulation area : $1.2 \times 10000 = 12000\text{ m}^2$

c. CFS Yard space

Yard space is required for keeping loaded containers and volume is taken as the same passing through the CFS.

- Average dwell time at CFS : 10days
- No. of TEUs requiring stacking space at any given time: $33450 \times 10 / 365 = 917$
Reach stacker operation is considered
- Average stack height : 2.5
- Ground slots required : $917 / 2.5 = 367$
- Land area required : $367 \times 45 = 16515$

d. Area for Miscellaneous Facilities

Area for miscellaneous facilities including parking: 20% of area under a to c = 7703

e. Total Land area for CFS facilities : 10000+ 12000+16515+ 7703=46218

Say, 5.00 hectares

f. Land area require at the final stage of development: $46218 \times 3.06/2.23=63420$

Say, 7.00 hectares

5.6.16. Power and Water Supply

Water will be tapped from the nearest source and there is expected to be no problem regarding its availability. Similarly, power will be drawn from the nearest substation of West Bengal Electricity Board. Since the requirement of water and electric power will be very small no major hurdle is anticipated on this account.

5.6.17. Land Requirement Summary for Terminal development

Land requirements at Balagarh Island for development of barge terminal facilities are summarized and presented below.

Land Requirement Summary for Terminal development

Sl. No.	Particulars	Area (hectares)
1.	Container Parking Yards	8.00
2.	Storage sheds	2.30
3.	Storage for Miscellaneous cargo	5.0
4.	Terminal supporting facilities	2.00
5.	Roads and drains inside terminal	2.00
6.	CFS facilities	7.00
7.	Truck parking area	1.50
8.	Road Connectivity Portion on Balagarh Island (35m width for 2km)	7.0
9.	Green Belt development	4.00
TOTAL		38.80

Say, 40 hectares

5.7 Road and Rail Connectivity to Balagarh Terminal

5.7.1 Road Connectivity

5.7.1.1 It is observed that existing road from SH6 towards the site has not been constructed for regular heavy vehicles like container trailers. As such new road connectivity has to be established from SH-6. It is understood that the Calcutta Electricity Supply Company (CESC) had commenced activities

for establishing a power plant in the Balagarh Island. In this connection they initiated action for establishing road connectivity to the Island and even commenced and substantially completed the construction of a bridge over the river branch between the main land and the Island. They had finalised the alignment of the connecting road and had taken steps for the acquisition of land required for the road. Details of the alignment of the proposed road and the bridge constructed by them have been collected and studied.

5.7.1.2 It is noted that the bridge has been designed for two lane traffic and for 70R loading complying with National Highway specifications. The bridge is adequate for the container vehicle traffic and accordingly it is seen prudent to make use of this bridge for the Island connectivity, through appropriate arrangements with M/s. CESC, on considerations of cost and time. As it is understood that M/s. CESC had substantially progressed in the land acquisition activities it is advisable to follow the road alignment finalised by them for the road construction. The alignment finalised by them is by making use of the existing railway level crossing at Darapara and extending the straight stretch of the road at this location through farm lands to meet the SH-6. The length of the proposed road from SH-6 to the foot of the existing bridge would be 3km. Another 2km length of road has to be constructed on the Island to reach the project site. Thus the total length of road connectivity to the proposed project location would be about 5.16km including the existing bridge.

5.7.2 Rail Connectivity

The receipt and evacuation of containers at Balagarh would be both by road and rail. For the purpose of planning, it is considered that 30% of all containers would move by rail and balance by road. The no of rail bound containers would therefore workout to 66,900 or 836.25 container trains which is about 2.3 trains per day. If it is taken that a train that brings in loaded /empty export containers and will carry the import containers, then it means that only one siding would be required. As such for handling just one incoming train and one outgoing train at the same siding an exclusive railway line from the existing main line which is at about 6 kilometers away from the propose port site in Balagarh is not viable. Hence it is proposed that all rail bound containers from and to Balagarh barge terminal will be moved by road for a distance of about 6 km to the nearest station in Balagarh where a siding will be created through Indian Railways.

5.8 Barge Terminal at Kolkata

It has been proposed to establish and operate a barge terminal at Kolkata when transloading operation of containers is established at Diamond harbour /Sagar Island. This barge terminal would enable handling of barges carrying transloaded containers bound for Kolkata and/or containers between NSD

and Balagarh without passing through the Dock. The tentative location of the barge berth is shown below.



Location of Proposed Barge Berth in Kolkata

5.9 Development Strategy

5.9.1. Transloading pulses at Diamond Harbour/Sagar Island and barge handling at Kolkata Port are well established operations. Therefore, good response can be expected from the Trade for diverting part of pulses cargo as projected to Balagarh from the initial stage itself. However, in the case of containers, transloading has not been done on regular basis and at least at the initial stage the potential containers for Balagarh would be transshipped from NSD. In view of the extra cost involved towards loading and unloading and barge transport for transporting containers between NSD and Balagarh the Trade would be selective for the option, with due reference to the total cost including the vehicle waiting time cost and cargo storage & retention cost under the two options. Advantageous position may be achieved progressively in tune with the traffic increase in the port and mounting road congestion due to port traffic and other traffic.

5.9.2. The pulse traffic is with almost stable trend. 83 berth days would be adequate for handling the projected Balagarh Pulses traffic of 3.0 lakhs tonnes per annum whereas effective berth availability per annum is 255.5 days at 70% acceptable berth occupancy rate. The 172.50 berth days that would be available after handling pulses would have capacity to handle 62100 TEUs of containers. In view of the above it is considered prudent to establish the terminal initially with minimum facility of one berth equipped with one MHC and minimum storage facilities. The major items proposed at the initial stage comprise of the following.

a.	Barge berth, 120m x 20m with two approaches	1
b.	Mobile Harbour Crane	1
c.	Reach Stacker	1
d.	Storage Shed for Pulses	: 5000m ²
e.	Loaded Container Parking Yard	: 15000m ²
f.	Empty container storage area	: 3000m ²
g.	Truck Parking area	: 5000m ²

5.9.3 Terminal security system, terminal roads & drainage system, bank protection works and dredging would be completed at the initial stage itself since stage development of these items is not advisable on technical grounds. As the Road connectivity is the essential infrastructure for establishing accessibility to the Island this has to be completed at the earliest possible time after the decision to implement the project. Since the road connectivity is an essential requirement for the development of the Balagarh village including the Balagarh Island the investment for the connectivity may be arranged through funding outside the project investment in order to make the project affordable to the users. No facility has been proposed at Kolkata Port at the initial stage and it is considered that container handling on barges would be done in KDS.

SECTION 6

EQUIPMENT PLANNING

6.1 Preface

The planning of cargo handling equipment will be influenced by the type of cargo handled, their unit weights and the rate of handling required. The traffic study has already defined the predominant type of cargoes to be handled at Balagarh Viz., containers and pulses in bulk. For unloading and loading of containers from and to barges and for unloading pulses in bulk from barges it is proposed to deploy Mobile Harbour Cranes.

6.2 Mobile Harbour Cranes

6.2.1 Need for Mobile Harbour Cranes

Mobile Harbour Cranes (MHCs) are among the most powerful material handling equipment due to their three outstanding features viz., mobility, flexibility and versatility and many a time economical when required for handling multiple type of cargoes viz., bulk cargoes, break-bulk cargoes, container handling etc., They have the advantage of being deployed ship-to-shore as well as shore-to-ship handling as also in back-up areas. MHCs are often tailor made and available both as tyre mounted and rail mounted, with the former being most popular. Rail mounted cranes limit themselves for use on a dedicated berth and often for specific cargoes. For the proposed application Balagarh, the choice is tyre mounted type.

6.2.2 Advantage of Tyre mounted MHCs:

a. Mobility: In this type of MHCs, the crane goes to the ship and there is no need for any rail infrastructure. Also the tyre mounted cranes can be freely positioned and they can travel between different quays and between quay and backup areas.

b. Versatility:

Tyre mounted MHCs can be quickly adopted to handle three main categories of cargoes in a port viz., Bulk, Break-bulk and Container Handling with appropriate attachments. For bulk handling it can be fitted with grab attachment to handle different types of bulk materials like coal, coke, fertilizers, lime stone and a wide range of other bulks. For Container Handling they can be used for handling ISO standard containers from 20 feet to 48 feet size by means of a container spreader. These are in addition to their well-known use for handling general/breakbulk and heavy lifts.

6.2.3 Configuration Proposed

The MHCs will be tyre travelling, slewing, luffing machine conforming to the plan of berth. It will comprise of a self-driven undercarriage (chassis) supporting a slewing superstructure with a counterweighted jib incorporating rope reeving arrangement to hoist a hook, spreader, lifting beam, grab or other suitable attachment for multipurpose cargo handling. The arrangement shall permit quick attaching/detaching of the handling device. It will be supported on outriggers, devoid of the wheels, during cargo handling operation. The MHCs shall be capable of being connected to the shore power supply and run on external source (if so required) to operate crane movements, bypassing the diesel-powered generator. The operator's cabins shall be ergonomic, offering a clear view of the working zones.

6.2.4 Working Conditions

In general, the machines shall operate within the constraints of proposed barge jetties including climatic conditions, material proposed for handling, stability, performance standards expected etc.

Stability of machines shall be unconditional for all operating and non-operating loads, including but not limited to chassis and jib collisions, operating and non-operating wind, overloads, jib resting on ground/deck etc, the machines shall be stable (from over-tipping) and free on wheels / outriggers under appropriate conditions. The equipment design shall ensure stability for all conditions including when the jib rests on the ground, berth or vessel through faulty operation or by failure of the luffing motion or any other circumstances.

6.2.5 Cargoes to be Handled

The equipment shall be for multipurpose application. Typical characteristics of the vessels for respective cargo to be handled are given below. There may however be variations in actual practice.

S. No.	Commodity	Barge Size (DWT)	Rated Handling Capacity proposed
A.	Dry Bulk commodities		
1.	Pulses	4000	300 TPH
B.	Break Bulk commodities		
1.	General Cargoes	4000	Depends on type of cargo
C.	Containers		
1.	ISO standard containers	4000	15 Moves per hour

6.2.6 Type of MHCs proposed:

The type of MHC proposed depends on the maximum load bearing capacity required for handling a fully loaded container from the farthest row of the barges proposed to be handled. Based on the size of barges analyzed, the main characteristic of the proposed type of crane will be with a maximum load bearing capacity of about 64 Tonnes on hook with an outreach of 40 m. The typical characteristics of such cranes as given below:

- Maximum Lifting capacity – 64 T (At minimum radius)
- Minimum Radius - 10 m
- Maximum radius of operation – 40m.
- Maximum load Bulk with a four rope grab – 45 t. (at minimum radius)
- Max. Capacity for bulk handling at about 22 m radius – 40 t (including grab weight)
- Max. capacity for container handling at about 27 m radius – about 31t
- (This will be with a 40 feet automatic spreader)
- Total weight – About 240t.
- Hoisting and Lowering speed – 90 m/min(Max)
- Luffing speed – About 75m/min
- Slewing Speed – About 1.6rpm
- Travel speed – About 5.4kmph
- Fields of operation – Container handling, bulk handling, General Cargo operations.

6.3 Outline of Equipment Requirements

Since all handling during transloading will be done with ship's gear the equipment planning will be confined to ship to shore handling and vice versa for containers and unloading of pulses in bulk.

6.3.1 Traffic Forecast:

The traffic forecast for phase I is 3 lakh tonnes of pulses and 50,000 TEUs of containers. During phase II the traffic forecast for pulses remain at 3 lakh tonnes whereas the container volume will be 2.23 Lakh TEUs.

6.3.2 Equipment Requirement During Phase I

a. For Handling Pulses:

- Annual throughput projections: 300,000tons

- No of Mobile harbor cranes proposed:1
- Volumetric capacity of Grab = 20 Cubm
- Bulk Density of Peas/pulses =0.8
- Therefore, handling per cycle: 16tons
- No of cycles per hour:15
- Handling Rate: 240TPH
- Effective Hours of operation per day:20
- Average handling efficiency:75%
- Effective working days required for handling 3.0 Lakh tons: $300,000/(240 \times 20 \times 0.75)$
= 83.33days
- Optimum berth occupancy per annum: 70% or 255.50days
- Equipment occupancy therefore works out to = $83.33/255.5 = 32.6\%$
- Therefore, effective working days available for container handling: $255.5-83.3=172.2$

b. For Containers

- Proportion of 20 feet and 40 feet containers: 50%each
- Therefore, Box to TEU ratio: 2 to3
- Rated productivity per hour: 15 moves orboxes
- No. of effective hours of operation in a day: 20hours
- Average handling efficiency:80%
- Effective working days available for container handling:172.2
- Annual container handling capacity: $172.2 \times 20 \times 15 \times 0.80 = 41328 \text{ boxes or}$
61992 TEUs

c. Total Crane Requirement

As detailed above, one MHC has the capacity to handle 3.0 lakhs tonnes of pulses/peas and 61992 TEUs of containers per annum. Accordingly, it is proposed to start the operations with one MHC and to take action for placing the second MHC in position by the time the container traffic reaches 50000 TEUs.



Figure 1 - Typical handling by MHCs on a Barge

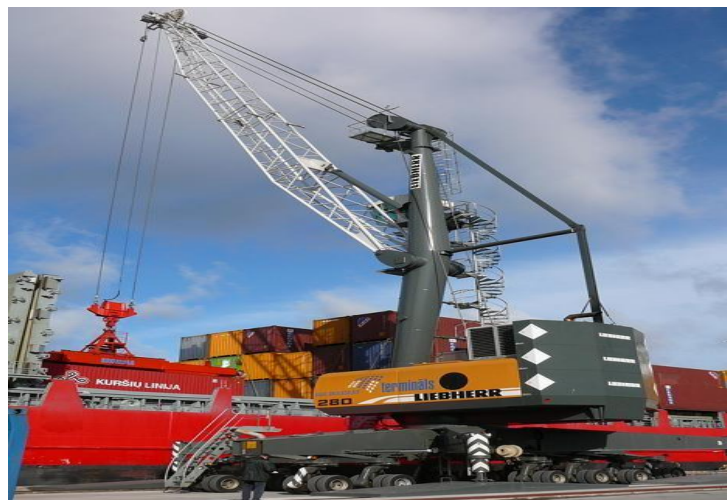


Figure 2 - Typical Container handling by MHCs



Figure 3 - Typical Bulk handling by MHC

6.3.3 Special Attachments Proposed

Typically, a standard supply of a Mobile harbour crane will include a hook and other attachments have to be specially obtained. As the traffic in Phase 1 consists of containers and pulses in bulk, it is proposed to plan for the following attachments on the MHC.

- Container Spreader attachment to handle standard ISO containers – 1No
- Grab of 20 cub.m capacity – 1No

6.4 Other Equipment

The containers will be transported from and to the berth by the stevedores, hence it is not proposed to plan for any container tractor trailers. However, it is proposed to plan for a mobile hopper to receive and transfer peas and pulses in bulk into the dumper lorries. In addition, it is proposed to plan for a Reach Stacker for handling containers for stacking in the backup area and for receipt and delivery in the container stack yard. A typical reach stacker can handle upto 90,000 TEUs per annum. As such for handling the boxes in phase 1, one no reach stacker will be adequate.

6.5 Supporting Facilities

6.5.1 Electrical Power Supply and Distribution

The supporting equipment planning will include electrical power supply for illumination of the berths, yard and transit storage shed. All yard illumination will be through high mast lighting.

6.5.2 Firefighting System

Basic firefighting facilities will be planned with back up from state Fire service in case of emergency. These will typically include fire extinguishers etc.

SECTION 7

PRELIMINARY DESIGN

7.1 General

Berthing structure and terminal pavement are the important components of the terminal construction. Preliminary designs of these components have been made for estimate purpose based on the Basic Design Criteria detailed hereunder.

7.2 Basic Design Criteria for Barge Berth

7.2.1 Berth Top Level

i. At Balagarh

Based on a preliminary study of water levels at Balagarh during the monsoon and dry period and flood history the following conclusions have been drawn for the purpose of design and operation of barge berth at Balagarh.

- The location is in the upper tidal compartment with predominant effect from river discharge and secondary from tide. The upland flows from catchment areas during the monsoon and the feeder canal discharge during the dry season play the major role in changes of morphology of the stretch. It is observed that ebb dominates (around 10 hrs.) in this region compared to flood (around 2 hr.). The flood was very weak compared to ebb. The daily water level fluctuations in tune with the tide are remarkable during the monsoon period with range around 2m. In the periods of normal monsoon flood level reaches upto 5.0 m with respect to local datum, 4.60 levels being a most common occurrence. In extreme cases such as in the year 2000 when severe flood occurred, the water level rose up by about 7m with respect to local datum. The lowest water level occurs during dry season and the mean value is in the order of 1.80m with reference to local datum.
- Considering the above positions, the Mean High water and Mean Low water to be considered for the design of the berth are taken as 5.0m and 1.80m with reference to the local datum. The top level of the berth would be kept at 6.0m above local datum after providing 1.0m clearance above the normally occurring high water. The cargo handling equipment would have to be shifted to a safe location during the periods of extreme flood. However, the berth would be designed for the extreme flood conditions without operational loads.

ii. At Kolkata

The tide details at Kolkata relevant for the planning and design of berth are as given below:

• Highest high water recorded	: +7.70m
• Mean High Water Springs Freshest	: +6.12m
• Mean High Water Springs Dry Season	: +5.24m
• Mean high water	: +4.88m
• Mean Low Water	: +1.68m
• Mean Low Water Springs Dry Season	: +1.226m
• Chart datum(CD)	: 0.00
• Lowest low water recorded	: +0.149m

The berth top level has to be a minimum of 1.0m above Mean High Water Springs Freshest of +6.12M, as per the provisions in the IS 4651. Accordingly, the top level of the proposed barge berth at Kolkata has been fixed at + 7.30m

7.2.2 Design Loads

Design loads for berth shall conform to IS: 4651 (part-III) and comprise of the following loads:

- Dead Load
- Live Load
- Impact or Dynamic effect of Live Load
- Tractive force due to breaking of vehicles
- Hydrostatic and Hydrodynamic forces
- Berthing Forces from the barges
- Mooring Forces from the barges
- Temperature Stresses
- Shrinkage stresses
- Seismic Forces

7.2.3 Details of Live Loads

Live loads comprise of the following:

- a) Uniformly distributed load: 5t/m^2
- b) Container loads: Equivalent point load associated with containers stacked, 3 high incorporating the load reduction factor for 3 high stacking – 72 t at one point from the corners of four containers.

- c) 64t Mobile Harbor Crane with lift capacity of not less 31t at the outreach of 27m from the center of crane under automatic spreader: 4 pads; each 1.30m x 5.5m; maximum load on each pad – 160t, 16 wheels; twin wheel configuration; Maximum wheel load –15t
- d) 45t Reach Stacker: Max. Wheel load: 25 t; Twin wheel configuration
- e) Vehicle load: IRC Class A, AA or 70R; parallel to berth

7.2.4 Details of Berthing Force

7.2.4.1 In view of the potential for introducing large size flat bottomed vessel in future due to economies of scale, the Design Barge parameters have been considered for the berth design as given below, based on discussions with barge operators.

- Length : 90 m
- Beam : 18 m
- Draft : 4 m
- DWT : 4000
- Displacement : 5000tonnes

The berthing energy is calculated as per the formula in the IS code 4651-Part III

$$E = W_D \times V^2/2g \times C_m \times C_e \times C_s$$

7.2.4.2 Considering that the berthing and de-berthing maneuvers are done with self-power of the barges approach velocity of 0.35m/s is reckoned in the berthing energy estimation and accordingly the berthing energy works out to 25tm. As per the recommendations in the IS 4651-Part IV, the selected fender should have Factor of Safety of 2 over its ultimate energy absorption capacity. Considering the large scale water level variation at the locality dual fender system with cone fender DCN 800H with R₂ grade rubber has been proposed. The ultimate energy absorption capacity of this fender system is 54.20 tm against the requirement of 50 tm. The impact force corresponding to the calculated berthing energy is 130t. Accordingly the berthing forces considered for the design is 130 t normal to the berth and 32.50t in the longitudinal direction.

7.2.5 Mooring Force

As per the IS Code mooring force of the vessels with displacement tonnages of 2000 and 10000 are 10t and 30t respectively. Based on this and water current condition at the location 20t bollard has been considered for the berth design.

7.2.6 Spacing of Fenders and bollards

Fenders and bollards are proposed at a spacing of 12m c/c in view of the requirement of operating the berth as continuous berths.

7.2.7 Dredged depth in front of berth

The draft of the Design Barge which would be deployed in future is 4.0m. Dredged depth to be provided in front of the berth is draft of the vessel plus 10% thereon. Therefore, the minimum depth required in front of berth is 4.40m. Considering the extra depth required for accommodating the siltation and also to have the flexibility for deepening marginally in future, dredged level of -5.0m is considered for the design.

7.2.8 Geo-technical Data

Geo-technical data as detailed in section 3 have been based for the design of pile foundation.

7.3 Preliminary Design of Berth

Based on the basic design criteria detailed in Section 7.2 above preliminary design of the berth foundation and super structure was carried out. As per this preliminary design the size, reinforcement details and founding level of piles were determined. The beam sizes and slab thickness including the reinforcement details of the deck have been finalized based on preliminary design.

7.4 Preliminary Design of Approach Bridge

The approach bridge is to be designed for the movement of Mobile Harbour Crane without load since the crane would have to be shifted to shore for repairs and also during extreme flood conditions. It is assessed that Mobile Harbour Crane would have the worst effect on the bridge. Accordingly, preliminary design of the bridge including its foundation was carried for the case of MHC movement and provided in the estimate.

7.5 Preliminary Design of Terminal Pavement

Basically, the pavements in the terminal are divided in to three categories as given below and preliminary design has been carried for the expected load.

a) Heavy Duty Pavement

Heavy duty pavement is considered for the Reach Stacker operating area and loaded containers stacking area. The front axle of the Reach Stacker has four wheels, each wheel with a maximum load

of 25t at operating condition with loaded container. 3 high stacking is proposed in the stacking area. The designed pavement composition is as given below.

- Granular Sub-Base : 250mm
- M-20 grade cement Concrete :350mm
- Concrete Paver block (M-50grade)
over 50mm thick sand layer :200x100x100mm

b) Light Duty Pavement

Light duty pavement is considered for the empty stacking area. Wheel loads of the tractor trailer units and wheel loads of empty handlers are considered for the design of this pavement. The designed pavement composition is as given below.

- Granular Sub-Base : 200mm
- M-20 grade cement Concrete :200mm
- Concrete Paver block (M-50grade)
over 50mm thick and layer :200x100x100mm

c) Road Pavement

Flexible pavement with bitumen surfacing is considered for the roads adjacent to the operational areas of the terminal. Wheel loads of the tractor trailer units and wheel loads of Reach Stackers and empty handlers without container are considered for the design of this pavement. The designed pavement composition is as given below.

- Granular Sub-Base : 300mm
- Wet Mix Macadam Base Course : 300mm
- Bitumen Macadam Base Course : 100mm
- Bitumen Concrete Surface Course : 40mm

SECTION 8

MAJOR CIVIL WORKS DESCRIPTION

8.1 General

The Civil Works involve the pre-project activities such as field investigations and surveys, planning and detailed design of barge terminal facilities including construction of barge berth and approach ridge, river bank protection works and dredging. The construction of the road connectivity which is essentially required for the operation of the project is proposed to be implemented with investment from sources outside the terminal development project.

8.2 Terminal Development

8.2.1 Barge Berth

8.2.1.2 The berth proposed is of continuous type so that there would be operational flexibility for the cargo handling equipment installed on the berth. Initially one berth would be constructed for a length of 120m and additions would be made in modules of 120m according to the building up of traffic. Considering the requirement of operating Mobile harbour Cranes and cargo carrying vehicles and hoppers the berth would be with a width of 20m. The structure of the berth is proposed to be in the form of open piled jetty. 1000 mm dia bored cast-in-situ concrete piles are proposed. Considering the nature of sub-soil at this location, the founding level of the piles is proposed at (-) 40.0 m to carry the estimated working load of about 230t. The piles are placed in bents across the berth; each bent across the berth with 3 piles spaced at 8.0m and bent spacing being 6.0m centre to centre. However, the diameter of the piles, their spacing and founding depth, will all be firmed up during detailed engineering.

8.2.1.2 The deck is of reinforced concrete with bent beam connecting the three piles in a bent and thick slab spanning between the bent beams. The bent beams are with overall size of 1200mm x 1400mm and the slab in between is of 500mm thick. Dual cone type fenders (DCN 800 H, R₂ grade or similar capacity fenders) and 20t capacity bollards would be provided at a spacing of 12m c/c in view of the continuous nature of berth. Concrete fascia would be appropriately incorporated in the deck design for supporting the fender system. A typical cross section of the berth is presented hereunder. The drawing for barge berth and layout drawing of the area showing the location of berths/yards/roads has been given at **Appendix 8.1 and Appendix 8.2.**

8.2.2 Approach Bridge

Berths are connected to the shore through approach bridges, one on either end of berth. The length of the bridge is 30.0 m. Considering the requirements of passing and turning of 40 ft trailers and also the MHC 10m carriageway has been proposed for the bridges. The structure is proposed to be with reinforced cement concrete beam and slab decking supported on bored cast-in-situ concrete piles. The piles would be of 1000 mm dia. Considering the nature of sub-soil at this location, the founding level of the piles is proposed at (-) 35.0m to (-) 40.0m. However, the diameter of the piles, their spacing and founding depth, will all be firmed up during detailed engineering. Kerbs and hand rails would be incorporated in the design.

8.2.3 Bank Protection

The river bank of the Balagarh Island adjacent to the proposed berth construction is prone to erosion and bank protection is required for a length of about 1300m for preventing further erosion and conservation of the present profile and configuration of the river bank. Apart from this the southern bank of the Island for a length of about 1300m has to be protected for conserving the river regime for ensuring required width and depth in this stretch for barge operation. The riverbed at this stretch has been eroded upto 6.60m. Based on the erosion trend in the main river it is likely that the erosion in the nearby area of Balagarh Island at this stretch may increase to the order of 8.0m below local Chart Datum, due to the flow diversion as well flow obstructions causing by piles proposed for the berth. The opposite bank may also undergo erosion and it is considered the bank at this location would have to be protected for a probable erosion of 4.0m below local Chart Datum. On the above considerations, based on preliminary designs, it has been proposed to provide 600mm thick rubble revetment bank protection for 1300m length on the northern bank of Balagarh Island adjacent to the barge berths. The proposed protection for the opposite bank comprise of 450mm thick rubble revetment for 1300 m length.

8.2.4 Dredging

Basin with a width of 120m and depth of 4.0m below Chart Datum has to be created in front of the proposed barge berths for the safe maneuvering of the barges including turning. Dredging is required for the creation of the basin since the prevailing depths at this location vary from 1.2m to 4.0m. Further, the western end of this river branch is to be marginally deepened for hugging the flow to the river branch for self-maintaining the required depth of 4.0m. The estimated dredging requirement is about 0.30 million Cu. m. The proposal is to carry out the dredging with a cutter suction dredger and dump the material on the Balagarh Island. The material can be subsequently used for raising the level of the proposed terminal area or otherwise since the material is usable for filling purposes.

8.2.5 Storage Sheds

Storage sheds which are proposed for the storage of dry bulk cargo like pulses would be of 25m single span type with pre-engineered steel frames supported on bored cast-in-situ concrete piles of 500mm dia founded at 30m below CD. It has minimum clear height of 6.0m from floor level. Raised platform would be provided on one side for truck loading. Ramps would be provided for vehicle entry and exit for smooth handling of the storage of materials. Side walls would be masonry construction for a height of 3.0m and cladding for the remaining height. The cladding and roofing would be with 5mm thick pre-coated steel sheets. Flooring shall be with 250 mm thick granular sub-base and 200mm thick M- 20 grade concrete finished with floor hardener. Exhaust, Illumination and fire protection facilities have been incorporated in the design.

8.2.6 Container Parking Yard

8.2.6.1 Separate areas have been proposed for stacking of loaded containers and empty containers. In the storage area for loaded containers, reach stackers with front axle (4 wheels) load of about 100t are to be operated. Therefore, heavy duty pavement is required for the parking yard of loaded containers. Based on preliminary design, the under mentioned pavement composition is proposed for the parking yard of loaded containers.

- Granular Sub-Base : 250mm
- M-20 grade cement Concrete :350mm
- Concrete Paver block (M-50grade)
over 50mm thick sand layer :200x100x100mm

8.2.6.2 In the case of empty container yard, specialised empty container handler would be deployed. The axle load of this equipment is less than the container trailers and accordingly light duty pavement has been proposed for the empty container storage yard. Details of the pavement proposed for empty container storage yard are as given below.

- Granular Sub-Base : 200mm
- M-20 grade cement Concrete :200mm
- Concrete Paver block (M-50grade)
over 50mm thick sand layer :200x100x100mm

8.2.7 Terminal roads

8.2.7.1 A main road is required inside the protected area of the terminal for hassle-free access to the container parking yard and circulation roads around the storage sheds. It is proposed to provide 10m carriageway for the main road in view of the requirement for the 40ft container trailers and requirement

of slow moving/waiting vehicles. This road would be used for the movement of Reach stacker with loaded containers on contingent occasions. Considering all these operational requirements it is proposed to construct the road with the following pavement composition.

- Granular Sub-Base : 300mm
- Wet Mix Macadam Base Course : 300mm
- Bitumen Macadam Base Course : 100mm
- Bitumen Concrete Surface Course : 40mm

8.2.7.2 For flexibility of construction and operations, the same pavement has been proposed for the roads around the storage sheds also.

8.2.8 Buildings in Terminal

The undermentioned buildings have been included in the project proposal for meeting the operational requirements.

- a. Administrative Building and Labor amenities : $500 + 250 = 750\text{m}^2$
- b. Gate office building including customs cabin : $120 + 0 = 120\text{m}^2$
- c. Generator-cum substation Building : $240 + 240 = 480\text{m}^2$
- d. Workshop Building : $0 + 400 = 400\text{m}^2$

The split up indicates the development in two phases according to traffic build-up.

8.2.9 Security Arrangements

The proposed Security arrangements comprises of 3.0m high security compound wall with catena protection on top etc around the customs bounded area of the terminal, entry and exit gates at the main entrance to the terminal and gates at access locations to the berths.

8.2.10 Drainage System

A combination of open and covered concrete drains has been proposed for the drainage of the container parking area and other areas of the terminal.

8.2.11 Water Supply and Sanitation System

External water supply system comprising of ground and overhead storage tanks and pumps and pipelines has been included in the proposal. Sanitary system comprises sewerage disposal system and solid waste management appropriate to the location.

8.2.12 Truck Parking Area

It is proposed to develop truck parking area near the entrance to the terminal. The proposal is to develop a total area of 15000 m² for the parking of 100 numbers 40 ft container trailers and 50 numbers trucks. Out of the 15000 m² proposed, 5000 m² would be developed at the time of commencement of operation of the terminal and add on would be done according to the traffic build up. Since the area is mainly for holding the vehicle medium type pavement is proposed with the following composition.

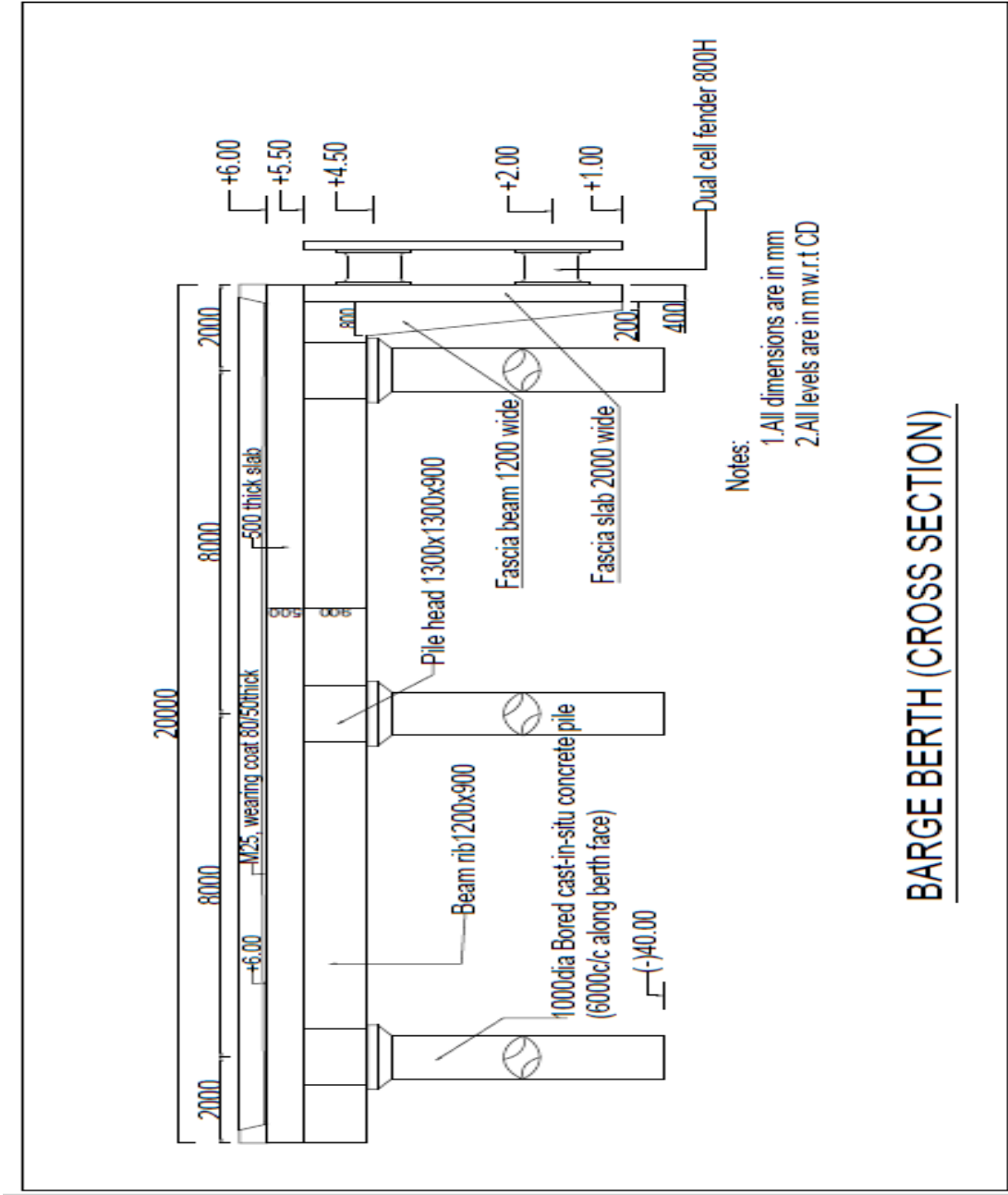
- Granular Sub-Base : 250mm
- Wet Mix Macadam Base Course : 250mm
- Bitumen Macadam Base Course : 80mm
- Bitumen Concrete Surface Course : 30mm

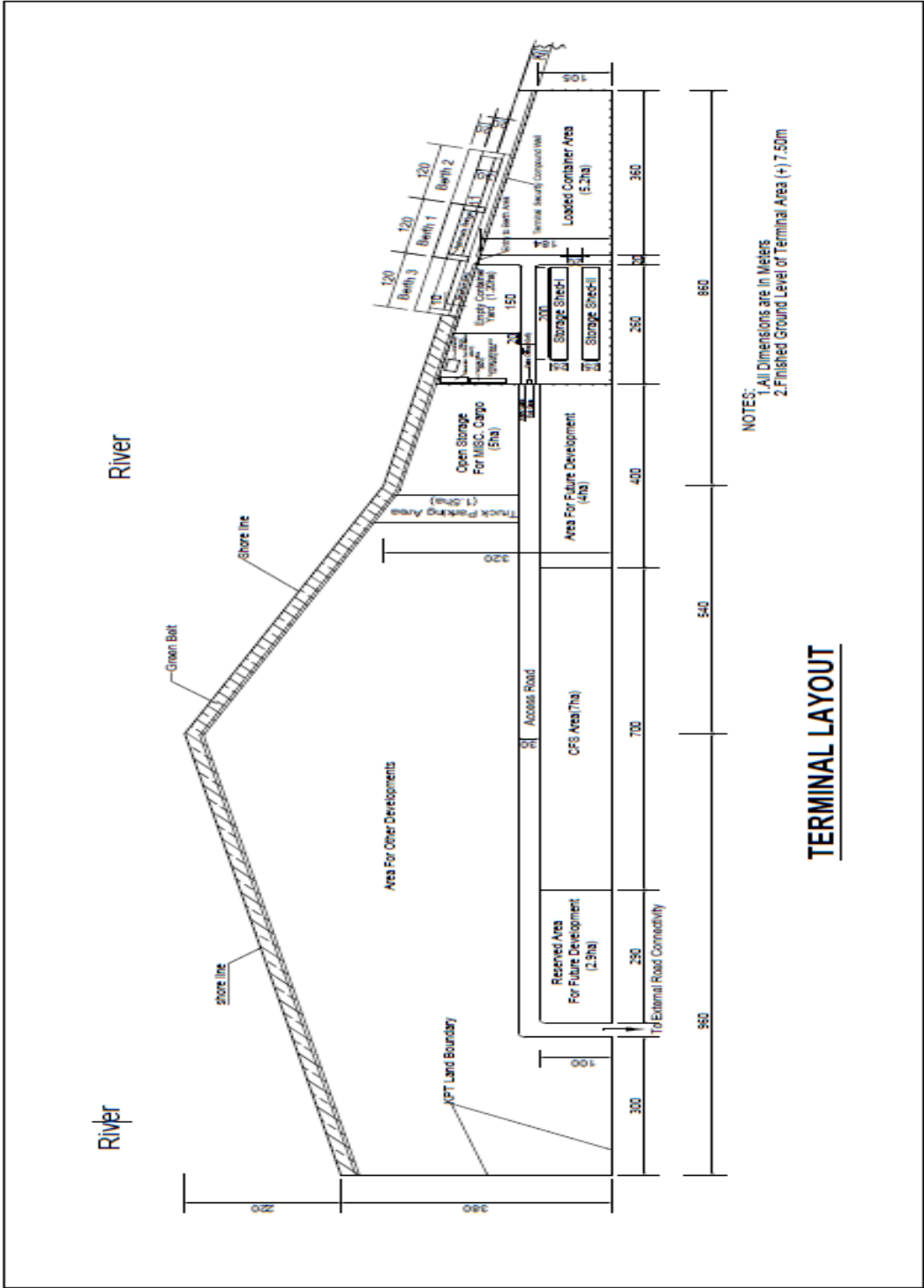
8.3 Road Connectivity

8.3.1 As detailed in the Planning Section the road connectivity has been along the alignment finalised by the Calcutta Electricity Supply Company with an intention to utilise the bridge already constructed by the company. The connectivity along this alignment comprises of 3 km road from State Highway SH-6 to the bridge, 160m long bridge across the river and another 2km long road on Balagarh Island (from the foot of the bridge to terminal entrance), The existing bridge has been constructed for two lane traffic with carriageway width of 7.50m. However, for the preparation of project estimate it has been considered that the bridge would be with 10.50 m carriageway for the smooth two lane passage of 40 ft container trailers. This is also to facilitate construction of the bridge with adequate operational flexibility in the event of becoming difficult to make available the existing bridge for the proposed terminal operation.

8.3.2 The road development would be for 7.0m carriageway and 1.50m paved & 1.0 unpaved shoulder on either side of carriageway. Cross drainage and land development requirements have been considered in the proposal. The 160m long bridge would have four spans, two abutments and three piers. The abutments and piers are of reinforced concrete construction and are supported on 1.0m diameter bored cast-in-situ concrete piles founded at an average level of 40m below Chart Datum. Each pier would on 6 piles whereas each abutment would be on 8 piles. The deck would be with pre-stressed concrete beams and reinforced cement concrete slab. Provisions towards kerbs, handrails and wearing coat have been included in the proposal The proposed pavement composition for the road is as given below.

- Granular Sub-Base : 300mm
- Wet Mix Macadam Base Course : 300mm
- Bitumen Macadam Base Course : 100mm
- Bitumen Concrete Surface Course : 40mm





SECTION 9

CAPITAL COST ESTIMATE AND IMPLEMENTATION SCHEDULE

9.1 As indicated in the Section 5, the two-phase Development of Balagarh Terminal Extended Gate System has been considered for evaluation of financial analysis. Accordingly, the capital cost of the project is estimated at Rs. 140.44 Crores under Phase- 1 and Rs. 234.74 Crores under Phase-2 totaling to Rs. 375.18 Crore. The detailed estimate is attached as **Annexure 9.1 and 9.2** respectively. The summary break-up of the estimate is given as under:

(Rs. in crores)

S. No.	Particulars	Phase-I	Phase-II	TOTAL
I.	Civil Works	74.19	89.27	163.46
II.	Mechanical Works	27.84	81.62	109.46
III.	Electrical Works	3.02	4.68	7.70
IV.	Environmental Work	3.15	5.27	8.42
	TOTAL	108.20	180.84	289.04
a	Detailed Engineering & Project Supervision @ 7%	7.57	12.66	20.23
b.	Contingencies @ 3%	3.25	5.43	8.68
c	Goods and Service Tax @ 18%	21.42	35.81	57.23
	TOTAL CAPITAL COST	140.44	234.74	375.18
ADD :	Miscellaneous Capital Cost as per TAMP Guidelines @ 5%	7.02	11.74	18.76
	GROSS CAPITAL COST	147.46	246.48	393.94

9.2 Implementation Schedule

The project implementation period including detailed engineering for the Phase-1 from the date of obtaining necessary approvals of Competent Authority is estimated at 24 months in view of the land acquisition requirement for the Road Connectivity which is essential for commissioning the barge terminal facilities. The phasing of expenditure is given as under:

Phase -1

(Rs. In Crores)

Year	Percent of Expenditure	Phase -1 Balagarh
2017-18	25 %	36.86
2018-19	65 %	95.85
2019-20	10 %	14.75
TOTAL	100 %	147.46

Phase - II

Year	Percent of Expenditure	Phase –II Balagarh	Phase –II KDS	Phase-II Total
2021-22	25 %	43.45	18.17	61.62
2022-23	65 %	112.97	47.24	160.21
2023-24	10 %	17.38	7.27	24.65
TOTAL	100 %	173.80	72.68	246.48

Detailed Capital Expenditure of the Project – Phase I

Sl. No.	Description	Amount (Rs. Crore)
A. Civil Works		
1	Construction of berth structure 120m x 20 m and approaches.(2 numbers, 30m x 11m)	24.00
2	Bank protection works.	4.94
3	Dredging Cost	7.50
4	Pavement of Container Storage Yards, Terminal Roads & other Operational areas and Truck Parking area	14.00
5	Storage sheds for bulk cargo (5000 m ²)	17.51
6	Buildings, security Compound wall and Gates.	4.85
7	Water supply and Sewage systems	1.39
	Civil Works Cost (Total A)	74.19
B. Mechanical & Electrical Works		
1	1 Nos. Mobile Harbor Crane	22.00
2	1 Nos 20 CBM capacity hopper	0.40
3	1 No. Grab	0.70
4	1 Nos. Reach Stacker	3.60
5	1 No Spreader	1.04
6	Electrical Power supply & Distribution System including illumination and high masts	3.02
7	Fire Fighting System	0.10
	Mechanical & Electrical Works Cost (Total B)	30.86
	C. Environmental works @ 3% of Sub-total of A & B	3.15
	Total Capital Cost before taxes and contingencies (A + B+ C)	108.20
Add:	Detailed Engineering & Project Supervision @ 7%	7.57
Add:	Contingencies @ 3%	3.25
Add:	Goods & Service Tax @ 18%	21.42
	TOTAL CAPITAL COST	140.44

Detailed Capital Expenditure of the Project – Phase - 2

Sl. No.	Description	Amount (Rs. Crores)
I	Civil Works	
	A. At Balagarh	
	Construction of barge berth (120mx20m) and approach (1No,30mx11m)	21.60
2	Pavement of Container Storage Yards, Terminal Roads & other Operational areas and Truck Parking area	24.28
3	Storage sheds for bulk cargo (5000 m2)	14.00
4	Buildings	2.92
5	Water Supply including Water Tanks	0.15
6	Sewerage and solid waste disposal system	0.15
	Total Civil Works at Balagarh(IA)	63.10
	B. At Kolkata	
7	Construction of barge berth (120mx20m) and approaches (2 Nos,30mx11m)	24.00
8	Bank protection works	0.30
9	Pavement of Truck Parking area	1.87
	Total Civil Works at Kolkata(IB)	26.17
	Total for Civil Works (I) = IA + IB	89.27
II	Mechanical & Electrical Works	
	A. At Balagarh	
10	2 Nos. Mobile Harbour Cranes with grab & spreader attachments	47.48
11	2 Nos 40 CBM capacity hoppers	0.80
12	2Nos. Reach Stacker	7.20
13	One number Empty container Handler	2.00
14	Power Supply and Illumination including communication & security system	3.02
15	Fire Fighting System	0.20
	Total Mechanical & Electrical Works at Balagarh (IIA)	60.70
	B. At Kolkata	
16	One Number Mobile Harbour Cranes with grab and spreader attachments	23.74
17	One Number 40 CBM capacity hopper	0.40

18	Power Supply and Illumination including communication & security system	1.46
	Total Mechanical & Electrical Works at Kolkata(IIB)	25.60
	Total for Mechanical & Electrical Works (II) = IIA + IIB	86.30
	Total I + II	175.57
III	Environmental Protection Works @ 3% of Total I+II	5.27
	Total Capital Cost before taxes and contingencies (I + II+ III)	180.84
Add:	Detailed Engineering & Project Supervision @ 7%	12.66
Add:	Contingencies @ 3%	5.43
Add:	Goods & Service Tax @ 18%	35.81
	TOTAL CAPITAL COST	234.74

Rate includes cost of filling the site to bring to the normal level

SECTION 10

OPERATION AND MAINTENANCE COST

10.1 Operation and Maintenance Cost

The annual operation and maintenance cost of the Project without escalation (At Constant prices) for the Phase- 1 development and at the end of Phase- II as indicated in Section 5, is estimated at Rs. 20.14 Crores and Rs.51.98 Crores respectively based on TAMP Guidelines for fixation of up-front tariff. The broad break-up of estimate is given at **Annexure – 10.1**

10.2 Key assumptions for estimation of Cost

The key assumptions for estimation of annual Operation and Maintenance expenditure are as follows:

10.2.1 Optimal Capacity Terminal

optimal capacity of the proposed Balagarh Terminal is determined at 1.17 million tonnes considering the share of 33% of capacity to handle anticipated 3.00 lakh tonnes of bulk cargo of Peas and Pulses and remaining 67% of capacity is proposed to handle Containers to an extent of 0.62 lakh TEUs even though the Container traffic anticipated for Balagarh Terminal is 2.23 lakh TEUs as per annum in the initial years of 2020 to 2024. On completion of the phase- II project, the optimal capacity of the Balagarh terminal is expected to reach 3.74 million tonnes, adding a capacity of 2.14 million tonnes. It is anticipated that Peas and Pulses of bulk cargo will continue to be handled at the same level of traffic i.e. 3.00 lakh tonnes per annum beyond 2024 forming a share of 11% of the terminal capacity and the remaining capacity of 89% will be utilized to handling container traffic at the level of 2.47 lakh TEUs.

10.2.2 Repairs & Maintenance cost:

As per norms specified in guidelines, the repairs & maintenance cost is estimated at the rates of 1% of civil assets and 5% of all mechanical and electrical equipment.

10.2.3 Power cost for Operations and Illumination:

The power consumption for illumination of the 7.50 hectares of land proposed for the phase – 1 project and an additional 14.30 hectares for phase-II, the power cost is taken at the norm of 2.4 lakh units per hectare as per TAMP guidelines. (Unit Rate at Rs.7.67 is taken as per WBSEDCL applicable for HT consumers for industrial purpose). However, the land requirement of 18.00 hectares towards

CFS, Greenbelt, and Road connectivity has not been considered for illumination.

10.2.4 Fuel Cost

As per technical specifications, the fuel consumption for operation of one MHC will be 60litersperhourandthatforonenumberreachstackerwillbe30litersperhour. These are considered for number of berth hours estimated. (Unit Rate at Rs. 63.46 per liters is taken as per prevailing market rate).

10.2.5 Depreciation

As per guidelines, depreciation is estimated at 6.33% of the capital cost of the mechanical equipment, 9.50% of electrical installations and 3.17% on civil assets on straight line method as per Companies Act 2013.

10.2.6 Other Expenses

As per norms specified in guidelines, other expenses are estimated at the rate of 5% of capital cost of mechanical & electrical equipment and 1% of capital cost of civil assets which include the following:

- a) Salaries and wages of operation and maintenance staff including welfare and other expenses towards them.
- b) Management and general overheads and other miscellaneous cost.

10.2.7 Insurance

As per guidelines, Insurance cost is estimated at 1% of the total gross capital cost.

10.2.8 License Fee

License Fee payable for the land area and berth front area of the project is estimated at as per applicable lease rental rates of Balagarh region @ Rs.250.01 per 100 sqm per month.

Details of the Operating Expenditure (Phase - 1)

Sl. No.	Particulars	Amount (Rs. In crores)
1.	Repairs & Maintenance Cost	2.96
	a) Civil Works (1% of civil assets – Rs. 96.30 crores)	0.96
	b) Mech. Works (5% of mechanical and electrical equipment – Rs. 40.05 crores)	2.00
2.	Power and Fuel cost	4.88
	a) Power for Operations and illumination 2.4 lakh Units per hectare x 7.50 hectare x Rs.7.67 per unit	1.38
	b) Fuel Cost for Operation of Harbour Mobile Crane (1 No.) 60 ltrs x Rs. 63.46 per litre x 6132 hrs	2.33
	c) Fuel Cost for Operation of Reach Stacker (1 No.) 30 ltrs x Rs. 63.46 per litre x 6132 hrs	1.17
4.	Depreciation	5.71
	a) Mechanical Equipment, Firefighting System (6.33% of equipment cost – Rs. 36.00 crores)	2.29
	b) Electrical Installations and High Masts (9.50% of Elec equipment cost - Rs.4.05 crores)	0.37
	c) Deprecation on civil structures (3.17% of capital cost – Rs. 96.30 crores)	3.05
5.	Other Expenses (Towards salaries and overheads @ 5% of Gross value of assets of Cargo Handling Activity – Rs. 96.31 crores)	4.89
6.	Insurance @ 1% of Gross value of assets – Rs. 147.46 crores)	1.47
7.	Lease rentals (Land area of 75000 sqm x Rs. 250.01 per 100 sqm/month x 12 months)	0.23
Total Operating Cost		20.14

Details of the Operating Expenditure (PHASE - II)
(On Commencement of Operations of Phase-II project)

Sl. No.	Particulars	Amount (Rs. In crores)
Balagarh Terminal		
1.	Repairs & Maintenance Cost	7.72
	a) Civil Works (1% of civil assets – Rs. 178.20 crores)	1.78
	b) Mech. Works (5% of mechanical and electrical equipment – Rs. 118.86 crores)	5.94
2.	Power and Fuel cost	14.86
	a) Power for Operations and illumination 2.4 lakh Units per hectare x 21.80-hectare x Rs.7.67 per unit	4.01
	b) Fuel Cost for Operation of Harbour Mobile Crane (3 Nos.) 60 ltrs x Rs. 63.46 per litre x 6132 hrs x 3 nos.	7.00
	c) Fuel Cost for Operation of Reach Stacker (3 Nos.) 30 ltrs x Rs. 63.46 per litre x 6132 hrs x 3 nos.	3.50
	d) Fuel cost for operation of Empty Containers handlers 15 ltrs x Rs. 63.46 per litre x 3620 hrs x 3 nos.	0.35
4.	Depreciation	13.43
	a) Mechanical Equipment, Firefighting System (6.33% of equipment cost – Rs. 111.02 crores)	7.03
	b) Electrical Installations and High Masts (9.50% of Elec equipment cost - Rs.7.84 crores)	0.75
	c) Deprecation on civil structures (3.17% of capital cost – Rs. 178.20 crores)	5.65
5.	Other Expenses (Towards salaries and overheads @ 5% of Gross value of assets of Cargo Handling Activity – Rs.321.26 crores)	12.11
6.	Insurance @ 1% of Gross value of assets – Rs. 321.26 crores)	3.21
7.	Lease rentals (Land area of 218000 sqm x Rs. 250.01 per 100 sqm/month x 12 months)	0.65
	Total Operating Cost (Total : A)	51.98
B.	At Barge Terminal at NSD, KDS	
1.	Repairs & Maintenance Cost	2.00
	a) Civil Works (1% of civil assets – Rs. 33.97 crores)	0.34
	b) Mech. Works (5% of mech. & elec. equip.– Rs.33.23 crores)	1.66

2.	Power and Fuel cost	2.97
	a) Power for Operations and illumination 2.4 lakh Units per hectare x 3.50-hectare x Rs.7.67 per unit	0.64
	b) Fuel Cost for Operation of Harbour Mobile Crane (3 Nos.) 60 ltrs x Rs. 63.46 per litre x 6132 hrs x 1 nos.	2.33
4.	Depreciation	3.24
	a) Mechanical Equipment, Firefighting System (6.33% of equipment cost – Rs. 31.33 crores)	1.98
	b) Electrical Installations and High Masts (9.50% of Elec equipment cost - Rs.1.90 crores)	0.18
	c) Deprecation on civil structures (3.17% of capital cost – Rs. 33.97 crores)	1.08
5.	Other Expenses (Towards salaries and overheads @ 5% of Gross value of assets of Cargo Handling Activity – Rs.72.67 crores)	3.63
6.	Insurance @ 1% of Gross value of assets – Rs. 72.67 crores)	0.73
	Total Operating Cost (Total : B)	12.57
	Total Operating Cost for the Project - (A + B)	64.55

SECTION 11

ANNUAL REVENUE ESTIMATES

11.1 Annual Revenue Estimates

11.1.1 The revenue earnings from the project to the Port is basically the Berth hire charges, handling charges from cargoes. In the event of taking up the Project on DBFOT basis viz through PPP Mode, the project term normally be limited to 30 years and the financial feasibility is to be examined accordingly duly determining the tariff under Revised Reference Tariff guidelines 2013 or under Upfront Tariff guidelines 2008 in case no reference tariff is available for the given cargo profile in the port concerned or in any other Major Port. The said guidelines will also apply to Port's own Project. For the reasons brought out and explained elsewhere in this report, viz.,

- i. To avoid evacuation hiccups of the cargo through city roads and easing the pressure on roads.
- ii. To alleviate from the problem of restricted movement of barges through lock gates as ships will get preference.
- iii. Vessels can avoid the hassle of streaming of 75 kms from Diamond Harbor to Docks, wait for tide and go through lock gates to berth and un-berth.
- iv. To make use of Balagarh river front with a depth of 3 meters always and 300 acres of land there owned by Port.
- v. To save road freight due to proximity of Balagarh to upcountry destinations, the entire project is proposed to be taken up with Internal Resources of the Port, and the financial feasibility is being examined considering a life period of 50years.

11.1.2. Though the rates are available in the scale of rates of KoPT for handling of the cargoes proposed for Balagarh Terminal, the rates are not representative enough since the handling rates and equipment provided are different as well as problems of discharging in stream and extra barging distance of 82 kms involved to reach Balagarh.

11.1.3. Para 5.7.1 of Working Guidelines to operationalize the Policy for Determination of Tariff for Major Port Trusts, 2015 stipulates that "5.7.1. Whenever a specific tariff for a service/ cargo is not available in the SOR, of that particular port, the concerned Major Port Trust can approach TAMP for

notification of tariff for the said new cargo/ equipment/ service adopting the tariff and performance standards if any fixed for comparable cargo/ equipment/ service in any other Major Port Trust. If there is no rate available in any other Major Port Trust or if the rate available is not representative enough of the proposed new cargo/ service/ facility, then the port may file the proposal for notification of tariff for the said new cargo/ equipment/ service with reference to optimal capacity assessed following the principles of 2008 guidelines or based on rated capacity or technical specification of service/ facility/ equipment. If determination of tariff based on the above prescribed options is not possible, then the Major Port Trusts after giving sufficient reasons may propose rates based on Cost plus 16% return formula.” However, an attempt has been made to determine the tariff under Upfront guidelines 2008 and the financial feasibility has been examined. It is also brought out at this juncture, that additional capital cost around Rs 75.00 crores is to be incurred towards Road Connectivity from Balagarh to State Highway SH6. This capital cost of road connectivity is contemplated to be borne by National Exchequer in a suitable scheme. Subject to above, the financial viability of the project is being examined.

11.2. Estimated Revenues from the Project –Balagarh (Phase I & II)

11.2.1. Accordingly, the estimated annual revenue has been assessed based on Upfront Tariff Guidelines 2008. The details are as under:

S. No.	Particulars	Unit	2020-21	2023-24	2026-27
1.	Estimated Throughput Containers Peas and Pulses	Lakh TEUs Lakh Tonnes	0.62 3.03	1.85 3.03	2.46 3.03
2.	Handling Rate Containers Peas and Pulses	Rs. per TEU Rs. per Ton	2867.05 540.04	2867.05 540.04	2867.05 540.04
3.	Revenue on Handling Charges	Rs. in lakhs	3413.89	6940.36	8689.26
4.	Estimated GRT	Lakh GRT hrs	53.31	124.33	159.59
5.	Berth hire charges	Rs./ GRT hr	10.40	10.40	10.40
6.	Revenue on Berth hire	Rs. in lakhs	554.42	1293.03	1659.74
7.	Total Estimated Income	Rs. In Lakhs	3,968.31	8,233.40	10,349.00

11.3. The port will also earn revenue from Port Dues and Pilotage as per the General scale of rates, which has not been considered for the cash flows.

SECTION 12

VIABILITY AND SENSITIVITY ANALYSIS

- 121** The financial viability for implementation of the project undertaken by port entirely with port's own resources has been assessed, and the outcome of the analysis are discussed hereunder.
- 122** If the port undertakes the Project from the internal resources, the financial viability of the project considering the 50 years as the life of the project, the project IRR works out to 17.24 % and 23.67 for the project (Phase- 1 and Phase-II) of Balagarh and Berth Berth at KDS respectively. The results of sensitivity analysis are as under.

Sl. No.	Pre-Tax Project IRR at Constant prices	Phase-II	
		Balagarh	Barge Berth- KDS
1	Base case	17.24%	23.67
2	Capital Cost up by 10%	15.75%	21.70
3	Revenue down by 10%	16.28%	22.66
4	Annual O&M Cost up by 10%	14.61%	20.46
5	Combined effect of Sl. no. 2, 3 & 4	12.35%	17.73

- 123** The Financial analysis is also carried for a scenario, if the port undertakes only Phase-1 of the Balagarh Project from the internal resources. The results of the financial viability of the project considering the 50 years as the life of the project are as under are as under.

Sl. No.	Description	Balagarh
		Phase – I
1	Throughput & Capacity: (i) Containers (Lakh TEUs) (ii) Bulk Cargo (Peas & Pluses) (Lakh tonnes)	0.62 3.03
2.	Revenue (in Rupees in Lakhs) (i) Revenue on Handling charges (ii) Revenue on Berth Hire charges (iii) Total	3344.23 1044.26 4388.49
3.	Financial Viability and Sensitivity Analysis (i) Base case (ii) Capital Cost up by 10% (iii) Revenue down by 10% (iv) Annual O&M Cost up by 10% (v) Combined effect of Sl. no. 2, 3 & 4	17.54% 16.01% 16.71% 15.00% 12.85%

124 The financial viability for implementation of the project Balagarh undertaken by port with commercial loan for 20 years with moratorium period of five years has been assessed, and the outcome of the analysis are discussed hereunder. Detailed cash flows are given at Annexure VII.

- The debt-equity considered for assessing the viability is 70:30.
- It was assumed a separate loan for Phase I and Phase II will be raised with a moratorium period of 5 years.
- The interest rate has been assumed at 12%, as per the prevailing market rates.
- The results of sensitivity analysis are as under.

Sl. No.	Pre-Tax Equity IRR at Constant prices	Balagarh Only
1	Base case	40.14%
2	Capital Cost up by 10%	36.25%
3	Revenue down by 10%	36.98%
4	Annual O&M Cost up by 10%	30.69%
5	Combined effect of Sl. no. 2, 3 & 4	21.84%

Traffic Estimates: Phase – I Balagarh Project

	Year	Containers	Peas & Pulses	Total
		In lakh teus	In lakh Tonnes	(In Lakh Tonnes)
1	2019-20	0.31	1.52	5.86
2	2020-21	0.62	3.03	11.71
3	2021-22	0.62	3.03	11.71
4	2022-23	0.62	3.03	11.71
5	2023-24	0.62	3.03	11.71
6	2024-25	0.62	3.03	11.71
7	2025-26	0.62	3.03	11.71
8	2026-27	0.62	3.03	11.71
9	2027-28	0.62	3.03	11.71
10	2028-29	0.62	3.03	11.71
11	2029-30	0.62	3.03	11.71
12	2030-31	0.62	3.03	11.71
13	2031-32	0.62	3.03	11.71
14	2032-33	0.62	3.03	11.71
15	2033-34	0.62	3.03	11.71
16	2034-35	0.62	3.03	11.71
17	2035-36	0.62	3.03	11.71
18	2036-37	0.62	3.03	11.71
19	2037-38	0.62	3.03	11.71
20	2038-39	0.62	3.03	11.71
21	2039-40	0.62	3.03	11.71
22	2040-41	0.62	3.03	11.71
23	2041-42	0.62	3.03	11.71
24	2042-43	0.62	3.03	11.71
25	2043-44	0.62	3.03	11.71
26	2044-45	0.62	3.03	11.71
27	2045-46	0.62	3.03	11.71
28	2046-47	0.62	3.03	11.71
29	2047-48	0.62	3.03	11.71
30	2048-49	0.62	3.03	11.71
31	2049-50	0.62	3.03	11.71
32	2050-51	0.62	3.03	11.71
33	2051-52	0.62	3.03	11.71
34	2052-53	0.62	3.03	11.71
35	2053-54	0.62	3.03	11.71
36	2054-55	0.62	3.03	11.71
37	2055-56	0.62	3.03	11.71
38	2056-57	0.62	3.03	11.71

	Year	Containers	Peas & Pulses	Total
		In lakh teus	In lakh Tonnes	(In Lakh Tonnes)
39	2057-58	0.62	3.03	11.71
40	2058-59	0.62	3.03	11.71
41	2059-60	0.62	3.03	11.71
42	2060-61	0.62	3.03	11.71
43	2061-62	0.62	3.03	11.71
44	2062-63	0.62	3.03	11.71
45	2063-64	0.62	3.03	11.71
46	2064-65	0.62	3.03	11.71
47	2065-66	0.62	3.03	11.71
48	2066-67	0.62	3.03	11.71
49	2067-68	0.62	3.03	11.71
50	2068-69	0.62	3.03	11.71
51	2069-70	0.62	3.03	11.71

Traffic Estimates: Phase – II Balagarh Project

	Year	Containers	Peas & Pulses	Total
		In lakh teus	In lakh Tonnes	(In Lakh Tonnes)
3	2019-20	0.31	1.52	5.86
4	2020-21	0.62	3.03	11.71
5	2021-22	0.62	3.03	11.71
6	2022-23	0.62	3.03	11.71
7	2023-24	1.85	3.03	28.93
8	2024-25	2.46	3.03	37.47
9	2025-26	2.46	3.03	37.47
10	2026-27	2.46	3.03	37.47
11	2027-28	2.46	3.03	37.47
12	2028-29	2.46	3.03	37.47
13	2029-30	2.46	3.03	37.47
14	2030-31	2.46	3.03	37.47
15	2031-32	2.46	3.03	37.47
16	2032-33	2.46	3.03	37.47
17	2033-34	2.46	3.03	37.47
18	2034-35	2.46	3.03	37.47
19	2035-36	2.46	3.03	37.47
20	2036-37	2.46	3.03	37.47
21	2037-38	2.46	3.03	37.47
22	2038-39	2.46	3.03	37.47
23	2039-40	2.46	3.03	37.47
24	2040-41	2.46	3.03	37.47
25	2041-42	2.46	3.03	37.47
26	2042-43	2.46	3.03	37.47
27	2043-44	2.46	3.03	37.47
28	2044-45	2.46	3.03	37.47
29	2045-46	2.46	3.03	37.47
30	2046-47	2.46	3.03	37.47
31	2047-48	2.46	3.03	37.47
32	2048-49	2.46	3.03	37.47
33	2049-50	2.46	3.03	37.47
34	2050-51	2.46	3.03	37.47
35	2051-52	2.46	3.03	37.47
36	2052-53	2.46	3.03	37.47
37	2053-54	2.46	3.03	37.47
38	2054-55	2.46	3.03	37.47
39	2055-56	2.46	3.03	37.47
40	2056-57	2.46	3.03	37.47

	Year	Containers	Peas & Pulses	Total
		In lakh teus	In lakh Tonnes	(In Lakh Tonnes)
41	2057-58	2.46	3.03	37.47
42	2058-59	2.46	3.03	37.47
43	2059-60	2.46	3.03	37.47
44	2060-61	2.46	3.03	37.47
45	2061-62	2.46	3.03	37.47
46	2062-63	2.46	3.03	37.47
47	2063-64	2.46	3.03	37.47
48	2064-65	2.46	3.03	37.47
49	2065-66	2.46	3.03	37.47
50	2066-67	2.46	3.03	37.47
51	2067-68	2.46	3.03	37.47
52	2068-69	2.46	3.03	37.47
53	2069-70	2.46	3.03	37.47

Revenue Estimates: Phase – I Balagarh Project

Year	Cargo Handling Charges			Berth Hire Chares	
	Containers	Peas & Pulses	Total	Lakh GRT Hours	Revenue
	(Rs. In lakhs)				Rs. In lakhs
2019-20	1,098.92	573.20	1,672.11	79.84	521.34
2020-21	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2021-22	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2022-23	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2023-24	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2024-25	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2025-26	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2026-27	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2027-28	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2028-29	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2029-30	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2030-31	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2031-32	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2032-33	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2033-34	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2034-35	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2035-36	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2036-37	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2037-38	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2038-39	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2039-40	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2040-41	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2041-42	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2042-43	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2043-44	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2044-45	2,197.84	1,146.39	3,344.23	159.92	1,044.26

Year	Cargo Handling Charges			Berth Hire Chares	
	Containers	Peas & Pulses	Total	Lakh GRT Hours	Revenue
	(Rs. In lakhs)				Rs. In lakhs
2045-46	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2046-47	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2047-48	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2048-49	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2049-50	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2050-51	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2051-52	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2052-53	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2053-54	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2054-55	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2055-56	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2056-57	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2057-58	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2058-59	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2059-60	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2060-61	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2061-62	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2062-63	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2063-64	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2064-65	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2065-66	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2066-67	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2067-68	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2068-69	2,197.84	1,146.39	3,344.23	159.92	1,044.26
2069-70	2,197.84	1,146.39	3,344.23	159.92	1,044.26

Revenue Estimates: Phase – II Balagarh Project

Year	Cargo Handling Charges		Total	Berth Hire Charges	
	Containers	Peas & Pulses		Lakh GRT Hours	Revenue
	(Rs. in lakhs)				(Rs. in lakhs)
2019-20	884.36	818.16	1,702.52	26.61	276.77
2020-21	1,777.57	1,636.32	3,413.89	53.31	554.42
2021-22	1,777.57	1,636.32	3,413.89	53.31	554.42
2022-23	1,777.57	1,636.32	3,413.89	53.31	554.42
2023-24	5,304.04	1,636.32	6,940.36	124.33	1,293.03
2024-25	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2025-26	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2026-27	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2027-28	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2028-29	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2029-30	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2030-31	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2031-32	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2032-33	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2033-34	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2034-35	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2035-36	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2036-37	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2037-38	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2038-39	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2039-40	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2040-41	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2041-42	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2042-43	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2043-44	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2044-45	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2045-46	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2046-47	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2047-48	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2048-49	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2049-50	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2050-51	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2051-52	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2052-53	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2053-54	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2054-55	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2055-56	7,052.95	1,636.32	8,689.26	159.59	1,659.74

Year	Cargo Handling Charges		Total	Berth Hire Charges	
	Containers	Peas & Pulses		Lakh GRT Hours	Revenue
	(Rs. in lakhs)				(Rs. in lakhs)
2056-57	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2057-58	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2058-59	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2059-60	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2060-61	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2061-62	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2062-63	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2063-64	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2064-65	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2065-66	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2066-67	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2067-68	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2068-69	7,052.95	1,636.32	8,689.26	159.59	1,659.74
2069-70	7,052.95	1,636.32	8,689.26	159.59	1,659.74

Cash Flow Analysis: Phase – I Balagarh Project

Annexure - V
(Rs. in Crores)

Year	Capital Cost	Op. & Maint. Cost	Total Cost	Revenue Earnings	Base Case	Sensitivity Analysis			
					Net Benefits	Capital Cost (+) 10%	O&M Cost (+) 10%	Revenue (-) 10%	Combined Effect
2017-18	36.87	0.23	37.09	-	(37.09)	(40.78)	(37.11)	(37.09)	(40.80)
2018-19	95.85	0.23	96.08	-	(96.08)	(105.66)	(96.10)	(96.08)	(105.69)
2019-20	14.75	7.34	22.09	21.93	(0.15)	(1.63)	(0.89)	(2.34)	(4.55)
2020-21		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2021-22		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2022-23		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2023-24		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2024-25		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2025-26		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2026-27		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2027-28		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2028-29		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2029-30		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2030-31	11.50	14.45	23.69	43.88	17.93	16.78	16.49	13.54	10.95
2031-32		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2032-33		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2033-34		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2034-35		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2035-36		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2036-37		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2037-38		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2038-39		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2039-40		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2040-41	40.06	14.45	54.51	43.88	(10.63)	(14.63)	(12.07)	(15.01)	(20.46)
2041-42		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2042-43		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2043-44		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60

Year	Capital Cost	Op. & Maint. Cost	Total Cost	Revenue Earnings	Base Case	Sensitivity Analysis			
					Net Benefits	Capital Cost (+) 10%	O&M Cost (+) 10%	Revenue (-) 10%	Combined Effect
2044-45		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2045-46		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2046-47		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2047-48		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2048-49		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2049-50		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2050-51	11.50	14.45	23.69	43.88	17.93	16.78	16.49	13.54	10.95
2051-52		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2052-53		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2053-54		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2054-55		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2055-56		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2056-57		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2057-58		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2058-59		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2059-60		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2060-61	40.06	14.45	54.51	43.88	(10.63)	(14.63)	(12.07)	(15.01)	(20.46)
2061-62		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2062-63		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2063-64		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2064-65		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2065-66		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2066-67		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2067-68		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2068-69		14.45	14.45	43.88	29.43	29.43	27.99	25.04	23.60
2069-70		14.45	14.45						
Total	250.58	730.17	981.04	2216.18	1235.13	1210.08	1162.09	1013.52	915.41
			NPV @ 12%		58.64	46.11	49.54	31.14	9.50
			IRR		17.54%	16.01%	16.71%	15.00%	12.85%

Cash Flow Analysis: Phase – II Balagarh Project

Annexure - VI
(Rs. in Crores)

Year	Capital Cost	Op. & Maint. Cost	Total Cost	Revenue Earnings	Base Case	Sensitivity Analysis			
					Net Benefits	Capital Cost (+) 10%	O&M Cost (+) 10%	Revenue (-) 10%	Combined Effect
2017-18	36.87	0.23	37.10	-	(37.10)	(40.79)	(37.12)	(37.10)	(40.81)
2018-19	95.85	0.23	96.08	-	(96.08)	(105.67)	(96.10)	(96.08)	(105.69)
2019-20	14.75	7.25	22.00	19.84	(2.16)	(3.64)	(2.89)	(4.14)	(6.34)
2020-21	-	14.26	14.26	39.68	25.42	25.42	23.99	21.45	20.03
2021-22	43.45	14.68	58.13	39.68	(18.45)	(22.80)	(19.92)	(22.42)	(28.23)
2022-23	112.96	14.68	127.64	39.68	(87.96)	(99.26)	(89.43)	(91.93)	(104.69)
2023-24	17.38	27.90	45.28	82.33	37.05	35.31	34.26	28.82	24.29
2024-25	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2025-26	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2026-27	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2027-28	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2028-29	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2029-30	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2030-31	11.50	38.58	50.08	103.49	53.41	52.26	49.55	43.06	38.05
2031-32	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2032-33	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2033-34	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2034-35	17.17	38.58	55.75	103.49	47.74	46.02	43.88	37.39	31.82
2035-36	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2036-37	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2037-38	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2038-39	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2039-40	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2040-41	40.06	38.58	78.64	103.49	24.85	20.84	20.99	14.50	6.64
2041-42	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2042-43	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2043-44	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2044-45	78.80	38.58	117.38	103.49	(13.89)	(21.77)	(17.75)	(24.24)	(35.98)
2045-46	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2046-47	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70

Year	Capital Cost	Op. & Maint. Cost	Total Cost	Revenue Earnings	Base Case	Sensitivity Analysis			
					Net Benefits	Capital Cost (+) 10%	O&M Cost (+) 10%	Revenue (-) 10%	Combined Effect
2047-48	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2048-49	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2049-50	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2050-51	11.50	38.58	50.08	103.49	53.41	52.26	49.55	43.06	38.05
2051-52	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2052-53	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2053-54	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2054-55	17.17	38.58	55.75	103.49	47.74	46.02	43.88	37.39	31.82
2055-56	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2056-57	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2057-58	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2058-59	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2059-60	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2060-61	40.06	38.58	78.64	103.49	24.85	20.84	20.99	14.50	6.64
2061-62	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2062-63	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2063-64	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2064-65	78.80	38.58	117.38	103.49	(13.89)	(21.77)	(17.75)	(24.24)	(35.98)
2065-66	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2066-67	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2067-68	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2068-69	-	38.58	38.58	103.49	64.91	64.91	61.05	54.56	50.70
2069-70	(50.01)	38.58	(11.43)	103.49	114.92	119.92	111.06	104.57	105.71
Total	566.31	1853.91	2420.22		2561.53	2504.90	2376.14	2063.36	1821.33
			NPV @ 12%		98.48	76.38	79.72	47.77	6.89
			IRR		17.24%	15.75%	16.28%	14.61%	12.35%

Cash Flow Analysis: Balagarh Project with the loan from Financial Institutes

(Rs. in Crores)

Year	Capital Cost	Op. & Maint. Cost			Total Cost	Revenue Earnings	Base Case	Sensitivity Analysis			
			Interest cost	Principal Repay ment			Net Benefits	Capital Cost (+) 10%	O&M Cost (+) 10%	Revenue (-) 10%	Combined Effect
2017-18	11.06	0.23			11.29	-	(11.29)	(12.40)	(11.31)	(11.29)	(12.42)
2018-19	28.76	0.23			28.99	-	(28.99)	(31.87)	(29.01)	(28.99)	(31.89)
2019-20	4.43	7.25			11.68	19.84	8.16	7.72	7.44	6.18	5.01
2020-21	-	14.26			14.26	39.68	25.42	25.42	23.99	21.45	20.03
2021-22	13.04	14.68			27.72	39.68	11.97	10.66	10.50	8.00	5.23
2022-23	33.89	14.68			48.57	39.68	(8.89)	(12.28)	(10.36)	(12.86)	(17.71)
2023-24	5.21	27.90			33.11	82.33	49.22	48.69	46.43	40.98	37.67
2024-25	-	38.58	21.92	2.54	63.04	103.49	40.45	40.45	36.59	30.10	26.24
2025-26	-	38.58	21.62	2.84	63.04	103.49	40.45	40.45	36.59	30.10	26.24
2026-27	-	38.58	21.28	3.18	63.04	103.49	40.45	40.45	36.59	30.10	26.24
2027-28	-	38.58	20.90	3.56	63.04	103.49	40.45	40.45	36.59	30.10	26.24
2028-29	-	38.58	46.31	6.98	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2029-30	-	38.58	45.47	7.82	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2030-31	11.50	38.58	44.53	8.75	103.37	103.49	0.12	(1.03)	(3.74)	(10.23)	(15.23)
2031-32	-	38.58	43.48	9.80	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2032-33	-	38.58	42.31	10.98	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2033-34	-	38.58	40.99	12.30	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2034-35	17.17	38.58	39.51	13.77	109.04	103.49	(5.55)	(7.26)	(9.41)	(15.90)	(21.47)
2035-36	-	38.58	37.86	15.43	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2036-37	-	38.58	36.01	17.28	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2037-38	-	38.58	33.94	19.35	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2038-39	-	38.58	31.61	21.67	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2039-40	-	38.58	29.01	24.27	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2040-41	40.06	38.58	26.10	27.19	131.93	103.49	(28.44)	(32.44)	(32.30)	(38.79)	(46.65)
2041-42	-	38.58	22.84	30.45	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2042-43	-	38.58	19.18	34.10	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2043-44	-	38.58	15.09	38.20	91.87	103.49	11.62	11.62	7.76	1.27	(2.58)
2044-45	78.80	38.58	10.51	18.32	146.21	103.49	(42.72)	(50.60)	(46.58)	(53.07)	(64.80)
2045-		38.58									

Year	Capital Cost	Op. & Maint. Cost	Interest cost	Principal Repayment	Total Cost	Revenue Earnings	Base Case	Sensitivity Analysis			
							Net Benefits	Capital Cost (+) 10%	O&M Cost (+) 10%	Revenue (-) 10%	Combined Effect
46	-		8.31	20.52	67.41	103.49	36.08	36.08	32.22	25.73	21.88
2046-47	-	38.58	5.85	22.98	67.41	103.49	36.08	36.08	32.22	25.73	21.88
2047-48	-	38.58	3.09	25.74	67.41	103.49	36.08	36.08	32.22	25.73	21.88
2048-49	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2049-50	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2050-51	11.50	38.58			50.08	103.49	53.41	52.26	49.55	43.06	38.05
2051-52	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2052-53	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2053-54	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2054-55	17.17	38.58			55.75	103.49	47.74	46.02	43.88	37.39	31.82
2055-56	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2056-57	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2057-58	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2058-59	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2059-60	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2060-61	40.06	38.58			78.64	103.49	24.85	20.84	20.99	14.50	6.64
2061-62	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2062-63	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2063-64	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2064-65	78.80	38.58			117.38	103.49	(13.89)	(21.77)	(17.75)	(24.24)	(35.98)
2065-66	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2066-67	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2067-68	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2068-69	-	38.58			38.58	103.49	64.91	64.91	61.05	54.56	50.70
2069-70	(50.01)	38.58			(11.43)	103.49	114.92	119.92	111.06	104.57	105.71
Total	341.44	1853.91			3261.10	4981.75	1720.65	1686.50	1535.26	1222.47	1002.94
					NPV @ 12%		100.63	93.20	81.87	49.91	23.71
					Equity IRR		40.14%	36.25%	36.98%	30.69%	21.84%