

INTEGRATED NATIONAL WATERWAYS TRANSPORTATION GRID

CONSULTATION DOCUMENT

India is a country of rivers and most of the cities and towns were developed alongside the river systems. It has large number of inland waterways consisting of rivers, canals, backwaters, creeks and lakes etc, which have the potential for development of efficient waterways transport network. Underutilization of Inland Water Transport (IWT) sector in India is a great opportunity loss for the country.

IWT is referred to as operationally cheaper, high in fuel efficiency and environmentally friendly mode of transport. It has a vast potential to act as an alternate and supplementary mode of transportation for handling certain bulk commodities.

Inland Waterways Authority of India (IWAI) is regularly trying to reinstate IWT services on various rivers and a number of studies have already been carried out in this direction, based on feasibility studies and DPRs various waterway stretches of different rivers were declared as National waterways. Five waterway stretches have already been declared as National Waterways, whereas sixth i.e. Barak river between Lakhipur and Bhanga in Assam is in the process for declaration as National Waterway 6.

National Waterway Systems

NW	Stretch	Length (Km)	Declared in (year)
1	River Ganga from Haldia to Allahabad	1620	1986
2	River Brahmaputra from Dhubri to Sadiya	891	1988
3	West Coast Canal from Kottapuram to Kollam with Udyogmandal & Champakara Canals	205	1993
4	Kakinada – Puducherry stretch of canals with River Godavari and River Krishna	1078	2008
5	East Coast Canal with River Brahmani and River Mahanandi's delta	588	2008
6	Barak river between Lakhipur and Bhanga	121	2013

The study was proposed to be undertaken in two phases. Phase-I of the study is limited to the Macro level information (using the secondary information, provided by IWAI and culled out from a number of studies carried out by RITES) and Phase II will involve Micro level studies which will be taken up based on the results of Phase I of the study.

All the national waterways were studied independently by different technical/expert groups during different periods of time, adopting different approaches, to assess their technical and financial viability before declaring different stretches as National waterways. With a view to overcome time variations of the studies as well as to update the traffic estimates IWAI

entrusted RITES Ltd., a study with the limited scope “for developing Integrated National Transportation Grid and identifying Specific Projects for Private Investment for the development of Inland Water Transport System in the Country, with the following terms of reference.

Terms of Reference (TOR)

- *Formulate projects for each National Waterways system by identifying the projects for best investment.*
- *Identify projects to be considered under PPP operations/concession agreement.*
- *Identify potential IWT terminals on NW-1, NW-2, NW-3, NW-4, NW-5 and NW-6.*
- *Develop Rail & Road connectivity to the identified/proposed terminals.*
- *Develop Sea Port and National Waterway connectivity including both physical and improvement of the existing charges for commercially viable connectivity.*
- *Establish Multi/Inter-modal grid for smooth movement of goods traffic on each National Waterways.*
- *Workout costs for Developing Integrated Transportation Grid around National Waterways.*

Study commenced with literature survey that involved close scrutiny of secondary information available from different Reports and documents and brought out various locations identified by different research teams on different waterways that formed basis for declaration of these waterways as the National Waterways.

As indicated earlier, different waterways were studied by varying agencies assigned by the IWAI during different periods of time, thereby, base year traffic, inter-modal costs as well as traffic projection period given in the Reports are different. Moreover, to arrive at infrastructural development cost and traffic estimation, different agencies have adopted different approach. In each of these Reports, commodity wise volumes of divertible traffic to proposed Inland Water Transport, different horizon years have been given.

Since, information provided by the different expert agencies pertained to different base years for traffic estimation, projection period and inter-modal costs the Consultants have taken appropriate steps to up-date traffic flows to base year of current study (2011-12) and reconfirm/re-estimate traffic projections. For up-dation of commodity wise traffic estimates covering primary hinterland of each waterway, actual rail flow data for 2011-12 have used, whereas for road sector, road flow estimates for 2007-08 given in Total Transport System Study (TTSS) conducted by RITES on behalf of Planning Commission have been brought to 2011-12 levels by applying appropriate raising factors.

For developing proposed facilities required at various IWT terminals four year period have been assigned. First year is allocated for obtaining necessary sanctions and approvals and following three years are dedicated for construction of the terminal infrastructure. Inland Water Transportation services on the proposed corridors are assumed to commence from 2016-17.

In view of the fact that all the past IWT studies were carried out with specific objectives, representing specified waterway system, therefore no national waterway systems grid was envisaged. In the current study, an attempt has been made to establish Total Transport System Grid in which Rail, Road and IWT form a part.

National Waterways 1, Ganga-Bhagirathi–Hoogly river system passes through the states of Uttar Pradesh, Bihar, Jharkhand and West Bengal, a distance of about 1620 km, serving nearly 42 traffic regions, between Allahabad and Haldia (Sagar). Major Ports such as; Haldia and Kolkata and important cities like; Kolkata, Patna, Varanasi and Allahabad fall under its primary hinterland. The river system serves richly endowed natural reserve areas as well as a large number of industrial units comprising Thermal Power Plants, Iron & Steel Plant, Sugar Milles, Cement Industry, Small Scale Industries etc.

River Brahmaputra between Dhubri and Sadiya over a length of about 891 km was declared as NW2 in 1988. It serves the states of Assam, Meghalaya and Arunachal Pradesh covering about 37 traffic regions. Because of its connectivity with National Waterway 1 through protocol route via Bangladesh its catchment area is extended up-to the state of West Bengal, thereby establishing its connectivity with Haldia and Kolkata ports.

An Indo-Bangladesh Protocol on Inland Water Transit & Trade exists between India and Bangladesh under which inland vessels of one country can transit through the specified routes of the other country. The existing protocol routes are: Kolkata-Pandu-Kolkata, Kolkata-Karimganj – Kolkata, Rajshahi-Dhulian-Rajshahi, and Pandu-Karimganj-Pandu. For inter-country trade, four ports of call have been designated in each country, namely; India – Haldia (West Bengal), Kolkata (West Bengal), Pandu (Assam), Karimganj (Assam) and Silghat (Assam) and Bangladesh - Narayanganj, Khulna, Mongla, Sirajganj and Ashuganj.

National Waterway-3 (NW-3) comprises West Coast Canal from Kottapuram to Kollam with Udyogmandal and Champakara Canals and extends over a distance of 205 km, in the state of Kerala. It has no connectivity with any other declared national waterway systems of the country. The waterway is directly linked to Cochin Port, therefore it can offer cost effective solution in handling foreign trade through the said port.

National Waterway 4 (NW-4) comprises Kakinada-Puducherry Canal System integrated with Rivers Godavari and Krishna. NW-4 can offer cost effective IWT services over a distance of about 1078 km covering states of Andhra Pradesh, Tamil Nadu and Union Territory of Puducherry. All the civil districts (19) falling along the considered river systems are covered under the primary hinterland. NW4 offers connectivity to intermediate-ports like; Kakinada, Machilipatnam, Krishnapatnam and major port as Chennai and Ennore as well as it serves important cities like; Chennai, Visakhapatnam, Vijayawada, etc. Although it does not provide linkage to any other declared national waterways, it can supplement other modes of transport by serving high transport demand corridors.

National Waterway 5 (NW-5) in the state of Odisha, extends from Talcher to Paradip Port and Dhamra Port, areas richly endowed with natural reserves on the one end and country's

major port on the other. It includes East Coast Canal with River Brahmani and River Mahanadi's delta (623 km). By developing Hijili tidal waterway systems, IWT services on NW-5 can offer connectivity up to Haldia that can result in extension of services up to Allahabad (Uttar Pradesh) on NW1, up to Sadiya (Assam) on NW2 and up to Lakhipur (Assam) on NW6. The corridor is likely to contribute movement of coal & other ores to thermal plants, fertilizers plants etc.

A stretch of river Barak between Lakhipur and Bhanga (121 km) is under consideration for declaration as Sixth National Waterway (NW-6). Like NW-2, NW-6 is also connected to Kolkata and Haldia and other IWT terminals in NW 1 via protocol route and further to NW 5. Although declared river stretch falls in the state of Assam, because of distance advantage offered by the proposed waterways (using protocol route) between rest of India and some of the Eastern States like Tripura, Mizoram and Manipur, its catchment area has been expanded.

National Waterways Grid: Although, all the declared waterway systems cannot be joined to form a national waterway grid, four out of the six national waterways can form a grid in the Eastern Region of the country i.e. NW-1 can be connected to NW-2 and NW-6 using protocol route through Bangladesh. Similarly, NW5 that extends up to Paradip Port can also be joined in the National Waterway grid through backwaters of Hooghly and Hijily tidal canal. Connectivity would further increase the area of influence of each designated waterway system. Proposed National Waterways Grid involves overall rivers length of 3220 km (excluding Indo-Bangladesh Protocol Route). Grid is likely to serve 11 states namely; Uttar Pradesh, Bihar, Jharkhand, West Bengal, Assam, Meghalaya, Arunachal Pradesh, Tripura, Mizoram, Manipur and Odisha serving 108 civil districts.

National Inter-Modal Grid : In the light of this, to offer cost effective transport solution at the nation level, it is important to develop optimum inter-modal mix, wherein IWT is also a part. To avail entire benefits of different modes, each mode should play a complimentary role. In the current study an attempt has been made to link identified potential IWT terminal/locations with national rail and road network, to prepare inter-modal national transport grid. In the case of rail, nearest railheads have been identified and for road, connectivity up to the nearest National or State Highways have been established.

National Inter-modal Grid, comprising rail, road and IWT (covering six declared National Waterways) spread over a total length of 4503 km is likely to serve 14 states and 137 civil districts under the primary hinterland.

In view of the fact that no regular IWT services are operated on the identified corridors (National Waterways) as well as study assigned is limited to secondary data, to arrive at 2011-12 levels of IWT potential traffic, Consultants have adopted a set of IWT operating assumptions, such as;

- *Fairways, navigation channel/depths (constant water draft of 2.0 to 2.5 meters and navigational aids maintained by IWAI*

- *Indo-Bangladesh Protocol route would be maintained. To meet future demand list of permissible locations for handling traffic may be enhanced.*
- *All IWT terminals are connected to the national rail and road network.*
- *No procedural delays towards obtaining approvals and clearances from various government authorities have been considered. One year period is earmarked for such sanctions.*
- *There are no corridor capacity constraints in either modes of transport.*
- *IWT would offer cost effective transport services, in comparison to other modes.*
- *If economical, potential agencies would utilize IWT corridors.*

Similarly, there are factors affecting inter-modal shift (level of diversion) in favour of IWT

- ✓ *Type of commodity and volumes (Bulk/Break Bulk/Container/Perishable)*
- ✓ *Long Term & firm commitment of traffic*
- ✓ *Actual place of origin / destination within the region*
- ✓ *Existing modal choice*
- ✓ *Port – IWT connectivity*
- ✓ *Empty return ratio/return load to IWT*
- ✓ *Deep sea transshipment, wherever feasible (avoiding berthing / port charges / costs)*

Comparative intermodal costs are one of the visible decision making tools for the users. Intermodal comparative costs given in “Report of the Inter – Ministerial Committee to Identify New Areas of Private Investment in the Inland waterways Transport (IWT) Sector” Planning Commission, (Transport Division), 30th November 2012, overall advantage of IWT vis-à-vis other modes have been worked out. In the current exercise, to encourage and promote dependence on IWT services tax exemption has been considered. Comparative inter modal costs Rs/TKm considered are given as under:

Mode	VOC/Freight (Rs/TKm)	Taxes	Total Rs/TKm
Railways *	1.36	3.71%	1.41
Highways**	2.50	3.09%	2.58
IWT	1.06	Nil	1.06
Source: Railways- Ministry of Railways, Road- TTSS, IWT – IWAI			
* Service Tax on rail transport is 12.36% abatement is 70%.			
** Service Tax on Road transport is 12.36% abatement is 75%.			

Traffic Projections : Based on the secondary information collected from Railways and Highways, commodity wise base year (2011-12) inter-regional goods flows have been generated. Since short lead traffic (below 100 km of trip length) which is not expected to affect proposed IWT services and commodities like; POL products, are kept beyond the purview of traffic estimates. Total potential inter-regional goods flow estimated (2011-12) on national waterways understudy worked out to 155.853 million tonnes.

Using commodity wise base year inter-regional flows, traffic divertible to proposed IWT services have been estimated. In view of the fact that proposed IWT services are more or

less likely to be introduced afresh, under different assumptions, three scenario approach have been adopted, i.e. optimistic, most likely and pessimistic. Base year divertible traffic estimated under most likely scenario worked out to 142.46 million tonnes on all the six National Waterways whereas for National Waterways proposed to be a part of the National Waterways Grid, total divertible traffic is estimated as 83.15 million tonnes.

To estimate future volumes of cargo between different pairs of points on proposed National waterways, appropriate raising factors have been applied on Base year divertible traffic. For railways, past growth trend formed basis to work out raising multipliers, whereas for road sector traffic, raising factors recommended in 12th Five Year Plan have been used.

Under most likely scenario divertible traffic estimated for the years 2016-17 and 2031-32 worked out to 186.21 million tonnes and 415.72 million tonnes on all the six National Waterways as against 108.32 million tonnes and 240.22 million tonnes worked out for National Waterways Grid, respectively.

IWT Terminals: With a view to handle estimated terminal year's traffic (2031-32) of 83.15 million tonnes on all the six National Waterways, potential IWT Terminals have been identified at 27 locations and requisite facilities have been proposed. As revealed from past studies many of the existing IWT terminals are of semi permanent type (Floating Pontoon with gangway) with manual handling. To handle bulk cargo viz., coal, limestone, building material, cement, etc. RCC terminal with mechanical material handling facilities like conveyors, mobile cranes etc shall be required. Further, for handling bulk cargo at port connectivity (IWT- Major Port) locations, requirement of Trans-shippers have been assessed and proposed.

Overall IWT Terminal Development costs involved; Rail Connectivity cost (BG), Road Connectivity Costs (2-Lane), Warehousing facilities, Berth development costs and Cargo handling facilities. To handle 2.5–3.0 million tons of cargo, including belt conveyor the terminals development cost on normative basis worked out to Rs. 65.0 crores as against Rs. 50.0 crores without belt conveyor system.

Overall costs for provision of requisite terminal facilities at identified high density IWT terminals worked out Rs. 3179.7 crores comprising Rs. 930 crores on provision of road connectivity, Rs. 454.7 crores on provision of BG rail linkage and Rs. 1795.0 crores towards development of terminal facilities.

Consultations Required: Keeping in view the role of IWAI, it is suggested that concerned Ministries/Departments may be consulted for requisite inputs. As assumed to provide Two-lane road connectivity between the proposed IWT terminals and the nearest existing State Highway or National Highways, concerned agencies may vary from place to place, depending upon the road link to be established. Since, the current exercise is limited to secondary source of information, it is further suggested that concerned agencies like; State Public Works Deptt. National Highway Deptt. (NH Div.), National Highway Authority of India (NHAI), State Land & Revenue Authority (for acquisition of land for construction or expansion of

roads), may please approached to furnish accurate details to arrive at cost estimates. National Waterway wise identified high density IWT Terminals and their nearest existing road links are given below.

Similarly, all the identified high density IWT terminals are required to establish rail connectivity between IWT Terminal and nearest working railhead for inter-modal transfer of cargo. It is pertinent to note that in the current exercise nearest railhead suggested is because of its proximity rather than its workability to provide necessary rail connection/linkage. National Waterway wise identified high density IWT Terminals and their nearest existing railway stations are given below:

Nearest Road & Rail Locations Requiring Consultations

National Waterways	SN.	Name of IWT Terminal	Nearest NH/SH	Nearest Railhead	Gauge
NW1	1	Haldia	NH - 41	Haldia	BG
NW1	2	Katwa	NH - 6	Katwa	BG
NW1	3	Hazardwari	SH	Murshidabad	BG
NW1	4	Behrampur	NH -34	Behrampur	BG
NW1	5	Farakka	NH -34	Farakka	BG
NW1	6	Sahebganj (Samdaghat)	NH - 80	Sahebganj	BG
NW1	7	Bhagalpur	NH-80	Bhagalpur	BG
NW1	8	Barh	NH - 30A	Barh	BG
NW1	9	Rajghat(Varanasi)	NH - 7	Mugalsarai	BG
NW1	10	G.R.Jetty-2 (Kolkata)	SH	Kidderpore	BG
NW1	11	Patna (Gaighat)	NH - 19	Gulzarbagh	BG
NW2	12	Jogighopa (Bongaon)	NH - 31 B	Jogigopa	BG
NW2	13	Tejpur	NH - 37	Tezpur	BG
NW2	14	Neamati (Jorhat)	NH - 37	Jorhat	BG
NW2	15	Saikhuaghat Ghat/Dibrugarh	NH - 52	Dibrugarh	BG
NW2	16	Pandu (Guwahati)	NH - 37	Kamakhya	BG
NW3	17	Kottapuram	NH-17	Aluva	BG
NW3	18	Aluva	NH - 47	Aluva	BG
NW3	19	Kollam	NH - 47	Kollam	BG
NW3	20	Alappuzhac (RCC Jetty Exist)	NH - 47	Alappuzha	BG
NW4	21	Kakinada/Kakinada Port	NH - 214	Kakinada	BG
NW4	22	Muktiyala /Guntur	SH	Guntur	BG
NW4	23	Vijayawada	NH - 9	Vijayawada	BG
NW5	24	Talcher	NH - 23	Talcher	BG
NW5	25	Paradip /Dhamra	NH - 5A	Paradip	BG
NW6	26	Silchar	NH - 151	Silchar	MG/BG
NW6	27	Karimganj	NH - 151	Karimganj	MG/BG

Port connectivity also requires adequate support from concerned agencies for successful implementation of the proposed scheme. In view of this the Government has laid emphasis on the creation of port infrastructure to handle the cargo and its smooth evacuation. Unless matched with connectivity infrastructure, the increased cargo would result in congestion and undermine the competitiveness of Indian industry at large. The best and economical way of evacuation of imported traffic at port is by Inland Water Transport mode using barges. Similarly, the inbound traffic to the port, i.e., export oriented cargo can also reach the sea port from its hinterland by barges using waterway mode.

It is important to add that all the waterways under study have direct excess to one or more of the India's major ports. On the one hand NW1 has common route with Kolkata and Haldia ports, NW2 and NW6 are connected to these ports by using protocol route through Bangladesh. Similarly NW3 covers Cochin Port, NW4 has established connectivity with Kakinada, Chennai and Ennore Ports and NW5 has connected to Dhamara and Paradip ports. Since all major ports act as an independent traffic generating hub, quantities and type of incoming and outgoing traffic dealt with at these ports plays an important role to boost IWT services.

National Waterway's connectivity to the existing Sea Port has been examined based on available National Hydrographic Charts and On-line satellite imaginaries. Prevailing port tariffs relevant to the identified IWT cargo have been collected from the respective ports for transshipment to IWT vessels. The loading / unloading of bulk cargo like coal and iron ore can be organized in two ways as stated below:

1. Using transhipper directly from the mother vessel anchored offshore and
2. Through the existing ports like Haldia, Kolkata, Paradip, Dhamara, Kochi, Kakinada, Krishnapatnam, Ennore

Evacuation of traffic through the existing ports, finger jetties as proposed in the report are required to be provided at all the waterway connected ports for transshipment of the traffic from sea vessel to the IWT barges.

IWT Terminal Appraisal: Financial Appraisal of the investment to be made in providing infrastructural facilities has been worked out using normative costs and benefits assuming three types of terminals. IWT Terminal Proposed to Handle General Cargo only, IWT Terminal Proposed to Handle Captive Cargo only and IWT Terminal Proposed to Handle Captive Cargo plus other General Cargoes.

For estimating the financial internal rate of return (FIRR), thirty years period has been considered, although traffic growth upto 2031-32, and kept constant thereafter. Three year construction period have been envisaged and actual revenue generation starts from 2016 onwards. Accordingly Capital investment of the project have also been staggered to three years i.e. 25 per cent of the investment is considered in the first year of the construction period followed by 50 per cent in second and 25 in the third year.

Project / Investment Appraisal for IWT terminals designed to handle only General Cargo with the capital investment of Rs. 50 crores, proposed terminal is likely to generate Financial Internal Rate of Return (FIRR) of about 10.86% . For IWT terminals designed to handle Captive Cargo only Financial Internal Rate of Return (FIRR) of about 6.38%. Similarly Project / Investment Appraisal for IWT terminals designed to handle both Captive Cargo and General cargo is likely to generate Financial Internal Rate of Return (FIRR) of about 10.81%. The exercise is purely indicative in nature, which requires to be assessed with facts and figures to arrive at more realistic results. Actual cost of the terminal may reduce, where partial IWT Terminal facilities are already available. On revenue side, traffic estimated pertains to primary hinterland of each terminal, the traffic volumes are likely to improve when traffic contribution from adjoining regions (which are not recommended under priority) is also considered. It is also to be submitted that, IWT being cost effective mode of transport is expected to generate sizeable volume of induced traffic, which also was kept beyond the purview of the current study, would effect in increase of terminal capacity utilization resulting in to higher rate of return on capital investment.

On providing required infrastructure facilities to attract IWT traffic on all proposed Waterways, private sector investment of Rs. 56992.0 crores have been envisaged in terms of providing required number of vessels and to meet regular operation and maintenance costs thereof, in the base year to handle estimated traffic volumes. Overall private sector contribution exclusively for Eastern Grid waterways works out to the tune of Rs. 33260.0 crores to handle base year traffic.

Conclusions

Based on foregoing analysis, following have been concluded:

- ✓ *High density potential IWT Terminals that can attract 80 per cent or above volumes of traffic on National Waterways have been identified for immediate consideration. On National Waterway-1, eleven locations have been suggested, as against five IWT terminals on NW2, four on NW3, three on NW4, only two each on NW5 and NW6.*
- ✓ *Deep Sea Transshipment of imported coal, by providing Tran-shippers has been concluded.*
- ✓ *To facilitate handling of bulk cargo like Coal, Iron ore etc., belt conveyor system have been proposed.*
- ✓ *Infrastructure development to meet traffic projections up to 2031-32, is suggested subjected to the detailed study of each proposed terminal, independently.*
- ✓ *Rail, Road & Port connectivity up to identified IWT Terminals to develop Integrated National Waterways Transportation Grid have been suggested. For each proposed/identified IWT Terminal independent study to firm up rail and road needs to be conducted*
- ✓ *Infrastructure development costs (on normative basis), comprising; Fairway development, Terminal Construction/Up-gradation, Rail, Road & Port connectivity established.*

Recommendations

Based on through examination of secondary information as well as primary data collected through limited sources, a set of recommendations have been put forth.

- ✓ *Because of limited scope of the current study, DPR to firm up costs and benefits for the identified corridors and selected IWT terminals have to be carried out*
- ✓ *By opting suitable measures to attract traffic amenable proposed IWT services, major/important Agencies/Shippers should be encouraged to Shift cargo to IWT.*
- ✓ *To organise regular movement of bulk users, assist in development of required Terminal facilities to handle captive cargo*
- ✓ *Deep Sea Transshipment to be encouraged with direct lighterage operation by IWT Barges.*
- ✓ *To promote IWT services and to attract shippers & investors, incentives should be offered.*
- ✓ *Financing options; Fairway development by Public & Multi-lateral, IWT Terminals by mix of Public & Private Vessels-Ownership, O&M by Private*