INLAND WATERWAYS AUTHORITY OF INDIA

Ministry of Shipping, Government of India

"CAPACITY AUGMENTATION OF NATIONAL WATERWAY.1"

(Jal Marg Vikas Project)

ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

VOLUME - 9:
Environmental Management Plan (EMP) for Barge Operation

May 2016

(Revised September 2016)

EQMS India Pvt. Ltd. In JV with IRG Systems South Asia Pvt. Ltd. Abnaki Infrastructure Applications & Integrated Development Pvt. Ltd.

Table of Contents

List of Tables

List of Figures

List of Annexure

Chapter 1. EMP FOR BARGE OPERATION

1.1. Introduction

Inland waterways Authority of India (IWAI) has proposed to augment the navigation capacity of waterway NW-1 (Haldia to Allahabad) and continue to maintain the entire stretch. Under this project, IWAI has proposed to develop the infrastructure facility like Multimodal terminals, Navigation aids for day & night navigation, River information system with all hardware and software, Ro-Ro jetties, Bank & slope protection, River training works, Equipment like tow barges, inland vessels, survey vessels including rescue boats & survey equipment and Dredging of the navigation channel, to augment the navigation capacity of the waterway. Major activities associated with the project are construction and operation of the civil interventions, barge movement and maintenance dredging. Barge movement will be carried out during the operation phase of the project. Location map of NW-1 is given in Figure 1.1.

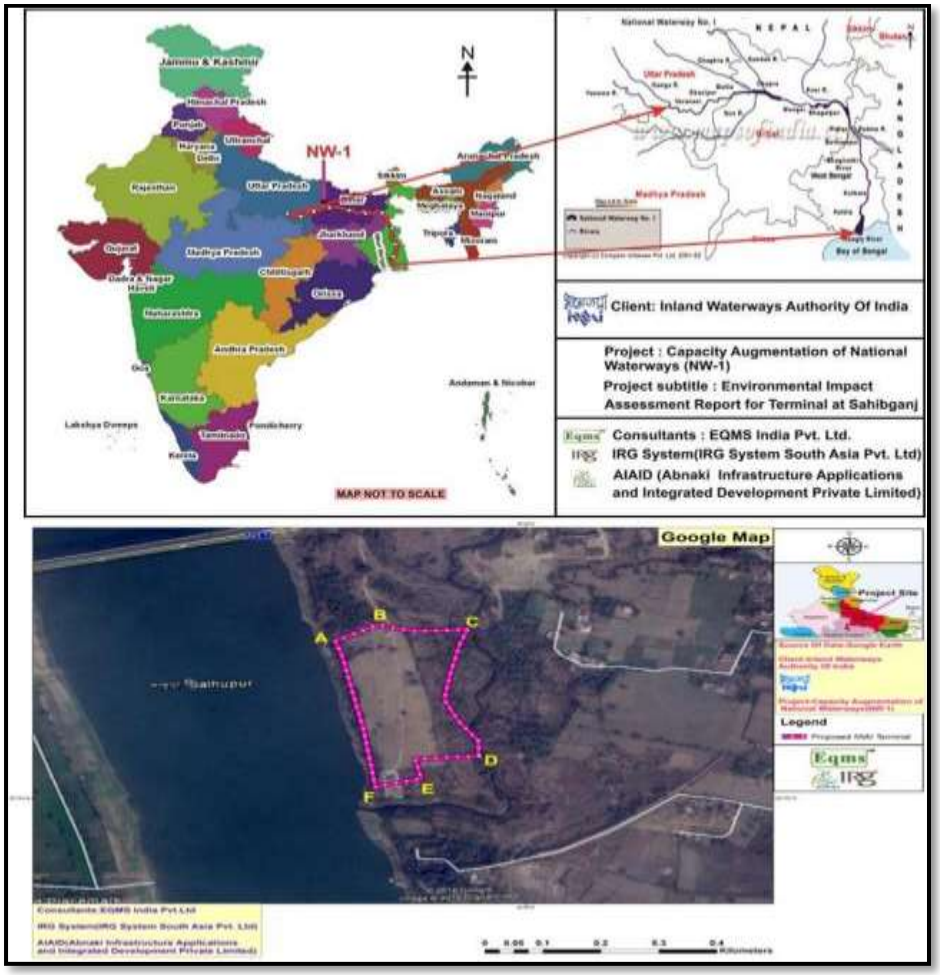

Figure 1.1 : Location Map

1.2. Description of Environment

The NW-1 stretch starts from Haldia to Allahabad (1620 KM long) on Ganga - Bhagirathi - Hooghly river system. NW-1 is passing through four states namely UP, Bihar, Jharkhand and West Bengal. The salient environmental features around NW-1 within, 500m, 2km and 10km stretches are summarised in Table 1.1.

Table 1.1 : Salient Environmental Features along NW-1 Alignment

S. No.	Environmental Features	Within NW-1 (500 M)	Within 2 km area around NW-1	Within 10 km area around NW-1
1	**Ecological Environment**			
A	Presence of National Park/Biosphere Reserves, Tiger reserve etc.	None	None	None
	Presence of Wildlife Sanctuary	Yes 1. Kashi Turtle Sanctuary at Varanasi 2. Vikramshila Dolphin Sanctuary Kahalgaon to Sultanganj 3. Hilsa Sanctuary stretch in west Bengal	None	Yes Udhwa lake sanctuary in Jharkhand (about 9 km away from NW-1
B	Reserved /Protected Forests	None	None	Yes (Bethuadahari RF, Bahadurpur RF & RF near Rajmahal Hills)
C	Wetland of state and national interest	None	None	Yes (Udhwa Bird sanctuary)
D	Migratory route for wild terrestrial animals	None	None	None
E	Presence of Schedule-I Terrestrial Fauna	None	Yes Migratory birds near Farakka Barrage and surrounding	Yes Migratory birds at important birds' areas
F	Presence of Schedule-I Aquatic Fauna	Yes Dolphin, and Turtle	None	None
G	Important Bird Area	Vikramshila sanctuary area	Yes	Yes Udhwa lake sanctuary

S. No.	Environmental Features	Within NW-1 (500 M)	Within 2 km area around NW-1	Within 10 km area around NW-1
			1. Danapur Cantonment area 2. Mokama tal 3. Kurseala river course and diyara floodplain. 4. Farakka Barrage and surround area	
H	Seismicity	NW-1 falls in Zone-III (moderate risk) and zone IV (high damage risk zone) as per Seismic Zoning Map of India		
B.	**Social Environment**			
I	Physical Setting	Rural, Industrial and Urban		
	Densely populated area	Allahabad, Sirsa, Mirzapur, Chunar, Varanasi, Zamania, Ghazipur, Gahmar, Buxar, Ballia, Chappra, Patna, Barh, Bihat, Munger, Bhgalpur, Kahalgaon, Sahibganj, Farakka, Berhampore, Katwa, Kalna, Kolkatta and Haldia are densely populated areas.		
J	Physical Sensitive Receptors	Yes Ghats, Temples, Schools, Colleges and Hospitals are present all along the NW-1.		
K	Archaeological Monuments	Yes There are 9 archaeological sites located within 300 m area of the NW-1 and these are Kardmeshwar Mahadeva Mandir, Ramnagar fort, archaeological excavation site, Varanasi, Manmahal and observatory, St. John's Church, Temple of Gour Chandra and Krishnachandra at Chatra (Gaur Chandra Ghat), Hazardwari Palace, Sindhi Dalan and Jami Masjid.		

1.3. Environmental Management Plans

Major activities associated with the project are construction and operation of the civil interventions, barge movement and maintenance dredging. Barge movement and maintenance dredging will be carried out during the operation phase of the project only whereas development of civil interventions will have components distributed during design, construction and operation phases. Civil interventions include construction of jetty, terminals, river training works, bend corrections, barge maintenance facility, and RO-RO jetties. A detailed environmental management plan for each associated development for all the three phases of the project, i.e. design/pre-construction, construction and operation phase is prepared as applicable. EMP lists the activities involved, associated impact with each activity on environment, suggestive mitigation measures, allocated environment

budget for impact mitigation, implementation plan covering monitoring, reporting and implementation and supervisory responsibility.

1.3.1. *Environmental Management Plan for Barge Movement*

The project Jal Marg Vikas aims ensuring the movement of barges in NW-1 during the entire year. Barge movement as discussed in Chapter 5 have associated impacts on environment, which are required to be mitigated and managed to prevent environmental damage. Environmental management plan for barge movement is given at **Table 1.2**.

Table 1.2 Environmental Management Plan for Barge Movement

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
1. Physical Environment							
Impact on Soil Quality and River Bed Sediments	• Restricting the ship speed in the stretches where river is narrow and in feeder canal to prevent impact on the river banks. • Entire stretch of NW-1 should be studied and speed regulations should be made for the different sections in the NW-1 as per sensitivity to erosion • River bank protection works should be carried out at the bank locations which are prone to erosion. Opt for the bank protection measures in feeder canal to maintain the speed of the barges. • All barges should have zero discharge facility they should have sewage treatment system on board alongwith treated sewage storage facility. It should also have facility to store for the storage of other domestic and maintenance and material handling waste. • Each barges should dispose these wastes at barge maintenance facilities. In absence of these facilities such waste should be disposed of at terminals. Each terminal should have the facility for suction and treatment of treated sewage from the barges and facility to handle all kind of wastes generated at the barges. These services can be provided to the barge operators on chargeable basis.						
Water Quality	• All waste water and solid waste or maintenance waste should be disposed at the designated barge maintenance facility only. Standards for discharge of wastewater & garbage from barges is attached as **Annexure 1.1 & 1.2.** • Material having potential to generate the dust like coal, sand stone aggregates should be transported under covered conditions to minimize dust generation and its settlement on river surface. Terminals should have facility to control dust pollution during barge loading and unloading actions. • Provision of oil water interceptors with the bilge tank to separate oil prior discharge of bilge water into river. Bilge water should be discharged as per MARPOL requirements. Bilge water tank should be maintained as per MARPOL requirement. Standards for discharge of oily waste is attached as **Annexure 1.3**	Water Act, 1974	Within River & at terminal/jetty location	During Barge Movement	Cost to be borne by vessel owner	Barge owner	IWAI

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	• Usage of non-toxic and non TBT containing anti-fouling paints for painting vessel • Immediate/quick clean-up of oil/other spills shall be undertaken in case of accidental release and ship owners should be liable for the same. • Crew of the vessel carrying especially oil should be competent and experienced so as they can prevent the accidents to happen as much as possible • IWAI should develop the stringent norms to be followed by vessel operators and shall develop the system of penalizing based on polluters pay principle in case the standards are not met or violated • Ship design (of capacity > 5000 DWT) should be as per MARPOL and should be provided with double hulls/double bottoms. Speed of oil carrying vessels should be maintained to prevent accidents due to high speed. • Vessels should not be washed or cleaned at terminal/jetty facility and washings should not be discharge at the terminal/jetty location. Standards for discharge of washing water as per MARPOL is given in **Annexure 1.4.** • All waste water and solid waste or maintenance waste should be disposed at the designated barge maintenance facility only. Till the time such facility is not developed, terminals should have arrangement for reception of the waste and wastewater from vessels so as to prevent its unauthorized disposal in river. A procedure should be developed by terminal facilities for reception of vessel waste, its storage and treatment and respective charges. • Further a waste management plan is requisite to be formed indicating the entire process of waste segregation, collection, storage, handling over to be followed by vessels. This plan can also indicate the fee amount to be paid by waste generator as per the weight of the garbage. Penalties should be imposed on the vessel operators in case the plan is not followed • The wastewater from vessels can be sent to STP for treatment and the treated water can be used for landscaping and dust suppression at terminal sites • Vessels also may have some facilities for treatment of the waste generated on board like recycling/chemical toilets. Standards for						

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	discharge of wastewater & garbage from barges as per MARPOL is attached as Annexure 1.1 & 1.2. • Vessel crew/captain should be aware about the waste handling and reception facilities and procedure at terminals and should be inline with above mentioned MARPOL standards. • Oil spill control and management plan should be prepared for each terminal facility and for barge operations inNW-1 as part of EHS management system of IWAI which shall be duly communicated to vessel operator. Immediate/quick clean-up of oil/other spills to prevent damage on aquatic organisms shall be undertaken and ship owners should be liable for the same. Facilities should be made to ensure quick rescue and clean-up operations in case of accidents. A oil spill management plan proposed for the NW-1 by IWAI is attached as Annexure 1.6 • Vessels should not be washed or cleaned at terminal/jetty facility and washings should not be discharge at the terminal/jetty location. Washing should be undertaken only at at the maintenance facility only. Standards for discharge of washing water from the vessels carrying noxious chemicals (vessel washing water) as per MARPOL is given in Annexure 1.4. • Incase maintenance facility is not in place then washing can be done at terminal sites also but terminal sites should have proper system for handling the washing waste from barges. All washing water should be directed through closed drains to settling tank. Supernatant water should be tested and if suitable should be sent to STP for treatment. Sludge should be tested and disposed of to municipal waste disposal facility or hazardous waste disposal facility depending on the quality of sludge.						
Erosion of River Banks/Bed	• Restricting the ship speed in the stretches where river is narrow and in feeder canal to prevent impact on the river banks. • Regularizing the barge speed to 7-8 knots in bending areas so as bank erosion can be reduced • River bank protection works should be carried out at the bank locations which are prone to erosion. Opt for the bank protection measures in feeder canal to maintain the speed of the barges.	--	At Banks	During Barge Movement	Part of Maintenance cost of project	Barge owner/IWAI	IWAI

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	• Provision of cautionary signage at the navigational hazard locations						
Air Quality	• Material having potential to generate the dust like coal, sand stone aggregates should be transported under covered conditions. • Air emissions from the vessel should be under the prescribed limits as per MARPOL and the standards. (Refer **Annexure 1.5** for standards). Regular maintenance of vessels engine and Propellers. IWAI should develop the stringent norms to be followed by vessel operators and shall develop the system of penalizing based on polluters pay principle in case the standards are not met or violated • Adoption of cleaner fuels such as low sulphur bunker oil as per USEPA norms, 2000 (sulphur content is 0.25% for diesel oil and 2.7% for residual oil) or switching to LNG based vessels • The vessel should operate at partial power while docking at the terminal and achieve full power back again after leaving the port area.	Air Act, 1981	Areas along the NW-1	During Barge Movement	Cost to be borne by vessel owner	Barge owner	IWAI
2. Biological Environment							
Aquatic ecology-due to collision with moving barges, ballast water discharges, spillage of material/oil & generation of underwater noise	• Vessel speed shall be restricted to 2.7 knots in VSDS and Kashi turtle sanctuary areas to reduce the noise generation from propeller. Hooting should also be prohibited in sanctuary areas. • Vessel shall be fitted with the dolphin reflectors • Usage of non-toxic and non TBT containing anti-fouling paints for painting vessel • Provision of propeller guards with vessel to minimize injury to the aquatic fauna • Barge/vessel movement will be restricted to the designate route only over the Sanctuary area to minimize noise disturbance of Aquatic life. • If any aquatic mammal spotted, then the measures should be taken to push it away through sirens/signals and creating noise signals. • If any accident of aquatic mammal occurs, then that should be reported to IWAI for rescue action through wild life or forests departments.	Wildlife Protection Act, 1972 &1993 and Bio-diversity Act, 2002	Within River	During Barge Movement	Cost to be borne by vessel owner &Part of Maintenance cost of project	Barge Owners/IWAI	IWAI

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	• All vessels should follow MARPOL for managing their liquid and solid waste. No vessel should discharge the liquid and solid waste in the river. All waste shall be discharged at vessel repair facility only. IWAI should develop the stringent norms to be followed by vessel operators and shall develop the system of penalizing based on polluters pay principle in case the standards are not met or violated • Material having potential to generate the dust like coal, sand stone aggregates should be transported under covered conditions to minimize dust generation and its settlement on river surface. • Provision of oil water interceptors with the bilge tank to separate oil prior discharge of bilge water into river. Bilge water should be discharged as per MARPOL requirements. Bilge water tank should be maintained as per MARPOL requirement. • Immediate/quick clean-up of oil/other spills to prevent damage on aquatic organisms shall be undertaken and ship owners should be liable for the same. Facilities should be made to ensure quick rescue and clean-up operations in case of accidents • Crew of the vessel carrying especially oil should be competent and experienced so as they can prevent the accidents to happen as much as possible • Regular maintenance of vessels engine and Propellers. • River training works should be carried out at the bank locations which are prone to erosion to minimize sedimentation & impact on water quality &aquatic organisms • Adequate depth to be maintained to prevent grounding under low flow conditions. Information on available depths should be conveyed to the navigators through online systems by IWAI. River Information System being developed by IWAI will serve this purpose. • Maintaining flood plains & riparian corridors wherever possible and limit potential damage to the navigation channel. Restricting the project activities in breeding and spawning ground of the fisheries which are majorly the bends in the meandering river.						

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	• Design measures like bandalling and design of groin should be considered which can reduce the dredging requirement and help in meeting depth, width and steerage needs and reduces dredging requirement • Modern design vessels having low draught say 2 m instead of 2.5 m for equal payload should be procured by IWAI for transportation. Modern vessel- better technology vessels or with retrofits with quieting techniques to reduce further the noise emissions (specifically cavitation noise). • Regular patrol and inspections should be carried out to monitor the activities in waterway. Also regular monitoring of environmental attributes as proposed in environment planning plan of this should be carried out for the waterway to keep track of the condition of the environmental attributes • Enhancement Measures: • Support for promoting fish productivity through setting up or supporting existing fish nurseries. Also providing training and awareness support through reputed institutes or experts like CIFRI for better fishing techniques. • Provision of supporting Studies for conservation of Dolphin and other sensitive studies shall be made. • The proposed oil spill control and management plan (attached as Annexure 1.6) should be effectively communicated for any emergency situations. • The navigation channel should maintain a minimum distance of 100m horizontally and 500m either side along the river at the confluence point of major tributaries with river Ganga.						
3. Socio-Economic Environment							
Health & Safety	• Record of the accidents should be maintained regularly by IWAI, analysis of each accident should be carried out by IWAI to know the reason for accident and preventions should be undertaken so as not to repeat the same cause • Adoption of SOLAS for maintaining the safety in vessel. Safety equipment, safety boats, lights, signalling system etc. should be as per the requirement of SOLAS	--	In River	During Barge Movement	Cost to be borne by vessel owner &Part of Maintenance cost of project	Barge Owners/IWAI	IWAI

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	• Provision of storm shelters and other infrastructure should be provided for vessel in waterways to manage the severe weather conditions like storms, floods. • Minimum passing distance between vessel and from vessel to the banks must be ensured for safe traffic conditions • Establishment of signalling system and patrol services by IWAI • Vessels licensed by IWAI and meeting the specified norms by IWAI shall only be allowed to ply in the waterway • Regular echo-soundings to be carried out by IWAI to identify LAD in different stretches and draw Thalweg profiles of various stretches. This information should be made available to the users through online system • Proper River information system, electronic charts display system, vessel tracking system automatic information system etc. should be developed by IWAI for its users. RIS system is already developed by IWAI for Haldia to Farakka stretch and RIS system implementation is under process for Farakka to Patna. Work for Patna to Varanasi is also under consideration. Installation of DGPS for maintaining positioning and communication system. This is already in place for NW-1 • Maintenance of buoys, beacons, signs, gauges & limiting the shoals through maintenance dredging. Marking of navigation channel through beacons and communicating information about the navigation channel monthly to fishermen and the expected timing or frequency of barges to fishing community so as they can be pre-informed and he damage to their boats and gears can be reduced. Barge movement schedule should be prepared in advance and should be shared with the fishermen • Carrying out river training works at critical bend locations and provision of cautionary signage at the navigational hazard locations. Provision of Radar navigation during night time and low visibility timing • Installation of navigation lights to make channel visible and painting beacons & bays with refractive paints for enhancing night time visibility • A direct investigation of accidents through an interactive system may serve the purpose of both developing an authentic and reliable accident database and updating the current faults						

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	• Sensors and hooters should be fitted with vessel which can notify the closeness of another ship or any other potential matter which can cause accident. • Crew of the vessel carrying especially oil should be competent and experienced so as they can prevent the accidents to happen as much as possible • Enhancement of fishing in the area by boosting and funding fish nurseries and provision of better fishing aids • There should be 24 hourly functional dedicated disaster management cells/ control rooms established along the waterway for monitoring movement of barges and to deal with emergencies. • Provision of backup medical facility for rescue operations. This can be arranged through tie up with hospitals located along the NW-1 • Environmental health and safety plan for barge operations should be prepared for the NW-1 by IWAI and same should be available on its website so as can be accessed by all stakeholders						
Impact on resources of socio-cultural aspects	• Vessel movement shall be restricted or regularise during the identified major festival period as listed under description of Environment chapter 4. • No waste in form shall be discharged by vessel in the river. • Enhancement Measures • Support for establishment of small enclosed areas dedicated for female bathing in every village along the NW-1 to allow female maintain their privacy. • Support for improving cleanliness and at existing Ghats at Varanasi and other locations • Provision for improving select Ghats as per the demand raised during public consultation.	--	Ghats, festival locations and river	During Barge Movement	Cost to be borne by vessel owner &Part of Maintenance cost of project	Barge Owners/IWAI	IWAI
Impact on Livelihood of Fishing Communities	• Barge/vessel movement will be restricted to the designate navigation route only. Maintenance of buoys, beacons, signs, gauges to mark the navigation channel • Crew of the vessel carrying especially oil should be competent and experienced so as they can prevent the damage to fishing gears and boats.	--	Fishing areas and navigation channel	During Barge Movement	Cost to be borne by vessel owner &Part of Maintenanc	Barge Owners/IWAI	IWAI

Environmental Issue /Component	Remedial Measure	Reference to laws and Contract Documents	Approximate Location	Time Frame	Indicative / Mitigation Cost	Institutional Responsibility	
						Implementation	Supervision
	• Marking of navigation channel through beacons and communicating information about the navigation channel monthly to fishermen and the expected timing or frequency of barges to fishing community so as they can be pre-informed and the damage to their boats and gears can be reduced. Barge movement schedule should be prepared in advance and should be shared with the fishermen • Regularizing the barge speed to 7-8 knots in bending areas so as bank erosion can be reduced due to barge movement resulting in lesser turbidity, enhanced planktonic growth and thus increased fish yield. • River training works should be carried out at the bank locations which are prone to erosion to reduce the turbidity in shallow areas and its impact on fish yield. • All measures to reduce the water quality pollution & to prevent damage to ecology due to barge movement as proposed above should be adequately addressed and implemented so as to minimise impact on fish yield due to the project. • In case of damage of fishing nets, fishing crafts and other gears of fishers, arising due to barge operation, appropriate and quick compensations may be given to the aggrieved fishers. • The barges may be fitted with powerful searchlight and may sound horn so that fishermen can realize arrival of barge at least from 500 m-1 km away to prevent damage to fishing nets • Regular consultations to be carried out with the fishing communities to get their feedback on the impact due to barge movement on fishing and problems they are facing Enhancement Measures • Support shall be extended in terms of supporting setting up fish nurseries for improving fish productivity and training awareness of fishermen for better fishing techniques through institute of repute like CIFRI.				e cost of project		

Annexure 1.1: Standards for discharge of Wastewater from barges

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions
All vessels (other than passenger ships within special areas)	Comminuted and disinfected sewage using an approved system in accordance with regulation 9.1.2 of MARPOL Annex IV	Permitted as long as no less than 3 nm from nearest land; and Sewage originating from holding tanks, or sewage originating from spaces containing live animals is discharged at a moderate rate* while the ship is proceeding en route at a speed not less than 4 knots. * The rate of discharge shall be approved by the Administration based upon standards approved by the Organisation. Recommended standards for the rate of discharge of sewage from ships can be found in Marine Order 96.

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions
All vessels (other than passenger ships within special areas)	Sewage not comminuted or disinfected	Permitted as long as no less than 12 nm from nearest land; and Sewage originating from holding tanks, or sewage originating from spaces containing live animals is discharged at a moderate rate* while the ship is proceeding en route at a speed not less than 4 knots * The rate of discharge shall be approved by the Administration based upon standards approved by the Organisation. Recommended standards for the rate of discharge of sewage from ships can be found in Marine Order 96
All vessels (other than passenger ships within special areas) on International voyages to and continuing in Australian waters	Treated sewage effluent discharged through an approved Sewage Treatment Plant (STP) certified by the Administration to meet the operational requirements referred to in regulation 9.1.1 of MARPOL Annex IV	Permitted provided: Effluent does not produce visible floating solids nor cause discolouration of the surrounding water Local laws may prohibit discharges in ports Additionally: When within port limits, check with port authority as permission may be required All vessels should ensure that the STP is operating at optimum performance when in Australian waters Food or biological waste removed from filtration units of vessels on international voyages is prohibited from discharge within 12nm from land (DAFF requirements)
Passenger ships within special areas* * further information on special areas can be found in circular MEPC.1/Circ.778/Rev.1	Treated sewage effluent from new passenger ships on, or after 1 January 2016 and for existing passenger ships on, or after 1 January 2018	Permitted provided: The ship has in operation an approved sewage treatment plant certified by the Administration to meet the operational requirements referred to in regulation 9.2.1 of MARPOL Annex IV; and Effluent does not produce visible floating solids nor cause discolouration of the surrounding water. Note: local laws may prohibit discharges in ports

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions
Great Barrier Reef Marine Park Vessels on International voyages to and continuing in Australian waters	All sewage discharges	In accordance with Annex IV requirements and where applicable with any additional restrictions imposed as conditions of a GBRMP permit
Great Barrier Reef Marine Park Vessels on domestic voyages	All sewage discharges	Recommended to comply with MARPOL Annex IV Or, in accordance with requirements of Part 3A of the GBRMPA Regulations (93A-93G) for both treated and untreated sewage AND, where applicable, in accordance with any additional restrictions imposed as conditions of a GBRMP permit
Queensland State Waters (small vessels/State registered and recreational)	If vessel does not have a sewage treatment system on board, options include: Using onshore toilet facilities whenever possible Using a portable toilet to be later emptied to a sewerage/septic system Retain sewage in on board holding tank for pumping out to shore facilities.	If a vessel has 16 or more persons on board, no discharge of untreated sewage is permitted anywhere in Queensland waters. If a vessel has 7 to 15 persons on board, no discharge of untreated sewage is permitted within 1 nm of a reef or the mean low water mark of an island or the mainland. No discharge of untreated sewage is permitted within 1 nm of aquaculture fisheries resources, or within 0.5 nm of a wharf or jetty other than a jetty that is a marina.

Annexure 1.2: Standards for discharge of garbage from barges as per MARPOL

Type of garbage	Ships outside special areas[1]	Ships within special areas[1]	Offshore platforms (more than 12 nm from land) and all ships within 500m of such platforms
Food[2] waste comminuted or ground to particle size < 25mm	Discharge permitted, while en route[3], as far as practicable from the nearest land, but in any case, ≥ 3nm from the nearest land.	Discharge permitted[4], while en route[3], as far as practicable from the nearest land, but in any case, ≥ 12nm from the nearest land.	Discharge permitted
Food[2] waste not comminuted or ground	Discharge permitted, while en route[3], as far as practicable from the nearest land, but in any case, ≥ 12nm from the nearest land.	Discharge prohibited	Discharge prohibited

[1]Under MARPOL Annex V, the areas of: the Mediterranean Sea; the Baltic Sea; the Black Sea; the Red Sea; the "Gulfs" area; the North Sea; the Antarctic area; and the Wider Caribbean region (including the Gulf of Mexico and the Caribbean Sea) are provided with a higher level of protection than other sea areas. Further information on special areas can be found in circular MEPC.1/Circ.778/Rev.1.

[2]Small quantities of food released directly into the sea for the specific purpose of fish feeding in connection with fishing or tourist operations is permitted.

[3]The **en route** requirement does not apply to the discharge of food wastes, where it is clear that retention on board presents an imminent health risk to the people on board. See MARPOL Annex V, Regulation 7.2.1

[4]The discharge of introduced avian products, including poultry and poultry parts, is prohibited within the Antarctic special area (sea area south of latitude 600S), except where those introduced avian products are incinerated, autoclaved or otherwise treated to be made sterile.

Type of garbage	Ships outside special areas[1]	Ships within special areas[1]	Offshore platforms (more than 12 nm from land) and all ships within 500m of such platforms
Cargo residues[5] that cannot be recovered using commonly available methods for unloading, not contained in wash water.	Discharge permitted, while en route, as far as practicable from the nearest land, but in any case, ≥ 12nm from the nearest land.	Discharge prohibited	Discharge prohibited
Cargo residues[5] that cannot be recovered using commonly available methods for unloading, contained in wash water		Discharge permitted, while en route, as far as practicable from the nearest land, but in any case, ≥ 12nm from the nearest land. Subject to two additional conditions[6].	Discharge prohibited

[5]These substances must not be harmful to the marine environment. When in port, check with the port authority as local regulations may also apply. The above restrictions do not apply to the wash down of cargo residues from deck areas of vessels undertaken for safety purposes including:

• Safe operation of a helicopter within the landing area and its immediate vicinity to avoid dust being raised by the down-draft of the rotors;

• Where there is a need to avoid navigational hazards such as dust being blown onto the wheelhouse or bridge wings;
• Where residues may cause a serious safety hazard to personnel if spillages are not cleaned from deck areas, adjacent walkways and working areas

[6]Discharge is permitted where conditions (a) and (b), as follows, both apply: (a) both the port of departure and the next port of destination are within the special area and the ship will not transit outside the special area between theses ports; and (b) if no adequate reception facilities are available at these ports. See MARPOL Annex V Regulation 6.1.2.

Annexure 1.3: Standards for discharge of oily Waste as per MARPOL

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions
For more information and definitions refer to MARPOL consolidated edition 2011* * Can be purchased at 'www.imo.org/Publications'.		
Oil tankers All waters	Oily waste from cargo tanks	• More than 50 nautical miles from the nearest land; and • Tanker is proceeding en route; and • Instantaneous rate of discharge < 30 litres per nautical mile; and • Total quantity discharge does not exceed 1/15,000 or 1/30,000 of the total cargo (depending on the age of the vessel); and • Oil discharge monitoring and control system and slop tank arrangement to be operating.
All vessels ≥ 400 gross tons All waters	Machinery space bilges	• Proceeding en route; and • Oil content less than 15 parts per million; and • Oil discharge monitoring and control system and oil filtering equipment to be operating • In some circumstances, oil or oily mixtures, may be retained on board for discharge to port reception facilities – see MARPOL Annex I, Regulation 14. Note: 15ppm discharges can be anywhere at sea (not within port limits) including the Great Barrier Reef Marine Park and Marine Protected Areas. Vessel must not be stationary when undertaking discharge.
All vessels <400 gross tons All waters	Machinery space bilges	• Oil and all oily mixtures retain on board for on shore disposal • OR • Proceeding en route; and • Has in operation equipment of a design approved by the administration that ensures oil content less than 15 parts per million. Note: 15ppm discharges can be anywhere at sea (not within port limits) including the Great Barrier Reef Marine Park and Marine Protected Areas. Vessel must not be stationary when undertaking discharge.
Vessels operating in Great Barrier Reef Marine Park	Bunkering utilising ship to ship transfers	A Permit is required from GBRMPA under which certain conditions may be imposed.

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions	
Cargo material[5] contained in cargo hold bilge water	Discharge permitted, from a loaded hold[7] through the ships' fixed piping bilge drainage system.		Discharge prohibited
Cleaning agents and additives[5]contained in cargo hold wash water	Discharge permitted	Discharge permitted, while en route, as far as practicable from the nearest land, but in any case, ≥ 12nm from the nearest land. Subject to two additional conditions[6].	Discharge prohibited
Cleaning agents and additives[4]in deck and external surfaces wash water		Discharge permitted	Discharge prohibited
Carcasses of animals carried on board as cargo and which died during the voyage	Discharge permitted, while en route, as far as practicable from the nearest land and at maximum water depth, but in any case, ≥ 100nm[8]from the nearest land.	Discharge prohibited	Discharge prohibited
Grey water	Discharge permitted[9]	Discharge permitted[9]	Discharge permitted9
All other garbage including plastics, synthetic ropes, fishing gear, plastic garbage bags, incinerator ashes, clinkers, cooking oil, floating dunnage, lining and packing	Discharge prohibited	Discharge prohibited	Discharge prohibited

[7]Vessels at anchorage for a period of time with empty holds may discharge hold bilge water through the ships' fixed piping bilge drainage system as long as the water is not directly related to a hold washing/cleaning operation.

[8]If a threat to human health and safety of the crew or the remaining live animals on board exists, discharge to take place ≥ 12nm from the nearest land.

[9]In all cases, check with local authorities as local regulations may apply. Within the Great Barrier Reef Marine Park, as far as practicable from reefs and islands.

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions
materials, paper, rags, glass, metal, bottles, crockery and similar refuse		
Mixed garbage	When garbage is mixed with or contaminated by other substances prohibited from discharge or having different discharge requirements, the more stringent requirements apply.	
Note: The above conditions apply except where the disposal of garbage from a ship is necessary for the purpose of securing the safety of a ship and those on board or saving life at sea – see MARPOL Regulation 7.1.1		

Annexure 1.4: Standards for discharge of washing water as per MARPOL

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions
Chemical and Product Tankers	Category X	Tanks to be prewashed before leaving unloading port, residues to be pumped ashore until the concentration of the substance in the effluent is 0.1% by weight or less, as indicated by analysis of samples of the effluent taken by an AMSA marine surveyor. When the required concentration level has been achieved, remaining tank washings to be discharged to the reception facility until the tank is empty. Appropriate entries to be made in the Cargo Record Book and endorsed by the AMSA marine surveyor. Any water subsequently added may be discharged if: Ship is proceeding en route at a speed of at least 7 knots; and Discharge below the waterline; and Ship is > 12 nm from nearest land and depth of water is >25m
	High-viscosity or solidifying Category Y	Prewash in accordance with Convention, residues to be pumped ashore until tank is empty. Any water subsequently added may be discharged if: Ship is proceeding en route at a speed of at least 7 knots; and Discharge below the waterline; and Ship is > 12 nm from nearest land and depth of water is >25m
	Category Y Category Z	Ship is proceeding en route at a speed of at least 7 knots; and Concentration of substance in wake of ship < 1 part per million; and Amount not to exceed 1m3 or 1/3,000 of tank capacity, whichever is greater; and Discharge below the waterline; and Ship is > 12 nm from nearest land and depth of water is >25m
MARPOL Harmful Packaged Substances (Annex III)	Jettisoning of harmful packaged substances into the sea	Prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea

Annexure 1.5: Standards for Air Emissions from Vessel as per MARPOL

Vessel/Voyage type/Area	Sub-Category	Discharge Conditions
All vessels	Ozone-depleting substances	Prohibited
	Nitrogen Oxides	Operation of diesel engines >130kW prohibited unless engine is certified to meet prescribed emission standards. New Engines: • Tier I - 17 g/kW from 1 January 2000 • Tier II - 14.4 g/kW from 1 January 2011 • Tier III - 3.4 g/kW from 1 January 2016 (in Emission Control Areas (ECA)) Existing Engines (installed on ship on or between 1 January 1990 to 1 January 2000) • 17g/kW for diesel engine with power output >5000kW and displacement per cylinder => 90 litres • Approved method by Administration
	Sulphur Oxides	Sulphur content of fuel oil not to exceed 4.5%. ** From 1 January 2012, sulphur content of fuel oil not to exceed 3.5% ** From 1 January 2020 sulphur content if fuel oil not to exceed 0.5% ** ** Fuel oil to be purchased from a registered supplier Note: Feasibility review to be completed 2018
	Incinerators	Incinerators installed after 1 January 2000 must be type approved and certified to meet prescribed emission standards. Do not use within port limits

Annexure 1.6: Oil Spill Management Plan

INLAND WATERWAYS AUTHORITY OF INDIA

Ministry of Shipping, Government of India

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT, ENVIRONMENTAL MANAGEMENT PLAN AND RESETTLEMENT ACTION PLAN FOR "CAPACITY AUGMENTATION OF NATIONAL WATERWAY.1" BETWEEN HALDIA AND ALLAHABAD

(JAL MARG VIKAS PROJECT)

OIL SPILL DISASTER CONTINGENCY PLAN

FOR

PROPOSED INLAND WATERWAY TERMINAL AT HALDIA,

DISTRICT PURBI MEDINIPUR,

WEST BENGAL

AUGUST, 2016

Table of Contents

Abbreviations:

TAC	:	Tariff Advisory Committee
NFPA	:	National Fire Protection Association
OISD	:	Oil Industry Safety Directorate
NOSDCP	:	National Oil Spill Disaster Contingency Plan
MARPOL	:	Marine Pollution – The International Convention for the Prevention of Pollution from Ships

DISASTER MANAGEMENT PLAN

1 INTRODUCTION

Disaster Management Plan of IWAI covers planning for handling of potential offshore and onshore emergencies during construction and operation phase of the Waterway. The facilities required to be provided by the IWAI for tackling potential emergencies mainly in terminals and during transportation of cargo in NW-1 are covered in this note of such items can be taken by IWAI during implementation of the present project.

2 POTENTIAL EMERGENCIES

2.1 On-shore Emergencies at Terminals

a) Leakage of oil (HSD) during bunkering

b) Spillage during handling of bulk liquid/hazardous cargo

c) Fire due to short circuiting/cable bursting etc.

d) Major fire during handling of bulk liquid/hazardous cargo handling

2.2 Off-shore Emergencies in Waterways

a) Grounding and sinking of vessel

b) Fire in a vessel

c) Oil spillage in water from fuel tanks of vessels due to collision/grounding

d) Spillage from vessels carrying oil/hazardous cargo due to collision/grounding

2.3 Type of Disasters Excluded from Scope of Disaster Management Plan

(i) Rescue operations of passengers due to sinking of vessels carrying passengers

(ii) Security Risks from unsocial elements

It is presumed that IWAI will take appropriate actions separately while planning passenger ferry services operation and patrolling in the waterway to take care of security risks in consultation with State Governments.

3 ONSHORE EMERGENCIES AT TERMINALS

Type of cargo to be handled at 6 new terminals:

- General Cargo

- Dry Bulk Cargo
- Bagged Cargo
- Containers
- Neo-bulk cargo

Handling of liquid bulk and other hazardous cargo at the terminals and/or their transport through NW-1 are not envisaged. Hence elaborate fire fighting and oil spillage prevention/response facilities required under Tariff Advisory Committee (TAC), National Fire Protection Association (NFPA), Oil Industry Safety Directorate (OISD), National Oil Spill Disaster Contingency Plan (NOSDCP), Marine Pollution – The International Convention for the Prevention of Pollution from Ships (MARPOL) etc. have not considered while preparing the Disaster Management Plan (DMP) for NW-1.

However it is essential to have some basic minimum facilities in the terminals at the landside and as well as water side to tackle emergencies in the event of fire, vessels getting grounded along the water way, oil spillage or the following facilities are envisaged under disaster management plan:

4 DISASTER MANAGEMENT FACILITIES

4.1 On Shore Terminals

(i) Fire Extinguishers at strategic locations and substations planned as part of the individual terminals and to be provided by the EPC Contractors.

(ii) Spill kit

- Sorbent materials such as clay (kitty litter), polypropylene pads, rags and saw dust
- Temporary Foldable tank for storage of spill oil

4.2 Off Shore

4.2.1 Salvage Vessels

Salvage Vessels are generally used for the following functions:

a) Towing of adrift or aground vessels

b) Fire fighting in case of fire on the moving vessels

c) Diving salvage operation

Since diving salvage operation need highly skilled team and sophisticated gadgets, it is preferred that IWAI may hire specialist firm for such operation.

For towing/ rescue of adrift or ground vessels and combating fires on the vessels, suitable tugs capable of such duties are generally deployed.

In NW-1, for towing 3000 DWT fully loaded barges, the tugs should be powerful enough and have Bollard Pull of at least 28 T. minimum speed of such tugs shall be 12 knots with draft less than 1.7 m suitable for operation in LAD of 2.2 m in Patna-Varanasi stretch. The external fire fighting facilities in the tug will be required for combating fire in barges while transporting cargo through waterways.

General specifications of such tugs are given below:

Length : 30-35 m

Beam : 9-11 m

Draft : not exceeding 1.7 m

Bollard Pull : not less than 28 T

Speed : not less than 12 knots

Special features:

a) Towing winch

b) Fire fighting gear with deluge system, hoses, nozzles etc.

4.2.2 Oil Spill Recovery System

The prime strategy for response to the event of oil spill in the waterway is containment, collection and disposal of the oil spill. The equipment generally used for such operations are:

(i) Oil spill dispersant with spray arm
(ii) Boom for containment of oil
(iii) Skimmer for pumping the contained oil
(iv) Flex barge/ floating storage for collection of spilled oil
(v) Disposal facility at shore
(vi) Vessels for laying the booms
(vii) Oil recovery boat

Their brief description is given below:

(i) Oil Spill Dispersants - Spraying of dispersants can be made from small boats. Boom, skimmers, flex barge can be stored in a vessel and lowered down to waterways for recovery of spilled oil.

(ii) Permanent and inflatable booms are generally designed for floating vertically without twisting so that oil containment is carried out efficiently. For floating features, hard shell HDPE floats/ circular foam filled with polyurethane foam is used for permanent boom whereas air chambers are provided in inflatable booms. Boom Reels, air blowers etc. are also required as a part of essential accessories for booms. These booms have draft ranging from 0.3m to 0.6m and free board of 0.3m to 0.5m. These booms can be towed in straight and sweep mode and also can be towed with collected oil.

(iii) Skimmers are generally motor or diesel engine driven equipment and can be deployed from vessels and capable of recovering all types of oil with viscosity ranging from medium to light viscous oil slicks. The skimming function is done from the brush or disc or drum type attachments of the equipment. Skimmers of 20 TPH oil recovery capacity are very common and generally used in oil handling facilities in Ports. The oil water recovery rate as offered by the manufacturers is generally not less than 60%: 40%.

(iv) Flex Barge – Flex barge is generally used for temporary storage of oils and collection and subsequent disposal of the stored oil. Such barges are designed for towing at higher speed even in the presence of high currents. It is a floating bladder type item. These barges have shallow draft so that they can access into tidal or shoaled areas for recovery of spilled oil. The standard capacity of such barge is 5-10 Ton. The fabric of such barge is polyamide/ polyester base with polyurethane/ Neoprene coating. These should be strong enough, heavy duty and durable.

(v) Disposal Facility - The disposal of oil can be done in portable tanks in shore. These tanks can be either temporary open top liquid storage tanks with metal frame or bladder type which can be used on land or floating in water and can be towed. Disposal facility can be created in strategic locations preferably in some terminals from where the portable tanks can be transported by road to designated disposal site approved by local municipality.

(vi) Oil Recovery Boat – Oil recovery boats are self propelled and fitted with filter belt skimmer by which the boat can skim oil with high efficiency while moving through the waterways. It is possible to achieve recovery rate of approx.80 M3/ hr. at a speed of about 3 knots. The skimmed oil can be retained in the

boat in recovered oil tanks and boat can quickly, transit to the disposal location where the oil is pumped from the holding tanks.

Debris collection system can be incorporated in such boats if required. Skimmers can be also lowered/ lifted from such boat by using on board crane facilities. If necessary, boom deployment device can be added as special features in such boat.

Typical Principal Particulars of such boat are given below:

Length	:	12-15 m
Beam	:	4-5 m
Draft (loaded)	:	1.7 m
Speed	:	10 knots
Cruising range	:	200 Km

5 CONCLUSION

(a) At Terminals

Spill kit with Sorbent Materials and temporary foldable tanks.

(b) In Waterways

Salvage tugs can be made available during emergencies to tackle accidental fire at vessels and assistance during grounding. Oil recovery facilities from waterways and in front of terminals are also required by keeping essential items in barges which can be deployed during emergency. These barges should be self propelled for the rapid response and should carry all accessories for oil spill recovery.

In case suitable tugs and barges are available with IWAI to undertake the specific duties explained above, such vessels can be made available otherwise new salvage tugs with fire fighting facilities and oil recovery boats along with required accessories like spraying of dispersants, boom with accessories, skimmer with power pack, flex barge/ floating storage tanks, etc. have to be procured under the present project.

(c) No. of Salvage Tugs and Oil Recovery Units

It is recommended to keep at least 2 salvage tugs and 4 oil recovery units in NW-1 to cover the stretch between Haldia and Varanasi.