Environment Management Plan for proposed Terminal Project (Construction Phase)

Component	Environmental Attribute and potential impacts	Remedial Measure	Relevant laws and Contract Documents	Approximate Location	Time Frame	Institutional Responsibility	
						Implementation	Supervision
1. Site Preparation: Levelling of Terminal Site, Base cap, Construction Camp & Labour camp							
1.1 C & G and levelling of site	• Loss of top soil. Loss of natural resource (Earth/soil)	• Top soil (15 cm) would be stripped and kept separately in stockpiles for use in landscaping. • Excavated materials would be preferably used for site filling/low lying area filling and the surplus material would be disposed as per norms. • Green belt/landscaping would be developed at the site and as per the Green Belt management Plan. • Survival rate of tree would be regularly monitored. It should be minimum of 70%. • Sedimentation tanks shall be provided for storm water drain to arrest the sediments and these sediments shall be removed and stored with remaining excavated soil. • Shore protection works like stone pitching along the bank shall be undertaken.	Solid Waste Management Rules, 2016, Hazardous & Other Waste (Management and Transboundary) Rules, 2016 C & D waste Rules, 2016. The Water (Prevention & Control of Pollution) Act, 1974 and amendments thereof.	Construction site Labour and construction Camp Locations	During design and Construction Stage	Contractor	TSC & PMU

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1.2 Setting of Labour & Construction Camps:	Contamination of land and water resources from waste generation.	• Construction camp location would be as per proposed Construction & Labour Camp Management Plan. • Labour camps would be located close to the construction sites to the extent possible. • Top soil (15 cm) would be stripped and kept separately in stockpiles for use in landscaping. • Excavated materials would be preferably used for site filling/low lying area filling and the surplus material would be disposed as per norms.	Solid Waste Management Rules, 2016, Hazardous & Other Waste (Management and Transboundary) Rules, 2016 C & D waste Rules, 2016. The Water (Prevention & Control of Pollution) Act, 1974 and amendments thereof.	Labour and construction Camp Locations	Construction Stage	Contractor	TSC & PMU
1.3 Sanitation, Health & Safety:	Unhygienic and unsafe living and working condition.	• Hygiene in the camps would be maintained by providing good sanitation and cleaning facilities. • Camp would be well ventilated with adequate provision for illumination,					

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		kitchen and safe drinking water. Proper drainage to be maintained around the sites to avoid water logging. • Proper sanitation with toilet and bathing facilities would be provided at the sites and labour camps. Wastewater generated from these facilities would be disposed through septic tanks and soak pit • Preventive medical care to be provided to workers • Segregated solid waste would be disposed of at municipal solid waste disposal location. If municipal solid waste site not available then waste should be land fill following local regulations. • LPG will be used for cooking in construction camps • Provision would be made for day crèche for children • First aid facilities, with room, personnel and ambulance would be available at the site. Also, tie-up with local hospitals					

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		would be done to handle emergency case, if any • Rest area would be provided at the site where workers can rest after lunch and should not lie on site anywhere • Working hours of labourers would not exceed than standard norms as per Factory Act • Wastewater from construction site would not be allowed to be accumulated as it may lead to breeding of mosquitoes. Septic tanks/soak pits would be provided for its disposal • Temporary storm water drainage system would also be provided at camp site so that no water logging takes place					
1.4 Waste Management	Generation of solid, liquid and hazardous waste	• Arrangement should be made for segregation of waste into recyclable and non-recyclable waste • Non-recyclable waste generated should be disposed regularly through authorized agency. Recyclable waste should					

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		be sold to authorized vendors. • Construction waste generated should be segregated at site into recyclable, reusable & rejected fraction. Recyclable should be sold to authorized vendor, reusable waste should be stored at site for usage and rejected fraction should be disposed at designated sites of the municipal authority • If no debris or waste disposal site exists in the area then a site would be identified with approval of AIWTDS and would be used & manage for the same as per the Debris Management Plan. • Any waste oil generated from construction machinery, should be stored on concrete platform and disposed off to authorized recyclers.					
2. Climate							
2.1 Climate	Project is unlikely to	• Daily monitoring of the	Kyoto Protocol,	Construction	During	Contractor	TSC & PMU

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Change	cause negative effect on climate. However, project can contribute positively for climate	CWC Gauge data at Pandu Ghat for GGG Ghat) • Regular interaction mechanism with Indian Meteorological Department (IMD) for early forecasting to avoid casualties • Working jointly with State Disaster Management Authority, State Disaster Response Force (SDRF) & National Disaster Response Force (NDRF) during emergency situation • Awareness programme with staff, passengers and contractors on Climate Change. • Shifting to alternative energy options like solar energy • Adoption of best practices to cut down resources and energy requirement	Forest Conservation Act & National Forest Policy	site	Design and construction stage.		
3. Air Quality							
3.1 Air Pollution	Dust Generation due to construction activities and material handling. Emission from machinery, DG and	• No crushers or Batching plants will be located at the sites. Ready mix concrete will be used. These considerably reduce the emission. • Low sulphur diesel would be used for operating DG	Environmental Protection Act, 1986 and amendments thereof; The Air (Prevention and Control of	Construction sites, Loading areas, storage areas,	During the Construction phase	Contractor	TSC & PMU

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	vehicular movement.	sets and construction equipment. • Periodic monitoring of air quality for PM_{10}, $PM_{2.5}$, SOx, NO_x, and CO shall be carried out quarterly at construction site • Regular water sprinkling/fogging to suppress the dust generatedat site, approach road & haulage roads. • Proper servicing and maintenance of earth moving vehicles and other machinery to minimize the emission generation • Vehicles transporting the loose and fine materials like sand and aggregates shall be covered. • Masks and other PPE shall be provided to workers in high dust generation area • Loading and unloading of construction materials shall be made at designated locations with provisions of water sprinkling. • Construction vehicle, machinery & equipment shall be regularly serviced and maintained and would	Pollution) Act, 1981 and amendments thereof				

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		have valid PUC certificate • Monitoring of air quality shall be carried out on quarterly basis to check the level of pollutants and effectiveness of mitigative measures					
4. Noise							
4.1 Noise Pollution	• Noise generation from construction activity. • Noise generation from operation of vehicle, equipment and machinery.	• Protection devices (earplugs or ear muffles) shall be provided to the workers operating near high noise generating machines. • Barricading (Temporary noise barrier) around the construction site to minimize the noise level • Restriction of high noise generating activity between 10:00 PM to 6 AM. • Restriction on Honking at the project site • Job rotations systems for workers, working in high noise level areas • Periodic monitoring of noise levels to check the level of pollutants and effectiveness of proposed EMP	Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof	Terminal site and access roads.	During the Construction stage	Contractor	TSC & PMU
5. Water Quality							

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5.1 Water pollution	Surface water pollution and Depletion of Groundwater due to abstraction for construction purpose.Siltation due to construction of terminal and contamination due to disposal of domestic waste	• Preference would be given to use river water for construction with permission from concerned authorities • In case of use of ground water, permission will be obtained from CGWA/CGWB • Water monitoring to be carried out as per monitoring plan. • Natural Drainage pattern of area shall be maintained by making a proper drainage network in project site. • Washing of vehicle and equipment shall not be carried out in river or nearby place. Washing area would be in a designated area with oil & grease trap. • Storage of debris and raw materials would be in designated area clearly demarcated. • Site would be regularly cleaned • Septic tank/soak pit shall be provided for the toilets at both construction site as well as workers camp.	Water Act, 1974	Terminal site	During Construction stage	Contractor	TSC & PMU

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		Adequate toilets & bathrooms shall be provided to prevent open defecation. Use of mobile toilets with anaerobic digestion facility would be explored. No domestic wastewater shall be allowed to be discharged to river. • Wastewater, generated from the washing/cleaning area after passing through oil & grease trap shall be re-used for water sprinkling. • Fuel shall be stored in leak proof containers and containers shall be placed on paved surface under shed. • The piling work in river shall be undertaken during low flow period. • Turbidity traps/curtains/ Geo-Textile synthetic sheet curtain would be placed around piling and construction area to prevent movement of sediments and construction waste. • Sedimentation tanks shall					

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		be provided for treating run-off from site before discharging into the river. • Proper collection, management and disposal of construction and municipal waste from site shall be made to prevent mixing of the waste in run-off and entering the water bodies • Monitoring of surface water quality shall be carried out on quarterly basis to check the level of pollutants and effectiveness of proposed EMP •					
6. Accident, Incident and Safety Risks							
6.1 Health & Safety	Accident and Incident risk from construction activities and safety of workers Impact on Social life.	• Local labour would preferably be employed for construction. • Site would be barricaded and would have security guards. • Resister would be maintained for entry to the construction sites. No unauthorized person would be allowed to enter the site. • A board in local language at entrance of site would display name of project,	BOCWA & BOCWR Central Motor Vehicle Act 1988 EP Act 1986 Noise Rules 2002	Terminal Site and the material source areas and haulage roads Construction sites	During Construction stage	Contractor	TSC & PMU

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		area and hazards associated for public awareness • Adequate illumination would be provided at site during evening and night time till the work is being carried out • Rest area for workers would be provided. • Personal protective equipment like helmet, gum boots, safety shoes, safety jackets, ear plugs, gloves etc to be provided to workers. Fines would be levied if they are found not using PPE • Noise level in the work zone would be maintained and followed as per OSHAS norms • Contractors would adopt and maintain safe working practices. SOPs would be prepared and followed for all activities under supervision of site engineer • Training would be given to workers to handle the heavy equipment so as to prevent accidents • Complete medical check-					

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		up would be done for workers prior to joining and after six months of joining • Emergency telephone nos.of hospitals, ambulance and doctors would be displayed in first aid room. • Working hours of labour should not exceed norms as per state factory law • Speed limit of vehicles would be restricted at site to prevent any accidents and fines would be imposed for violation. All construction vehicles would follow the designated routes & timings. • Arrangement of fire-fighting would be made at site and workers would be trained on their use. • Maintenance and repair of any local village road used for the project activities should be carried out both before and end of construction by contractor.					
7. Protection of Flora and Fauna							
7.1 Loss of Biodiversity	• Loss of terrestrial flora &	• Caution sign shall be placed to prevent hunting	Wild Life (Protection) Act, 1972, Bio-	Terminal site/construction camps	During design and construction	Contractor	TSC & PMU

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	fauna. • Loss of Aquatic Fauna including Dolphins and macrophytes	of animals • Construction activities shall be restricted to 6:00 Am-10:00 Pm especially noise generating activities. • No hazardous material or waste shall be disposed in the land or nearby area as it may harm the animals, if consumed accidently • Site should be barricaded to prevent entry of the animal in the site • Illumination at the night time should be reduced (if no activity is going on) as it may disturb the nocturnal animals • Workers should not use any timber or firewood as fuel for any purpose • The river area in which the piling is planned, advisable to carefully determine drop sites before anchor placement to ensure that Dolphin and fish communities that	diversity Conservation Act, 2002	Around Piling Area	stage		

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		could locally still be present in the area are not unnecessarily damaged. • Before starting piling allow some time to aquatic fauna to displace from the piling area. • Bubble curtains can be provided at the time of pilling to displace the aquatic fauna prior start of construction activities • The piling activities must be carried out in shortest possible timeframe. • All the debris should be disposed away from river course. • Noise reducing devices like mufflers, enclosures shall be fitted with the equipment as much as feasible. • Fish exclusion devices shall be installed in water column around the pile driving area to prevent fish access • Geo Textile synthetic					

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		sheet curtain &turbidity traps shall be placed around piling and construction area to prevent movement of sediments and construction waste • Piling should be stopped for some time, if any dolphin/turtle/RET species is sighted in activity area • Aquatic ecology monitoring should be carried out prior to start of construction and after completion of construction to assess the impact of construction activities on aquatic life. • Wherever bentonite slurry is used, the contractor shall be responsible for prompt removal from site and safe disposal. No muck, bentonite slurry will be allowed to be discharged into river. • No -Construction Period will be maintained from					

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		Mid March to Mid June as suggested by the Dolphin study report conducted under the project. During this time construction activities will be restricted in the water part.					
Cultural & Heritage Resources	• Temporary diversion of access towards cultural resources, temples; • Safety issues to devotees during the construction stage various construction activities. etc. • Chances of vibration impact to these cultural resources during the construction work;	• Adequate diversion signs shall be displayed in the access route for the devotees towards these cultural heritage and temples. • Warning signs shall be given if there is any large excavation work done or scaffoloing put thereof		Near the Heritage Site	During design and construction stage	Contractor	TSC & PMU
Labour Influx	• Influence in the demographic composition	• Specifications on employment of local workforce including women should be		Construction Area	During design and construction stage	Contractor	TSC & PMU

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	• Increased demand and competition for local social and health services • Social conflicts between the local community and the construction migrant workers. • Increased rates of illicit behaviour and crime against women, which is a real threat for Assam where gender-based violence is rampant • Increase competition for jobs and have an impact on wage distribution	reflected in the civil works bidding documents and subsequent contracts to ensure that the contractors fulfil these commitments. Locals including women may be screened further for skills, and adequate orientations can be provided to recruit for the work. AIWTDS can prepare a roster of interested workers and their skills • The project contractor needs to prepare a site-specific Labour Influx Management Plan and/or a Workers' Camp Management Plan. • Security personnel will be deployed at the construction sites, and emergency nos. including contact details of local law enforcement officers, project's helpline no., existing state-run women helpline nos. will be prominently displayed at the site. The contractors will ensure that an Internal					

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		Complaints Committee (ICC) for each establishment is set-up to meet their corporate requirement and legal mandate under the Sexual Harassment at the Workplace Act, 2013. • Health problems of the workers should be taken care of by providing basic health-care' facilities through health centres temporarily set up for the construction camp. The health centre should have the requisite staff, free medicines and minimum medical facilities to tackle first-aid requirements or minor accidental cases, linkage with nearest higher order hospital to refer patients of major illnesses and critical cases. • Awareness camps on HIV/AIDS for both, construction workers and neighbouring villages must be organised at regular					

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		intervals by NGOs empanelled with NACO. • It is expected that among the women workers there will be mothers with infants and small children. The provision of a day care crèche as per the Building and Other Construction Workers (regulation of employment and conditions of service) act, 1996 is the contractor's responsibility. The crèche should be provided with trained women to look after the children. • In case work schedule extents up till night, it should be ensured that women workers are exempted night shifts.					
8. Repairing & Retrofitting of vessels of IWT:							
Repairing & Retrofitting of vessels of IWT	The reparing and retrofitting of vessels involve replacement of old machineries with	• Wastewater will be passed through oil and grease trap and treated in STP. • The contaminated waste	Hazardous & Other Waste (Management and Transboundary)	Pandu	Design & Construction Phase	Contractor	TSC & PMU

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	latest one. In the process the waste water is likely to be generated from the washings and contaminated with oil and grease. The waste generated from repairing will be asbestos, ferrous and non ferrous scraps, plastics, packings, oil contaminated cotton, paint waste etc. in addition to this, used engine oil and oily sludge are likely to be generated.	will be seggregated and kept in separate drums/bins under shed. • The used oil will be collected in leak proof drums and kept under shed. • The waste will be categorised as recycleable, incinerable and land disposable. • Used oil and mettalic waste will be sold to authorised recyclers. • The incinerable waste such as oil contminated cottons, filters, waste oil sludge, paint waste etc will be disposed of in authorised common incinerator. • Land disposable waste such as wood, fibers etc will be disposed of in authorised common hazardous waste treatment, storage and disposal facilities (TSDF).	Rules, 2016 The Water (Prevention & Control of Pollution) Act, 1974 and amendments thereof.				