Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
ECoB 1: Waste Man	agomont	
Impact Source ECoP 1: Waste Man General Waste	agement Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	<ul> <li>The Contractor shall</li> <li>Develop waste management plan for various specific waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to Construction Contractor for approval.</li> <li>Organize disposal of all wastes generated during construction in an environmentally acceptable manner. This will include consideration of the nature and location of disposal site, so as to cause less environmental impact.</li> <li>Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach.</li> <li>Segregate and reuse or recycle all the wastes,</li> </ul>
		<ul> <li>beging also and rouge of recycle and the water, wherever practical.</li> <li>Prohibit burning of solid waste</li> <li>Collect and transport non-hazardous wastes to all the approved disposal sites. Vehicles transporting solid waste shall be covered with tarps or nets to prevent spilling waste along the route</li> <li>Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process.</li> <li>Provide refuse containers at each worksite.</li> <li>Request suppliers to minimize packaging where practicable.</li> <li>Place a high emphasis on good housekeeping practices.</li> <li>Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal.</li> </ul>
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	<ul> <li>The Contractor shall</li> <li>Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately labeled for safe transport to an approved chemical waste depot.</li> <li>Store, transport and handle all chemicals avoiding potential environmental pollution.</li> <li>Store all hazardous wastes appropriately in bunded areas away from water courses.</li> <li>Make available Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction.</li> <li>Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations.</li> <li>Construct concrete or other impermeable flooring to prevent seepage in case of spills</li> </ul>
ECoP 2: Fuels and I	Hazardous Goods Managem	ent

## Annexure 7-1: Environmental Code of Practices for Contractor

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers	<ul> <li>The Contractor shall</li> <li>Prepare spill control procedures and submit the plan for Construction Contractor approval.</li> <li>Train the relevant construction personnel in handling of fuels and spill control procedures.</li> <li>Store dangerous goods in bunded areas on a top of a sealed plastic sheet away from watercourses.</li> <li>Refueling shall occur only within bunded areas.</li> <li>Make available MSDS for chemicals and dangerous goods on-site.</li> <li>Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site approved by DoE.</li> <li>Provide absorbent and containment material (e.g., absorbent matting) where hazardous material are used and stored and personnel trained in the correct use.</li> <li>Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use.</li> <li>Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur.</li> <li>Store hazardous materials above flood plain level.</li> <li>Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area shall preferably slope or drain to a safe collection area in the event of a spill.</li> <li>Put containers and drums in permanent storage areas on an impermeable floor that slopes to a safe collection area in the event of a spill or leak.</li> <li>Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution.</li> <li>Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials.</li> <li>Return the gas cylinders to the supplier. However, if they are not empty prior to their return, they must be labeled wit</li></ul>

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
impact Source		
Hazardous Material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	<ul> <li>The Contractor shall</li> <li>Follow the management guidelines proposed in ECoPs 1 and 2.</li> <li>Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables</li> </ul>
Discharge from construction sites	During construction both surface and groundwater quality may be deteriorated due to construction activities in the river, sewerages from construction sites and work camps. The construction works will modify groundcover and topography changing the surface water drainage patterns of the area including infiltration and storage of storm water. These changes in hydrological regime lead to increased rate of runoff, increase in sediment and contaminant loading, increased flooding, groundwater contamination, and effect habitat of fish and other aquatic biology.	<ul> <li>The Contractor shall</li> <li>Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials</li> <li>Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site</li> <li>Divert runoff from undisturbed areas around the construction site</li> <li>Stockpile materials away from drainage lines</li> <li>Prevent all solid and liquid wastes entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot</li> <li>Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay at the entrance of the construction site) to remove the mud from the wheels. This shall be done in every exit of each construction vehicle to ensure the local roads are kept clean</li> </ul>
Soil Erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	<ul> <li>The Contractor shall</li> <li>Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion</li> <li>Ensure that roads used by construction vehicles are swept regularly to remove sediment.</li> <li>Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds)</li> </ul>
Construction activities in water bodies	Construction works in the water bodies will increase sediment and contaminant loading, and effect habitat of fish and other aquatic biology	<ul> <li>The Contractor Shall</li> <li>Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site</li> <li>Monitor the water quality in the runoff from the site or areas affected by dredge plumes, and improve work practices as necessary</li> <li>Protect water bodies from sediment loads by silt</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul> <li>screen or bubble curtains or other barriers</li> <li>Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables.</li> <li>Use environment friendly and nontoxic slurry during construction of piles to discharge into the river.</li> <li>Reduce infiltration of contaminated drainage through storm water management design</li> <li>Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets</li> </ul>
Drinking water	Groundwater at shallow depths is contaminated with arsenic and hence not suitable for drinking purposes. Depletion and pollution of groundwater resources	<ul> <li>The Contractor Shall</li> <li>Pumping of groundwater shall be from deep aquifers of more than 300 m to supply arsenic free water. Safe and sustainable discharges are to be ascertained prior to selection of pumps.</li> <li>Tube wells will be installed with due regard for the surface environment, protection of groundwater from surface contaminants, and protection of aquifer cross contamination</li> <li>All tube wells, test holes, monitoring wells that are no longer in use or needed shall be properly decommissioned</li> <li>Install monitoring wells both upstream and downstream areas near construction yards and construction camps to regularly monitor the water quality and water levels.</li> <li>Protect groundwater supplies of adjacent lands</li> </ul>
ECoP 4: Drainage N	lanagement	
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth	<ul> <li>The Contractor shall</li> <li>Prepare a program for prevent/avoid standing waters, which Construction Contractor will verify in advance and confirm during implementation</li> <li>Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line</li> <li>Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there</li> <li>Rehabilitate road drainage structures immediately if damaged by contractors' road transports.</li> <li>Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to the relevant standards provided by DoE, before it being discharged into the recipient water bodies.</li> <li>Ensure the internal roads/hard surfaces in the</li> </ul>

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul> <li>construction yards/construction camps that generate has storm water drainage to accommodate high runoff during downpour and that there is no stagnant water in the area at the end of the downpour.</li> <li>Construct wide drains instead of deep drains to avoid sand deposition in the drains that require frequent cleaning.</li> <li>Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion</li> <li>Protect natural slopes of drainage channels to ensure adequate storm water drains.</li> <li>Regularly inspect and maintain all drainage congestion problem.</li> <li>Reduce infiltration of contaminated drainage through storm water management design</li> </ul>
Ponding of water	Health hazards due to mosquito breeding	<ul> <li>Do not allow ponding of water especially near the waste storage areas and construction camps</li> <li>Discard all the storage containers that are capable of storing of water, after use or store them in inverted position</li> </ul>
ECoP 5: Soil Quality	y Management	
Filling of Sites with dredge spoils	Soil contamination will occur from drainage of dredged spoils	<ul> <li>The Contractor shall</li> <li>Ensure that dredged sand used for land filling shall be free of pollutants. Prior to filling, sand quality shall be tested to confirm whether soil is pollution free. Sediments shall be properly compacted. Top layer shall be the 0.5 m thick clay on the surface and boundary slopes along with grass. Side Slope of Filled Land of 1:2 shall be constructed by suitable soils with proper compaction as per design. Slope surface shall be covered by top soils/ cladding materials (0.5m thick) and grass turfing with suitable grass.</li> <li>Leaching from the sediments shall be contained to seep into the subsoil or shall be discharged into settling lagoons before final disposal.</li> <li>No sediment laden water in the adjacent lands near the construction sites, and/or wastewater of suspended materials excessive of 200mg/l from dredge spoil storage/use area in the adjacent agricultural lands</li> </ul>
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils	<ul> <li>The Contractor shall</li> <li>Strictly manage the wastes management plans proposed in ECoP1 and storage of materials in ECoP2</li> <li>Construct appropriate spill contaminant facilities for all fuel storage areas</li> <li>Establish and maintain a hazardous materials register detailing the location and quantities of hazardous substances including the storage, use of</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction material stock piles ECoP 6: Erosion an Clearing of	Erosion from construction material stockpiles may contaminate the soils <b>d Sediment Control</b> Cleared areas and slopes	<ul> <li>disposals</li> <li>Train personnel and implement safe work practices for minimizing the risk of spillage</li> <li>Identify the cause of contamination, if it is reported, and contain the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site</li> <li>Remediate the contaminated land using the most appropriate available method to achieve required commercial/industrial guideline validation results.</li> <li>The Contractor shall</li> <li>Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds</li> <li>Reinstate and protect covered areas as soon as</li> </ul>
construction sites	are susceptible for erosion of top soils, that affects the growth of vegetation which causes ecological imbalance	<ul> <li>possible</li> <li>Mulch to protect batter slopes before planting</li> <li>Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turfings/tree plantations</li> </ul>
Construction activities and material stockpiles	The impact of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream, (ii) destruction of aquatic environment in nearby lakes, streams, and reservoirs caused by erosion and/or deposition of sediment damaging the spawning grounds of fish, and (iii) destruction of vegetation by burying or gullying.	<ul> <li>The Contractor shall</li> <li>Locate stockpiles away from drainage lines</li> <li>Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds</li> <li>Remove debris from drainage paths and sediment control structures</li> <li>Cover the loose sediments and water them if required</li> <li>Divert natural runoff around construction areas prior to any site disturbance</li> <li>Install protective measures on site prior to construction, for example, sediment traps</li> <li>Control drainage through a site in protected channels or slope drains</li> <li>Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion</li> <li>Observe the performance of drainage structures and erosion controls during rain and modify as required.</li> </ul>
ECoP 7: Top Soil	Management	
earth works	fertile top soils that are enriched with nutrients required for plant growth agricultural development.	<ul> <li>Strip the top soil to a depth of 15 cm and store in stock piles of height not exceeding 2m.</li> <li>Remove unwanted materials from top soil like grass, roots of trees and similar others.</li> <li>The stockpiles will be done in slopes of 2:1 to reduce surface runoff and enhance percolation through the mass of stored soil.</li> <li>Locate topsoil stockpiles in areas outside drainage lines and protect from erosion.</li> <li>Construct diversion channels and silt fences around the topsoil stockpiles to prevent erosion and loss of</li> </ul>

	willigation measures/ management Guidelines
	<ul> <li>topsoil.</li> <li>Spread the topsoil to maintain the physico-chemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites</li> <li>Prior to the re-spreading of topsoil, the ground surface will be ripped to assist the bunding of the soil layers, water penetration and re vegetation</li> </ul>
outside ROW or temporary access roads will affect the soil fertility of the agricultural lands	<ul> <li>Limit equipment and vehicular movements to within the approved construction zone</li> <li>Construct temporary access tracks to cross concentrated water flow lines at right angles</li> <li>Plan construction access to make use, if possible, of the final road alignment</li> <li>Use vehicle-cleaning devices, for example, ramps or wash down areas</li> </ul>
ony and Landscaping	The Contractor shall
Flood plains of the existing Project area will be affected by the construction of various project activities. Construction activities especially earthworks will change topography and disturb the natural rainwater/flood water drainage as well as will change the local landscape.	<ul> <li>The Contractor shall</li> <li>Ensure the topography of the final surface of all raised lands (construction yards, approach roads, access roads, bridge end facilities, etc.) are conducive to enhance natural draining of rainwater/flood water;</li> <li>Keep the final or finished surface of all the raised lands free from any kind of depression that insists water logging</li> <li>Undertake mitigation measures for erosion control/prevention by grass-turfing and tree plantation, where there is a possibility of rain-cut that will change the shape of topography.</li> <li>Cover immediately the uncovered open surface that has no use of construction activities with grass-cover and tree plantation to prevent soil erosion and bring improved landscaping</li> </ul>
eas Management	
Borrow areas will have impacts on local topography, landscaping and natural drainage	<ul> <li>The Contractor shall</li> <li>Use only approved quarry and borrow sites</li> <li>Identify new borrow and quarry areas in consultation with Project Director, if required.</li> <li>Reuse excavated or disposed material available in the project to the maximum extent possible.</li> <li>Store top soil for reinstatement and landscaping.</li> <li>Develop surface water collection and drainage systems, anti-erosion measures (berms, re vegetation etc.) and retaining walls and gabions where required. Implement mitigation measures in ECoP 3: Water Resources Management, ECoP 6: Erosion and Sediment Control</li> <li>The use of explosive should be used in as much minimum quantity as possible to reduce noise, vibration and dust.</li> </ul>
	Vehicular movement outside ROW or temporary access roads will affect the soil fertility of the agricultural lands <b>bhy and Landscaping</b> Flood plains of the existing Project area will be affected by the construction of various project activities. Construction activities especially earthworks will change topography and disturb the natural rainwater/flood water drainage as well as will change the local landscape. <b>eas Management</b> Borrow areas will have impacts on local topography, landscaping and natural drainage

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
ECoP 10: Air Qualit	v Management	<ul> <li>application of watering and implementing mitigation measures proposed in ECoP 10: Air Quality Management.</li> <li>Noise and vibration control by ECoP 11: Noise and Vibration Management</li> </ul>
		The Construction of all
vehicular traffic	adversely affected by vehicle exhaust emissions and combustion of fuels.	<ul> <li>Fit vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition.</li> <li>Operate the vehicles in a fuel efficient manner</li> <li>Cover haul vehicles carrying dusty materials moving outside the construction site</li> <li>Impose speed limits on all vehicle movement at the worksite to reduce dust emissions</li> <li>Control the movement of construction traffic</li> <li>Water construction materials prior to loading and transport</li> <li>Service all vehicles regularly to minimize emissions</li> <li>Limit the idling time of vehicles not more than 2</li> </ul>
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	<ul> <li>The Contractor shall</li> <li>Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition in accordance with the specifications defined by their manufacturers to maximize combustion efficiency and minimize the contaminant emissions. Proof or maintenance register shall be required by the equipment suppliers and contractors/subcontractors</li> <li>Focus special attention on containing the emissions from generators</li> <li>Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites</li> <li>Service all equipment regularly to minimize emissions</li> <li>Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant to control the particle emissions in all its stages, including unloading, collection aggregate handling, cement dumping, circulation of trucks and machinery inside the installations</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a nuisance in the environment and can be a health hazard	<ul> <li>Water the material stockpiles, access roads and bare soils on an as required basis to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds). Stored materials such as gravel and sand shall be covered and confined to avoid their being wind-drifted</li> <li>Minimize the extent and period of exposure of the bare surfaces</li> <li>Reschedule earthwork activities or vegetation clearing activities, where practical, if necessary to avoid during periods of high wind and if visible dust is blowing off-site</li> <li>Restore disturbed areas as soon as practicable by vegetation/grass-turfing</li> <li>Store the cement in silos and minimize the emissions from silos by equipping them with filters.</li> <li>Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations</li> <li>Crushing of rocky and aggregate materials shall be wet-crushed, or performed with particle emission control systems</li> </ul>
ECoP 11: Noise and	Vibration Management	
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	<ul> <li>The Contractor shall</li> <li>Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures</li> <li>Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc.</li> <li>Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site</li> </ul>
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	<ul> <li>The Contractor shall</li> <li>Appropriately site all noise generating activities to avoid noise pollution to local residents</li> <li>Use the quietest available plant and equipment</li> <li>Modify equipment to reduce noise (for example, noise control kits, lining of truck trays or pipelines)</li> <li>Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment.</li> <li>Install acoustic enclosures around generators to reduce noise levels.</li> <li>Fit high efficiency mufflers to appropriate construction equipment</li> <li>Avoid the unnecessary use of alarms, horns and</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		sirens
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment	<ul> <li>The Contractor shall</li> <li>Notify adjacent landholders prior any typical noise events outside of daylight hours</li> <li>Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions</li> <li>Employ best available work practices on-site to minimize occupational noise levels</li> <li>Install temporary noise control barriers where appropriate</li> <li>Notify affected people if major noisy activities will be undertaken, e.g. pile driving</li> <li>Plan activities on site and deliveries to and from site to minimize impact</li> <li>Monitor and analyze noise and vibration results and adjust construction practices as required.</li> <li>Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas</li> </ul>
ECoP 12: Protection	n of Flora	
Vegetation clearance	Local flora are important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and overall keep the environment very friendly to human-living. As such damage to flora has wide range of adverse environmental impacts.	<ul> <li>The Contractor shall</li> <li>Reduce disturbance to surrounding vegetation</li> <li>Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation.</li> <li>Get approval from supervision consultant for clearance of vegetation.</li> <li>Make selective and careful pruning of trees where possible to reduce need of tree removal.</li> <li>Control noxious weeds by disposing of at designated dump site or burn on site.</li> <li>Clear only the vegetation that needs to be cleared in accordance with the plans. These measures are applicable to both the</li> <li>construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill and construction of diversion roads, etc.</li> <li>Do not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary access tracks or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds.</li> <li>Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same area of the roadside it came from.</li> <li>Avoid work within the drip-line of trees to prevent</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul> <li>damage to the tree roots and compacting the soil.</li> <li>Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible.</li> <li>Ensure excavation works occur progressively and re-vegetation done at the earliest</li> <li>Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction</li> <li>Supply appropriate fuel in the work caps to prevent fuel wood collection</li> </ul>
ECOP 13: Protection	n of Fauna	
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality,.	<ul> <li>The Contractor shall</li> <li>Limit the construction works within the designated sites allocated to the contractor</li> <li>check the site for animals trapped in, or in danger from site works and use a qualified person to release the animal</li> </ul>
Vegetation clearance	Impact on migratory birds, its habitat and its active nests Clearance of vegetation may impact shelter,	<ul> <li>The Contractor shall</li> <li>Not be permitted to destruct active nests or eggs of migratory birds</li> <li>Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and located active nests</li> <li>Minimize the release of oil, oil wastes or any other substances harmful to migratory birds to any waters or any areas frequented by migratory birds.</li> <li>The Contractor shall</li> <li>Restrict the tree removal to the minimum required.</li> </ul>
	feeding and/or breeding and/or physical destruction and severing of habitat areas	<ul> <li>Retain tree hollows on site, or relocate hollows, where appropriate</li> <li>Leave dead trees where possible as habitat for fauna</li> <li>Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition</li> </ul>
Construction camps	Illegal poaching	<ul> <li>Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching</li> </ul>
Construction activities in River	The main potential impacts to fisheries are hydrocarbon spills and leaks from riverine transport and disposal of	<ul> <li>The Contractor shall</li> <li>Ensure the riverine transports, vessels and ships are well maintained and do not have oil leakage to contaminate river water.</li> <li>Contain oil immediately on river in case of</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	wastes into the river	<ul> <li>accidental spillage from vessels and ships and in this regard, make an emergency oil spill containment plan to be supported with enough equipment, materials and human resources</li> <li>Do not dump wastes, be it hazardous or non-hazardous into the nearby water bodies or in the river</li> </ul>
construction activities on the land	The main potential impacts to aquatic flora and fauna River are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	<ul> <li>follow mitigation measures proposed in ECoP 3 : Water Resources Management and EC4: Drainage Management</li> </ul>
	Filling of ponds for site preparation will impact the fishes.	<ul> <li>The Contractor shall</li> <li>Inspect any area of a water body containing fish that is temporarily isolated for the presence of fish, and all fish shall be captured and released unharmed in adjacent fish habitat</li> <li>Install and maintain fish screens etc. on any water intake with drawing water from any water body that contain fish</li> </ul>
ECoP 14: Protection	of Fisheries	
Construction activities in River	The main potential impacts to fisheries are hydrocarbon spills and leaks from riverine transport and disposal of wastes into the river	<ul> <li>The Contractor shall</li> <li>Ensure the riverine transports, vessels and ships are well maintained and do not have oil leakage to contaminate river water.</li> <li>Contain oil immediately on river in case of accidental spillage from vessels and ships and in this regard, make an emergency oil spill containment plan to be supported with enough equipment, materials and human resources</li> <li>Do not dump wastes, be it hazardous or nonhazardous into the nearby water bodies or in the river</li> </ul>
Construction activities on the land	The main potential impacts to aquatic flora and fauna River are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	<ul> <li>The Contractor shall</li> <li>follow mitigation measures proposed in ECoP 3 : Water Resources Management and EC4: Drainage Management</li> </ul>
	Filling of ponds for site preparation will impact the fishes.	<ul> <li>The Contractor shall</li> <li>Inspect any area of a water body containing fish that is temporarily isolated for the presence of fish, and all fish shall be captured and released unharmed in</li> </ul>

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul> <li>adjacent fish habitat</li> <li>Install and maintain fish screens etc. on any water intake with drawing water from any water body that contain fish</li> </ul>
ECoP 15: Road Trai	nsport and Road Traffic Mar	nagement
Construction vehicular traffic	Accidents and spillage of fuels and chemicals	<ul> <li>The Contractor shall</li> <li>Prepare and submit a traffic management plan to the Construction Contractor for his approval at least 30 days before commencing work on any project component involved in traffic diversion and management.</li> <li>Include in the traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges temporary diversions, necessary barricades, warning signs / lights, and road signs.</li> <li>Provide signs at strategic locations of the roads complying with the schedules of signs contained in the IWT Traffic Regulations.</li> <li>Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Assam:</li> <li>Duration of construction period</li> <li>Period of proposed detour / alternative route</li> <li>Suggested detour route map</li> <li>Name and contact address / telephone number of the concerned personnel</li> <li>Name and contact address / telephone number of the Contractor</li> <li>Inconvenience is sincerely regretted.</li> <li>Restrict truck deliveries, where practicable, to day time working hours.</li> <li>Restrict the transport of oversize loads.</li> <li>Operate road traffics/transport vehicles, if possible, to non-peak periods to minimize traffic disruptions.</li> </ul>
	isport manayement	

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The presence of construction and dredging barges, pipe lines and other construction activities in the river can cause hindrance and risks to the river traffic.	<ul> <li>The Contractor shall</li> <li>Not obstruct other normal riverine transport while doing riverine transport and works</li> <li>Identify the channel to be followed clearly using navigation aids such as buoys, beacons, and lighting</li> <li>Provide proper buoyage, navigation lights and markings for bridge and dredging works to guide the other normal riverine transport</li> <li>Keep regular and close contacts with Assam Inland Water Transport Authority (AIWTDS) regarding their needs during construction of the project</li> <li>Plan the river transport and transportation of large loads in coordination with AIWTDS to avoid traffic congestions.</li> <li>Provide signage for river traffic conforming to the AIWTDS requirements</li> <li>Position the dredge and pipeline in such a way that no disruption to the channel traffic will occur</li> </ul>
FCoP 17: Construct	Accidents	<ul> <li>The Contractor shall</li> <li>Prepare an emergency plan for dealing with accidents causing accidental sinking of the vessels and ships</li> <li>Ensure sufficient equipment and staffs available to execute the emergency plans</li> <li>Provide appropriate lighting to barges and construction vessels</li> </ul>
of construction camps	workers are the important locations that have significant impacts such as health and safety hazards on	<ul> <li>Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view.</li> <li>Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities.</li> <li>Submit to the Construction Contractor for approval a detailed layout plan for the development of the constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps in power supply and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters.</li> </ul>

Project Activity/	Environmental Impacts	Mitigation Measures/Management Guidelines
Impact Source		Miligation measures management outdennes
Impact Source Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	<ul> <li>Contractor shall provide the following facilities in the campsites</li> <li>Adequate housing for all workers</li> <li>Safe and reliable water supply. Water supply from deep tube wells of 300 m depth that meets the national standards</li> <li>Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons</li> <li>Treatment facilities for sewerage of toilet and domestic wastes</li> <li>Storm water drainage facilities Both sides of roads are to be provided with shallow v drains to drain off storm water to a silt retention pond which shall be sized to provide a minimum of 20 minutes retention of storm water flow from the whole site. Channel all discharge from the silt retention pond to natural drainage via a grassed swale at least 20 meters in length with suitable longitudinal gradient.</li> <li>Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil that there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to work against possible muddy surface during monsoon.</li> <li>Provide child crèches for women working construction site. The crèche shall have facilities for dormitory, kitchen, indoor and outdoor play area. Schools shall be attached to these crèches so that children are not deprived of education whose mothers are construction workers</li> <li>Provide in-house community/common entertainment outlets by the construction camps to be</li> </ul>
		discouraged/prohibited to the extent possible
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	<ul> <li>The Contractor shall</li> <li>Ensure proper collection and disposal of solid wastes within the construction camps</li> <li>Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level.</li> <li>Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipment/vehicles needed.</li> <li>Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies</li> </ul>

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul> <li>mosquitoes, dogs, cats, rats, are not attracted. One may dig a large hole to put organic wastes in it; take care to protect groundwater from contamination by leachate formed due to decomposition of wastes. Cover the bed of the pit with impervious layer of materials (clayey or thin concrete) to protect groundwater from contamination.</li> <li>Locate the garbage pit/waste disposal site min 500 m away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children to enter and play with.</li> <li>Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites</li> </ul>
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	<ul> <li>The Contractor shall</li> <li>Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass.</li> <li>Made available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking.</li> <li>Conduct awareness campaigns to educate workers on preserving the protecting the biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection</li> </ul>
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS	<ul> <li>The Contractor shall</li> <li>Provide adequate health care facilities within construction sites.</li> <li>Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse.</li> <li>Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals.</li> <li>Initial health screening of the laborers coming from outside areas</li> <li>Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis</li> <li>Complement educational interventions with easy access to condoms at campsites as well as voluntary counseling and testing</li> <li>Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form.</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
•		<ul> <li>Regular mosquito repellant sprays during monsoon.</li> <li>Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices</li> </ul>
Safety	In adequate safety facilities to the construction camps may create security problems and fire hazards	<ul> <li>The Contractor shall</li> <li>Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry in to the camp area.</li> <li>Maintain register to keep a track on a head count of persons present in the camp at any given time.</li> <li>Encourage use of flameproof material for the construction of labor housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones.</li> <li>Provide appropriate type of firefighting equipment suitable for the construction camps</li> <li>Display emergency contact numbers clearly and prominently at strategic places in camps.</li> <li>Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors</li> </ul>
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	<ul> <li>The Contractor shall</li> <li>Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work.</li> <li>Dismantle camps in phases and as the work gets decreased and not wait for the entire work to be completed</li> <li>Give prior notice to the laborers before demolishing their camps/units</li> <li>Maintain the noise levels within the national standards during demolition activities</li> <li>Different contractors shall be hired to demolish different structures to promote recycling or reuse of demolished material.</li> <li>Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site.</li> <li>Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so.</li> <li>Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.</li> <li>Not make false promises to the laborers for future employment in O&amp;M of the project.</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
ECoP 18: Cultural a	nd Religious Issues	
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances	<ul> <li>The Contractor shall</li> <li>Communicate to the public through community consultation and newspaper announcements regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction.</li> <li>Do not block access to cultural and religious sites, wherever possible</li> <li>Restrict all construction activities within the foot prints of the construction sites.</li> <li>Stop construction works that produce noise (particularly during prayer time) shall there be any mosque/religious/educational institutions close to the construction sites and users make objections.</li> <li>Take special care and use appropriate equipment when working next to a cultural/religious institution.</li> <li>Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until approval to continue is given by the Construction Contractor /PMU. Provide separate prayer facilities to the construction workers</li> <li>Show appropriate behavior with all construction workers especially women and elderly people</li> <li>Allow the workers to participate in praying during construction time</li> <li>Resolve cultural issues in consultation with local leaders and supervision consultants</li> <li>Establish a mechanism that allows local people to raise grievances arising from the construction process.</li> <li>Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters</li> </ul>
ECoP 19: Worker H	ealth and Safety	
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the	<ul> <li>The Contractor shall</li> <li>implement suitable safety standards for all workers and site visitors which shall not be less than those laid down on the international standards (e.g. National / International Labor for 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with the national standards of</li> </ul>

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
Impact Source	construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc) and (iii) road accidents from construction traffic.	<ul> <li>the Government of Assam and Government of India</li> <li>Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas,</li> <li>Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones.</li> <li>Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job</li> <li>Appoint an environment, health and safety manager to look after the health and safety of the workers</li> <li>Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security Matters</li> </ul>
	Child and pregnant labor	<ul> <li>The Contractor shall</li> <li>not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Bangladesh Labor Code, 2006</li> </ul>
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	<ul> <li>Provide health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations shall be easily accessible throughout the place of work Document and report occupational accidents, diseases, and incidents.</li> <li>Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice.</li> <li>Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures.</li> <li>Provide awareness to the construction drivers to strictly follow the driving rules</li> <li>Provide adequate lighting in the construction area and along the roads</li> </ul>

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
Impact Source	-	
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health	<ul> <li>The Contractor shall provide the following facilities in the campsites to improve health and hygienicconditions as mentioned in ECoP 17 Construction Camp Management</li> <li>Arrangement for trainings</li> <li>Adequate ventilation facilities</li> <li>Safe and reliable water supply. Water supply from deep tube wells that meets the national standards</li> <li>Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage.</li> <li>Treatment facilities for sewerage of toilet and domestic wastes</li> <li>Storm water drainage facilities</li> <li>Safe storage facilities for petroleum and other chemicals in accordance with ECoP 2</li> <li>Solid waste collection and disposal system in accordance with ECoP1.</li> <li>Paved internal roads.</li> <li>Security fence at least 2 m height.</li> <li>Sick bay and first aid facilities</li> </ul>
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	The contractor shall provide portable toilets at the construction sites, if about 25 people are working the whole day for a month. Location of portable facilities shall be at least 6 m away from storm drain system and surface waters. These portable toilets shall be cleaned once a day and all the sewerage shall be pumped from the collection tank once a day and shall be brought to the common septic tank for further treatment. Contractor shall provide bottled drinking water facilities to the construction workers at all the construction sites.
Other ECoPs	Potential risks on health and hygiene of construction workers and general public	<ul> <li>The Contractor shall follow the following ECoPs to reduce health risks to the construction workers and nearby community</li> <li>ECoP 2: Fuels and Hazardous Goods Management</li> <li>ECoP 4: Drainage Management</li> <li>ECoP 10: Air Quality Management</li> <li>ECoP 11: Noise and Vibration Management</li> <li>ECoP15: Road Transport and Road Traffic Management</li> <li>ECoP 16: River Transport management</li> </ul>
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	<ul> <li>The Contractor shall</li> <li>Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS.</li> <li>Train all construction workers in general health and safety matters, and on the specific hazards of their work Training shall consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate.</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul> <li>Commence the malaria, HIV / AIDS and STI education campaign before the start of the construction phase and complement it with by a strong condom marketing, increased access to condoms in the area as well as to voluntary counseling and testing.</li> <li>Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This shall be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.</li> </ul>
ECoP 20: Dredging	Management	
Locations of dredging	Impact on habitats of sensitive species such dolphin and migratory birds, and fish habitats	<ul> <li>The Contractor shall</li> <li>Avoid sensitive areas (dolphin and bird habitats, fish spawning areas and char lands) identified in the EIA. No dredging will be carried out within one kilometer from these sensitive areas.</li> <li>Obtain approval from Construction Contractor (construction supervision consultant) before starting dredging from any location</li> </ul>
Preconstruction studies	Quality of river bed sediments are to be established to identify potential impacts associated with dredging and placement. Proposed dredging locations are to be studied for their ecological sensitivity	<ul> <li>AlWTDS and Construction Contractor</li> <li>Will evaluate the river bed materials for their physical, chemical, biological, and engineering properties prior to initiation of dredging activities. Sediment quality studies for nutrients and pollutants are particularly important to monitor the impacts of dredging</li> <li>Carry out survey of the area prior to dredging</li> <li>Identify any sensitive receptors/habitats (e.g., dolphin area / turtle nesting area, birds colony) at or near the proposed dredging locations.</li> <li>Determine 'no-go' areas for dredging, based upon the above survey,</li> <li>Monitor the activity to ensure that the contractor complies with requirements</li> <li>Survey the area after dredging to identify any leftover impacts</li> </ul>
Dredging - Excavation	Increased turbidity, loss of transparency and increased suspended sediment concentrations. Impact on benthic habitats.	<ul> <li>The Contractor shall</li> <li>Select dredging equipment (e.g. Cutter Suction Dredger) which are known to have a low risk of sediment dispersal. The suction action inside the Cutter Suction Dredger means that most of the sediment removed by the cutter is captured. As high dredging efficiency and low turbidity at the cutter head are closely linked, it is uncommon for turbidity generated by the cutter head to cause environmental concern.</li> </ul>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Dredging: Lifting	The release of suspended sediments during lifting can cause mortality to fish. The re-suspension of	<ul> <li>Monitor the dredging operation and, if necessary, change the dredge location to minimize fines or modify operations, e.g. restrict the amount of material being dredged (or the number of dredgers allowed to operate) at any one time.</li> <li>Maintain record of all sand or sediment extraction (quantities, location shown on map, timing, any</li> <li>The Contractor shall</li> <li>Select dredging equipment (e.g. Cutter Suction Dredger) which are known to have a low risk of sediment releases from lifting.</li> </ul>
	sediments can also release toxic chemicals or nutrients such as phosphates and nitrates, which may increase the eutrophic status of the system. Release of anaerobic sediment and organic matter in high concentrations may in some cases deplete the dissolved oxygen	<ul> <li>Reduce the suspended material released into the water column by adjusting the ratio of cutter revolutions to pump velocity to ensure that the cutter advancement rate is not greater than the ability of the suction pump to remove the material</li> <li>Monitor the lifting operations and if required use techniques (e.g. silt curtains) to minimize adverse impacts on aquatic life from the re suspension of sediments</li> </ul>
Dredging: Transportation	Leakages and spillage from the hydraulic pipeline	<ul> <li>The Contractor shall</li> <li>Regularly inspect and maintain equipment in order to prevent leaks.</li> <li>Develop and implement a spill prevention plan to prevent and contain accidental spills</li> </ul>
Dredging: Placement	Dispersion of sediments and release of high sediment laden runoff from the placement sites.	<ul> <li>The Contractor</li> <li>Shall directly place the sediments for filling the proposed disposal areas. Prior to filling commencing, the areas being filled will be subdivided into compartments by construction of temporary containment bunds of suitable material (e.g. dredged sand). Filling will be achieved by progressively pumping a slurry of sand and water into the bunded areas, allowing the surplus water to drain away to artificial and natural waterways in a controlled manner through the pipeline, without affecting floodplains.</li> <li>Control the discharge of site runoff, including excess dredge water, by the installation and correct use of containment walls, bunds and weirs.</li> <li>Monitor the quality of water (e.g. sediment content) in site runoff to confirm that the design and operation of the bunds and weirs, and the retention time for dredge waters which facilitates the settlement out of fine sediments prior to discharge off site, is adequate. If required, additional siltation ponds are to be provided to divert the runoff water before discharging in to the river.</li> </ul>
River Traffic	The presence of barges and associated vessels	<ul> <li>The Contractor shall</li> <li>Provide proper navigational lighting for the barges</li> </ul>

Project Activity/	Environmental Impacts	Mitigation Measures/ Management Guidelines
	and discharge pipelines will pose a risk to local river traffic. There is also risk of collision of construction boats with dolphins.	<ul> <li>and associated vessels</li> <li>Provide appropriate lighting to all floating pipelines and buoys</li> <li>Check all navigational lights routinely to ensure that they are working properly.</li> <li>Limit the motor boat speed to 15 km/h in accordance with best international practices and to avoid any collision with dolphins. Pingers will be used to chase away dolphins form the construction areas thus minimizing the chances of any collision</li> </ul>
Noise from dredging activities	Noise and vibration under water: Disruption to fish migration and disturbance to dolphins Noise and vibration above water: Nuisance to local community, disturbance to birds	<ul> <li>The Contractor shall</li> <li>Reduce the dredger noise at source by isolation of exhaust systems, by keeping engine room doors shut and by additional measures such as shielding.</li> <li>Limit the noisy dredging to daylight hours, where possible, rather than at sunrise or sunset (significant for wildlife) or during night time hours. Where unavoidable, the contractor should ramp up the levels of engines or other noise producing sources, so that the noise slowly increases. This will encourage riverine and terrestrial fauna to move away from the source area prior to significant noise emissions</li> <li>Inspect and maintain equipment in good working condition</li> </ul>
Exhaust emissions	Air pollution and release of greenhouse gases from construction equipment	<ul> <li>The Contractor shall</li> <li>Inspect and maintain equipment in good working condition. Proper maintenance of engines ensures full combustion with low soot emissions.</li> <li>Select and operate equipment and manage operations to reduce engine emissions.</li> <li>Use low-Sulphur heavy fuels to reduce noxious emissions.</li> <li>Provide Exhaust filtering.</li> </ul>
Oil spills	Oil spills	<ul> <li>The Contractor shall</li> <li>Refuel of barges and boats with a proper care to avoid any spills.</li> <li>Make available spill kits and other absorbent material at refueling points on the barges</li> </ul>
Bilge water	Waste water disposal from the barges and associated vessels	<ul> <li>The Contractor shall</li> <li>Properly collect, treat and dispose the bilge water from of barges, and boats.</li> <li>Empty barge or hopper from rest load by washing or mechanical cleaning before moving between different dredging areas to prevent distribution of contaminated material through residual loads</li> </ul>