



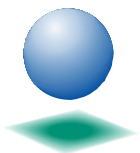
USAID
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Sri Lanka Tsunami Reconstruction Program (SLTRP)
USAID Contract # 386-C-00-05-00166-00

**Environmental Assessment:
Water Supply Facilities for Pottuvil,
Arugam Bay and Panama**

June 2007

SLTRPR-00056



CH2MHILL

*In association with Chemonics, DEVTECH, FNI, Engineering Consultants Ltd., EML Consultants,
Lanka Hydraulic Institute, MICD and Uni-Consultancy Service*

ANNEX 3: ENVIRONMENTAL CHECKLIST

Environmental Checklist for Assessing Suitability of Sites for Construction of Water Treatment Plants and Associated Environmental Impacts.

Date :

Time :

Name of person/s filling the questionnaire:

No	Item	Details		
LOCATION DETAILS				
1	Name of the Site			
2	District			
3	Divisional Secretary Division (s)			
4	Local Authority			
5	Grama Niladari Division (s)			
6	GPS reference points of the project site			
SITE CHARACTERISTICS				
7	Extent of the land demarcated for the proposed development			
8	Distance from the coast line (m)			
9	Present Land Ownership	State	Private	Other (specify)
10	Present land-use of the site (physical structures, human activity, ecological features)			
11	Infrastructure facilities available at the site (roads, water, electricity and other)			
12	Does the site /project require any:	Yes	No	If yes, give the extent (in ha) or number of trees
	Reclamation of land, wetlands			
	Clearing of forest			
	Felling of trees			
PROJECT ACTIVITIES				
13	Brief description of the activities proposed to be carried out at the site.	Site (Demolition of existing structures, ground preparation etc)	Preparation	Activities

		Construction of new buildings, access roads and other services				
DESCRIPTION OF THE ENVIRONMENT						
PHYSICAL						
14	Topography & Landforms (map)	Attach an extract from relevant 1: 50,000 topographic sheet/ if detailed maps are available provide them				
15	Relief (difference in elevation from highest point to lowest point)	Low <20m	Medium 20-40m	High 40-60	> 60m	
16	Slope	Low <30%	Medium 30-40 %	High 40-60 %	Very High > 60%	
17	Position of activities on Slope	Bottom	Mid-slope	Upper-slope		
18	Soil (Great Soil Group) – Please see the list below					
19	Soil Depth	Shallow < 20cm	Moderate 20 – 100 cm	Deep >100cm		
20	Is there evidence of soil erosion on the site?					
	If yes, erosion on site is	Low	Medium	High		
21	Annual dry period					
22	Source of fresh Surface Water available in the project area	Spring/ Canal	Tank/Reservoir	Perennial Stream	Seasonal Stream	None
23	Present Surface Water Use	Domestic	Washing/Bathing	Irrigation	Animal use	
24	Surface Water Quality	Poor (6-11 yes answers)	Moderate (3-5 yes answers)		Good (0-2 yes answers)	
	Identification of surface water quality problems			Yes	No	
i	Are there latrines within 15 m of the source/s identified in section (21)?					
ii	Are there latrines on higher grounds than the water source?					
iii	Are there other sources of pollution to be identified within 15 m of the water source?					
iv	Are there human settlements upstream or surrounding the water source/s?					
v	Are there agricultural activities in the catchment area upstream of the intake?					
vi	Are agro-chemicals used in agricultural land within the catchment area?					
vii	Do people practice open defecation in or near the water source?					
viii	Are animals bathed in the water-source upstream of the intake?					
xi	Do people wash clothes upstream of the intake?					

x	Is there evidence of soil erosion on the embankments upstream of the intake?			
25	Ground Water Availability on-site	Dug Well	Tube Well	Other (specify)
26	Present Ground Water Use	Domestic	Washing/Bathing	Irrigation Animal use
27	Ground Water Quality	Poor	Moderate	Good
	Identification of ground water quality problems		Yes	No
i	Are there latrines within 15 m of the source/s identified in section (25)?			
ii	Are there latrines on higher grounds than the well?			
iii	Are there other sources of pollution to be identified within 15 m of the well? (any industrial activity that has been harbored previously on this site)			
iv	Are there intensive agricultural activities in the area?			
v	Are agro-chemicals used in agricultural land within the catchment area?			
vi	Is the groundwater brackish and hard in wells on-site, if any, or wells nearby?			
vii	Is there evidence of salinity intrusion in the groundwater of the area			
28	Incidence of Natural Disasters	Floods	Prolonged droughts	Cyclones/tidal waves Other
29	Geological Hazards	Landslides -	Rock falls	Subsidence Other –
ECOLOGICAL (Impact Zone to be taken as 500m from the middle of the project site)				
30	Habitat Types in the Project Site (indicate the % of each habitat type)	Natural forest (%), degraded forest(%), natural scrubland(%), degraded scrubland(%), riverine forest, grassland(%), abandoned agricultural land(%), marsh(%), lagoon(%), estuary(%), coastal scrub(%), mangrove(%), salt marsh(%), home-gardens(%), Other (%) (List)		
31	Habitat types within 250m radius from the site periphery (indicate the % of each habitat type)	Natural forest (%), degraded forest(%), natural scrubland(%), degraded scrubland(%), riverine forest, grassland(%), abandoned agricultural land(%), marsh(%), lagoon(%), estuary(%), coastal scrub(%), mangrove(%), salt marsh(%), home-gardens(%), Other (%) (List)		
32	Habitat types within 500m radius from the site periphery (indicate the % of each habitat type)	Natural forest (%), degraded forest(%), natural scrubland(%), degraded scrubland(%), riverine forest, grassland(%), abandoned agricultural land(%), marsh(%), lagoon(%), estuary(%), coastal scrub(%), mangrove(%), salt marsh(%), home-gardens(%), Other (%) (List)		
33	Are there any environmentally and culturally sensitive areas within 250m of the site?	Protected Areas	Migratory pathways of animals	Archeological sites Wetlands Mangroves strands
34	Are there any plants of conservation importance within 250m (endemic and threatened species)? If yes, provide a list			
35	Are there any animals of conservation importance			

	within 250m (endemic and threatened species)? If yes, provide a list			
ENVIRONMENTAL SENSITIVITY				
36. Does the project wholly or partly fall within any of the following areas?				
	Area	Yes	No	Unaware
a	100m from the boundaries of or within any area declared under the National Heritage Wilderness Act No 4 of 1988			
b	100m from the boundaries of or within any area declared under the Forest Ordinance (Chapter 451)			
c	Coastal zone as defined in the Coast Conservation Act No 57 of 1981			
d	Any erodible area declared under the Soil Conservation Act (Chapter 450)			
e	Any Flood Area declared under the Flood Protection Ordinance (Chapter 449)			
f	Any flood protection area declared under the Sri Lanka Land Reclamation and Development Corporation Act 15 of 1968 as amended by Act No 52 of 1982			
g	60 meters from the bank of a public stream as defined in the Crown Lands Ordinance (Chapter 454) and having width of more than 25 meters at any point of its course			
h	Any reservations beyond the full supply level of a reservoir.			
i	Any archaeological reserve, ancient or protected monument as defined or declared under the Antiquities Ordinance (Chapter 188).			
j	Any area declared under the Botanic Gardens Ordinance (Chapter 446).			
k	Within 100 meters from the boundaries of, or within, any area declared as a Sanctuary under the Fauna and Flora Protection Ordinance (Chapter 469)			
l	100 meters from the high flood level contour of or within, a public lake as defined in the Crown Lands Ordinance (Chapter 454) including those declared under section 71 of the said Ordinance			
m	Within a distance of one mile of the boundary of a <u>National Reserve</u> declared under the Fauna and Flora Protection Ordinance			
CONSTRUCTION MATERIAL AVAILABILITY				
37	What are the sources available locally from where construction material can be sources legally?	Type	Name of location	Distance from site
		Sand		
		Rubble		
		Timber		
		Tiles		
38	If site preparation involves demolition/renovation of existing buildings, what material can be salvaged for re-use in the proposed new structures?			

ENVIRONMENTAL IMPACT AND MITIGATION / ENHANCEMENT DURING CONSTRUCTION PERIOD							
IMPACT						MITIGATION/ ENHANCEMENT	
		H	M	L	N/A		
39	Soil erosion (from excavations, cut & fill operations etc)						
40	Water pollution (from siltation, discharge of waste matter etc)						
41	Noise pollution						
42	Solid waste generation						
43	Sewage generation					Cesspool	Sewage Pond
						Septic Tank	Other
44	Loss of vegetation cover						
45	Salinity increase due abstraction of water						
45	Habitat loss or fragmentation						
46	General disturbance to animal behavior						
47	Interference with normal movement of animals						
48	Irreversible/irreparable environmental change						
ENVIRONMENTAL IMPACT AND MITIGATION / ENHANCEMENT DURING OPERATION PERIOD							
49	Sewerage Disposal	Cesspool		Sewage Pond			
		Septic Tank		Other			
50	Solid Waste Disposal						
51	Drinking Water Supply	Common Dug Well	Yes / No	Individual dug well		Yes / No	
		Common Tube Well	Yes / No	Town supply – pipe		Yes / No	
		Spring	Yes / No	Town supply – Stand post		Yes / No	
52	Alteration to storm water drainage pattern	No changes		No major Changes		Major changes	
SUMMARY OF ENVIRONMENTAL IMPACTS ARISING OUT OF THE PROJECT & RECOMMENDATIONS							
53	Identification of environmental impacts due to this Project						
54	Overall observation and recommendations: (a) Does this site						

<p>require further detailed field assessments to understand and analyze environmental issues?</p> <p>(b.) If the answer is “Yes” briefly describe the issues and type of investigations that need to be undertaken.</p> <p>(c) Will this site be abandoned after this analysis; please state the reasons.</p> <p>(d) Does the proposed site meet the urban planning requirements under the UDA and Local Authority regulations? If the answer is “No”, what needs to be done to meet these requirements; if the answer is “Yes”, has the project site obtained the necessary approvals?</p> <p>(e) In addition to the above issues, please indicate any additional observations, recommendations if any</p>	
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ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN					
Impact	Mitigatory Measure	Monitoring Indicator	Responsible Agency	Frequency of Monitoring	Reporting Procedure

**Great Soil Groups of Sri Lanka: Dry Zone

ANNEX 7 ENVIRONMENTAL MANAGEMENT PLAN

Construction Stage

Environmental Issues		Protection And Preventative Measures That Have To Be Taken By The Contractor	
1.	Earthwork and Soil Conservation		
	1.1	Disposal of Debris and Spoil [for pipe trench excavation & other construction at tube well & treatment plant site]	
		(a)	Excavated spoil shall be disposed of only at a location specified by the approving authority under recommended guidelines.
		(b)	All other debris and residual spoil material, including any remaining earth shall be disposed only at locations approved by the engineer for such a purpose. If directed by the Engineer the contractor shall obtain the necessary approval from the relevant local authority for disposal of debris and spoil at the specified location.
		(c)	The debris and spoil shall be disposed in such a manner that (i) drainage paths are not blocked (ii) the disposed material should not be washed away by runoff/floods and (iii) should not be a nuisance to the public.
		(d)	If the Engineer consents, the contractor can dispose the debris and spoil as a filling material provided that the contractor can ensure that such material is used for legally-acceptable purposes with disposal conducted in an environmentally acceptable manner.
		(e)	Priority shall be given to re-use, recycle opportunities available for waste construction materiel and debris
		(f)	In removal temporary storage transport and disposal of construction materiel and waste, proper consideration shall be given to health aspects, particularly with regard to waste such as asbestos. In all such case proper safety precaution shall be taken in disposal of such materiel.
	1.2	Protection of Ground Cover and Vegetation [for pipe trench excavation & other construction at tube well & treatment plant site]	
		(a)	Construction vehicles, machinery and equipment shall be used and stationed only in the areas of work and in any other designated areas by the Engineer.
		(b)	Contractor shall provide necessary instructions to drivers and operators not to destroy ground vegetation cover unnecessarily.
		(c)	Instead of machinery manual work should be carried out at designated places as directed by the engineer.
	1.3	Prevention of Soil Erosion[for pipe trench excavation & other construction at tube well & treatment plant site]	
		(a)	Work that leads to heavy erosion shall be avoided during the raining season. If such activities need to be continued during the rainy season, prior approval must be obtained from the Engineer by submitting a proposal on actions that will be undertaken by the contractor to prevent erosion.
		(b)	The work, permanent or temporary, shall consist of measures as per design or as directed by the Engineer to control soil erosion, sedimentation and water pollution to the satisfaction of the Engineer. Typical measures include the use of berms, dikes, sediment basins, fiber mats, mulches, grasses, slope drains and other devices. All sedimentation and pollution control works and maintenance thereof are deemed as incidental to the earthwork or other items of work and no separate payment will be made for their implementation.

	1.4	Contamination of Soil by Fuel and Lubricants [Generally within the project area]	
		(a)	Servicing of vehicle/machinery and equipment shall be carried out only in designated locations/service stations approved by the Engineer.
		(b)	Waste oil, other petroleum products and untreated wastewater shall not be discharged on ground so that it causes soil pollution. Adequate measures shall be taken against pollution of soil by spillage of petroleum/oil products from storage tanks and containers. All waste petroleum products shall be disposed of in accordance with the guidelines issued by the CEA or the engineer.
		(c)	Sites used for vehicle and plant service and maintenance shall be restored back to their initial status. Site restoration will be considered as incidental to work.
2.	Water – Protection of Water Sources and Quality		
	2.1	Contamination from Fuel and Lubricants	
		(a)	All vehicle and plant maintenance and servicing stations shall be located and operated as per the conditions and/or guidelines issued by the Engineer/Central Environmental Authority.
		(b)	No discharges of oil etc. should be allowed to contaminate water of Heda Oya
	2.2	Locating, Sanitation and Waste Disposal in Construction Camps	
		(a)	Setting up of labor camps shall have the Engineer’s approval and shall comply with any guidelines/recommendations issued by the CEA/LA. Construction laborers’ camps shall not be located within 60m of waterways, near to a site or premises of religious, cultural or archaeological importance, school or any other sensitive area.
		(b)	Labor camps shall be provided with adequate and appropriate facilities for disposal of sewerage and solid waste. The sewage systems shall be properly designed, built and operated so that no pollution to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided in the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.

			(c)	Contractor shall ensure that all camps are kept clean and hygienic. Necessary measures shall be taken to prevent breeding of vectors.
			(d)	Contractor shall report any outbreak of infectious disease of importance in a labor camp to the Engineer and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately. Contractor shall carry out all instructions issued by the authorities, if any.
			(e)	Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharge to ground or waterways in a manner that will cause unacceptable surface or ground water pollution.
			(f)	All relevant provisions of the Factories Act and any other relevant regulations aimed at safety and health of workers shall be adhered to.
			(g)	Contractor shall remove the labor camps fully after construction is complete, empty septic tanks, if instructed by the engineer shall be closed; remove all garbage, debris and clean and restore the area back to its former condition.
	2.3	Waste of Water and Waste Minimization		
			(a)	Contractor will minimize waste of water in the construction process/operations.
			(b)	Contractor shall educate and made employees aware of water conservation, waste minimization and safe disposal of waste.
	2.5	Extraction of Water		
			(a)	Contractor is responsible for arranging adequate supply of water for the project purpose throughout the construction period. Contractor shall not obtain water for his purposes including for labor camps from public or community water supplies without approval from the relevant authority.
			(b)	Contractor shall not extract water from groundwater or from surface water bodies without permission from the Engineer. If directed by the Engineer the contractor must obtain approval from the relevant agency for extraction of water prior to the commencement of the project.
			(c)	Contractor may use the natural sources of water subject to the provision that any claim arising out of conflicts with other users of the said natural sources of water shall be made good entirely by the contractor.

3.	Prevention of Water Logging		
	3.1	Blockage of drainage paths and drains	
		(a)	Contractor's activities shall not lead to water logging as a result of blocked drainage paths and drains. The contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times.
		(b)	If water logging or stagnation of water is caused by contractor's activities, contractors shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. Contractor shall compensate for any loss of income or damage as a result.
4.	Air Pollution		
	4.1	Generation of Dust	
		(a)	Contractor shall effectively manage the dust generating activities such as earthwork during periods of high winds.
		(b)	All stockpiles of material generating dust shall be located sufficiently away from sensitive receptors.
		(c)	All vehicles delivering materials shall be covered to avoid spillage and dust emission.
		(d)	Contractor shall avoid (where possible) and take suitable action to prevent dirt and mud being carried to the roads (particularly following wet weather).
		(e)	Contractor shall enforce vehicle speed limits to minimize dust generation.
		(f)	Contractor shall spray water for dust suppression on all exposed areas as required (note: the use of waste water / waste oil for dust suppression is prohibited).
		(g)	All cleared areas shall be rehabilitated progressively.
		(h)	All earthworks shall be protected to minimize generation of dust.
		(i)	All existing highways and roads used by vehicles of the contractor, or any of his sub-contractor or supplies of materials or plant and similarly roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles.
		(j)	Clearance shall be effected immediately by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed satisfactorily. Additionally, if so directed by the Engineer, the paved areas/road surfaces shall be hosed or watered using appropriate equipments.
		(k)	Plants, machinery and equipment shall be so handled (including dismantling) to minimize generation of dust.
		(l)	Contractor shall take precautions to reduce the level of dust emission from the batching plants up to the satisfaction of the Engineer in accordance with the relevant emission norms.

	4.2	Odor and Offensive Smells	
		(a)	Contractor shall take all precautions to prevent odor and offensive smell emanating from chemicals and processes applied in construction works or from labor camps. In a situation when/where odor or offensive smell does occur contractor shall take immediate action to rectify the situation. Contractor is responsible for any compensation involved with any health issue arisen out of bad odor and offensive smells.
		(b)	The waste disposal and sewerage treatment system for the labor camps shall be properly designed, built and operated so that no odor is generated. Compliance with the regulations on health and safety as well as CEA guidelines if any shall be strictly adhered to.
	4.3	Emission from Construction Vehicles, Equipment and Machinery	
		(a)	The emission standards promulgated under the National Environment Act shall be strictly adhered to.
		(b)	All vehicles, equipment and machinery used for construction shall be regularly serviced and well maintained to ensure that emission levels comply with the relevant standards.
5.	Noise Pollution and Vibration		
	5.1	Noise from Vehicles, Plants and Equipment.	
		(a)	All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer's instructions.
		(b)	All vehicles and equipment used in construction shall be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliant plant(s) shall be removed from site.
		(c)	Noise limits for construction equipment used in this project (measured at one meter from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed the stipulated noise levels of EA
		(d)	Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the Engineer, to keep noise from these at a minimum.
		(e)	Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall be provided with protective gear.

	5.2	Vibration		
		(a)	Contractor shall take appropriate action to ensure that construction work does not result in damage to adjacent properties due to vibration.	
		(b)	Prior to commencement of any activity that generates vibration (such as blasting), the Contractor shall undertake a condition survey of existing structures within the zone of influence, as agreed with the Engineer.	
		(c)	Contractor shall carry out monitoring at the nearest vibration sensitive receptor during blasting or when other equipments causing vibration are used.	
		(d)	Contractor shall modify the method of construction until compliance with the criteria occurs, in the instance that vibration levels exceed the relevant vibration criteria.	
		(f)	Contractor shall pay due consideration to vibration impacts of blasting on adjoining structures. Explosive loads shall be determined so that excessive vibration can be avoided and blasts shall be controlled blasting in nature. Notwithstanding to these provisions contractor is liable for any damage caused by blasting work.	
6.	Impact on Flora			
	6.1	Loss or Damage to Trees and Vegetation [Heda Oya tube well site , Pottuvil/Ulla & Panama treatment plant site]		
		(a)	All works shall be carried out in a manner that the destruction to the flora and their habitats is minimized. Trees and vegetation shall be felled / removed only if they impinge directly on the permanent works or necessary temporary works. In all such cases contractor shall take prior approval from the Engineer.	
		(b)	Contractor shall make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance. If such action is unavoidable the Engineer shall be informed in advance and carry out public consultation and report on the same should be submitted to the Engineer.	
		(c)	Contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority, if any, with regard to felling of trees and removal of vegetation.	
		(d)	Suggested mitigatory measures in the EA should be adopted.	
7.	Impact on Fauna			
	7.1	Loss, Damage or Disruption to Fauna		
		(a)	All works shall be carried out in such a manner that the destruction or disruption to the fauna and their habitats is minimized.	
		(b)	Construction workers shall be instructed to protect fauna aquatic life as well as their habitats. Hunting, poaching and unauthorized fishing by project workers is not allowed.	
		(c)	Suggested mitigatory measures in the EA should be adopted.	
		(d)	Contractor should liaise with the officials of Department of Wildlife at all stages of construction.	

8.	Disruption to Users		
	8.1	Loss of Access	
		(a)	At all possible times, work in the sites shall be planned and carried out in a way that will minimize obstruction to other uses of the site and the surrounding area. The contractor should identify such uses and consult the people on such matters and notify them of anticipated times of construction activities.
		(b)	At all times, Contractor shall provide safe and convenient passage for vehicles and pedestrians livestock to and from side roads and property accesses connecting the access road. Work that affects the use of access roads and existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the Engineer.
		(b)	The works shall not interfere unnecessarily or improperly with the convenience of public by use and occupation of public or private roads, railways and any other access footpaths to or of properties whether public or private.
		(c)	On completion of the works, all temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access be cleared to the satisfaction of the Engineer.
	8.2	Traffic Jams and Congestion [Conveyor & Distribution Pipes]	
		(a)	Contractor shall assess the impact of his activities on traffic in access roads and plan for minimizing traffic-related inconvenience to public shall be submitted to the Engineer for approval. If directed by the Engineer the contractor shall obtain the consent for the traffic arrangement from the Local Police.
		(b)	Any temporary diversion of traffic to facilitate construction work shall have the approval of the Engineer. If directed by the Engineer the contractor shall obtain the consent for the traffic arrangement from the Local Police.
		(d)	Contractor shall ensure that the running surface is always properly maintained, particularly during the monsoon so that no disruption to the traffic flow occurs.
		(e)	The temporary traffic detours shall be kept free of dust by frequent application of water, if necessary.
		(f)	Personnel used for traffic control by the contractor shall be properly trained, provided with proper gear including communication equipment and luminous jackets for night use. All signs, barricades, pavement markings used for traffic management should be to the standards and approved by the Engineer/ Police.
	8.3	Traffic Control and Safety	
		(a)	Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic using the access roads.

9.	Accidents and Risks		
	9.1	Public and Worker Safety	
		(a)	All reasonable precautions will be taken to prevent danger of the workers and the public from accidents such as fire, explosions, blasts, falling rocks, falling to excavated pits, breaking flood diversions, chemical sprays, unsafe power supply lines etc.
		(b)	Contractor shall comply with requirements for the safety of the workmen as per the International Labor Organization (ILO) convention No. 62 and Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. The contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, boots, etc., to the workers and staff.
		(c)	Contractor should obtain all necessary insurance covers.
	9.2	Prevention of Risks of Electrocution	
		(a)	All electrical wiring and supply-related work should conform to relevant Sri Lankan Standards. Adequate precautions will be taken to prevent danger of electrocution from electrical equipment and power supply lines including distribution boards, transformers, etc. Measures such as danger signboards, danger/red lights, fencing and lights will be provided to protect the public and workers. All electric power driven machines to be used in the construction shall be free from defect, be properly maintained and kept in good working order, be regularly inspected to the satisfaction of the Engineer.
	9.3	Risk at Hazardous Activity	
		(a)	All workers employed in hazardous activities shall be provided with necessary protective gear. These activities include mixing asphalt material, cement, lime mortars, concrete etc., welding work, work at crushing plants, blasting work, operators of machinery and equipment such as power saws, etc.
		(b)	The use of any toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be notified of toxic chemicals that are planned to be used in all contract-related activities. A register of all toxic chemicals delivered to the site shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.

10.	Health and Safety		
	10.1	Prevention of Vector-based Diseases	
		(a)	Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labor camps, plus office and store buildings. Stagnation of water in all areas including gutters, used and empty cans, containers, tires, etc. shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied.
		(b)	Contractor shall keep all places of work, labor camps, plus office and store buildings clean devoid of garbage to prevent breeding of rats and other vectors such as flies.
	10.2	Workers Health and Safety	
		(a)	Contractor shall comply with the provisions in Health and Safety regulations under the Factory Ordinance with regard to provision of health and safety measures and amenities at work place(s).
	10.2	First Aid	
		(a)	At every workplace, a first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.
	10.3	Potable Water	
		(a)	In every workplace and labor camps potable water shall be available through out the day in sufficient quantities. Water should be easily accessible. In general cold potable water is acceptable.
	10.4	Hygiene	
		(a)	Contractor shall provide and maintain necessary (temporary) living accommodation and ancillary facilities for labor to standards and scale approved by the resident engineer.
		(b)	At every workplace and labor camp a sufficient number of bathing facilities, latrines and urinals shall be provided in accordance with the Health and Safety regulations and/or as directed by the Engineer. These bathroom and toilet facilities shall be suitably located within the workplace/buildings. Latrines shall be cleaned at least three times daily in the morning, midday and evening and kept in a strict sanitary condition. If women are employed, separate latrines and urinals, screened from those for men and marked in the vernacular shall be provided. There shall be an adequate supply of water, within and close to latrines and urinals.
		(c)	The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to.
		(d)	Garbage bins must be provided in the camp and regularly emptied and the garbage disposed off in a hygienic manner. Construction camps shall have a clean hygienic environment and adequate health care shall be provided for the work force.
		(d)	Unless otherwise arranged for by the Local Authority, the contractor shall arrange proper disposal of sludge from septic tanks. The contractor shall obtain approval for such disposal from the Public Health Inspector of the area.

11	Protection of Archaeological, Cultural and Religious Places and Properties		
	11.1	Chance Found Archaeological Property	
		(a)	All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archaeological interest etc. discovered on the site and/or during construction work shall be the property of the Government of Sri Lanka, and shall be dealt with as per provisions of the relevant legislation.
		(b)	Contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any such article or thing and shall, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same, awaiting which all work shall be stopped in the respective area.
		(c)	If directed by the Engineers the Contractor shall obtain advice and assistance from the Department of Archaeology of Sri Lanka on conservation measures to be taken with regard to the artifacts prior to recommencement of work in the area.
12	Environmental Enhancement		
	12.1	Handling Environmental Issues during Construction	
		(a)	Contractor will appoint a suitably qualified Environmental Officer following the award of the contract. The Environmental Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He/She shall be responsible for the ensuing implementation of this EMAP. This environmental officer should liaise with the Environmental Officer of the local authority
		(b)	Contractor shall appoint a person responsible for community liaison and to handle public complaints regarding environmental/social related matters. All public complaints will be entered into the Complaints Register. The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hrs of when they are received, with the action taken by the Environmental Officer on complaints thereof.
		(c)	Contractor shall develop suitable method to receive complaints. The complain register shall be placed at a convenient place, easily accessible by the public.
		(d)	The employer shall develop a monitoring plan for implementation of the EMAP. The contractor shall be responsible for reporting the implementation of the EMAP to the employer based on an agreed reporting format either monthly or periodically, as agreeable. The report should carry observations of the Engineer who will continuously monitor compliance with the EMAP. Periodic field supervision shall be undertaken by the employer (or representatives) to make observations on the implementation progress of the EMP.
13	Impact on Utilities		
	12.1	Impacts on electrical, telecommunication lines	
		(a)	The contractor should take all precautions to avoid the impacts on utilities such as electrical & telecommunication cables. Necessary utility plans should be obtained from the relevant line agencies.

14	Minimization of Social Inconvenience		
	12.1	Minimization on impacts on the society	
		(a)	The contractor should take all precautions to minimize the impact on the social groups. The contractor should interact with various affected social groups through the “ <i>Grama Niladari</i> ”, Divisional Secretary , “ <i>Pradeesheeya Saba</i> ” etc. Their ideas concerns should be well addressed in order to avoid social protests during construction

Operational Stage

Environmental Issues	Protection And Preventative Measures That Have To Be Taken By The Contractor		
1.	Water Quality		
	1.1	Impacts from substandard water quality of treated water	
		(a)	The contractor during the operation & maintenance period should regularly (as stipulated in the Monitoring Programme” check the water quality at the source (tube wells) before treatment , just after treatment before distribution & at distribution points . The water quality after the treatment and at distribution points should conform to the national standards.

2.	Atmosphere		
	2.1	Air quality degradation near treatment plant	
		(a)	The contractor during the operation & maintenance period should regularly (as stipulated in the Monitoring Programme” check the air quality near the treatment plant sites.
	2.2	Noise Level Degradation Near Treatment Plant	
		(a)	The contractor during the operation & maintenance period should (as stipulated in the Monitoring Programme) check the noise level near the treatment plant sites
	2.3	Odor causing gases	
		(a)	The contractor during the operation & maintenance period should (as stipulated in the Monitoring Programme) check odor causing gases near the treatment plant sites

3.	Sludge Recipient Entities		
	3.1	Pathogenic Organisms in sludge	
		(a)	The contractor during the operation & maintenance period should regularly (as stipulated in the Monitoring Programme” check the air quality near the treatment plant sites.
	3.2	Ordor from sludge	
		(a)	The contractor during the operation & maintenance period should (as stipulated in the Monitoring Programme) check the noise level near the treatment plant sites
	3.3	Groundwater contamination from sludge	
		(a)	Sludge should be disposed to sludge beds only. Sludge could be removed from beds only after making sure that it does not contain any harmful material.
	3.4	Heavy metals in sludge	
		(a)	The contractor during the operation & maintenance period should (as stipulated in the Monitoring Programme) check the heavy metals in sludge.

4.	Social Impacts		
4.1	Social inconvenience owing to odor & noise near treatment plant		
	(a)	The contractor should take all action to mitigate noise & odor near the treatment plant. In case of social complaints the contractor should liaise with the local authorities and address the concerns of social groups.	
4.2	Public Health hazards owing to pathogens in sludge		
	(a)	All precautions should be taken in handling sludge as stipulated in the EA.	
4.3	Impacts on water users in Heda Oya		
	(a)	The environmental flow requirements at Heda Oya should be maintained especially during dry months as stipulated in EA.	
4.4	Impacts on water users of wells near Panama treatment plant site.		
	(a)	The contractor should monitor the water level status of the wells which are located close to Panama treatment plant site. Water levels of these wells should be observed weekly especially during dry season to check whether there are any impacts.	

Contingency Stage

Environmental Issues		Protection And Preventative Measures That Have To Be Taken By The Contractor
1.	Contingency Impacts (sudden leaks, routine leaks, break downs & non function of the plant owing to strikes etc.)	
	1.1	Contingency impacts are not very common but possible. All precautions should be taken to avoid contingency impacts by adopting the mitigatory measures given in the EA & the monitoring plan. Preventive maintenance should be essentially carried out so that these types of contingency impacts are minimized.