Draft Terms of Reference for a Construction Supervision Consultant

1. Background

The Government of India has initiated a number of initiatives to reconcile the aims of protection of life and livelihood of coastal communities; conservation of ecological resources in the coastal and marine areas; and, promotion of economic activities that have necessarily to be located in the coastal regions. As one of the different initiatives, the The Ministry of Environment and Forests (MoEF) in the Government of India along with the respective State Governments is implementing a World Bank financed project called the ñIntegrated Coastal Zone Management Projectò(referred to as ñICZM Projectò), with an overall objective of assisting the Government of India in building national capacity for implementation of the new integrated management approach for Indiaôs coastal zones, and piloting the integrated coastal zone management approach in the three states of Gujarat, Orissa and West Bengal

The ICZMP Project includes four components (Component One: the National Component has the specific objectives to establish and support an appropriate national institutional structure for guiding and coordinating coastal zone management, including, as sub-components: (a) hazard line and coastal sediment cell mapping; (b) mapping of ecologically sensitive areas; (c) establishing a new national institute for sustainable coastal zone management; and (d) national level capacity building; and Components Two, Three and Four aimed at piloting the integrated coastal zone management approach in Gujarat, Orissa and West Bengal, respectively);

(A) To exclusively lead implementation of the Project, and to achieve the Project Development objectives for the West Bengal Component of the Project, the Government of West Bengal has created a special purpose vehicle, called the West Bengal State Project Management Unit (SPMU), and has appointed the Institute of Environmental Studies & Wetland Management (IESWM), Kolkata to be the SPMU;

(B) Component Four for West Bengal aimed at developing and empowering state level authorities to adopt appropriate ICZM approaches consistent with national strategies, includes sub-components: (a) preparation and adoption of an ICZM plan for the coastal stretches of West Bengal; (b) intuitional strengthening and capacity building at the State level; and,

(C) Pilot investments consistent with local ICZM priorities around three themes of (c-i) Conservation and protection of coastal resources; (c-ii) Environment and pollution management; and (c-iii) Livelihood security of coastal communities. The activity (a) above will be implemented by SPMU, and activities under (b) and (c) above in West Bengal will be implemented in partnership with some Pilot Execution Agencies ï of which the c-iii sub-component related to the planning, designing and executing the activities related investment in the Project for Construction of Cyclone Shelter Facilities in Coastal West Bengal has been entrusted to the Department of Disaster Management, Government of West Bengal

The coastal districts of West Bengal are vulnerable severe cyclonic storms. South 24 Parganas, North 24 Parganas and Purba Medinipur experience frequent tropical cyclones, having disastrous consequences on the lives of human beings as well as animal population of the region. It must be mentioned here that the vulnerability due to cyclones cannot be determined solely by its frequency of occurrence, the vulnerability depends on associated storm surge, coastal inundation or flooding and socio economy of the affected region.

The Sundarban Delta Complex which has geo-genetic link to the tectonic Bengal Basin known for its startling coastal landforms that include back-dunal mudflats, back swamps, salt marshes and tidal creeks enshrouded with mangrove vegetation, low gradient supratidal and intertidal shores with mud bank, swales and berms, rivulets, tidal flats etc. However despite the mind boggling floral and faunal diversity Sundarban is very much vulnerable to natural hazards e.g. storm surge, flood, tidal wave, cyclone etc. Moreover due to rising sea level, the existing coastline is retreating at alarming rate which is symptomatic to some impending natural catastrophes. The inhabitants of the Sundarban estuary probably have acclimatized themselves how to live on facing the natureôs wrath. Sundarban is still recuperating from the brunt of Cyclone Aila that devastated thousands of hectares of once fertile agricultural land adjoining the mangrove forests into a wasteland. The loss of human life and property is beyond any estimation in real terms. The aftermath of these kinds of cyclones and storm surges is on the livelihood of the people at large as due to the ingress of saline sea water into the lush green fertile fields used for paddy cultivation, these tracts of land rendered useless for any kind of agricultural activities.

The construction of MPCS will not only pave the way for increase the communities resilience during calamity, but also opening avenue for social coordination and enhanced the capacity to shoulder responsibility by operating the shelters in a gainful pro-social way. The MPCS has a multiï pronged approach in catering to the needs especially of the disadvantaged sections of the populace through a string of activities such as:-

- Minimization of loss of lives, property and livestock by providing it shelters during cyclone calamity
- MPCSs will act nodal points for receipt and dissemination of cyclone warnings PCSs will provide the warehousing facilities of essential stocks/ items for post disaster usage.
- The nodal points for carrying out post disaster response and relief activities will be from MPCSs. MPCSs will also provide temporary protection from the heavy downpour during the monsoon and also from the scorching heat during the summer to the shelter less people.
- Basic health services like immunization programmes can be administered through these MPCSs.
- MPCSs will act as models for safe construction in vulnerable seismic zones.

This terms of reference pertains to appointment of Construction Supervision Consultant for the state of West Bengal for the supervision of construction of 25 (twenty five) Multi Purpose Cyclone Shelters in 5 (Five) coastal blocks of South 24 Parganas district (namely Gosaba, Basanti, Namkhana, Pathar Pratima and Sagar) to be constructed by the contractor M/s Macintosh Burn Ltd. a Government of W Bengal enterprise.

1.1 Project Implementation Arrangements

Institute of Environmental Studies & Wetland Management (IESWM) has been appointed as the State Project Management Unit (SPMU). The Department of Disaster Management, Government of West Bengal is Pilot Executing Agency (PEA). The duties of the PEA as per the memorandum between the SPMU and the PEA executed on the 15th June, 2010 are as follows:

a. Preparing and finalizing the Annual Plans for the PEA to complete execution of the Activity and forwarding the Annual Action Plan to be SPMU at least three months before the start of the next financial year. Participating in any review of the Annual Action Plan organized by SPMU, and proposing or agreeing on modifications to ensure completion of execution of the Activity in a timely manner (with as little deviation as possible from the completion schedule agreed at the start of the Project) so that the overall objective of the State Component of the Project is met in a timely manner.
b. Providing all necessary funds, facilities, resources and staff necessary to complete execution of the Activity, over and above the funds, resources and staff agreed to be financed by the Project.
c. Preparing operation and maintenance management plan for the assets created under the Project, and ensuring that the funding and other resources required for proper and adequate operation and maintenance of these assets remain sustainable on completion of the Activity.
d. Nominating a Nodal Officer of the PEA for executing the Activity. The Nodal Officer shall work full-time for the Activity until its completion. The Nodal Officer shall be fully empowered to make all decisions required to execute the Activity, including (i) submitting the bill of quantities, technical specifications and drawings for the works contracts; technical specifications for the goods contracts; and terms of reference for the consultancy contracts, (ii) participating in the procurement committee that will approve the bid documents, shortlist and request for proposals for consultancy services, participating in the bid or technical proposal evaluation committee meetings, and contract negotiation meetings, as relevant, (iii) signing the contract, (iv) certifying work, approving and releasing payments, contract management, and performance evaluation of contractors and contractual staff employed for the Activity, (v) all procurement decisions including award for any contract where PEA is responsible for the entire procurement process; (vi) approving travel requisitions and all such necessary requisitions to complete execution of the

Activity in the best professional standard and as per the performance standard for the Activity agreed with the SPMU as per the Detailed Project Report.

e. In addition to the Nodal Officer, nominating all required staff for satisfactory completion of the Activity including staff required for contract management and to ensure high quality execution. PEA will procure, in a timely manner, the necessary contract staff needed for financial management or accounting, contract supervision.
f. Undertaking contract management and day to day supervision in such ways that the Activity is executed without any time overrun. Any change in cost estimate, budget and schedule of execution will be subject to prior concurrence by SPMU.
g. Implementing all actions and taking all measures to comply with the Environmental and Social Management Plan and the first tier of the Grievance Redress procedure of the Project. These actions will be reported in each quarterly progress report. In addition, each quarterly progress report will certify that the issues defined to be avoided in the Environmental and Social Management Plan, as applicable for the Activity has not occurred or surfaced during execution of the Activity.
h. Implementing the Communication Plan of the Project, as applicable for the Activity. In addition, assist SPMU to implement any related or associated public communication and corrective actions.
i. Bringing to the notice of SPMU any grievance of any individual, community or stakeholders with respect to the plan, design or execution of the Activity within 15 days of noticing or recognizing any such grievance, including the description of actions already taken or proposed to be taken to address such grievance.

The Construction Supervision Consultant will be appointed by the PEA who shall report to it on its findings.

2. OBJECTIVES OF THE CONSTRUCTION SUPERVISION CONSULTANT

The objectives of consulting service are to assist the Disaster Management Department, Government of West Bengal to Implement the Project as follows:

a) To ensure high standards of quality assurance in the execution of work and completion of work within stipulated time period;
b) Comprehensive supervision of project implementation activities carried out by the Contractor to ensure complete compliance with the drawings, technical specifications and various stipulations contained in the Contract Documents
c) Efficient construction supervision by personnel who are experienced in modern methods of construction supervision and contract management.
d) Act independently and on behalf of the DoDM, Govt. of West Bengal to review all activities associated with Construction to ensure compliance of requirements of Contract Agreement in order to have a sound Project.
e) Report to DoDM, Govt. of West Bengal on the financial and technical aspects of the project.

f) Assist the Principal Secretary, DoDM in arriving at an amicable settlement of dispute.
g) The Secondary objective is to assist the DoDM for effective project monitoring by providing project management and monitoring support.

3. SCOPE OF SERVICES, TASKS(COMPONENTS) AND EXPECTED DELIVERABLES

3.1 The scope of services for the TPQA assignment includes:

The Scope of the Consulting services includes but is not limited to the following activities:

3.1 The Consultant will be responsible for the supervision of all construction work. The Consultant will administer the Construction Contract and ensure that the contractual clauses, with respect to both quality and quantity of work are respected and the works are constructed in accordance with the provisions of the Construction Contracts. The Consultant will be required to nominate a Representative who will be full time resident on the Project.

3.2 The Supervision Consultant will make all necessary measurements and control the quality of works. The Supervision Consultant will make all engineering decisions required for the successful and timely implementation of the Construction Contracts in consultation with the DoDM.

3.3 The Supervision Consultant shall undertake a review of the Construction Contracts for the purpose of identifying any omissions, which compromise the completeness or consistency of the design. This review shall be carried out immediately after the services commence and shall be completed within two months. On completion of the review, the supervision consultant shall prepare a report on this review which sets out all findings and recommendations for making good any omissions identified. Notwithstanding the above, the Supervision Consultant shall immediately inform the DoDM of any omission which may have a substantial impact on the Project at the time the omission is uncovered. The Supervision Consultant shall submit four copies of the review report to the DoDM.

3.4 In addition to or as an expansion of the activities and responsibilities required of the DoDM, as detailed in Construction Contracts, the Supervision Consultant will, interalia, undertake, but not limited to the following:

a. Project Inception

1. At this stage the Consultant shall conduct a preliminary review of standard contract documents, drawings, specifications, materials reports and status of the work for the current contracts to obtain understanding of the scope and complexities of the assignment. This exercise will also include familiarization with the Environment and Social Framework (ESMF) and Environment Management Plans (EMP) with the assistance of, GIS Specialist deployed by DoDM.

2. The Consultant will also have discussions with the key stakeholders at DODM to understand implementation status, basis for site selection, the various manuals and guidelines prepared for the project, specific concerns of DoDM (if any) and the nature and frequency of various field tests to be performed on civil works and reporting arrangements.

3. After the initial study and discussions, the Consultant will prepare and submit a Project Inception Report, within 30 days of issue of work order. The Inception report would include items like:

a) Detailed methodology for execution of the audit, including the various tests that will be conducted and outlining quality audit procedures.

b) Detailed methodology for checking compliance to Environment and Social Management Framework (ESMF) including the EMPs and applicable laws pertaining to environment protection and labour welfare.

c) Audit plan for the first year clearly identifying the audit stage for each type of work.

d) Overall team deployment schedule

e) Reporting formats including schedule of reporting and verification of compliance to observations.

f) Reporting and escalation protocols including methodology for integrating the audit results in payment certification system and

g) Evaluation of the project MIS and suggesting updating requirements for capturing the audit reports, compliance and linking with payment certification system with assistance of MIS Specialist deployed by the DODM.

b. General

(i) administer the construction contracts, approve materials, issue orders to the Contractors in consultation with the DoDM and ensure that the quality of the works is in accordance with contractual specifications;

(ii) approve/suggest modifications in the Contractorôs work program, material sources, etc;

(iii) monitor progress of the Works, identify causes, or potential causes, of any delay and advise the DoDM of suitable corrective actions in a timely manner;

(iv) review and approve Contractorôs proposed personnel for positions nominated in the Contract;

(v) provide assistance to the Engineer-in charge in respect of contract implementation claims and other matters;

(vi) advise and assist the Engineer-in charge with respect to the dispute, the appeal of dispute or litigation relating to the works, whenever required;

(vii) provide other specialist services relevant to the Project as may be agreed to during negotiations or ordered by the Engineer-in charge;

(viii) ensure that the construction methods as proposed by the Contractor for carrying out the works are satisfactory, with particular reference to the

technical requirements of sound environmental standards, inspection of Contractorôs construction equipment, safety of the works, property, personnel, and general public.

(ix) prepare and issue the following reports, the format and content for each report is to be acceptable to the Engineer-in charge;

1. an Inception Report, to be submitted within 10 days of commencement of services, 4 copies to be submitted to the Engineer-in charge;
2. a brief monthly progress report, which should be limited to 5 pages and be submitted within 7 days of the end of each month, 4 copies to be submitted to the Engineer-in charge;
3. a detailed quarterly report, to be submitted within 14 days of the end of each quarter. Quarterly reports should include description of project activities illustrated by progress/completion photographs, status of any delays and contractual claims and details of all latest financial projections , 4 copies to be submitted to the Engineer-in charge;
4. a detailed Contract Completion Report of which , 5 copies to be submitted to the Engineer-in charge;
5. a Quality Assurance Manual, detailing all QA/QC procedures, to be submitted within 10 days of commencement of services, 6 copies to be submitted to the Engineer-in charge;

(x) ensure that working drawings as issued to the Contractor are complete consistent and coherent across the entire project;

c. Construction Supervision

i) assist DoDM in proper monitoring/progress of works and implementation of the project through computer aided project management techniques;

ii) approve Contractorôs proposed designs/drawings for temporary works;

iii) check Contractorôs setting out for conformance with the working drawings;

iv) inspect at regular intervals the Contractorôs plant and facilities, for both construction production work and workers accommodation, to ensure that they conform with both the conditions of contract and all government regulations;

v) inspect all the Contractorôs safety measures, including labour welfare, notify immediately both the Employer and the Contractor of any infringement or violation;

vi) maintain records, working/as-built drawings, test data, details of various correspondence and diaries in the formats approved/specified by the DoDM;

vii) at the completion of the contract verify the ñas-built drawingò as true record of the works as constructed;

viii) assist DoDM in coordination work with different agencies and hold meetings for proper and timely implementation of the Project;

ix) liaise and coordinate with relevant authorities to remove all obstacles and encumbrances from the project site, including utility relocation and tree cutting, as required.

d. The Consultant will be responsible and ensure that the contractor maintains all the EMP as per contractual clauses and as detailed in clause d.1

d.1 . Environment Management Plan

The Environment Management Plan (EMP) is a set of measures for avoidance, minimization and mitigation of adverse environmental impacts. The Contractor will abide by the environmental, occupational health and safety measures listed in the Environment Management Plan (EMP) given in the table below during preparation and execution of Works. Adverse impact/s on the environment caused due to non-adherence of legal and EMP requirements during preparation and execution of civil works shall be made good at the Contractorôs own expenses. The Engineerôs check and certification for payment, in accordance to requirements under Clause 42.2 of GCC, shall also include the performance review of the Contractor with regard to EMP compliance.

The complete document on Environmental and Social Management Framework (ESMF) from which these conditions have been derived/listed is available with the Engineer and State Disaster Management Authority (SDMA) for the Contractorôs reference. It is also available on the websites of National Disaster Management Authority (NDMA) and State Disaster Management Authority (SDMA).

S. No.	Activity	Measures to be Implemented by the Contractor
1.	Work Plan for EMP implementation	The Contractorôs Project Manager shall be responsible for implementation of EMP provisions and will coordinate the over-all implementation of the said plan. Along with the Work Programme, the Contractor shall submit a plan including method statement and timeline about specific actions that will be taken by him to implement the provisions laid out in the EMP.
2.	Regulatory Permissions and Consents	The Contractor shall obtain all requisite statutory clearances prior to commencement of civil works, which includes obtaining permission/consent for plants, water extraction and borrow areas operations. This includes: ▪ Consent for establishment and operation of plant (for concrete work) from SPCB ▪ PUC certification for all vehicles/equipment used for/during construction ▪ Permission/consent of the District Administration/Mining Department/other agencies for quarrying and/or borrowing operations for materials like sand and earth ▪ Permission for water extraction, if applicable in the local area context. The Contractor shall abide by all conditions laid out in the said clearances.
3.	Consultation and Community Consent	The Contractor shall consult and obtain written consents of landowners (individual/panchayat/govt. agency) for temporary use of land for all construction related activities including: (a) setting-up and operation of construction camp including labour camps, stock yards etc. (b) borrow areas and (c) disposal of debris and other waste material.
4.	Construction/ Labour Camp	(a) Location: The camp and plant site/s location and establishment shall be done in a manner that does not interfere or disturb the activities of local inhabitants, particularly those of schools and health facilities. Written permission (no objection certificate) shall be taken from the Gram Sabha and the land owner prior to location selection and a copy shall be submitted to the Engineer for approval. (b) Camp site shall not be located within 250 mts. from a water body including village ponds. (c) A distance of at least 500 mts. shall be maintained from designated/protected natural habitats

S. No.	Activity	Measures to be Implemented by the Contractor
		(such as National Parks, Sanctuaries, Biosphere Reserves, Reserve Forests and Ramsar Sites) and Coastal Regulation Zone.
		(b) Accommodation and Basic Amenities: All weather shelter with the required tenement size and toilets shall be provided, as per provisions of Labour Laws. Separate toilet facilities shall be provided for women workers. If a common mess is not provided/operated, additional space for cooking shall be provided. The contractor shall ensure that hygienic conditions are maintained during the operation of such camps/facilities.
		(c) Fuel for Cooking: The Contractor shall ensure that fuel wood is not used as a cooking medium in the construction/labour camp.
		(d) Potable water supply: Drinking water supply of at least 40 lpcd with the required supply points shall be provided.
		(e) Fire Safety: Adequate fire safety precautions shall be taken and required fire safety equipment (such as fire extinguishers) shall be provided by the Contractor.
5.	Site Clearance	(a). No tree cutting is to carried out without the written instruction from the Employer, who in turn will ensure that relevant regulatory permission/s (including those from Forest Dept., if required) are obtained prior to cutting of such trees.
		(b) The non-timber grade trees are to be stacked and possession is to be given to Employer/concerned Govt. Department.
		(c) The Contractor shall strip, store and preserve top soil from the site of construction work and in the stock yards prior to stacking of materials. The top soil shall be reinstated in the cyclone shelter compound after the construction is over.
6.	Protection of Properties and Resources	The Contractor shall take due care to protect and prevent damages to the following resources during preparatory and construction work: a. Water supply lines b. Irrigation canals c. Cart, cattle and/or foot trail/tracks d. Cultural properties and sites/structures of religious importance e. Houses, Farmlands, Orchards and/or Trees f. School and other existing buildings adjacent to the site of construction In case of damage due to construction activity, the restoration/repairs shall be carried out by the Contractor at his own cost.
7.	Quarry Operations	The Contractor shall procure material from quarries that have been approved/licensed by the State Govt. A copy of such an approval shall be submitted to the Engineer prior to procuring material.
8.	Borrow Areas	(a) Borrow areas for the project will be selected by the Contractor following the stipulations given below. The finalization of all such locations shall be dependent on the approval of the Engineer on technical and environmental grounds. This includes on-site verification to cross-check the accuracy of details provided by the Contractor. Only after receipt of the written approval from the Engineer, the Contractor shall enter into a formal agreement with landowner.
		(b) The Contractor shall not procure any kind of construction material (such as aggregates, sand and earth) from ecologically protected areas.
		(c) <u>Identification and Selection</u> 1. The borrow area should not be located in agriculture field/s unless unavoidable i.e. barren land is not available. In case borrowing needs to be done on an agricultural land, top-soil stripping, stacking and preservation is a must. 2. Borrow pits shall not be located within a distance of 100 mts. from any NH, SH or other roads. 3. Borrow pits shall be preferably located 500 mts. away from settlements/ habitations. 4. No borrow pits shall be located within 500 mts. from schools, colleges, playgrounds, religious structures and health centres. 5. No borrow area shall be opened within 500 mts. from a reserved or protected forest area, protected sites, wildlife movement zone and cultural heritage site. 6. No tree cutting shall be undertaken. 7. Borrow area near any surface water body will be at least 100 mts. away.

S. No.	Activity	Measures to be Implemented by the Contractor
		(d) Operation 1. Area up to which material will be extracted shall be clearly demarcated on ground. 2. A 15 cm topsoil layer will be stripped and preserved in stockpiles. 3. Borrowing of earth should be preferably limited to a depth of 1.5 mtr from the existing ground level. 4. Slope at the edges will be maintained not steeper than 1:3 (Vertical: Horizontal).
		(e) Rehabilitation of Borrow Areas 1. Rehabilitation shall be satisfactorily undertaken immediately after the use has ceased and at least three weeks prior to monsoon. 2. Preserved top soil has be spread uniformly over land (except in cases where borrow area is developed as a water body) used as a borrow area.
9.	Water Extraction/ Use	Water for construction and for use at construction camps (including labour camps) is to be extracted with prior written permission of (a) the individual owner, in case the source is private well/tube well; (b) Gram Panchayat in case the source belongs to community; and (c) Irrigation Department in case the source is an irrigation canal or a river.
10.	Safety of Road Users and Local Residents	(a) Traffic safety arrangements (including provision of warning signage, speed breakers etc.) shall be made by the Contractor to ensure safety of road users and local people, particularly in the internal village roads which will be used for transporting materials.
		(b) Material shall be covered during transportation to prevent spillage, accidents and pollution.
		(c) All required measures to ensure safety of local residents including children and other near-by residents shall be taken up by the Contractor. This shall include provisions to prevent unauthorised entry into the construction site and camp; fire and electrical safety measures; pre-cautions around excavation such as barricading and warning signs and safe storage of material.
11.	Workerôs Safety	(a) All measures required for ensuring safety and health of the workers shall be taken up by the Contractor. This includes provision and enforcement of appropriate personal protective equipment; first aid facility; emergency response arrangement; proper storage of hazardous/ toxic and polluting materials and; measures for ensuring fire, electrical and mechanical safety arrangements in camp and in work site.
		(b) All methods, steps and measures required for ensuring safety of workers, particularly those needed while undertaking work in or around excavations; working at height; and; while handling inflammable, toxic and/or hazardous materials shall be ensured by the contractor.
		(c) Material safety data sheet record of fuel and other inflammable chemicals shall be maintained at the site.
12.	Air Pollution	(a) Wind barriers or screens shall be provided in the downwind direction at air pollution causing sources like plant sites and fine material storage stock yards.
		(b) Fugitive dust emissions have to be eliminated by providing dust suppression/control measures, such as water sprinkling and cover on materials, based on activity and site conditions.
		(c) All plants and equipment shall comply with pollution control norms.
		(d) Water shall be sprinkled at least twice during dry day on haulage roads passing through or near settlements (including at least 100 m before the settlement).
13.	Water pollution	(a) All measures (including provision of temporary silt fencing to control sediment run-off) required for avoiding adverse impacts to water bodies (such as ponds, streams, canals and rivers), water sources (such as hand pumps and wells) and adjacent farmland shall be undertaken by the Contractor.
		(b) Storage of materials like fuel, chemicals and cement shall be done in a manner (with impervious layer on bottom and a covered shed on top) that does not contaminate land and ground/surface water.
14.	Noise Pollution	(a) All noise causing activities shall be stopped during night time (9:00 PM to 6:00 AM). The Contractor shall schedule construction works in consultation with local Panchayat Authority and School Principal to ensure least disturbance to school children and other adjacent residents.

S. No.	Activity	Measures to be Implemented by the Contractor
		(b) Ear plugs shall be provided to the labour facing risk from high noise pollution such as plant site and those working near generators, heavy equipment/machinery.
		(c) Appropriate noise controlling devices including acoustic generators shall be used to minimise noise during construction work and operation of camp.
15.	Disposal of Debris/Wastes	(a) Debris and other construction waste, if any, shall be disposed in locations pre-approved by the Engineer in a manner that it does not contaminate the environment.
		(b) Location of Debris Disposal Sites: Debris disposal sites shall be located preferably away from farmlands, water sources and water bodies. In no case, debris shall be disposed within 500 mts. of ecologically sensitive areas, including forests, wetlands and protected natural habitats.
16.	Restoration and Rehabilitation of Sites	All work sites and areas under temporary use (including construction and labour camps, plant sites, haul roads and borrow areas) shall be restored/ rehabilitated to a better condition (if not at least to its original condition) and to the satisfaction of the Engineer and land owner upon completion of construction work by the Contractor. Completion of work (as covered under clause 55.1 of GCC) will also include completion of rehabilitation and clean-up of the work sites including camps, plants, in and around the construction site; disposal of debris/construction wastes at pre-approved locations and; restoration of borrow areas and other sites/locations used for material sourcing.
17.	Liabilities	Any liability arising out of Contractorôs agreement with landowners/ local people/gram panchayat (including those related to temporary use of land, water extraction and disposal of debris) shall be settled by the Contractor.

e. Measurement and Payment

i) make measurements and keep measurement records, including the measurement books issued to him by the DoDM;
ii) to check the consumption of the materials of executed items from the original bills/challans of the suppliers;
iii) issue interim certificates for progress payments;
iv) certify completion of part or all of the works;
v) prepare quarterly cash flow projections for the DoDM in a format acceptable to the DoDM. Cash flows should identify budget estimates for all outstanding work;
vi) maintain records of all plant, labour and materials used in the construction of the Works;
vii) check Contractorôs materials ordering schedule;
viii) analyze any contractual claim submitted by the Contractor and prepare a report for the DoDM addressing the contractual basis, in terms of both technical and financial issues, for the claim and recommendations for a response to the Contractor;

f. Quality Control

Audit Planning

During the inception for first year and subsequently at the beginning of each year an audit plan will be prepared in consultation with DODM. Each site shall be audited at

least once during each stage of work and for certification of compliance of reported non compliances. The audit plan would be updated quarterly and may be revised on the basis of findings of the audits conducted in the preceding quarter.

g. Execution of audits

1. The Consultantôs Quality Assurance Plan shall include but not be limited to the following:
   (i) Check the setting out of the Contractor.
   (ii) Review of all concrete mix designs proposed by the Contractors and approve/suggest modifications in the mix design, laying methods, sampling and testing procedure, and quality control measures, to ensure required standard and consistency in quality at the commencement of items;
   (iii) Check the Calibration of the Contractorös Plants and Equipment
   (iv) Evolve a system of Quality Assurance of works, including, but not limited to establishing testing frequencies and acceptance criteria for all construction activities based on the Specifications mentioned in the construction contract agreement or international best practice where such Specifications is not mentioned in the construction contract;
   (v) Testing and sampling frequencies shall be in accordance with the instructions of the DoDM
   (vi) Inspect the performance of the work with regard to workmanship, compliance with the specifications all necessary testing required for acceptance of any item of work;
   (vii) Inspect all material sources nominated by the Contractor and recommend the same for approval to the DoDM;
   (viii) Assess and check the laboratory and field tests carried out by the Contractors and carry out independent tests;
   (ix) Issue orders to the Contractor to remove or make good any work which is found to be;
      A. Not in accordance with the drawings;
      B. Not in accordance with the specifications in terms of either work method or materials specification;
      C. Covering work which has not been inspected for acceptance or reflected as unacceptable;
   (x) Maintain records of all testing work, including cross referencing to items of work to which each test refers and location from which any samples were obtained for testing.
2. The execution of audits will be in accordance with the approach and methodology agreed in the Inception Report and in accordance with the audit plan. In general the purpose of quality audit exercise is to ensure that the works are:

i. Executed according to the designs, drawings and specifications as specified in the bidding documents / applicable standards, and that good engineering practices are followed in construction.

ii. True to desired lines, levels and finishing.

iii. Executed following the EMP provisions included in the bidding documents and in general follow the agreed provisions in the ESMF.

iv. Executed following the relevant laws / statutes and practices / guidelines related to workers welfare, safety at worksite, insurances, etc.

3. The quality audit at construction sites shall include (but not be limited to) the following:

4. Assess independently the quality of construction vis-à-vis the standards specified in the bidding documents and good engineering practices including disaster resistant construction standards.

5. Review the degree of quality control exercised during the construction by the contractor maintaining adequate arrangements / practices (tests, numbers, frequency, approach and timing etc.) / documentation (QC registers, test reports, observations of supervisory staff, compliances etc) and the degree of monitoring done by the line department identify non-compliances and suggests necessary improvements and compliance methodologies.

6. Through the agreed Audit strategy and a series of test procedures:

a) Review that the materials have been procured stored and used in accordance with the quality standard requirements set forth in the contract agreement.

b) Review that the workmanship of the work confirms to specified standards.

c) Review that the test reports of the materials / workmanship that were tested by the contract as required in the individual contract document are satisfactory.

7. Carry out additional testing of the materials and works where necessary at site or in the approved laboratories. Care should be taken to minimize the additional testing and shall preferably be carried out where a prime facie doubt arises related to quality of works and / or compliance of standards.

8. Review the action taken on the earlier reported non-compliances and re-certify including following up with the heads of implementing agencies for action on earlier reported non-compliances.

9. Assist the DoDM in resolving the issues related to non compliances. The consultantôs responsibility does not end by merely pointing the defects rather they should facilitate the follow up action required to rectify the defects.

10. Create photo documentation of quality related issues including its compliances with date and geo tags

11. Check and report on compliance to:

    a) Environment Management Plans (EMP) defined in the contract document and the Resettlement Action Plans (RAP) mentioned in the DPR

    b) Environment laws / regulations of Govt. of India and rules formulated by the concerned State Government.

    c) Labor laws/ regulations applicable to construction sites.

    d) Safety management at the construction sites as per the relevant IS codes.

    e) Specifications of agencies like Indian Road Congress, Ministry of Shipping and Road Transport, Central Public Health Engineering Organization, Bureau of Indian Standards, Ministry of Rural Development (MORD), Ministry of Road Transport and Highways (MORTH) etc as applicable.

12. Review of all concrete mix design proposed by the Contractors and approve/suggest modifications in the mix design, laying methods, sampling and testing procedure, and quality control measures, to ensure required standard and consistency in quality at the commencement of items;
13. Evolve a system of Quality Assurance of works, including, but not limited to establishing testing frequencies and acceptance criteria for all construction activities based on best practice;
14. inspect the performance of the work with regard to workmanship, compliance with the specifications all necessary testing required for acceptance of any item of work;
15. inspect and approve all material sources nominated by the Contractor;
16. assess and check the laboratory and field tests carried out by the Contractors and carry out independent tests;
17. issue orders to the Contractor(s) in consultation with the DoDM to remove or make good any work which is found to be;
    A. not in accordance with the drawings;
    B. not in accordance with the specifications in terms of either work method or materials specification;

C. covering work which has not been inspected for acceptance or rejected as unacceptable;

18. maintain records of all testing work, including cross referencing to items of work to which each test refers and location from which any samples were obtained for testing;

19. The Consultants shall also

a) Inspect, review and report the adequacy and competence of contractorôs staff, labor and machinery.

b) Review contractors work program and advice on need for corrective measures in cases where such matters are referred by the Engineers.

20. Review the works progress in accordance with agreed milestones and work schedules and provide regular updates to including need for increasing resources and / or change in work plan for timely execution.

21. Subject to quality of works covered under every bill submitted, counter-sign the Quality certificate as applicable.

22. All the apparatus and equipment for the field testing shall be procured by the Firm at its own cost. The Firm shall be free to take back these apparatus and equipment on completion of the contract. The tests shall include all common tests as specified by technical specification and as prescribed by BIS. Where use of back office laboratory is necessary, consultants will take the samples and get it tested in accredited/approved laboratories. The minor testing equipment includes as but is not limited to: sieves and weights, moisture meter, soil density meter, temperature recorder, surface finish recording instruments such as straight edges, measuring tapes, calipers, etc. for óon spot field testingô of material and workmanship.

23. In case any specific quality testing is required by the DoDM for any work within the site, it shall be carried out and report shall be furnished with a reasonable time.

24. To the extent possible field testing and sampling shall be done in the presence of Engineer/Contractorôs representative and the process should be photo documented with geo tagging.

25. The Consultant will use approved laboratory in the region which will be first inspected and recommended for accrediting by Consultant under the project by DoDM. The identification and certification of the testing agency will be specific to the tests that can be carried out in a particular laboratory.

26. The Consultant may propose alternative independent testing laboratories also. Full details and information on the testing laboratories are to be provided. On approval the alternative laboratories may be used.

27. It is proposed that the some field visits shall also be carried out without advance information to be decided randomly.

28. Upon field inspection and tests the Consultants, where required and in critical cases through the Engineer in Charge shall arrange to issue óstop workô notice in consultation with DoDM, to the contractors and assist in remedying the defects. This shall be done only in exceptional cases where continuance of works may jeopardize the ultimate quality and safety of structure, safety of workers and of third parties etc.

29. The Contract Documents are the basis of all works to be undertaken under the Project. These are standard documents which will be made available to the Consultant.

30. **Annexure A** contains a list of indicative quality checks on materials, equipment and appurtenances that should not be considered as limiting. In consultation with the other consultants, DoDM; based on Annex A of the ToR; the specifications in the bid documents and relevant standards; prepare standard Quality Assurance Plan (tests, stage, frequency, standards to be complied, guidance on judging from test results, critical workmanship requirements, critical stages of work that require Engineerôs presence ñas a mustò etc.) for various types of works to be audited and formats for documenting the quality test results and reporting of such tests.

3.5 The Supervision Consultant will process interim and final payments to the contractor. Interim monthly payments shall be based on interim payment certificates processed by the Supervision Consultant following claims filed by the Contractor within the ambit of the Contract. The Supervision Consultant will be accountable for the quality and the quantities of the work. Whenever final measurements are to be made, the Supervision Consultantôs Senior Resident Engineer will inform the Contractor several days in advance. The representative of DoDMôs participation in such measurements will not be mandatory; however, he may wish to participate or be represented by his representative, to check any measurement.

3.6 Supervision Consultant and his staff shall also carry out such duties and exercise authority as may be delegated to him by the DoDM. The DoDM may, from time to time, delegate any of the duties and authorities and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Contractor.

3.7 The principal duties of the Supervision Consultant and his staff shall be as follows:

(i) to check setting out of the Project;

(ii) to inspect the performance of the works with regard to workmanship and compliance with the specifications and to order, to supervise, or perform tests on materials and/or work and to approve or disapprove the Contractorôs plant and equipment;

(iii) to order the uncovering of completed work and/or the removal and substitution of proper materials and/or works, if required;

(iv) to check systematically the progress of the work and to order the initiation of certain work, which is part of the contract;

(v) to examine and attend the measurement of any work, which is about to be covered or put out of view before permanent work is placed thereon and/or to examine and attend the measurement of the completed works in the prescribed form;

(vi) to supervise the contractor(s) in all matters concerning safety and care of the works;

(vii) to direct the contractor(s) in consultation with the DoDM to carry out all such work or to do all such things as may be necessary in the opinion of the DoDMôs Representative to avoid or to reduce the risk;

(viii) to maintain a day-to-day project diary, which shall record all events pertaining to the administration of the contract, request forms, and order given to the contractor, and any other information which may at a later date be of assistance in resolving queries which may arise concerning execution of the works;

(ix) to verify the as-built drawing, supplied by the contractor(s), as a true record of the works as constructed;

(x) to carry out periodic review of contractorôs resources vis-à-vis work program; and

(xi) any other assignments given by the DoDM.

3.8 The Supervision Consultant shall, if so required by the DoDM, provide any of the following Services as Additional Services; (a) prepare reports, including technical appraisals, additional contract documentation and/or reviewing and commenting on Contractorôs proposals, as may be required for any additional work required for the successful completion of the Project; and (b) provision of any other specialist services as may be required from time to time.

3.9 All Additional Services, other than minor extras which do not materially affect the scope of work, will be authorized by the DoDM at the rates established in the Construction Supervision Contract, or, when services require the use of specialists not listed in the Contract, as mutually agreed upon.

3.2 Reporting

1. DoDM of the State will be the nodal agency for the execution of this assignment. The consultants will submit all the reports to DoDM as per the specified timelines with the assistance of MIS Specialist deployed by the DoDM.

2. The field visits ï which shall be an ongoing activity ï shall be undertaken as per the audit strategy finalized. Audit reports would be prepared once a week covering the sites visited, and submitted within 3 days of completion of the week. The reports shall highlight for each contract package, status and progress of work, audit opinion, status of compliance to earlier observations, critical issues, and follow-up actions. Any critical issues needing stoppage of work need to be reported immediately to the DODM, through different means (telephone, SMS, e-mail, fax etc.) In addition to the site level reports, consolidated reports would be submitted every month and quarter, compiling the findings in the site reports, summary audit opinion, corrective actions, progress of works and issues etc. The Consultant may be also required to make presentations on audit findings at the designated forums as and when required by the client.

3. Annual review report would be submitted at the end of financial year and a final review report would be submitted at the end of the project / this consultancy assignment. The monthly, quarterly annual and final review reports should also include good practices and lessons learnt with regard to quality systems and ESMF implementation.

4. In addition, the consultant will comply with any other reporting requirements as agreed in the project inception stage. Reports on non compliances are to be transmitted immediately (on real time basis through email/ other means) and the communication shall be simultaneous to the concerned engineer, line department and the DoDM.

3.4 Update the Project monitoring system

The Consultant would facilitate the MIS Specialist deployed by the DODM in uploading the site visit reports, audit findings, suggested corrective action, status of completion of corrective action etc. in the project monitoring system

3.5 Schedule of Completion of Tasks

The consultancy will be initially for a period of one and half year which can be extended later with mutual consent if performance is satisfactory. The DODM will facilitate for the Consultant to conduct audit as per the strategy.

4.0 TEAM COMPOSITION & QUALIFICATION REQUIREMENTS FOR THE KEY EXPERTS

Estimated input for the first year of consultancy services is around 677 { 8*12+35*12*365/(12*22)}man-months. However, depending on the number of sites getting approved in subsequent years, the number of man-month requirement may go up. The total estimated man-month requirement for the duration of the project is about 1015 (1.5 times) man-months. However the details of the man-month input can be finalised at the inception stage.

The list of sites proposed to be audited in the first year has been provided as **Annexure C**. The Supervision Team will consist of the following:

The consultantôs team shall be organized as follows:

1	Project Management Team	• Project Manager ï 1 Nos. • Deputy Project Manager ï 5 Nos. • Environmental& Social Specialist ï 1 No • Monitoring & Evaluation Expert ï 1 Nos.	One position each at the state level One position each for each package One position each at the State level One position each at the State level
2	Site Teams	• Site Engineers: • Civil ï 15 • Electrical ï 5 • Quantity Surveyor ï 5 • Material Engineer - 5 o Cyclone Shelters • Support Staff ï 5 Nos.	A team of engineers will be deployed in each block. The number of engineers in each team may vary depending on the construction activity in progress in the block. Of the requirement specified, there will be atleast three electrical engineers.

The desired qualifications for various team members are as follows:

Sl. No	**Key Position**	**Minimum Qualifications**	**Minimum desired Experience**	**Age**	**Estimated Man-month input**[3]
1	**Project Management Team**				
1.1	Project Manager	Graduate Civil Engineer with Post Graduation in Construction Management / Planning / Engineering/Bu	At least 20 years experience in multi location civil engineering projects, at least 12 of them in management. Experience of managing multi-disciplinary teams is essential.	Not more than 65 years	

		siness Administration	Familiarization with disaster resistant construction techniques is essential. Experience of working in the coastal regions will be an added advantage. Past experience of having conducting technical audit for WB projects is desirable.		
1.2	Deputy Project Manager	Graduate Civil Engineer	At least 12-15 years of experience in the field of civil engineering and should have managed technical audits in the past. Demonstrate expertise of working in the coastal areas, Past experience of conducting technical audits for WB projects is desirable Demonstrate expertise in one or more of the following areas • construction of disaster resistant buildings in coastal zones • construction of roads/bridges	Not more than 55 years	
1.3	Environmental and Social Specialist	Environmental Engineer, Rural Development, or equivalent	At least 5-10 years of experience in supervision of environmental compliance in civil engineering and should worked in technical audits teams in the past. Should have relevant experience in environmental and social standards compliance in engineering projects. Experience of working in the coastal regions will be an added advantage.	Not more than 50 years	
2.4	Monitoring and Evaluation Expert	Information Technology, Computer Sciences, or equivalent	At least 5-10 years of experience in the use of GIS tools for civil engineering projects.		
2	**Site Teams**				
2.1	Site Engineer - Cyclone shelters	Graduate/ Diploma Civil Engineer (specialization in construction	At least 5-10 years of experience in the field of civil engineering and should worked in technical audits teams in the past. Should have relevant experience in	Not more than 50 years	

		practice or equivalent is preferable)	construction of disaster resistant buildings. Experience of working in the coastal regions will be an added advantage.		
2.2	Site Engineer ï Electrical	Graduate/ Diploma Electrical Engineer	At least 5-10 years of experience in the field of electrical engineering and should worked in technical audits teams in the past. Experience of working in the coastal regions will be an added advantage.	Not more than 50 years	

Note: 1) Project wise deployment of technical staffs among the above stated team will have to be made in consultation with the DoDM.

2) The supervision consultant will establish their site office in the vicinity of each project location at their own cost.

The Consultants can perform the Services and carry out their obligations with due diligence, efficiency and economy, in accordance generally accepted professional standards and practices. They can observe sound management practices and employ appropriate technologies and methods. The Consultants always act, in respect of any matter relating to the Contract or to the Services, as faithful advisers to the DoDM. At all times, the Consultants will safeguard the DoDMôs legitimate interests in any dealings with Contractor and maintain the confidentiality of the data and other information which are not to be disclosed elsewhere.

The Consultant will give an undertaking that the personnel to be deployed as mentioned above will be continued for the duration of the consultancy. Changes of personnel will be permitted only if the Consultant has given a prior intimation that a personnel deployed has resigned his employment or on health grounds and that he would be substituted with a person of the desired qualifications mentioned above. During the period of non-availability of the personnel, the Consultant will not be permitted to raise any bill with respect to their remuneration.

5. Reporting Requirements and Time Schedule for Deliverables

The key deliverables for the assignment along with respective timelines are as follows:

Deliverable	**Timeline**
Inception Report	Within 30 days of signing the contract
Audit strategy	Within 1 month of signing the contract (for the first year) as part of Inception Report. Next years-Within 7 days from end of financial year (subsequent years)
Quality Assurance Plan and Reporting Formats	By the end of 2nd Month
Weekly Audit Report	Within 3 days of completion of week.

Non compliance event report/ Critical issue reports	Immediate
Monthly progress report	Within seven days of the end of reporting month
Quarterly Summary Report	Within 15 days from end of quarter
Annual Review Report	Within 15 days from end of financial year
Final Review Report	Three months prior to winding up of the Project or completion of the Consultantôs contract, whichever is earlier
Presentation to the DODM on the findings of the audit and suggestions	Every quarter

Reports shall be delivered in CD/DVD Rom in addition to specified number of hard copies.

6. Clients input and counterpart personnel

DATA AND SERVICES TO BE PROVIDED BY DODM

The Consultant will be provided access to all such information as is necessary to plan and execute the assignment. It shall include:

1. List of sites
2. Contracts/tenders for selected sites, including special specifications
3. Project documents available in public domain such as ESMF, procurement plan, Manuals etc.
4. Access to sites, and support of the nodal department
5. Site Survey / Soil Test Reports
6. Detailed (Construction) Drawings & Specifications

REVIEW AND MONITORING OF CONSULTANTS WORK

1. Consultants performance and quality of work will be continuously reviewed by the DODM.

2. There would be formal review, annually by a committee set up at DODM at the Inception stage. Unsatisfactory performance will invite action including pre closure of contract in accordance with the contract provisions.

ANNEXURE A: INDICATIVE TEST REQUIREMENTS:

1. An indicative list of tests on material and workmanship is listed here, which is to provide guidance to the Consultant. This list is not exhaustive and all the necessary tests on materials in accordance with contract documents, relevant specifications and

good engineering practices need to be carried out to meet the objective of quality inspection which is to ensure that the works are carried out in conformity with required standards and specifications.

A. Civil Works

The main materials to be supervised and inspected are as follows:

- Reinforced concrete
- Building works
- Road materials
- Building service appurtenances and associated works
- Soil tests

1. Reinforced concrete

The relevant tests are included in the standard specifications; they shall include but not be limited to the following:

Tests for cement and aggregates	
Cement	1. Consistency test 2. Initial and final setting time test 3. Compressive strength test 4. Soundness test 5. Fineness test
Coarse Aggregate	1. Sieve analysis test and grading. 2. Bulk density test 3. Flakiness index test 4. Elongation index test 5. Water absorption test 6. Aggregate impact value test 7. 8. 9. specific gravity 10
Fine Aggregate	1. Sieve analysis test 2. Silt content test 3. Specific gravity 4. Uniformity co-efficient 5. Effective size Percentage of impurities 6. Loss on ignition 7. Acid Solubility 8. Bulkage of sand
Test for water	1. Suitability for use in concrete e.g. pH etc
Concrete	1. Cube Test 2. Slump test
Tests for reinforcement	

Reinforcing Steel	1. Tensile test- 0.2% proof stress, 2. Bend test ultimate strength and % of elongation. 3. Re-bend test
Tests for Reinforced Concrete Members	
	1. Rebound hammer test

In certain cases extraction of cores shall be carried out.

2. Building works

Structural steel	1. Tensile test 2. Bend test 3. Thickness of galvanising
Bricks	1. Compressive strength test 2. Water absorption test 3. Efflorescence test 4. Dimensional tolerance
Blocks	1. Compressive strength test 2. Water absorption test 3. Density test
Tiles	1. Water absorption test 2. Wet transverse strength test 3. Abrasion/wear resistance test
Ceramic tiles	1. Water absorption test 2. Wet Transverse strength test 3. Abrasion / wear resistance test 4. Crazing test
Galvanised sheeting	1. Thickness of sheets 2. Thickness of galvanising
Water proofing compounds	1. Tests for permeability and compatibility
Paints	1. Performance tests 2. Thickness
Plumbing and sanitary fixtures	1. Dimensional verification, physical examination and relevant tests.

B. Mechanical and electrical works:

List of mechanical and electrical items required to be inspected by the consultant

1. Mechanical

- Pumps by type

2. Electrical

- Motors by type
- Electrical starters
- Electrical panels
- Switchboards
- Motor control panels
- DC distribution panels
- Induction-cum-enunciation panels
- Bus ducts
- Battery chargers
- Transformers
- HV/MV/LV
- Power
- Voltage
- Current
- Capacitors
- Level switches
- Electrical cables
- Underground cabling

3. Miscellaneous

- Earthing equipment
- Lightening arrestors and essential fittings
- Cable trays
- Any other items as specified in the contract documents

4. Inspections

The main headings for these works are as follows:

- Pumps
- Motors
- Gear Boxes
- Transformers
- Capacitors
- Cables
- Pipe and special
- Valves
- Diesel generator sets

1	Pumps	1. 2. 3. 4.

		5.	
			•
			•
2	Motors	1.	
		2.	
		3.	
		4.	
		5.	
		6.	
3	Gear Boxes		
4	Transformer	1.	
		2.	
		3.	
		4.	
		5.	
5	Capacitor		
6	Cables	1.	
		2.	
		3.	
7	Pipe and specials	1.	
		2.	
		3.	
		4.	
8	Valves	1.	
		2.	
		3.	
		4.	
9	Diesel generating sets	1.	Review of tests as specified in relevant IS or Special Specifications

5. Quality Checks On Materials, Equipment and Appurtenances

These lists are not to be considered as prescriptive. The Consultant is to develop a more detailed approach before commencing work in the field.

C. Overhead water tanks

The quality monitoring / auditing of various works shall be included but not be limited to the following:

1. Quality of materials
2. Quality of construction of various construction works at various stages
3. Witnessing the performance tests
4. Performance of the various mechanical equipment in treatment plants

1. Quality of materials

- Physical examination of materials brought to the site

- Perusal of test reports on materials furnished by the construction agency from time-to-time and also ensuring the frequency of such tests to be as per relevant standards
- Randomly selecting the samples at site and conducting necessary test for confirmation

2. Quality monitoring during the construction stage

(a) Structure:

Foundation stage

- Examining the soil encountered at site with respect to soil test reports furnished and also checking the adequacy of type of foundation system proposed to be adopted with respect to site condition
- Randomly checking grid markings
- Checking the fabrication of reinforcement and dimensions
- Witnessing concreting of foundation systems and reviewing the reports of cube testing

Superstructure

- Checking the fabrication of reinforcement, formwork, cover, etc.
- Checking the facilities available for the concreting, curing, etc.
- Dimensional verification and alignment of reinforced concrete members
- Checking the various levels to ascertain whether they are in accordance with the drawings and from hydraulic considerations
- Witnessing the concrete works of major structures and witnessing the tests on fresh concrete

Miscellaneous items

Checking the quality of pipes and pipe appurtenance

- Quality of water proof plaster on the interior surface
- Galvanised items

Tests on finished structure

- Conducting non-destructive tests at random to ascertain the quality/strength
- Witnessing the hydraulic tests on water retaining structures

3. Mechanical and Electrical Works

- Effectiveness of earthing systems
- Effectiveness of lightening arrestor systems
- Evaluating the performance of various mechanical equipment installed in various units in relation to the specification requirements

D. Quality monitoring during construction of pipelines

- Checking pipe work excavation levels, randomly
- Checking effectiveness of pipe joints

- Inspection of manholes, chambers and other structures
  - Base levels and concrete thickness
  - Walls
  - Roof slabs and covers
- Checking sewers for water tightness

E. Quality monitoring of building works

The total quality monitoring of various works will be included but not be limited to the following:

1. Quality of materials
2. Quality of construction of various works during different stages of construction.
3. Performance of mechanical and electrical equipment and systems.

1. Quality of materials

The checking of quality of materials includes:

- Physical examination
- Review of test reports
- Collecting representative samples wherever possible and conducting necessary tests for confirmation
- Informing the concerned agencies regarding the acceptance of material or otherwise
- Witnessing the performance tests on machinery carried out by the manufacturer at his factory, before dispatching to site.

2. Quality monitoring during construction

During the course of construction, independent unannounced visits shall be made to check the quality of construction. The visits shall be made at the following stages:

Foundation stage

- Checking the foundation with respect to the soil reports and its suitability as bearing strata including shoring, shuttering and dewatering arrangements.
- If under ream pile foundation is adopted, verify the results of test piles (if done), otherwise conduct test pile for results. Check the pile work being conducted at the site.
- Dimensional verification of selected footings
- Checking the layout marking and centre lines, at random
- Checking the reinforcement fabrication, at random
- Checking the concreting arrangements and witnessing concreting of a few footing at random including use of sweet water (not saline water) for concreting

Plinth stage

- Checking the quality of stone masonry with emphasis to quality of stones, joints, joint materials, etc.
- Checking the reinforcement fabrication of plinth beams at random
- Checking the quality of concrete in plinth beams, at random
- Checking the adequacy and compaction of floor filling, at random

Lintel stage

- Checking the quality of wall masonry with emphasis to joints, joint mortar, curing, etc.
- Checking the quality of column concrete
- Checking the reinforcement fabrication of lintels, at random
- Checking the quality of concrete in lintels

Roof stage / slab stage

- Checking the quality of centering, shuttering and formwork, with emphasis on lines and levels, joints and safety considerations
- Checking the reinforcement fabrication of selected panels
- Checking the arrangements for concreting, vibration and curing
- Checking the concrete while concreting, with respect to mix proportion, w/c ratio and compaction. Casting independent set of cubes for verification of strength
- Checking steel sheet fabricators for roof, roofing sheets and fencing and fixings.

Finishing stage

- Checking the quality of flooring with respect to levels and smoothness at random
- Checking the door and window opening locations
- Checking the quality of joinery with respect to workmanship and fixtures, at random
- Checking the plaster in walls and ceiling with regard to proportions, line and level and curing, at random
- Checking the finishing works at random, such as painting, dadooing, fixing of ceramic tiles, fixing of sanitary fixtures, steel grill works, etc.

3. Mechanical and electrical works

The standard and special specifications shall be referred, to determine the scope of the work to be undertaken. Test of earthing and lightening protection systems shall be included.

F. Quality monitoring during construction of landfills

- Checking the level of excavation, plan dimensions and side slopes
- Checking the type of soil available and its uniformity in the site
- Verifying the soil with respect to its suitability for mixing with bentonite in achieving required permeability
- Mixing of bentonite and compaction of layers through testing on compacted layers

ANNEXURE B : LIST OF SITES PROPOSED TO BE SUPERVISED, INSPECTED AND AUDITED

Sl No.	Site Code	BLOCK	Name of GP	Name of the site	Package No.
1	G1	**Gosaba**	Rangabelia	Rangabelia High School	1
2	G2	**Gosaba**	Lahiripur	Santigachi High School	1
3	G3	**Gosaba**	Sambhunagar	Sambhunagar High School	1
4	G4	**Gosaba**	Kumirmari	Safakachari N.C. Memo. F.P. School	1
5	G5	**Gosaba**	Chottomollakhali	Mangal chandra High School	1
6	G6	**Gosaba**	pathankhali	Pathankhali Hazi Desharat College	1
7	G7	**Gosaba**	C.M. Khali	Gobindapur Jr. High School	
8	B1	**Basanti**	Nafargang	Surendranath Balika Vidyalaya HS	2
9	B2	**Basanti**	Basanti	Purandar Free Primary School	2
10	B3	**Basanti**	Uttarmokamberia	Harbhangi Free Primary School	2
11	B4	**Basanti**	Chunakhali	Chunakhali Hatkhola Upper Primary School	2
12	B5	**Basanti**	Masjidbati	Hiranmoypur Godkhali Free primary School	2
13	N1	**Namkhana**	Budakhali	Rajnagar Srinathgram Jr. Basic School	3
14	N2	**Namkhana**	Narayanpur	Iswaripur Free Primary School	3
15	N3	**Namkhana**	Frazerganj	Near Debnibas Sub-center Field	3
16	PP1	**Patharpratima**	Laxmijanardanpur	Laxmijanardanpur High School	4
17	PP2	**Patharpratima**	G-Plot	Daspur Upper Primary School	4
18	PP3	**Patharpratima**	Ramganga	Devichak Veterinary Ground	4
19	PP4	**Patharpratima**	Banshyamnagar	Gangapur Free Primary School	4
20	PP5	**Patharpratima**	G-Plot	Indrapur Taltala Kamlakanta Free primary School	4

Sl No.	**Site Code**	**BLOCK**	**Name of GP**	**Name of the site**	**Package No.**
21	S1	**Sagar**	Dhablat	Dhablat R.K.G.N. Free primary School	5
22	S2	**Sagar**	Dhaspara Sumatinagar-II	Sumatinagar Sarat Kumari High School	5
23	S3	**Sagar**	Gangasagar	Bishnupur Khagendranath Balkrishna Vgidyapith	5
24	S4	**Sagar**	Ghoramara	Khasimara Jr. Basic School	5
25	S5	**Sagar**	Ramkarchar	Krishnanagar High School	5