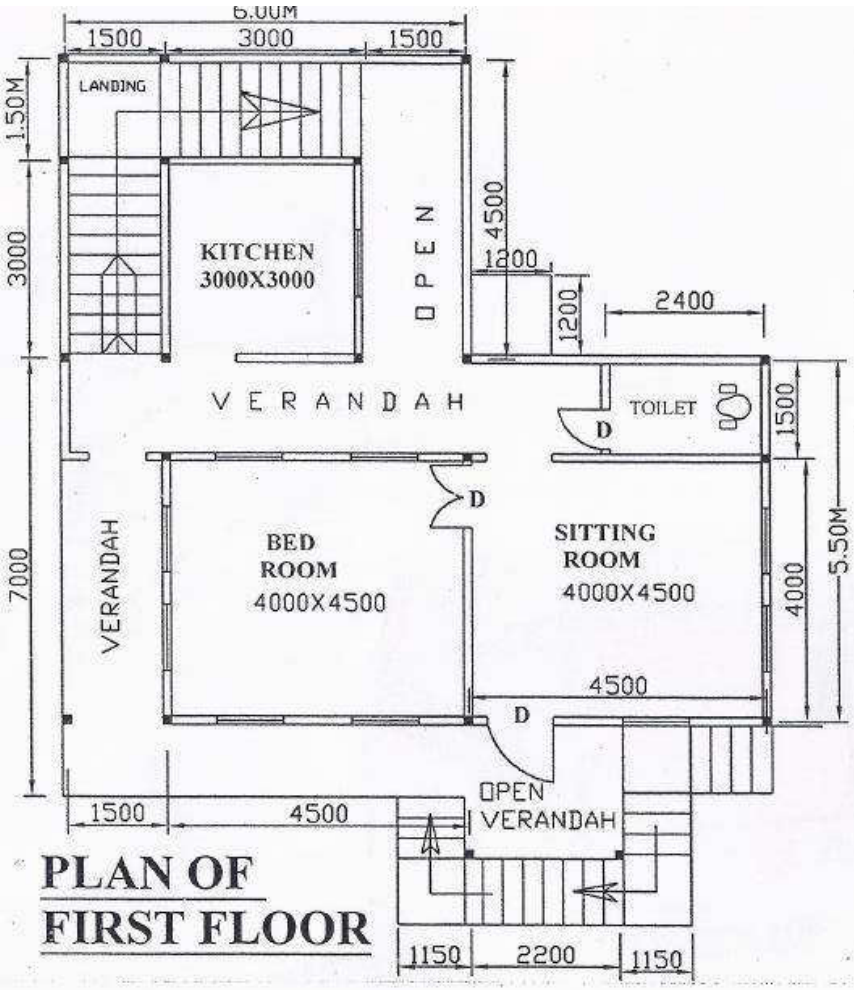
Initial Environmental Examination
(updated)

Project Number: 38412-033
August 2018

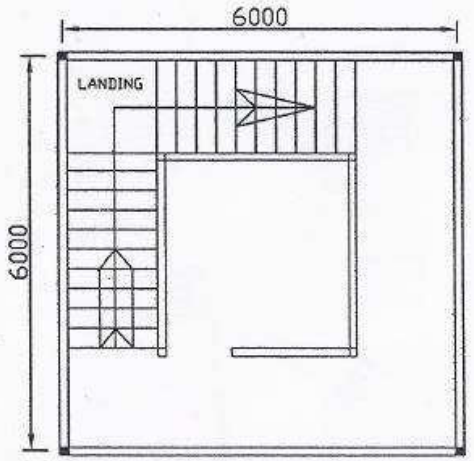
India: Multitranche Financing Facility – Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program – Project 2

Kaziranga Subproject (Golaghat District)
(2 of 2)

Prepared by the Flood and River Erosion Management Agency of Assam, Government of Assam for the Asian Development Bank. This is an updated version of the initial environmental examination originally posted in July 2018 available on https://www.adb.org/sites/default/files/project-documents/38412/38412-033-iee-en_1.pdf.

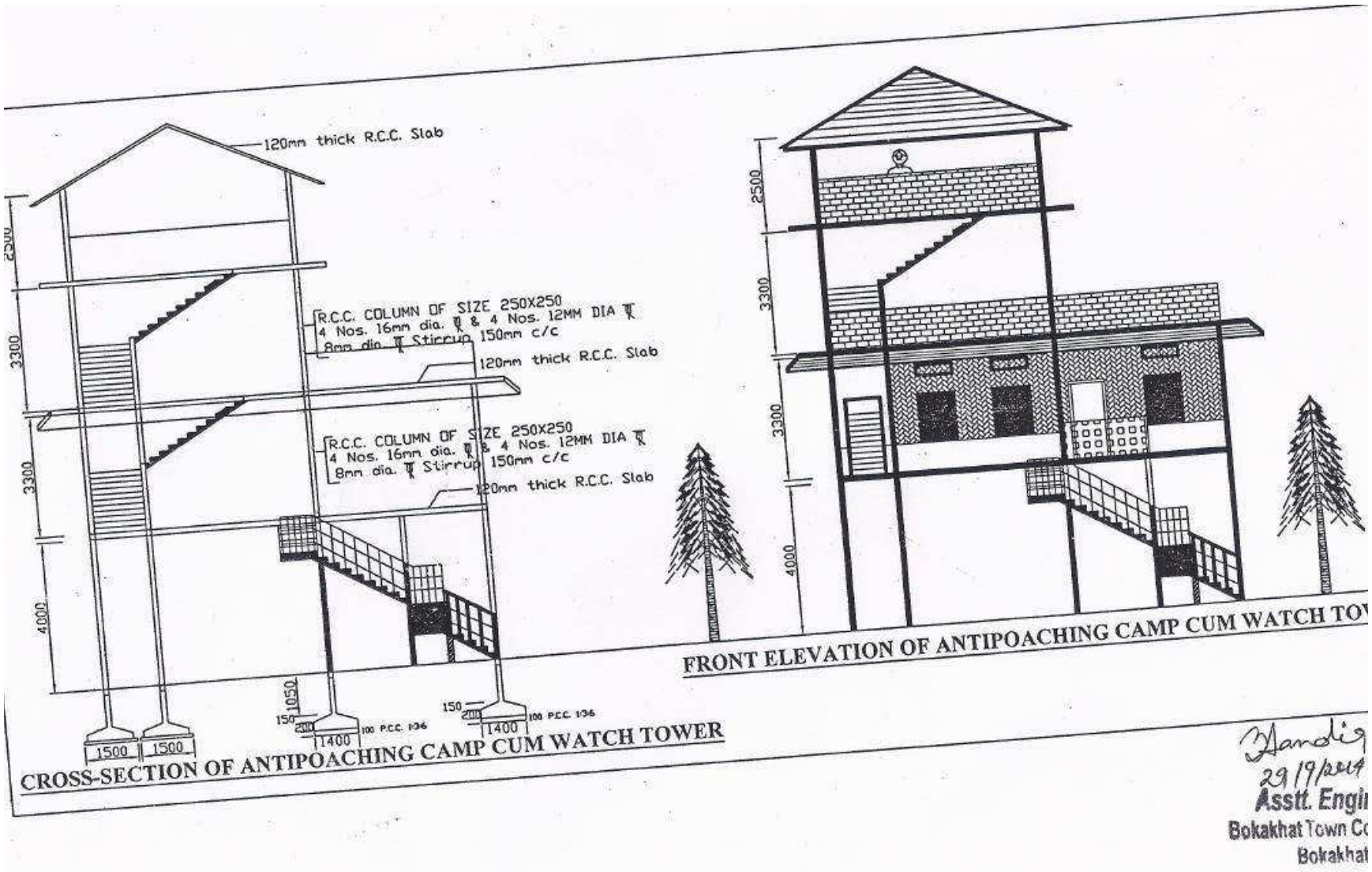


PLAN OF FIRST FLOOR



PLAN OF 2nd & 3rd FLOOR

29/09/2014
Asstt. Engineer
Bokakhat Town Committee
Bokakhat


120mm thick R.C.C. Slab
R.C.C. COLUMN OF SIZE 250X250
4 Nos. 16mm dia. ₹ & 4 Nos. 12MM DIA ₹
8mm dia. ₹ Stirrup 150mm c/c
120mm thick R.C.C. Slab
R.C.C. COLUMN OF SIZE 250X250
4 Nos. 16mm dia. ₹ & 4 Nos. 12MM DIA ₹
8mm dia. ₹ Stirrup 150mm c/c
120mm thick R.C.C. Slab
2500
3300
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4000
1050
150
200
1400
100 P.C.C. 1:3:6
150
200
1400
100 P.C.C. 1:3:6
1500
1500
CROSS-SECTION OF ANTIPOACHING CAMP CUM WATCH TOWER
FRONT ELEVATION OF ANTIPOACHING CAMP CUM WATCH TOW
Asstt. Engi
Bokakhat Town C
Bokakhat

Appendix 21: Design and Detailed Cost of the Anti-Poaching Watch Tower

ESTIMATE

DETAIL ESTIMATE FOR CONSTRUCTION OF TONGI HOUSE (WATCH TOWER) AT BURACHAPARI WILDLIFE SANCTUARY UNDER NAGAON WILDLIFE DIVISION, DIST. NAGAON, ASSAM.

Estimate is prepared as per Assam PWD Schedule of Rates of year -2011-12 (Building)

Item No	Particulars	Qnty	Unit	Rate/unit	Amount in Rs
1/1.1(a)	Earth work in excavation for foundation trenches of wall footing of column, septic tank etc. including refilling breaking clods in return filling complete as directed. in ordinary soil.	8.64	m3	64.67	558.75
2/1.3(c)	Sand filling in plinth in layers not more than 150 mm thick complete with truck carriage including payment of land compensation loading unloading complete	1.73	m3	322.75	558.36
3/2.1.1(a)	Plain cement concrete work with coarse agg. of sizes 13 mm to 32 mm of size in foundation bed including dewatering if necessary and curing complete in prop 1:3:6(using M/machine	0.68	m3	3733.63	2538.87
4/2.2.1(a)	Providing and laying reinforced cement concrete work in prop.1:2:4 with graded stone agg.....complete as directed in foundation in super structure from plinth up to Ist floor level M15 or 1:2:4	2.01	m3	4734.15	9515.64
5/2.2.1	(b)-do- in super structure up to Ist floor level. Providing and laying reinforced cement concrete work in prop. 1:2:4 with graded stone agg complete in super structure up to Ist floor level.	4.68	m3	4875.71	22,818.32
7/9.9.2 (A) (ii)	Providing fitting & fixing full paneled door, window including butt hinges with necessary screw complete with Ist class local wood. 30 mm thick. Gamari/ Hallock etc.	2.21	m2	2947.16	6,513.22
8/6.2.2 (b)	15 mm thick cement plaster in single coat on both side of brick wall for plasteringup to first floor even & smooth complete in prop.1:5	126.54	m2	111.25	14,077.58
9/9.9.8 (c)(iii)	Providing fitting and fixing fully glazed window with intermediate sash bar complete . 30 mm thick. Gamari/ Hallock etc.	9.45	m2	994.89	9401.71
11/4.1.4(c)	Brick work in cement mortar with Ist class brick including racking out all joints.complete. in prop.1:5	4.72	m3	4423.20	20877.50
12/4.1.7(b)	112 mm thick Ist class brick nogged wall in cement mortar embedded with ..... complete in prop. 1:5	49.75	m2	499.76	24863.06
13/13.2.2 (f)	Distempering with dry distemper of approved brand and manufacture(two coats)and of required shade on new wall surface to give an even shade, over and including priming coat of white primer after thoroughly brushing the said wall	86.73	m2	62.42	5413.69

14/13.3.1	PLASTER OF PARIS & WALL PUTTY Providing surface preparation for walls, calling excusing average 1.50 mm thick plaster of Paris including clearing, rubbing with sand paper, filling gaps, depression etc. where necessary, with chalk powder and plaster of Paris paste, making the surface even and smooth complete at all levels as specified and directed	76.59	m2	47.42	3631.90
15/14.1.1	Varnishing two coats (excluding priming coat) on new wood and wood based surfaces under coating with flatting varnish and finishing coat with copal varnish or spar varnish to give an even surface including cleaning the surface of all dirt, dust and smooth, dry and matt surface	12.68	m2	70.37	892.29
16/5.7.1.1	FLOOR TILES -Providing Ceramic Tiles of approved quality, size, shape and thickness not less than 8 mm on floors, skirtings, treads where necessary finished with flush pointing with Fix-A TileChoksey /Sika/	57.65	m2	754.61	43,503.27
17/10.2 (II)(a)	Providing fitting and fixing ornamental grill of required pattern fixing in wooden frame..... complete.	125.41	kg	63.27	7,934.69
18/18.1.1	Supplying fitting and fixing in position reinforcement bar conforming to relevant I.S code for RCC works exculding cost of shuttering and shoring.	9.76	Qntl	4746.44	46,325.25
19/3.3.1.3 (a)	Providing form work of ordinary timber planking so as to give a rough finish including centering, plain concrete work in superstructure	86.54	m2	215.79	18,674.47
20/10.2	Providing fitting and fixing M.S steel ladder of require pattern for window/clearestory window opening with M.S flat at required space headed with screw and nuts & bolts complete.	188.75	Kg	63.27	11942.21
		TOTAL		Rs	250040.78
		SAY		**Rs**	**250000.00**

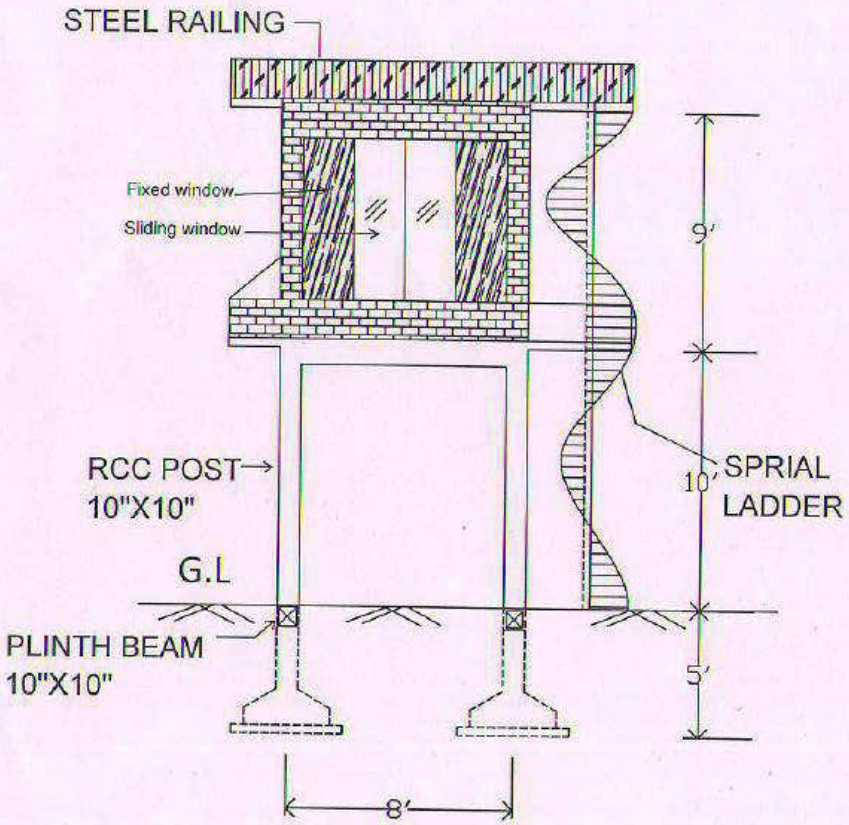
(Rupees Two lakhs fifty thousand) only

Prepared by

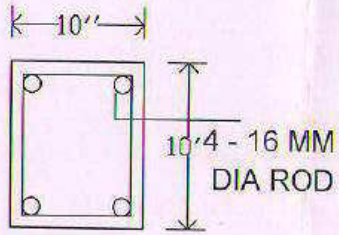
16/4/14

Junior Engineer (Civil)
Town & Country Planning
Nagaon, Assam

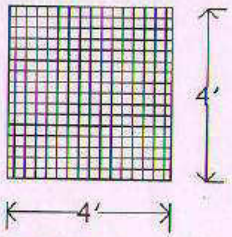
CONSTRUCTION OF TONGI HOUSE (WATCH TOWER) AT BURACHAPARI WILDLIFE SANCTUARY UNDER NAGAON WILDLIFE DIVISION, DIST. NAGAON, ASSAM.



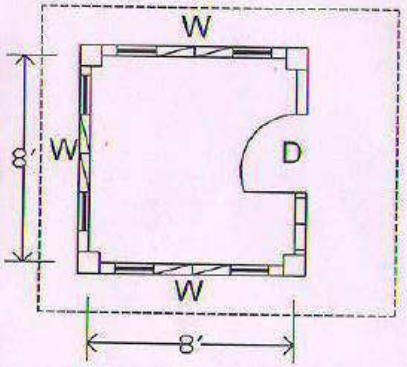
ELEVATION



TIE BEAM



FOOTING JALI



PLAN OF WATCH TOWER

Junior Engineer (Civil)
Town & Country Planning
Nagaon, Assam

Appendix 22: Design and Detailed Cost of the Monitoring Boat

Construction detail

1. **Introduction**

The design and specifications of the boat are to house a comfortable and safe sailing passenger for river patrolling with all related onboard service and facilities. Also the boat will be considered for minimum draft measured as low as 2.5 ft only.

2. **Boat Specification**

2.1. Basic Dimensions

Length	: 56'
Breath	: 12'
Heigth	: 3'8"

Minimum Draft at operation level : 2'6"

Draft determines the minimum depth of water the boat can safely navigate. The draft can also be used to determine the on board weight of the boat by calculating the total displacement of water and using Archimedes' principle.

2.2. **Material in used**

The type of wood used for the construction of boat (hull) are *sam, makai, gansroi* with their local name. 2" of woodplank will be used in the overall structure along with the standard wood studs.

3. **Engine Details & Specifications**

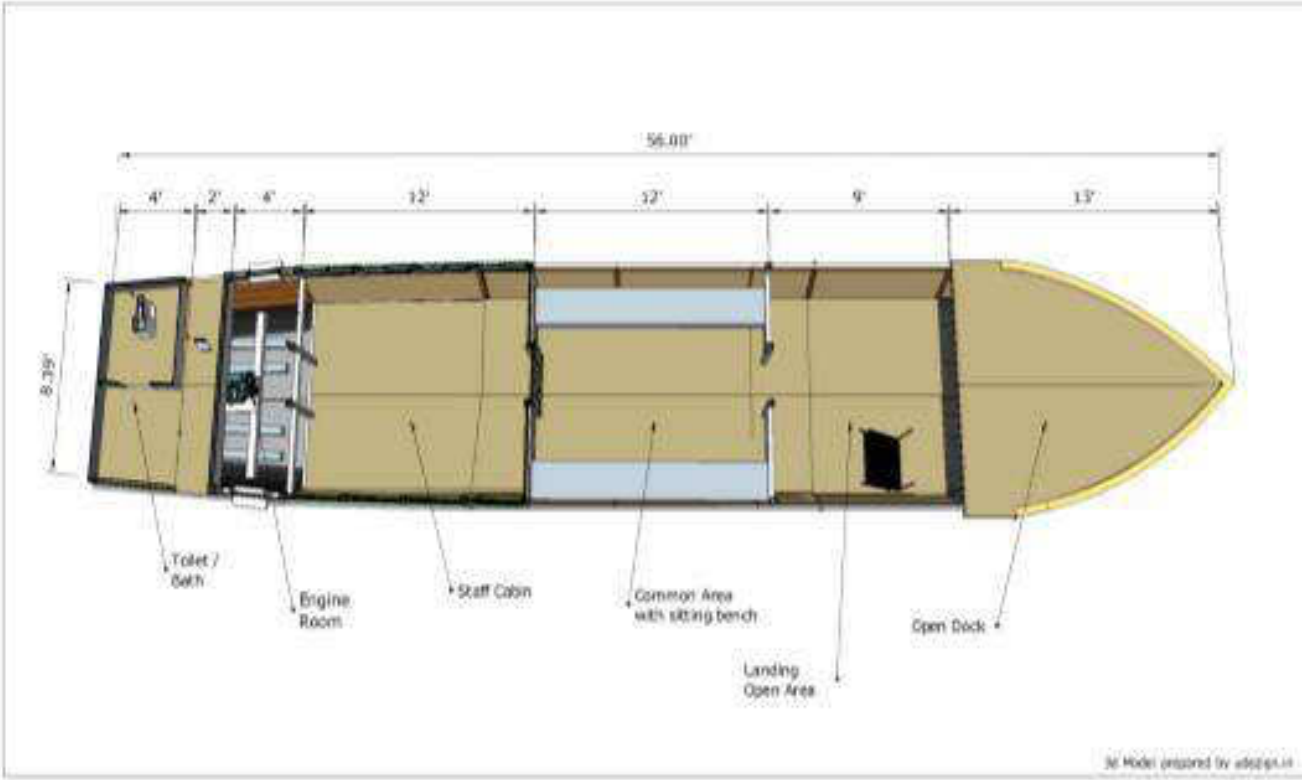
One (1) engine, make TATA 407 are going to be used for the boat driving force. The turbo engine of TATA 407 creates less pollution. Normally the boat can easily driven by one engine but if high speed is needed both the engine can be used. Therefore one engine will remain standby for emergency. The tata engine, the fuel consumption is also very less

Engine Specifications

Model :	TATA SFC 407 EX 3800/HSD
Engine Displacement :	2956 cc
Engine :	2956 cc, TATA 407 SP TURBO, Inter-cooled direct injection diesel engine
Emission Norms :	BS-III
Engine Cylinder :	4 (Four)
Displacement (cc) :	2956
Maximum Power :	72.8bhp @ 3050rpm
Max Torque :	245Nm @ 1400-1600rpm
Transmission :	Manual
Gearbox :	2-speed
Battery :	12 V, 75-Ah; Alternator Capacity:- 65 Amps
Fuel Consumption (apx.) :	2 to 5 ltr per hour

4. On board facilities

- One Staff Cabin
- One Toilet / Wash Room
- One Radar Control Area
- Upper Dock
- Front Landing with Ladder



5. Boat Standard Features
   - 5.1. Manual Drive Control
   - 5.2. Anchor
   - 5.3. Life Jacket & Life buoy

6. Clips Gallery

Front View

Side View

Section Cut - Engine Room

Front Elevation

Side View

7. Approximate Estimate

A	**WOOD FOR BOAT (HULL)**	**₹1,000.00**	**300**	**CFT**	**Rs 300,000.00**
	BOAT SIZE WIDTH = 14 FT LENGTH = 72 FT. DRAFT = 4 FT 6 INCH				
B	**CARPENTER & LABOUR CHARGE**		**1**	**LUMSUM**	**Rs 125,000.00**
	ONLY FOR THE HULL				
C	**DIESEL ENGINE**	**₹120,000.00**	**1**	**NOS**	**Rs 120,000.00**
	TATA SFC 407 EX 3800/HS (with Gearbox)				
D	**PROPELLER AND STEERING CONTROL**	**₹50,000.00**	**1**	**SET**	**Rs 50,000.00**
	Single Propeller with shaft Anchor and rope Life Jacket and Life buoy 1 x 12Volt Battery				
E	**CABIN AND INTERIOR FINISHING**	**₹75,000.00**	**1**	**Unit**	**Rs 75,000.00**
	One Staff Cabin One Toilet Cum / Wash Room Top Open Dock with railing				
F	**Lights & Wiring**	**₹150,000.00**	**1**	**SET**	**Rs 25,000.00**
	All electric wiring and plumbing works				
G				**All Tota*l =**	**Rs 695,000.00**

* Additional Govt taxes applicable

Appendix 20: Good Practices

GUIDELINE-12: LABOUR AND WORKER'S HEALTH AND SAFETY

1. INTRODUCTION

The safety and health concerns of the workers and the community are impacted due to the hazards created during the construction of road. **Box: 1** gives the safety concerns during construction. This Guideline describes the hazards and measures that need to be taken to mitigate the impacts.

2. PROJECT PLANNING AND DESIGN STAGE

To address health and safety concerns, the DPR shall contain selection criteria for setting up:

- Construction Camps (as per guideline);
- Borrow Areas (as per guideline); and
- In case of opening new quarry areas (as per guideline).

To address the safety concerns to road user during operational phase, the DPR shall contain the following:

- Selection and location of regulatory as well as informatory signs as per IRC: 67-2001, depending upon the geometry of the road.

Box 1: Safety Concerns during Construction

Community due to:

- Improper scheduling of construction activities especially near the settlements and sensitive areas;
- Parking of equipments and vehicles at the end of the day likely to cause accidents to the general public especially during night hours;
- Transportation of uncovered loose material or spillage of material increases the chances of accidents to road users and surrounding settlements.

Workers due to:

- Improper handling of materials like bitumen, oil and other flammable material at construction sites, likely to cause safety concerns to the workers;
- Lack of safety measures such as alarm, awareness and safety equipment result in accidents, especially working with or around heavy machinery / equipments.

PRE-CONSTRUCTION STAGE

In order to incorporate public health and safety concerns, the PIU and the Contractor shall disseminate the following information to the community:

- Location of construction camps, borrow areas and new quarry areas;
- Extent of work;
- Time of construction;
- Diversions, if any;
- Precaution measures in sensitive areas;
- Involvement of local labours in the road construction;
- Health issues - water stagnation, exposure to dust, communicable disease; and
- Mechanism for grievances.

Health Concerns are adversely impacted.....

Public due to:

- Unhygienic conditions due to water logging (improper drainage of waste water), either by improper decommissioning of Construction Camps and parking lots, or improper disposal of construction wastes, leading to the breeding of vectors that are likely to impact the health of the general public
- Interaction between workers and host community is likely to increase the risk of spread of communicable diseases.

Workers due to:

- Low quality drinking water as well as inappropriate storage of drinking water likely to cause water borne diseases among workers.
- Absence of proper sanitary facility likely to act as a breeding ground for vectors raising health concerns among workers.

The information dissemination could be through the local newspaper, billboards, panchayats meetings, etc. The Contractor must educate the workers to undertake the health and safety precautions. The contractor shall educate the workers regarding:

- Awareness on HIV/AIDS awareness and usage of safety measures such as condoms;
- Awareness on hygienic sanitary practices;
- Personal safety measures and location of safety devices;
- Interaction with the host community;
- Protection of environment with respect to:
  - Trampling of vegetation and cutting of trees for cooking;
  - Restriction of activities in forest areas and also on hunting; utmost
  -
  - Water bodies protection;
  - Storage and handling of materials;
  - Disposal of construction waste.

FIRST AID FACILITIES

- First Aid Kit, distinctly marked with Red Cross on white back ground and shall contain minimum of following:
  - 6 small sterilized dressings
  - 3 medium and large sterilized dressings
  - 1 (30 ml.) bottles containing 2 % alcoholic solution of iodine
  - 1(30 ml) bottle containing salvolatile
  - 1 snakebite lancet
  - 1 pair sterilized scissors
  - 1 copy of first-aid leaflet issued by the Director General, Factory Service & Labour Institute, Government of India
  - 100 tablets of aspirin
  - Ointment for burns
  - A suitable surgical antiseptic solution
- Adequate arrangement shall be made for immediate recoupment of the equipments, whenever necessary.
- A trained personnel incharge of first aid treatment to be readily available during working hours at construction site
- Suitable transport to the nearest approachable hospital should be made available.
- Tetanus injection must be made compulsory for all workers every 6 months.

3. CONSTRUCTION STAGE

During the progress of work, following are the safety requirements that need to be undertaken by the contractor at the construction site:

- Personal Protective Equipments (PPE) for the workers. **Table 1** gives the safety gear to be used by the workers during each of the construction activities.
- All measures as per bidding document shall be strictly followed.
- Additional provisions need to be undertaken for safety at site:
  - Adequate lighting arrangement;
  - Adequate drainage system to avoid any stagnation of water;
  - Lined surface with slope 1:40 (V:H) and provision of lined pit at the bottom, at the

storage and handling area of bitumen and oil, as well as at the location of generator (grease trap); and
- Facilities for administering first aid.

Table 1: Worker Safety Measures

Sl. no.	Activity	Safety Requirement
1.	Setting out and levelling	• Luminous jackets; • Helmets; • Boots for protection against insect bite; and Dust Mask
2.	Tree cutting	• Helmet Boots • Luminous safety jackets
3	Reinforced yard/ carpentry/ reinforcement cutting/ bending work.	• Hand gloves
4.	Shuttering work	• Goggles Hand gloves
5.	Plant and Machinery	• Hand gloves • Boots • Helmets • Dust Mask
6.	Material handling	• Hand gloves • Dust mask
7.	Batching plant	• Goggles • Hand gloves • Dust mask
8.	Weeding	• Goggles
9.	Binding reinforcement	• Safety belt • Boots
10.	Manual concrete laying	• Gum boots • Hand gloves • Helmet
11.	Piling	• Helmet • Hand gloves, gumboots.

The following measures need to be adopted by the contractor to address public safety concerns:

- The Contractor shall schedule the construction activities taking into consideration factors such as:
  - Sowing of crops;
  - Harvesting;
  - Local hindrances such as festivals etc.; and
  - Availability of labour during particular periods.
- All the cautionary signs as per IRC: 67-2001 and traffic control devices (such as barricades, etc) shall be placed as soon as construction activity get started and shall remain in place till the activities get completed.
- Following case specific measures need to be followed during the progress of the activity:
  - Incase of blasting, the Contractor must follow The Explosives Rules, 1983.
  - Incase of construction activity adjoining the water bodies, measures shall be taken as per measures suggested in Guideline on "Water Body".
  - If construction of road is within the settlement, the contractor must ensure that there shall not be any unauthorized parking as well as storage of material, adjacent to road.
  - Approved chemicals should be sprayed to prevent breeding of mosquitoes and other disease-causing organisms, at all the water logging areas

The PIU shall carry out periodic inspections in order to ensure that all the measures are being undertaken as per the guideline.

4. POST-CONSTRUCTION STAGE

During this stage a major concern is on road user safety. Following are the measures that need to be undertaken by the PIU to ensure safer roads:

- Inspection and maintenance of installed regulatory and informatory signs.
- Ensure that the location of signage does not obstruct the visibility
- Incase of hill roads, maintenance of parapet wall as well as of overtaking zones.

The PIU must ensure that during the maintenance operation of road, road materials are stored at a location such that they shall not create any risk to road users.

The construction site shall be cleaned of all debris, scrap materials and machinery on completion of construction for the safety of public and road users, as per the measures given in Guideline on "Construction and labour Camp" and "Waste Management and Debris Disposal."

GUIDELINE-6: WATER FOR CONSTRUCTION

1. INTRODUCTION

The scope of this guideline includes the procurement of water required for construction of roads. Except bituminous works, water is required during all stages of road construction such as Embankment Sub-Grade; Granular sub-base (GSB) and Water Bound Macadam (WBM). Management of water in various stages of construction is given in the following sections.

2. PROJECT PLANNING & DESIGN STAGE

- The Detailed Project Report for both road constructions shall contain the following information:
- Estimate of water requirement during different seasons based on construction schedule of various stages of construction.
- Identification of potential sources of water for construction,
- Arrangements to be worked out by the contractor with individual owners, when water is obtained from private sources, and
- Whether scarcity of water would have any impact on schedule of construction.

In water-scarce regions, provide the following additional information in Project Reports…

- Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant Government Departments, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users.
- Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works
- Identification of alternate water sources, water-harvesting techniques will be explored to avoid water extraction from the existing community sources.

In water scarce regions, if water-harvesting structures are to be constructed, suitable locations and mechanism for siting these structures will be identified. These are envisaged to be permanent water tanks for collection of stream water. Detailed drawings of water harvesting structures based on site conditions will need to be worked out and presented in the DPR. No extra payment shall be generally made for these works and the Contractor has to include the cost of these items in his offer while quoting his tendered rate.

Scheduling Construction in Water Scarce Areas: As part of the project preparation, the PIU shall conduct an assessment of water requirement and availability in water scarce regions. As far as possible, schedule for construction in these water scarce areas shall be prepared such that earthwork for embankment is carried out just before monsoon, so that water requirement for subsequent construction works such as granular sub-base and water bound macadam are met in monsoon and post monsoon season. Carrying

out these activities even during the monsoon is possible as the rainfall may not be high enough to disrupt construction.

3. PRE-CONSTRUCTION STAGE

Prior to commencement of extraction of water for construction, the contractor shall work out arrangements as specified in the DPR.

In water-scarce regions, provide the following additional information in Project Reports…

- Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant Government Departments, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users.
- Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works.
  from any septic tank/soak pit or other source of pollution.
- **In case of water harvesting structures** (if required), the Contractor shall in consultation with the residents, identify suitable locations for siting the structure and construct the same.
- **In case of perennial sources,** the Contractor shall adhere to all administrative procedures pertaining to procurement of water from such sources.

CONSTRUCTION STAGE

During construction, the Contractor shall be responsible to monitor the following:

- The arrangements worked out with the Panchayat/individual land owners for water extraction is adhered to;
- Extraction of water is restricted to construction requirement and domestic use of construction workers;
- Water requirement for curing of concrete shall be minimized by pooling of water over the concrete or by covering with wet gunny bags; and
- The potable water used for drinking purposes of construction workers shall be as per the Indian Standard for Drinking Water IS: 10500, 1991.

GUIDELINE-5: QUARRY MANAGEMENT

1. INTRODUCTION

This guideline pertains to the measures to be taken to address environmental concerns in quarry areas. The general practice adopted is to procure materials from existing quarries operating with the requisite permits. The measures to be taken for operation and management for quarries during all stages of construction have been discussed in this Guideline.

2. PROJECT PLANNING AND DESIGN STAGE

The PIU shall provide in the DPR / bid document, a list of licensed quarries operating within the district and adjoining districts. In addition, the DPR shall contain the following: (i) Quantity of materials available in quarries (ii) Lead from the various existing quarries and (iii) Adequacy of materials for the project in these quarries. **Table 1** and **2** give the format for preparing a list of quarries.

Table 1 Details of Sand Quarry

Sampl	Sourc	Name	Site Identification/ Location	Approximat	Approximat	Remark

e No.	e of Sand	of quarry area	Nearest Chainage (Km.)	Left/Right	Offset from nearest chainage (km)	e Quantity (cum)	e basic cost of the material (Rs.)	s

Table 2 Details of Quarry Area for Aggregates

Sample No.	Chainages(Km.)	Left/Right	Name of Quarry Area	Name of Crusher	Lead from nearest chainage (Km.)	Basic cost of the material (Rs.)	Available land/terrian	Surrounding land Terrian	Remarks

Only in the event of non-availability of existing quarries, the Contractor shall open a new quarry in accordance with Mines and Minerals (Development & Regulation) Act, 1957. The bid document shall include the exhaust quarry reclaim plan per needs of the landowner / community.

3. PRE-CONSTRUCTION STAGE

The Contractor shall select an existing licensed quarry identified in DPR for procuring materials. The Contractor shall establish a new quarry with the prior consent of the PIU only in cases when: (i) Lead from existing quarries is uneconomical and (ii) Alternative material sources are not available. The Contractor shall prepare a Redevelopment Plan for the quarry site and get it approved by the PIU.

The construction schedule and operations plans to be submitted to the PIU prior to commencement of work shall contain a detailed work plan for procuring materials that includes procurement, transportation and storage of quarry materials.

4. CONSTRUCTION STAGE

4.1 Development of Quarry Area

To minimize the adverse impact during excavation of material following measures are need to be undertaken:

- Adequate drainage system shall be provided to prevent the flooding of the excavated area
- At the stockpiling locations, the Contractor shall construct sediment barriers to prevent the erosion of excavated material due to runoff.
- Construction of offices, laboratory, workshop and rest places shall be done in the up-wind of the plant to minimize the adverse impact due to dust and noise.
- The access road to the plant shall be constructed taking into consideration location of units and also slope of the ground to regulate the vehicle movement within the plant.
- In case of storage of blasting material, all precautions shall be taken as per The Explosive Rules, 1983.

4.2 Setting up of Crushers and other equipments

The following measures shall be undertaken for setting up of crushers are other equipments.

- The contractor shall obtain “No Objection Certificate (NoC)” from the Assam State Pollution Control

Board.

- All vehicles must possess Pollution Under Control (PUC) Certificate and shall be renewed accordingly
- All machinery, equipments, and vehicles shall comply with existing CPCB noise and emission norms.
- The PIU must ensure that contractor shall submit the copy of NoC and PUC Certificate before the start of work.

4.3 Quarry operations

The followings precautions shall be undertaken during quarry operations. vii) Overburden shall be removed and disposed as per **Guideline 8** "Waste Management and Debris Disposal".

- During excavation slopes shall be flatter than 20 degrees Guideline 8 on to prevent their sliding
- In case of blasting, the procedure and safety measures shall be taken as per The Explosive Rules, 1983
- The Contractor shall ensure that all workers related safety measures shall be done as per measures for, "Labour& Workers Health & Safety" (**Guideline 12**).
- The Contractor shall ensure maintenance of crushers regularly as per manufacturer's recommendation.
- Stockpiling of the excavated material shall be done as per stockpiling of topsoil explained in **Guideline 4**, "Topsoil Salvage, Storage& Replacement."
- During transportation of the material, measures shall be taken as per **Guideline 11** "Construction Plants and Equipment Management" to minimize the generation of dust and to prevent accidents
- The PIU and the concerned authority shall review the quarry site for the management measures during quarry operation, including the compliance to pollution norms.

5. POST CONSTRUCTION STAGE

A quarry redevelopment plan shall be prepared by the Contractor. All haul roads constructed for transporting the material from the quarries to construction site shall be restored to their original state.

The PIU and the concerned authority shall be entrusted the responsibility of reviewing the quarry site for the progress of implementation of Redevelopment Plan.

The plan shall include:

- Photograph of the quarry site prior to commencement
- The quarry boundaries as well as location of the materials deposits, working equipments, stockpiling, access roads and final shape of the pit.
- Drainage and erosion control measures at site
- Safety measures during quarry operation
- Design for redevelopment of exhaust site.

Two options for redevelopment of quarry areas are given below:

Option A: Revegetating the quarry to merge with surrounding landscape. This is done by conserving and reapplying the topsoil for the vegetative growth.

Option B: Developing exhausted quarries as water bodies. The pit shall be reshaped and developed into pond, for harvesting rainwater. This option shall only be considered where the location of quarry is at the lowest point, i.e. surrounding areas/ natural drainage slopes towards it.

(ii) development of borrow areas (iii) temporary construction activities such as construction camps, material storage locations, diversion routes etc. The environmental measures for both these activities during all stages of construction activity are discussed in the subsequent sections.

3. PROJECT PLANNING & DESIGN STAGE

At the project preparation stage, the following shall be estimated: (i) Extent of loss of top soil due to widening and siting of construction activities (ii) Estimates of borrow area requirements and (iii) Area requirement for topsoil conservation. The bid document shall include provisions that necessitate the removal and conservation of topsoil at all locations opened up for construction by the Contractor.

4. PRE-CONSTRUCTION STAGE

The arrangements for temporary usage of land, borrowing of earth and materials by the Contractor with the land owner/concerned department shall include the conservation / preservation of topsoil.

5. CONSTRUCTION STAGE

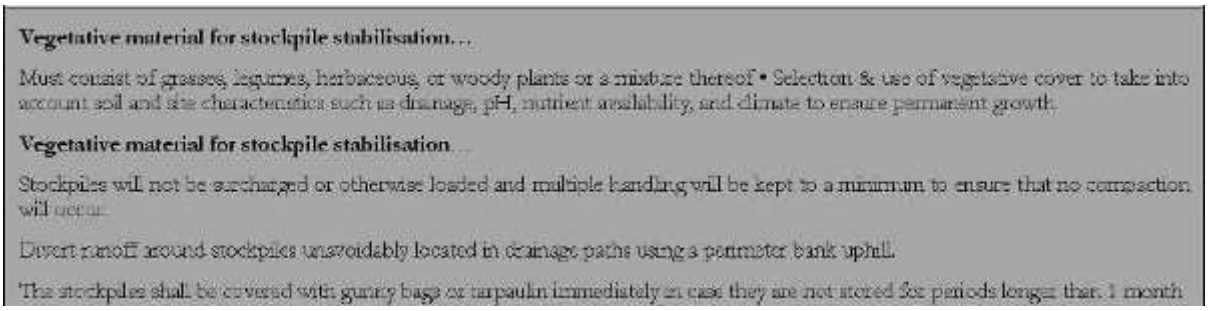
It shall be the responsibility of the Contractor to strip the topsoil at all locations opened up for construction. The stripped topsoil should be carefully stockpiled at suitable accessible locations approved by the PIU. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. In case of hilly and desert areas, topsoil with humus wherever encountered while opening up the site for construction shall be stripped and stockpiled. The stockpiles shall be located at:

- Areas away from Grade, Subsoil & Overburden materials;
- Areas away from pit activities and day-to-day operations;
- Areas that do not interfere with future pit expansion; and
- Areas away from drainage paths and uphill of sediment barriers.

The stockpiles for storing the topsoil shall be designed such that the slope should not be less than 1:2 (Vertical to horizontal), and the height of the pile is restricted to 2m. A minimum distance of 1m is required between stockpiles of different materials.

In cases where the topsoil has to be preserved for more than a month, the stockpile is to be stabilised within 7 days of forming. The stabilisation shall be carried out through temporary seeding. It consists of planting rapid-growing annual grasses or small grains, to provide initial, temporary cover for erosion control.

After spreading the topsoil on disturbed areas, it must be ensured that topsoil is seeded, and mulched within 30 days of final grading. During construction, if erosion occurs from stockpiles due to their location in small drainage paths, the sediment-laden runoff should be prevented from entering nearby watercourses. The Contractor shall preserve the stockpile material for later use on slopes or shoulders as instructed by the Engineer.


Vegetative material for stockpile stabilisation…

Must consist of grasses, legumes, herbaceous, or woody plants or a mixture thereof • Selection & use of vegetative cover to take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth.

Vegetative material for stockpile stabilisation

Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur.

Divert runoff around stockpiles unavoidably located in drainage paths using a perimeter bank uphill.

The stockpiles shall be covered with gunny bags or tarpaulin immediately in case they are not stored for periods longer than 1 month

6. POST CONSTRUCTION STAGE

The topsoil shall be re-laid on the area after taking the borrow earth to maintain fertility of the agricultural field, finishing it to the required levels and satisfaction of the farmer. The area to be covered with vegetation shall be prepared to the required levels and slope as detailed in the DPR. The stockpile material shall be spread evenly to a depth of 5-15cm to the designed slopes and watering the same as required. The growth

of the vegetation shall be monitored at frequent intervals. All temporary arrangements made for stockpile preservation and erosion control are to be removed after reusing the stockpile material. The top soil can also be used for the following purposes:

a. Covering the borrow areas;
b. Embankment and turfing;
c. Median; and
d. Rehabilitation of construction and labour camp.

GUIDELINE-3: BORROW AREAS

1. INTRODUCTION

Embankment fill material is to be procured from borrow areas designated for the purpose. Borrow areas cause negative environmental impacts if appropriate mitigation measures are not taken. The scope of this guideline includes measures that are required during project planning and design stage, pre-construction, construction stage and post construction stage. Borrow areas are related only to road construction activities.

2. PROJECT PLANNING AND DESIGN STAGE

Design measures for reduction in the quantity of the earthwork will have to be undertaken to reduce the quantity of material extracted and consequently decrease the borrow area requirement. Borrow area siting should be in compliance with IRC: 10-1961. The DPR shall contain (i) Guidelines for locating site of borrow areas (ii) The arrangements to be worked out with the land owner/community for the site and (iii) Sample designs for redevelopment of borrow areas.

3. PRE-CONSTRUCTION STAGE

The contractor shall identify the borrow area locations in consultation with the individual owners in case of private lands and the concerned department in case of government lands, after assessing suitability of material. The suitable sites shall be selected and finalized in consultation with the PIU. Borrowing to be avoided on the following areas:

- Lands close to toe line.
- Irrigated agricultural lands (In case of necessity for borrowing from such lands, the topsoil shall be preserved in stockpiles. The subsequent Guidelines discuss in detail the conservation of topsoil.
- Grazing land.
- Lands within 0.8km of settlements.
- Environmentally sensitive areas such as Reserve Forests, Protected Forests, Sanctuary, wetlands (including beel). Also, a distance of 500 m should be maintained from such areas.
- Designated protected areas / forests.
- Unstable side-hills.
- Water-bodies.
- Streams and seepage areas.
- Areas supporting rare plant/ animal species;
- Ensure unsuitable soft rock is not prominent within the proposed depth of excavation which will render rehabilitation difficult.

3.1. Arrangements for Borrow Area

The Contractor will work out arrangements for borrowing with the land owner/concerned department. The arrangements will include the redevelopment after completion of borrowing. The arrangements

will be verified by the PIU to enable redressal of grievances at a later stage of the project. The Engineer of PIU shall approve the borrow area after inspection of the site to verify the reclamation plan and its suitability with the contractor and landowner. The contractor shall commence borrowing soil only after the approval by the PIU. The contractor shall submit to the PIU the following before beginning work on the borrow areas.

- Written No-objection certificate of the owner/cultivator;
- Estimate extent of earth requires;
- Extent of land required and duration of the agreement;
- Photograph of the site in original condition; and
- Site redevelopment plan after completion.

The depth of excavation should be decided based on natural ground level of theland and the surroundings, and rehabilitation plan. In case higher depth of excavation is agreed with backfilling by unsuitable excavated soil (from roadway), then filling should be adequately compacted except topsoil, which is to be spread on the top most layer (for at least 20m thick). The guidelines for location, depth, size and shape of the borrow areas are available in the following:

- Clause 305.2.2.2 of MoRTH specification for roads and bridge works of IRC;
- Guidelines for environmental impact assessment of highway projects, Indian Roads Congress, 1989: (IRC: 104-1988);
- IRC: 10-1961-Recommended practice for borrow pits for road embankments constructed by manual operations, as revised in 1989;
- IRC SP: 58-2001 guideline for use of fly ash in road construction;
- EIA manual of MoEF, 2001;
- MoEF notification on utilisation of fly ash dated 27 August, 2005.

3.2. Documentation of Borrow Pit

The contractor must ensure that following data base must be documented for each identified borrow areas that provide the basis of the redevelopment plan.

- Chainage along with offset distance;
- Area (Sq.m);
- Photograph of the pit from all sides;
- Type of access/width/kutcha/puccaetc from the carriageway;
- Soil type;
- Slope/drainage characteristics;
- Water table of the area or identify from the nearest well, etc;
- Existing landuse, for example barren/agricultural/grazing land;
- Location/name/population of the nearest settlement from borrow area;
- Present usage of borrow area; and
- Community facility in the vicinity of borrow pit.

3.3. Redevelopment Plans for Borrow Pits

The following checklist provides guidelines in order to ensure that redevelopment of borrow areas must comply with MoRTH, clause 305.2.2.2 and EMP requirement. Borrow areas can be developed as:

- Ponds (various types) (eg: Drinking Water only; Washing and for other Domestic Chores; Only for Cattle; Mixed Uses etc.) (a large pond can be divided into two parts - each having a defined use)
- Farmland
- Water Recharging Zones
- Pastureland
- Fish Ponds (pissiculture)

- Waste disposal Sites (depending upon the location, distance from settlements, pollution risks, safety, associated environmental risks and hazards, regulations/ permissions of appropriate authority and other such factors)
- Plantation Zones
- Recreational Zones (depending upon location, size, potential of the site, willingness of the local bodies to develop it)
- Wildlife Refuge and Drinking Area (applicable only in case of sensitive environs with appropriate planning and understanding including regulation of depth for safety of animals etc.)

The rehabilitation measures for the borrow areas shall be dependent on the following factors:

- Land use objectives and agreed post-borrowing activities;
- Physical aspects (landform stability, erosion, re-establishment of drainage);
- Biological aspects (species richness, plant density,) for areas of native re vegetation;
- Water quality and soil standards; and
- Public safety issues.

Rehabilitation should be simple and maintenance free. Depending on the choice of the individual land owner/community, the contractor shall prepare redevelopment plans for the borrow areas. The options can be: (i) Restoring the productive use of the land (ii) Development of detention ponds in barren areas.

Option I: Suitable in locations with high rainfall and productive areas

Topsoil must be placed, seeded, and mulched within 30 days of final grading if it is within a current growing season or within 30 days of the start of the next growing season. Vegetative material used in reclamation must consist of grasses, legumes, herbaceous, or woody plants or a combination thereof, useful to the community for the fuel and fodder needs.

Plants must be planted during the first growing season following the reclamation phase.

Selection and use of vegetative cover must take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth. The vegetative cover is acceptable if within one growing season of seeding, the planting of trees and shrubs results in a permanent stand, or regeneration and succession rate, sufficient to assure a 75% survival rate.

Option II: In barren land, the borrow areas can be redeveloped into detention ponds.

These will be doubled up as water bodies and also for removal of sediment from runoff flowing through the ponds. Design of the detention basin depends upon the particle size, settling characteristics, residence time and land area. A minimum of 0.02 mm size particle with a settling velocity of 0.02 cm/sec (assuming specific gravity of solids 2.65) can be settled in the detention basin.

Following parameters are to be observed while setting up a detention pond:

- Pond should be located at the lowest point in the catchment area. Care should be taken that the horizontal velocity should be less then settling velocity to prevent suspension or erosion of deposited materials.
- Minimum Effective Flow Path: 5 times the effective width
- Minimum Free Board: 0.15 m
- Minimum Free Settling Depth: 0.5 m
- Minimum Sediments Storage Depth: 0.5 m
- Maximum interior slope: 2H : 1V
- Maximum exterior slope: 3H : 1V
- The inlet structure should be such that incoming flow should distribute across the width of the pond. A pre-treatment sump with a screen should provide to remove coarse

sediments. Settled sediment should be removed after each storm event or when the sediment capacity has exceeded 33% of design sediment storage volume. Accumulated sediment must be disposed of in a manner, which will prevent its re-entry into the site drainage system, or into any watercourse.

1. CONSTRUCTION STAGE

No borrow area shall be operated without permission of the Engineer. The procurement of borrow material should be in conformity to the guidelines laid down in IRC: 10-1961. In addition, the contractor should adopt precautionary measures to minimise any adverse impacts on the environment. Checklists for monitoring borrow areas operation and management has been prepared (**Table 1**).

Table 1: Checklist for Monitoring Borrow Area Operation and Management

Attributes	Requirements
Access Road	Access road shall be used for hauling only after approved
Top soil preservation	To soil, if any, shall be stripped and stored at corners of the area before the start of excavation for material collection; Top soil should be reused / re-laid as per agreed plan; In case of riverside, borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood. In no case shall be borrow pit be within 1.5m from the Toe line of the proposed embankment.
Depth of excavation	For agricultural land, the total depth of excavation should be limited to 150cm including top 30 cm for top soil preservation; For river side borrow area, the depth of excavation shall be regulated so that the inner edge of any borrow pit, should not be less than 15m from the toe of the bank and bottom of the pit should not cut the imaginary line of 1:4 projected from the edge of the final section of the embankment. To avoid any embankment slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Engineer.
Damage to surrounding land	Movement of man and machinery should be regulated to avoid damage to surrounding land. To prevent damages to adjacent properties, the Contractor shall ensure that an undisturbed buffer zone exists between the distributed borrow areas and adjacent land. Buffer zone shall be 3 m wide or equal to the depth of excavation whichever is greater.
Drainage control	The Contractor shall maintain erosion and drainage control in the vicinity of all borrow pits and make sure that surface drains do not affect the adjacent land or future reclamation. This needs to be rechecked by the engineer of the PIU.
Dust Suppression	Water should be sprayed on kutcha haul road twice a day or as may be required to avoid dust generation during transportation of material; Depending on moisture content, 0.5 to 1.5% water may be added to excavated soil before loading during dry weather to avoid fugitive dust emission.
Covering material for transport material	Material transport shall be provided with tarpaulin cover
Personal Protective Equipment	Workers should be provided with helmet, gumboots and air mask and their use should be strictly enforced.
Redevelopment	The area should be redeveloped within agreed timeframe on completion of material collection as per agreed rehabilitation plan.

2. POST CONSTRUCTION STAGE

All reclamation shall begin within one month of abandonment of borrow area, in accordance with the

redevelopment plan. The site shall be inspected by the PIU after implementation of the reclamation plan. Certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction". The final payment shall be made after the verification by PIU.

3. CHECKLIST FOR INSPECTION OF REHABILITATION AREA

Inspection needs to be carried out by the PIU for overseeing the redevelopment of borrow areas as per the plan. The checklist for the inspection by the PIU is given below.

- Compliance of post-borrowing activities and land use with the restoration plan;
- Drainage measures taken for inflow and outflow in case borrow pit is developed as a detention pond;
- Levelling of the bottom of the borrow areas;
- In case the borrow area is on private property, the contractor shall procure written letter from landowner for satisfaction on rehabilitation. In case of no rehabilitation is desired by the landowner, the letter should include statement "no responsibility of R&BD on contractor in the event of accident.
- Condition of the reclaimed area in comparison with the pre-borrowing conditions.

GUIDELINE-2: CONSTRUCTION AND LABOUR CAMPS

1. INTRODUCTION

The scope of this guideline pertains to the siting, development, management and restoration of construction and labour camps to avoid or mitigate impacts on the environment. The area requirement for the construction camp shall depend upon the size of contract, number of labourers employed and the extent of machinery deployed. The following sections describe the siting, construction, maintenance, provision of facilities in the camps and finally rehabilitation of the construction and labour camps. These are described in three stages, pre-construction, construction and post-construction stage. The issues related to construction camps are similar in the case of road construction and hence have been taken together.

2. PRE-CONSTRUCTION STAGE

Identification of site for construction and labour camps is the first task. The Contractor shall identify the site for construction camp in consultation with the individual owners in case of private lands and the concerned department in case of Government lands. The suitable sites shall be selected and finalized in consultation with the PIU. **Table 1** gives the lands that could be avoided for construction camps and conversely those that could be preferred.

Table 1: Selection Criterion for Construction Camps.

Avoid the following …	Prefer the following …
• Lands close to habitations. • Irrigated agricultural lands. • Lands belonging to small farmers. • Lands under village forests. Lands within 100m of community water bodies and water sources as rivers. • Lands within 100m of watercourses. • Low lying lands. • Lands supporting dense vegetation. • Grazing lands and lands with tenure rights. • Lands where there is no willingness of the landowner to permit its use.	• Waste lands. • Waste Lands belonging to owners who look upon the temporary use as a source of income. • Community lands or government land not used for beneficial purposes. • Private non-irrigated lands where the owner is willing. • Lands with an existing access road.

The contractor will work out arrangements for setting up his facilities during the duration of construction with the land owner/concerned department. These arrangements shall be in the form of written agreement between the contractor and the land owner (private/government) that would specify:

a) photograph of the proposed camp site in original condition;

b) activities to be carried out in the site;

c) environmental mitigation measures to be undertaken to prevent land, air, water and noise pollution;

d) detailed layout plan for development of the construction and labour camp that shall indicate the various structures to be constructed in the camp including temporary, drainage and other facilities (**Figure 1** gives a layout plan for a construction camp); and

e) Restoration plan of camp site to previous camp conditions.

The arrangements will be verified by the PIU to enable redressal of grievances at a later stage of the project.

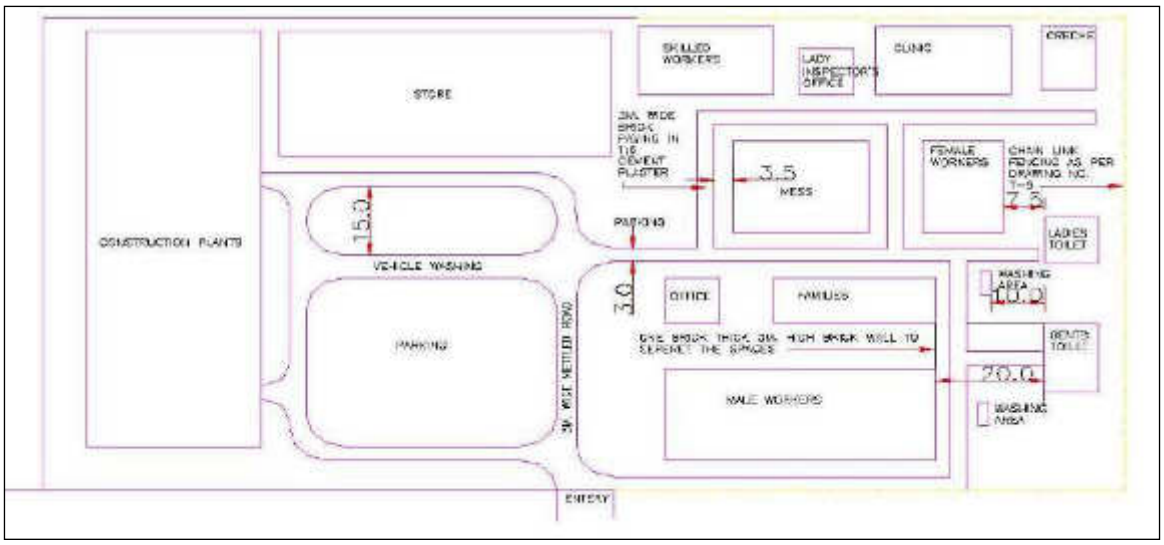


Figure 1: Layout Plan for Construction Camp

2.2 Setting up of labour camp

The contractor shall provide, free of cost in the camp site, temporary living accommodation to all the migrant workers employed by him for complete construction/maintenance work is in progress. A minimum area of 6 sq.mts per person shall be provided. The rooms of labour shall be well lighted and ventilated. The facilities to be provided for the labour are discussed below:

a) Drinking Water

Towards the provision and storage of drinking water at the construction camp, the contractor shall ensure the following provisions

- The contractor shall provide for a continuous and sufficient supply of potable water in the camps, in earthen pots or any other suitable containers.
- The contractor shall identify suitable community water sources for drinking. Only in the event of non-availability of other sources of potable water, the Contractor shall obtain water from an unprotected source only after the testing for its potability. Where water has to be drawn from an existing open well, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with dust proof trap door.
- Every water supply or storage shall be at a distance of not less than 15m from any wastewater /

sewage drain or other source of pollution. Water sources within 15m proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project.

- A pump shall be fitted to covered well used as drinking water source, the trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.

b) Washing and Bathing Facilities

In every site, adequate and suitable facilities for washing clothes and utensils shall be provided and maintained for the use of contract labor employed therein. Separate and adequate bathing shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions.

c) Toilets Facilities

Sanitary arrangements, latrines and urinals shall be provided in every work place separately for male and female workers. The arrangements shall include:

- A latrine for every 15 females or part thereof (where female workers are employed).
- A latrine for every 10 males.
- Every latrine shall be under cover and so partitioned as to secure privacy, and shall have a proper door and fastenings.
- Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers “For Men Only” or “For Women Only” as the case may be.
- The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times and should have a proper drainage system;
- Water shall be provided in or near the latrines and urinals by storage in suitable containers.

d) Waste Disposal

- Disposal of sanitary wastes and excreta shall be into septic tanks.
- Kitchen waste water shall be disposed into soak pits/kitchen sump located preferably at least 15 meters from any water body. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged per day. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit. New soak pits shall be made ready as soon as the earlier one is filled.
- Solid wastes generated in the kitchen shall be reused if recyclable or disposed off in land fill sites.

e) Medical and First Aid Facilities

Medical facilities shall be provided to the labour at the construction camp. Visits of doctor shall be arranged twice a month wherein routine checkups would be conducted for women and children. A separate room for medical checkups and keeping of first aid facilities should be built. The site medical room should display awareness posters on safety facilitation hygiene and HIV/AIDS awareness.

- First Aid Box will be provided at every construction campsite and under the charge of a responsible person who shall always be readily available during working hours. He shall be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to carry injured person or person suddenly taken ill to the nearest hospital. The first aid box shall contain the following.
    - 6 small sterilized dressings
    - 3 medium size sterilized dressings
    - 3 large size sterilized dressings
    - 3 large sterilized burns dressings
    - 1 (30 ml) bottle containing 2 % alcoholic solution of iodine
    - 1 (30 ml) bottle containing salvolatile
    - 1 snakebite lancet
    - 1 (30 gms) bottle of potassium permanganate crystals
    - 1 pair scissors

- Ointment for burns
- A bottle of suitable surgical antiseptic solution

In case, the number of labour exceeds 50, the items in the first aid box shall be doubled.

f) Provision of Shelter during Rest

The work place shall provide four suitable sheds, two for meals and two for rest (separately for men and women). The height of the shelter shall not be less than 3.0m from the floor level to the lowest part of the roof. These shall be kept clean.

g) Crèches

In case 20 or more women workers are employed, there shall be a room of reasonable size for use of children under the age of six years. The room should have adequate light and realisation. A caretaker is to be appointed to look after the children. The use of the room shall be restricted to children, their mothers and the caretaker.

2.2 Storage of Construction Material in Construction Camps

For storage of Petrol/Oil/Lubricants, brick on edge flooring or sand flooring will be provided at the storage places of Petrol/Oil/Lubricants to avoid soil and water contamination due to spillage. These should be kept away from labour residential areas. The storage of cement shall be at Damp-proof flooring, as per IS codes. All materials shall be stored in a barricaded area. In case of electrical equipments, danger signs shall be posted. The batch mix plant is to be located away from the residential area and not in the wind direction. Separate parking areas for vehicles and also workshop areas need to be provided.

2.2 Fire fighting arrangement

- The following precautions need to be taken:
- Demarcation of area susceptible to fires with cautionary signage;
- Portable fire extinguishers and/or sand baskets shall be provided at easily accessible locations in the event of fire;
- Contractor shall educate the workers on usage of these equipments.

2.2 Interactions with host communities

To ensure that there is no conflict of the migrant labor with the host communities, the contractor shall issue identity cards to labourers and residents of construction camps.

3. CONSTRUCTION STAGE

Construction camps shall be maintained free from litter and in hygienic condition. It should be kept free from spillage of oil, grease or bitumen. Any spillage should be cleaned immediately to avoid pollution of soil, water stored or adjacent water bodies. The following precautions need to be taken in construction camps.

- Measures to ensure that no leaching of oil and grease into water bodies or underground water takes place.
- Wastewater should not be disposed into water bodies.
- Regular collection of solid wastes should be undertaken and should be disposed off safely.
- All consumables as the first aid equipment, cleaning equipment for maintaining hygiene and sanitation should be recouped immediately.
- The debris/scrap generated during construction should be kept in a designated and barricaded area.

The PIU will monitor the cleanliness of construction campsites and ensure that the sites are properly maintained throughout the period of the contract.

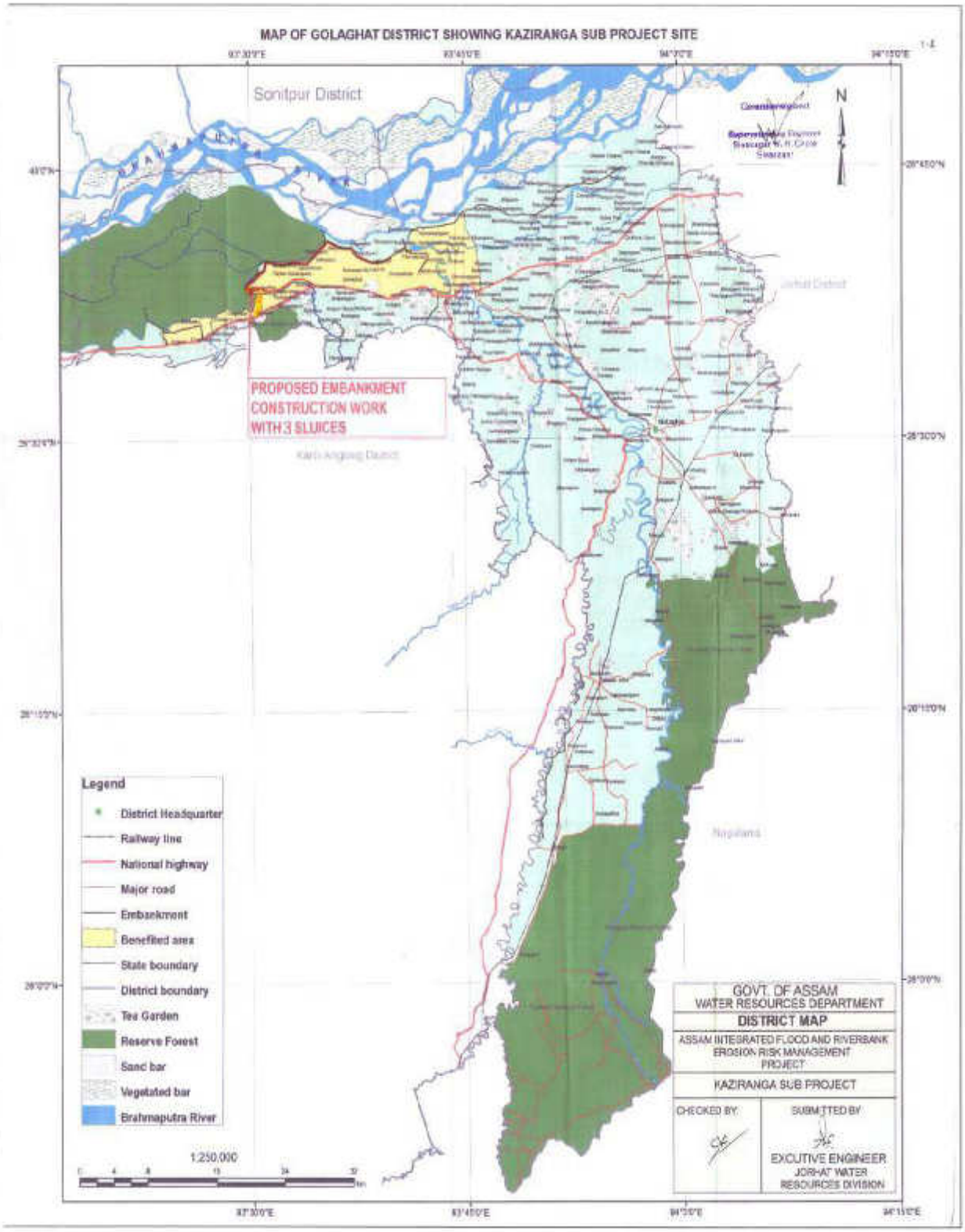
4. POST CONSTRUCTION STAGE

At the completion of construction, all construction camp facilities shall be dismantled and removed from the site. The site shall be restored to a condition in no way inferior to the condition prior to commencement of the works. Various activities to be carried out for site rehabilitation include:

- Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas.
- Soak pits, septic tanks shall be covered and effectively sealed off.
- Debris (rejected material) should be disposed off suitably (Refer **Guideline - 10** on "Waste Management and Debris Disposal").
- Ramps created should be levelled.
- Underground water tank in a barren/non-agricultural land can be covered. However, in an agricultural land, the tank shall be removed.
- If the construction camp site is on an agricultural land, top soil can be spread so as to aid faster rejuvenation.
- Proper documentation of rehabilitation site is necessary. This shall include the following: −Photograph of rehabilitated site;

    - Land owner consent letter for satisfaction in measures taken for rehabilitation of site;
    - Undertaking from contractor; and
    - Certification from Engineer in-charge of the PIU.

In cases, where the construction camps site is located on a private land holding, the contractor would still have to restore the campsite as per this guideline. Also, he would have to obtain a certificate for satisfaction from the landowner.


MAP OF GOLAGHAT DISTRICT SHOWING KAZIRANGA SUB PROJECT SITE
Sonitpur District
N
PROPOSED EMBANKMENT
CONSTRUCTION WORK
WITH 3 SLUICES
Legend
District Headquarter
Railway line
National highway
Major road
Embankment
Benefited area
State boundary
District boundary
Tea Garden
Reserve Forest
Sand bar
Vegetated bar
Brahmaputra River
1:250,000
GOVT. OF ASSAM
WATER RESOURCES DEPARTMENT
DISTRICT MAP
ASSAM INTEGRATED FLOOD AND RIVERBANK EROSION RISK MANAGEMENT PROJECT
KAZIRANGA SUB PROJECT
CHECKED BY:
SUBMITTED BY
EXCUTIVE ENGINEER
JORHAT WATER RESOURCES DIVISION

Appendix 21: Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: INDIA: ASSAM INTEGRATED FLOOD AND RIVERBANK EROSION RISK MANAGEMENT - INVESTMENT PROGRAM (Project 2) Kaziranga Sub-Project

Sector Division: South Asia Environment, Natural Resources, and Agriculture Division

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		X	The reduced proposed Project -2 is not located inside or share boundary with the Kaziranga National Park. The scope of work is now limited to the conduct of emergency repairs on the existing Brahmaputra Dyke which is separated from the Kaziranga National Park (KNP). In between the Dyke and the KNP in the north-western section of the project area is a thin strip of agricultural lands, and electric fence that was installed and being maintained by the KNP. This area of separation becomes wider in the southwestern with width big tracks of agricultural lands and the same electric fence. KNP is on the UNESCO World Heritage Site list describing it as one of the last unmodified natural areas in North-Eastern India, the single largest undisturbed representative area in the Brahmaputra Valley Floodplain, and one of the finest wildlife refuge in the world. KNP is also classified as an Important Bird Area by Birdlife International, a conglomerate of more than 100 NGOs, and a Tiger Reserve by the Government of India.
▪ Legally protected Area (core zone or buffer zone)o		X	The project area is located outside the core and buffer zones of the KNP and the Tiger Reserve. The KNP territory was first defined in 1908 as a reserved forest and expanded six times in 1999. The Panbari and Kukurakata Reserve Forest are also under the jurisdiction of the KNP. The core area of the Tiger Reserve is defined as the first, second, third, and fifth additions and its buffer zone is the fourth and sixth additions and the reserve forests.

Screening Questions	Yes	No	Remarks
▪ Wetland	**X**		Numerous beels and jaors are located with the sub-project area. A xx kilometer section of the southern Brahmaputra riverbank is the focus of revetment and river training through the use of porcupine screens.
▪ Mangrove		X	N/A
▪ Estuarine	**X**		
▪ Special area for protecting biodiversity		X	.
B. Potential Environmental Impacts Will the Project cause…			
▪ impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		**x**	No historical site or area in the sub-project area.
▪ disturbance to precious ecology (e.g. sensitive or protected areas)?		**x**	Although the sub-project is near the KNP, no adverse impacts are anticipated to the protected and threatened species or reduction of their habitats. All construction activities towards the KNP boundary will be confined within 20-30 meters from the Brahmaputra dyke toes and will not encroach to any part of the KNP. The truncated sub-project design focuses on emergency works to decrease the risk of flooding and riverbank avulsion. The sub-project intends to provide repair works at 6 small sections of the Brahmaputra dyke that has sustained damaged from past floods (especially the high monsoon of 2017), lack on maintenance, and local communities cutting locally through the dyke to gain access to agricultural lands and waterways. The installation of the a 10-km porcupine screens at 3 sections from Dhansirimukh to Agartoli in the riverbed to expand the current WRD's activities but realigned along the riverbank 4 km (2 reaches of 2 km) of underwater and bank protection works using geo-textile bags in sections adjacent to porcupine screens will also not encroach on the KNP. The sections of the dyke to get repaired nearest to the KNP are located between 174 and 220 meters from the KNP boundary. The 3 sluice gates proposed to be constructed along the existing Brahmaputra dyke are approximately 136, 174, and 388 meters away from the KNP boundary.

Screening Questions	Yes	No	Remarks
▪ alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?	x		The installation of 10 km of porcupine screens are designed to enhance siltation along the riverbank in the sub-project area. These screens serves as pro-siltation, designed to slow down the flow in the area of their application and with underwater will offer toe protection on the eroding banks. The bank protection proposed in the project, located upstream of the KNP, will be implemented in such a way that the natural character of the banks are maintained. Alternative techniques in the bank protection like techniques like bandalling, bendway weirs and bottom vanes are available will be considered. These techniques basically diverts and concentrates the river flow towards the center that will generate maximum velocities at the center and slower speeds along the river banks. The scale of the porcupine screens, compared to the many kilometers of the rivet width, is not expected to result in general rearrangement of the channel pattern. Also, the existing bankline channel is now dominated by relative low sediment flow coming from the Dhansiri river. In this regard, the anticipated morphological impact is rather limited and it will be very difficult to establish that there is either more or less erosion at the Kaziranga National Park downstream.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	x		The launching of geobags for riverbank protection will increase the suspended solids loads of the immediate downstream of the Kaziranga reach. This impact is short-term and not anticipated to generate adverse impacts on the aquatic environment.
▪ increased air pollution due to project construction and operation?	x		Both on- and off-site deterioration of air quality will result from the emergency repairs along the Brahmaputra dyke due to earth and sand borrowing, materials transport, clearing and grubbing, and embankment re-formation. Dust from these activities may increase baseline ambient levels in the short-term. Key mitigation measures include water sprinkling, covering of haul trucks, speed limits along un-paved road travel, and avoiding material piles near community areas. This impact is confined with the immediate vicinity of the active construction fronts and borrow areas and co-terminus with the construction period.
▪ noise and vibration due to project construction or operation?	x		Excavation and compaction of the embankment are anticipated to generate noise standards and vibration guide values will cause disturbance within 300 m radius from the 6 discreet construction sites. Timing of activities that will generate elevated noise and vibration levels will avoid night-time in residential areas, time of worship near temples, and daytime near schools. Monitoring of structural cosmetic damage on structures along the haul roads will be conducted during the construction phase.
▪ involuntary resettlement of people? (physical displacement and/or economic displacement)		x	Based on the updated social impact assessment, 12 families will be resettled.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		x	No anticipated disproportionate impacts on the poor, women, children, and indigenous people. The sub-project assures equal pay for equal work, active role in the grievance and redress mechanism, separate latrines and health check-up for women involved in construction. Benefits from reduced risk of flooding and riverbank erosion will result to increase economic activities that benefits poor, women, and Mishing people.

Screening Questions	Yes	No	Remarks
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?		X	The establishment of small construction camps will temporarily add to the population of the sub-project area. Migrant workers may have conflicting culture, lifestyle, and compete with local laborers over job opportunities. They also increase the risk of disease transmission such as HIV/AIDS. Mitigation measures. Early consultations will be made by the contractors with the local communities to determine the appropriate location of work camp sites with the encouragement that local people will be given preference in employment when they meet basic job requirements. All migrant workers will undergo workshop/briefings to sensitize them on local culture and lifestyle awareness. All water, electricity, transport, and waste disposal requirements of the camps will be provided by the contractor and ensure existing supplies and utilities of the host communities are not affected. Prior clearances and permissions from the panchayats will be secured by the contractor.
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	x		Borrow areas not properly closed can create habitat to mosquitoes while improper disposal of household solid wastes generated by the labor camp can provide suitable conditions to rodents. A borrow area management plan is included in the environmental assessment report and referred to in the EMP which forms part of the BoQ. Maintaining camp hygiene is the responsibility of the contractor as highlighted in the EMP.
▪ social conflicts if workers from other regions or countries are hired?		x	To minimize conflicts, most of the laborers will be sourced from the local communities.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		x	No large population of workers is expected considering the limited scope of the works.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	x		Working with heavy equipment, transport and movement of materials, launching of geobags along the Brahmaputra riverbank will pose physical hazards to the workers. Adequate occupational health and safety measures from previous experiences in the other sub-project areas were incorporated in the EMP.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		x	No explosives will be used in the civil works. Numerous fuel stations exist in the sub-project area and fuel storage, enough for a 2-3 days of work will be stored on site. Fuel transport to the work sites and construction camps will be provided by government accredited third parties that are capable of containing spills. All vehicle service areas
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	X		During construction phase, as required in the EMP the contractor is required in the EMP to and implement detailed occupational and community health and safety programs are provided in IEE and EMP. During operation phase, failure of the existing Brahmaputra dyke and avulsion of the southern Brahmaputra riverbank due continuous attack by the river, will have catastrophic damages in terms of human life, wildlife, and public and private properties. The goal of the sub-project is to minimize the risk from these contingent events due to flooding and erosion.

Screening Questions	Yes	No	Remarks
▪ generation of solid waste and/or hazardous waste?	**X**		Labor camp and construction wastes such as damaged geobags, empty fuel drums, and cement sacks will be disposed in accordance with the environmental and local laws and regulations. Prior consent will be secured by the contractor before disposal.
▪ use of chemicals?	**X**		Termicide will be used to avoid the premature deterioration of the embankment from termite attacks of dead plant materials such as tree stumps and roots. The contractor will seek clearance from the SPCB and Wildlife Authorities on the safety of termicide to aquatic and terrestrial wildlife before use.
▪ generation of wastewater during construction or operation?	**x**		Insignificant amount of wastewater will be generated from the construction camps.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: INDIA: ASSAM INTEGRATED FLOOD AND RIVERBANK EROSION RISK MANAGEMENT - INVESTMENT PROGRAM (Tranche 2) Kaziranga Sub-Project
Sector : Flood Control
Subsector:
Division/Department: SAER

Screening Questions		Score	Remarks[32]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	Not likely. There is no alternative option for the sub-project site.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	2	The design of the underwater and river bank protection works and levels of porcupine screens have included parameters such as high flood levels and river flow velocity. The original design of the Brahmaputra dyke was based on historical high flood levels.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	2	Increase in flood levels and more intense rainfall in the subproject area beyond the anticipated and designed levels will require higher embankments to provide the same level of safety.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	2	The predicted increase in peak and volume of floods due to climate change will require more frequent monitoring, repair and maintenance activities by WRD and communities and corresponding costs.
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	2	The predicted increase in peak and volume of floods due to climate change poses threat to the communities behind the embankment and the KNP. The sub-project components comprised of infrastructure and community capacity building will provide resilience to flood and allow the community to adapt to the challenges of flooding.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1

[32] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): HIGH

Other Comments:_____
_____

Prepared by: _____

Appendix 22. PHOTO DOCUMENTATION (PLATES)

Kaziranga sub project






Public hearing at Japoripathar School, Kaziranga Sub project area. 9th November, 2015

	Public consultation in 2 places in Kaziranga Reach on 8th Feb,16

Consultation in 2 places in Kaziranga Reach on 9th November, 2016

	
Maina Doley, Baba Doley, Bihuram Singthe, Rupa Kordong were consulted (12.30PM) Near Dhansiri Mukh	Paddy field near the river
	
Hireswar Doley, Monding Pasung, Bogiram Doley, were consulted of Dhansirimukh Bamungar village (13:20PM)	
	

Typical house of Mising people.	Consulted with Forest Department at Agoratoli Range Office (14.30 PM)

Proposed work sites (Kaziranga)

Proposed work sites (Kaziranag)

Fringe area people (Kaziranga sub project area)

Discussion with local officials of WRD regarding tranche 2

Existing Embankment along the Brahmaputra River

Existing Embankment along Kaziranga National Park Border

Riverbank Erosion (at Sakopara)

Porcupine Structure

Existing Raised Community Platfrom

Interactions with Villagers

Kaziranga Tranche-2 site

Kaziranga Public Consultation for tranche 2