North East Housing Reconstruction programme (NEHRP)

Environmental Management Framework

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Trincomalee
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Acknowledgement

This report is really a compilation and summary of the comments/knowledge of various people who had willingly helped with information. I acknowledge their contribution and thank them for their cooperation, most of whom are listed in Annexure I.

Special Thanks to all the GA’s of the province who welcomed us at all times, and gladly assisted us. Cooperation from Planning and development Secretariat of LTTE is deeply appreciated.

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Many unlisted, who had assisted me in the project, participated in discussions and helped in the fine tuning the draft thinking are acknowledged with thanks.
Executive Summary

The main aim of the project is to assist in the rehabilitation of the war torn North east by providing assistance to the Reconstruction of the damaged/destroyed houses in the all eight province of the North east. The first phase of the programme is estimated to assist 90,000 houses, over a period of four years costing around US$100 m in toto. The grant for each house would be Rs 110,000 (for repairs Rs 50,000) for the construction of about 420 sq ft. It has now been agreed in principle, that the grant be increased to Rs 150,000 (repairs 70,000) minus the toilet, which would be proportionally reduced in the number of houses to be assisted.

The total requirement of the Building materials needed for this project is very large and cumulative total with the other projects in the province, could be as high as 25-50% of the country’s demand. It is very evident that the province does not have the major resources required viz. sand, clay, timber, metal and rubble. Some districts are better than the others. Potential impacts include excess sand, gravel and clay mining, illegal felling of timber, illegal metal quarries, increased coral mining, increased solid waste and sewage etc. Mitigatory/prevention measures include alternatives for the traditional building, material and technology. There is a urgent need to look for alternate material and technology to reduce the cost of construction and also minimize the impact on the environment. Technology is available but the lack of awareness had kept us from adopting them. Awareness and training on the new technologies are recommended. New industries which would be able to produce building materials needs to be promoted for sustainability and local employment. Studies have revealed that the savings using the new technology could be as high as 25% in the case of Cement-soil compressed blocks and in cases where they may not be cheap as in the case of pre stressed concrete, the longevity out weighs the cost on a long run. The cost of dune sands and off shore sand provide cost effective solutions to the river sand, at a lesser environmental cost. Transporting of materials from outside North East and Importing are two options available. Tiles, Metal and Coconut rafters are transported from outside the province even at present, but the volume in demand is so high that the sustainability is a question, specially in relation to metal and rafters. There is also a tendency to decrease the quality and increase the cost during high demand. We do have to also ensure that the environment in the other parts of the country is not also not compromised.

The national legislations and safe guards of the World bank for donor funded projects provide adequate legislative framework to ensure the protection of the environment (Special considerations for indigenous people would be revoked if the indigenous families are selected as beneficiaries in Batticaloa). However, inadequacies in the infrastructure and lack of capacity in appropriate methodology may cause difficulties during implementation. Recommendations are made for awareness building and training (capacity building) of stakeholders in appropriate fields, specially in the area of monitoring and evaluation. It is also recommended that the use of Asbestos as roofing sheets be desisted for health reasons.

This report provides an over all guideline of framework in regard to the potential impact of the project on the environment and mitigatory measures under the current legislative and administrative structure. However detailed environmental
assessment/EIA needs to be done, once the site is selected. Guidelines for the conduct of EIA and development of reporting and monitoring mechanisms are prescribed. It is recommended that we follow the environmental regulations seriously and only deal with the suppliers who are legitimate i.e who have got necessary environmental approvals for their venture. Similarly all the constructions need to have the appropriate approval from the Pradeshya sabah, Municipal council, Urban Council as appropriate to ensure that the public health, sewage disposal etc. are streamlined, as it is the duty of these offices to provide such services.

It is only an integrated approach of awareness raising, capacity building, introduction of technology and new material in combination with enforced legislations that would make the successful implementation of the project with minimal impact to the environment. There are many avenues where the private sector could be of great assistance in producing and supplying building materials, sustainably.
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Introduction:

Need of the Project:

North East of Sri Lanka had suffered immensely during the 20 year old armed ethnic conflict. More than 70,000 lives had been lost, most of the infrastructure and livelihood were destroyed and millions became displaced from their homes, most becoming IDPs in other parts of the province or country, while a proportion left the country. An MOU signed between the GoSL (Government of Sri Lanka) and Liberation Tigers of Tamil Elam (LTTE) on 22nd February 2002 brought an end to this armed conflict as a ceasefire agreement, which is in place to date. Space became available for the rehabilitation of the destroyed infrastructure i.e. physical, social and economic. Various forms of assistance became available to the province from different agencies, governments for rehabilitation, restoration and development of the province. The UN agencies undertook a needs assessment study in 2003, which indicated the sectors that had been largely affected and those that need urgent assistance for the rebuilding of the province, towards normalcy. Housing was one such sectors, which is addressed by this project, North East Housing Reconstruction Project (NEHRP).

The Project

It was estimated that nearly 326,000 housing units were partly or fully damaged over the past twenty years of conflict. Ministry of Rehabilitation, Resettlement of Refugees report that 160,754 families were displaced in the country, 84% were from the North East. Of the total 144,890 houses owned by the IDPs nearly 90% is said to be damaged. About 45% of these are in the Jaffna district. The total amount needed for the reconstruction of these units would be around $562 million. The initial assistance is for 95000 households, probably in the order of 65000 fully damaged and 30000 partly damaged. The assistance is to target the poor and the vulnerable groups matching the following criteria for eligibility:

1. poor households whose monthly income is less than 2500 rupees
1. families whose house have been partly or fully damaged
2. returned/settled or non displaced families with their own land/property or on land legally granted to them by the authorities. Each family will receive assistance for one house only.

The Current UAS (Unified assistance scheme) provide Rs 25,000 as livelihood assistance and Rs 75,000 for permanent housing, repair or rebuilding alike. Most of the families which had received livelihood assistance had not yet received housing allowances since the MOU. The allowances for housing of Rs 110,000 was granted to the Ratnapura flood victims of 2003, and the raising of the housing allowance to Rs 110,000 is under consideration, by the GoSL. The current project focuses on a house of about 420 square feet at a total cost of Rs 160,000 inclusive of a toilet. Rs 110,000 is expected to be the maximum grant for the reconstruction of a totally damaged house. The balance is expected from the beneficiary as their contribution to the construction. (There is a recent agreement to increase the grant to Rs 150,000...
per beneficiary, excluding the cost of toilet. The maximum for repairs have been increased to Rs 70,000 per house. The total number of beneficiaries will be proportionally decreased).

The project targets the eight districts of the North east province, which shared the maximum damages. The border districts which also do have suffered damages would be catered through other schemes, as the numbers are much lower. The selection of the districts and the divisions within are expected to be based on the extent of the damages in the districts, to avoid any ill feelings between districts or divisions. The project is planned to have a pilot phase of about 100 houses in each district at the beginning, which would be followed by the project proper. The project is expected to disburse around $100 m and at the current rate of construction potential it is expected to spread over a period of four years to completion.

Demand and Supply of natural resources/Building materials

Many cultural values are attached to the types of houses one owns. Each have their priority in the designing of their own house. Many programmes had used type designs of houses in reconstruction programmes for logistic reasons. They have some what distanced the beneficiary from ‘ownership’ of the house in a philosophical sense. It is proposed to allow the beneficiaries to select their design in this project, Alacarte menu than set menu, to give a personal attachment to the house as a home, as uniquely their own. However, with all the differences, a permanent house is traditionally perceived as bricks, cement, sand, timber and tiles. A project of this magnitude of 95,000 houses would require large quantities of above materials for the construction, which may not be readily available at all locations. Many of the materials in concern are natural resources themselves or products of such, which are limited and their extraction/mining may cause negative impacts on the environment, reversible or permanent. It must be remembered that the damaged houses were constructed over a period of many decades drawing on the resources. But the current reconstruction is within a short period and demands a heavy supply of material in a short space in time. Further, the reconstruction programme in the North East and the country goes beyond this project and involves many other projects on irrigation, road development, town reconstruction and housing by private individuals and other agencies. In fact more than 500 houses have been permitted each year in the Batticaloa municipality alone, where each house is around 1200 sq ft in extend. Therefore the demand for the building materials are many folds higher than needed for this project alone, though what is needed for the project itself is large.

It is for this reason that this study had been commissioned to produce a environmental framework which would look at the impacts on the environment by the project, implementation mechanisms, capacity of the region and suggest mitigatory, preventive and enhancing mechanisms as appropriate, to effectively implement the project.

Environment management framework

Environmental Management Framework is the template on which the Environmental Impact assessment would operate and EMP would be produced. It provides an overall framework of the potential impacts by the project activities, description of mitigatory measures, monitoring methods and institutional arrangements for implementation,
inclusive of stakeholder consultation. This also provides the guidelines to ensure that the project activities are in consistent with the legislations of the GoSL and the policies of the World Bank, during the implementation.
Methodology

Desk study:

This included study of building materials in the country with special emphasis on the North East; survey of national legislations in regard to environmental management, Construction and mining/extraction of natural resources; study of the World bank policy on environmental safeguards in relation to their funded projects; study of North East administration and infrastructure for implementation of projects; Survey of alternate technology and material available for Construction of low cost housing.

Scanned the literature in print and electronic media for alternate housing methods and materials available for low cost constructions.

Field study:

Visited various sites of extraction/mining of natural resources (sand, clay, timber); manufacturing sites of building materials (brick manufacturing, pressed earth blocks, Cement sand blocks) in different districts. Visited various housing projects constructed by other agencies in different districts. Interviewed the occupants of the houses in these cases.

Interviews and Consultation:

Interviews and consultations were held with the Government agents and their officers in each district.
Consultations were held with NHDA officers, Planning officers and Divisional secretaries as far as possible.
Interviews and Consultations were held with Officers of the NERD, NBRO, GSMB, NHDA head office and Academic staff (Civil engineering) University of Moratuwa.
Consultations were held with Director/ NECORD, Director/ CIRM, Director/GTZ Jaffna and UNDP-Mine Clearance unit/Trincomalee, and Planning Secretariat/LTTE, Kilinochi.
Consultations were held with NGOs, Business community and Local Contractors wherever possible.

The Names of persons contacted are given in annexure I.
Environmental Profile of North East:

Physical Environment:

North East has an area of 18860 sq Km which is about 28% of the country of 66450 sq km area. The province has a coastline of about 1000 km which is 50% of the country’s coastline. The entire province has a flat terrain, undulating in general which is part of the coastal lowland (third peneplain) of the country. Maximum elevation is about 305 m of some isolated insolbergs. Geologically most of the North East is made of Precambrian metamorphic rocks i.e Westen Vijayan complex (also termed the Wanni complex), Highland group, and Eastern Vijayan complex. The North Western region inclusive of the Jaffna peninsula is made of Jurassic, Miocene and Holocene sedimentary formation, chiefly of Miocene limestone formation. Quaternary deposits are also seen in the north-west and eastern coastline. Large number of rivers drains the water to the sea throughout the provincial coastline. The Jaffna peninsula has no rivers within.

Climate is tropical and has a mean monthly temperature range from 27-30 °C and Mean annual rainfall range of 1000-2500 mm per year. Rainfall is seasonal based on monsoons. Most of the rainfall is obtained during the Northeast monsoons from October to January. Considerable rainfall is also received during the Southwest monsoons from May to September and inter monsoonal convectional rains during other periods. The latter is often associated with thunder and lightening. Winds are moderate from about 7 – 15 km per hour most of the year. However stronger winds are experienced in the east during the South west monsoons which blow dry after the dispensing of the rains. Further, the province is also subject to periodic cyclones, mostly arising from the perturbations at the bay of Bengal.

The Coastline is mostly sandy with wide beaches. Mineral deposits of mostly Illmonite and zircon are found in the entire Northeastern coast with Pulmottai and Pottuvil being particularly important for Illmonite. Large sand dunes are seen in the entire coast, prominently at Pottuvil, Manalkadu and Kautharimunai. Soils of the Province are mostly reddish Brown earths. Alluvial and Sandy regosols are found along the river beds and coastal zones.

Biological environment:

The natural forest cover of the country had dwindled to mere 22% from more than 80% at the beginning of the 20th century. The remaining forest cover, with the exception of the protected areas (14%) are mostly confined to the North east. This accounts to about 8% of the country which is about 40-50% of the North east, where part of the protected areas are included in the provincial landscape. Large tracts of forests are the Tropical monsoonal forests flanked by the Tropical thorn forests in the Mannar region and Tropical dry mixed evergreen forests of Mullaithevu and Ampara. Extensive grasslands of Savannahs occur in the Ampara district. Damana grasslands are extensive throughout the province. However the quality of the forest have not been assessed as much have been disturbed during the period of conflict. It has been known that large areas have been felled during the conflict and areas on either side of
the roads have been cleared for security reasons. Continuous collection of firewood/posts have been known in all districts as very evident in Oddamawadi for the past many years, indicating the loss of the quality of forests. Implementation of checks have been rather lacking except in the LTTE controlled areas, leading to removal of large timber species. Major Plantations of Teak, Coconut, Palmyrah, cashew etc had been lost over the past due to the conflict and cyclone which had never had a chance to really reestablish. It is also a fact that more than 70% of the households use the firewood as the primary energy source, in the province.

The most striking feature of the Northeast are its lagoons and coastal water ecosystems, which are more or less continuous along the Eastern Coast from Jaffna Lagoon to Kumbukkan oya. Many of these lagoon systems are highly productive and lie in the path of a bird migratory route. The Chundikulam lagoon and Kumana are noted for its bird populations and is declared as protected areas for their significance as bird habitats. Many ecosystems, which are coastal, and wetland based are prominent in the Northeast. Northeast shares 65% of the lagoons, 64% of mangroves, 81% of salt marsh, 59% of sand dunes, 58% of beaches and 48% of marshes in the country. It is enriched with wildlife and bird populations local as well as migrants, which flock the region in the winter/rainy seasons.

Coral reefs are also found in many places in the shallow sea adjacent to the Northeast coastline but are most prominent near Nilaweli and Kalkudha. A prominent coral reef also exists near Pasikudha but is thought to be dead. In addition, Jaffna peninsula, Gulf of Mannar and Trincomalee, especially Pigeon Island, also have coral reefs although the exact condition of most of these reefs are not accurately known as they have not been evaluated recently. Recently good reefs have been located near Punnaikudah in the Batticaloa district (Pers Comm. Arjan Rajasooriya).

The Eastern Province is important in terms of the rich wildlife it supports. The 1997 forest map of the Forest Department show a continuous forest cover from Kokillai to Kuman although it gets narrow in width at certain points. These forests support important mammalian fauna such as Elephant, Deer, Sambhur, Wildboar, Leopard and Bear. The Eastern Province itself has 17 protected areas out of a total of 70 in the country.

**Environmental Issues of the North East**

The environmental issues of the North East are numerous.

- Lack of enforcement structures or weakness of it, is a prime issue.
- Many of the ecosystems have been destroyed during the conflict and the lack of restoration mechanisms is another issue.
- The rehabilitation and reconstruction along with the development of the North east places a heavy thrust on the already depleted natural resources, and the non availability of a regulating mechanism is another issue.
- Further increasing pollution, increased solid wastes need for better sanitation, need for clean water to drink etc. are the other aspects of environment that cause concern.
- Above all the issue of the land mines and UXOs spread over the province forms a serious threat to the environment.
These issues will be dealt in detail later, specifically in relation to the housing programme.

**Profile of the Natural Resources utilized for Construction**

It is important to consider the demand and supply of the construction material prior to discussing the impacts of the process in the system.

The materials that are used in construction are cement, steel, timber, rubble, metal, lime, sand, gravel and clay. Of these with the exception of cement and steel the others are natural resources often supplied from the region. Table 1, is constructed from estimates of the GTZ (400 sq ft house) and NHDA (430 sq ft house) housing programmes and the estimate for the calicut roofing is from local experience. The material needed for each unit for reconstruction is given in column 2, cost for 1000 houses are given in the 4th column (the requirement for the pilot project). The next column to indicate the magnitude of the requirement for each district assuming that they would have about 12,000 houses for construction, if shard equally among the districts of the total 95,000. Multiplying this column by 8 will the entire requirement of material for the project, which is the last column.

The availability of materials (qualitative statements only) is summerised below in Table 2, as indicated by the different Government agents and officers in each district.

It is very clear that the districts do not have the entire resources needed for the project within their districts, specially in relation to timber and metal. Position on Sand seems to be more complicated as they do have various sources but the extent available or extractable amount is not known, though they have been extracting. The study on the Manalkadu sand dunes by GSMB in Jaffna, indicates that the deposit could provide sand for long periods. But its use is subject to a proper EIA as it exceeds 10 hectares in extent. Reports on interior dune sands in Puttalam had revealed that they could mostly substitute the river sand requirement. But the cost of transport to the location makes it prohibitive at this stage, which may be the case for Jaffna too. It must also be noted that the removal of sand has been perceived and reported as an environmental issue in 1998. Ampara tends to be the best in relation to the availability of resources. They may be able to meet the demand from a variety of sources distributed through the district. All other districts have strong limitations, or more correctly that their status is not known with certainty.

Batticaloa has many lime kilns burning corals at Pasikkudah (which had been reduced at present) and Navatkudah (bivalves shells) which produce lime for the purpose of Building industry. Similar is also found at Kinniya from the extracted deposits from the Thambalagamaum bay. Though this lime could be easily substituted by the dolomite lime preference is given to this by tradition, which causes concern. The government construction industry has banned the use of coral lime in construction, though it is used by private contractors in other places.
Table 1: Approximate demand of building material for the programme (see text)

<table>
<thead>
<tr>
<th>GTZ</th>
<th>Per unit</th>
<th>X1000</th>
<th>X12000</th>
<th>x96000</th>
</tr>
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<tbody>
<tr>
<td>Cement</td>
<td>30 Bags</td>
<td>30,000</td>
<td>360,000</td>
<td>2,880,000</td>
</tr>
<tr>
<td>Riversand</td>
<td>3 Cubes</td>
<td>3,000</td>
<td>36,000</td>
<td>288,000</td>
</tr>
<tr>
<td>Gravel</td>
<td>2 Cubes</td>
<td>2,000</td>
<td>24,000</td>
<td>192,000</td>
</tr>
<tr>
<td>Rubble</td>
<td>3 Cubes</td>
<td>3,000</td>
<td>36,000</td>
<td>288,000</td>
</tr>
<tr>
<td>Cement blocks</td>
<td>2000</td>
<td>2,000,000</td>
<td>24 million</td>
<td>192 million</td>
</tr>
<tr>
<td>1.25 metal</td>
<td>1 Cube</td>
<td>1000</td>
<td>12,000</td>
<td>96,000</td>
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<tr>
<td>.25 metal</td>
<td>0.15 Cube</td>
<td>150</td>
<td>1800</td>
<td>14,400</td>
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<tr>
<td>Door frame</td>
<td>1</td>
<td>1000</td>
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<td></td>
</tr>
<tr>
<td>Window &amp; frame</td>
<td>1</td>
<td>1000</td>
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<tr>
<td>Roofing sheet</td>
<td>14</td>
<td>14,000</td>
<td>168,000</td>
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<tr>
<td>Ridge tiles</td>
<td>19</td>
<td>19,000</td>
<td>138,000</td>
<td>1,104,000</td>
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<td>4x2 rafter</td>
<td>180 Ft</td>
<td>180,000</td>
<td>2,160,000</td>
<td>17,280,000</td>
</tr>
<tr>
<td>2x2 perlin</td>
<td>200 Ft</td>
<td>200,000</td>
<td>2,400,000</td>
<td>19,200,000</td>
</tr>
<tr>
<td>Ridge plate</td>
<td>25 Ft</td>
<td>25,000</td>
<td>300,000</td>
<td>2,400,000</td>
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**NHDA**

<table>
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<tbody>
<tr>
<td>Bricks</td>
<td>6500</td>
<td>6,500,000</td>
<td>78 million</td>
<td>624 million</td>
</tr>
<tr>
<td>3”x2” sawn timber/doors and windows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6’-0’</td>
<td>60</td>
<td>60,000</td>
<td>7,200,000</td>
<td>57,600,000</td>
</tr>
<tr>
<td>4’-0’</td>
<td>52</td>
<td>52,000</td>
<td>462,000</td>
<td>2,772,000</td>
</tr>
<tr>
<td>4-6’</td>
<td>36</td>
<td>36,000</td>
<td>432,000</td>
<td>3,456,000</td>
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<tr>
<td>Sapu Planks</td>
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</tr>
<tr>
<td>6”x 6’</td>
<td>99</td>
<td>99,000</td>
<td>1,188,000</td>
<td>9,504,000</td>
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<tr>
<td>7”x 6’</td>
<td>35</td>
<td>35,000</td>
<td>420,000</td>
<td>3,360,000</td>
</tr>
<tr>
<td>6”x4’</td>
<td>40</td>
<td>40,000</td>
<td>480,000</td>
<td>3,840,000</td>
</tr>
<tr>
<td>7x4</td>
<td>19</td>
<td>19,000</td>
<td>228,000</td>
<td>1,824,000</td>
</tr>
<tr>
<td>Sawn timber</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6”x2” 13’</td>
<td>78</td>
<td>78,000</td>
<td>936,000</td>
<td>7,488,000</td>
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<tr>
<td>Coconut rafter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12’</td>
<td>16</td>
<td>16,000</td>
<td>192,000</td>
<td>1,536,000</td>
</tr>
<tr>
<td>Asbestos sheets</td>
<td>34</td>
<td>34,000</td>
<td>408,000</td>
<td>3,264,000</td>
</tr>
<tr>
<td>Bricks</td>
<td>6500</td>
<td>6,500,000</td>
<td>78 million</td>
<td>624 million</td>
</tr>
<tr>
<td>LOCAL</td>
<td>Quantity</td>
<td>Unit</td>
<td>Cost</td>
<td>Total Cost</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------</td>
<td>------</td>
<td>---------</td>
<td>----------------</td>
</tr>
<tr>
<td>Rafters 4x2</td>
<td>280</td>
<td>Ft</td>
<td>280,000</td>
<td>3,360,000</td>
</tr>
<tr>
<td>2x2 perlin</td>
<td>800</td>
<td>Ft</td>
<td>800,000</td>
<td>9,600,000</td>
</tr>
<tr>
<td>Ridge plates</td>
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<td>Ft</td>
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</tr>
<tr>
<td>tiles</td>
<td>900</td>
<td></td>
<td>900,000</td>
<td>10,800,000</td>
</tr>
</tbody>
</table>

| Total                         |          |      |         | 26,880,000     |
|                               |          |      |         | 76,800,000     |
|                               |          |      |         | 7,200,000      |
|                               |          |      |         | 144 million    |
Legal Framework:

Tasks of the project

The project has the primary aim of reconstruction of the houses damaged during the conflict to assist Voluntary resettlement/settled to have a better quality of life by way of a decent housing, to the most vulnerable section of the community in the North East. The component and subcomponent of the project would involve/include:

a. Identification/selection of site for construction
b. Procurement/supply of building material as sand, timber, roofing sheets, granite, lime, rubble steel rods, cement etc.
c. Designing of houses and construction of a house of at least 420 square feet
d. Construction of a toilet including sanitation facilities
e. Promotion/development of industries to supply building materials for the project
f. Training of stakeholders (beneficiaries, government and non-government organizations, beneficiaries) to develop their capacity in project management, quality control, environmental monitoring etc.
g. Awareness building on the community participation processes and environment/natural resources management
h. Training of skills to youth in the region to meet the demand of the project, specially in the fields of masonry and carpentry and plumbing
i. Capacity development of skilled personnel to handle new building materials and associated technologies
j. Promotion of techniques to accommodate specialized needs (cyclone tolerant) and minimize environmental and health impacts and
k. Institution building for the above.

The project and sub projects are subject to the environmental safeguards of the World Bank and the Environmental regulations of the GoSL.

Safeguards of the World Bank

The World bank safeguards in relevance to the project would be its operations policies OP1 (Environmental assessment), OP4 (Natural Habitats), OP36 (Forestry) and OP20 (indigenous people).

Environmental assessment (EA)

EA is a requirement of the World Bank to,
a. ensure that they are environmentally sound and sustainable and thus improve the decision making
b. evaluate the potential environmental risks and to examine alternatives and mitigatory measures. It prefers preventive measures than mitigatory measures.

c. account for natural environment, social environment in an integral way

d. ensure that the country conditions and national legislations are not violated

e. ensure that the projects are met by the country obligations to international treaties and agreements.

It is the responsibility of the client to carry out the EA. Category A projects are those that is likely to have significant adverse impacts and require stringent EIA process as a measure of EA. Category project B, has potentially less adverse environmental impacts on the human populations or environmentally important areas, than category A. The impacts too are site specific and mitigatory measures are easily designed.

This project has been classified as category B. Project documentation has addressed the EA by preparation of an EMF at the initial phase and then EIA/IEEs for site-specific sub projects along with appropriate EMPs, to facilitate implementation process.

The safeguard also includes capacity building as a component where the client has inadequate capacity in terms of environmental monitoring, inspection and management of mitigatory measures. It also stipulate stakeholder consultation (public consultation) and transparency (disclosure) by having document for public inspection.

**OP 4.04 Natural habitat**

Policy on natural habitat states that the bank does not support projects involving projects that involve significant conversion or degradation of critical natural habitats. The bank also promotes rehabilitation of natural habitats via this policy. The policy also ensures that dialogue between right groups, NGOs are promoted and are taken into consideration in the process. Transparency and disclosure is recommended as in 4.01.

**Forestry policy OP 4.36**

This states that it does not support commercial logging or purchase of equipment for the use in Tropical forests.

**Indigenous People (OP 20)**

The World Bank considers them with their rights to culture and land and environmental special rights

**National Legislations**

The national legislations the are of significant to this project would be the following:

5. Fauna and Flora ordinance as amended by act no 49 of 1993  
6. Forestry Ordinance  
7. Pradeshya sabahs act  
8. Urban Development Authority Act 41 of 1978

Article 27(14) of the constitution states that it is the duty of the state “to protect preserve and improve the environment for the benefit of the community”. Article 28 (f) makes it a fundamental duty of every person “to protect nature and conserve its riches”

**EIA/IEE approval**

National Environmental Act 47 of 1980 amended by act 56 of 1988 administered by the Central Environmental Authority tends to be the overarching regulation in relation to environmental management in the country. It is under these provisions of the act that EIA (Environmental impact assessment), Initial environmental examination (IEE), EPL (Environmental Protection License) are administered for the development projects. The projects that require such assessments are given by gazette extraordinary of 24 June 1993 and 772/22 of 23rd February 1995.

Part I relates to the establishment of the CEA. Part II deals with powers and functions including a) to monitor new projects in order to evaluate their impacts on the environment b) to require any local authority to comply with and give effect to any recommendation relating to environmental protection within the limits of the jurisdiction of such local authority. Chapter III deals with the staff of CEA. Part IV relates to environmental management via policy making on land use, natural resources, wildlife, forestry, soil conservation etc. Part IVA, introduced in 1988 deals with prevention of pollution and EPL scheme. Part IV B also introduced in 1988 relates to pollution of inland waters, atmosphere and soil. Part IV C entitled “approval of Projects” was introduced in 1988. Part V deals with the general provision clauses to implement the act.

The regulation for provision of approval of projects was under National Environmental regulations 1 of 1993 gazetted in June. This regulation spells out the type of developments that need to undergo an environmental assessment. It also lists a number of government agencies that can act as PAAAs (Project approving agencies are listed) describes the process by which the relevant PAA is selected.

List of projects that need EIA are listed in three parts. Part I lists projects and undertakings that are prescribed for EIAs. Part II lists 20 categories which need EIA if they are within the sensitive areas listed in part III. Part III defines sensitive areas for which approval is necessary, as describe below.

1. Within 100m from the boundaries or within any area declared under national Heritage and Wilderness areas act 3 of 1988 or the forest ordinance.  
2. Within the following area  
   * any erodable area declared under soil conservation act
The EIA/IEEs for the Coastal Zone is carried out by the CCD (Coast Conservation Department). Any development activity taking place within a wildlife protected area or within a mile of the boundary of such a zone requires approval from the DWLC (Department of Wildlife Conservation) who will determine the need for a IEE or EIA. However, operationally, both the CCD and the DWLC makes an appropriate recommendation to the developer in consultation with the CEA.

All development projects need environmental clearance by GoSL. The proponent has to fill the basic environmental information questionnaire, which is submitted to CEA. The CEA determines whether the project or sub projects require IEE or EIA or none depending on the nature of potential impacts and the responsible PAA that should handle the EA.

If an EIA is required then the PAA in consultation with the CEA sets the terms of reference for the EIA. The EIA submitted by the proponent is assessed by the PAA and submitted for public comments prior to making decision on the report. Approval may be granted by the PAA. If not appeals could be made to the Secretary of the Ministry whose decision shall be final.

If IEE is considered adequate then the proponent conducts an IEE which is similar to the EIA but with lesser detailed analysis.

Mining of Sand, clay, minerals etc.

Mining of all minerals are under the license from the GSMB (Geological Survey and the Mining bureau) administered under the Mines and Mineral Act 33 of 1992. All mining is under their license and they may devolve their authority to any local agency as appropriate.

Geological Survey and Mines Bureau (GSMB) was established in 1993 under the Mines and Minerals Act 33 of 1992. Its functions were

a) to undertake the systematic geological mapping of Sri Lanka and preparation of geological maps
b) to identify and assess the mineral resources in Sri Lanka
c) to evaluate commercial viability of mining for export of such minerals
d) regulate exploration and mining for minerals for processing, trade and export
e) advise the minister

GSMB was authorised to issue the following licenses

1. Exploration license
2. Artisanal mining license (AML)
3. Reserved mining license
4. Trading license
5. Transport license
6. Export permit
7. Industrial mining license (IML)
Extraction of Forest/natural resources

The Fauna and Flora protection (amendment) Act 49 of 1993, Forest Ordinance and Forest (amendment ) Act 56 of 1979 and Coast Conservation Act 57 of 1981 are three important acts that govern the removal or exploitation of natural resources in the country. Flora and fauna Act governs the protected areas. Director/DWC needs to authorize any activity within a km radius from the periphery of any protected area. It also defines the plants and animals that are protected and thereby controls the biodiversity of the country. Forest Act prohibits collection, cutting or transport of any form of forest material without a permit. Coast Conservation Act is the authority of all activities in the coastal zone defined as 300 m landwards from the high tide zone and 3 km perpendicular from the sea where the water bodies are connected to sea. Sand mining in this zone is also controlled by them. Any construction in this zone has to be on the permit from the Director/CCD.

4.3.4 Public health, waste disposal and peoples participation:

The Pradeshya Sabah is entrusted with granting of permission for built environment within its jurisdiction. It also serves to ensure public health, solid waste collection, and disposal under this act. It is entrusted to deal with nuisance. It also provides for participation of people in the decision-making. The Pradeshya sabah Act 15 of 1987, Municipal Council ordinance, Urban Council ordinance, Urban development authority law provide for the above and the salient features are listed below:

1. Pradeshiya Sabhas Act, No. 15 of 1987

“To provide greater opportunities for the people to participate effectively in decision making process relating to administrative and development activities at a local level; to specify the powers, functions and duties of such Sabahs; and to provide for matters connected therewith or incidental thereto. “

part II 16(4) all rates taxes, duties, fees and other charges levied by the development council, under the town council ordinance or the village council ordinance or any other law relating to the local government, in respect of any land or thing in a Pradeshya Sabah area……shall be paid to the Pradeshya sabah……”

18. The following calluses of property shall be vested with the PS
   a) All public parks, gardens and open spaces….
   b) All public roads, canals, bridges..
   c) All public markets…

29 allows taking over land of any person if required for public use
50 1 a. to demarcate by permanent marks the building limit prescribed by section 49 on every road referred to in that section:
86. (i) in any case where the PS is of opinion that any latrines, water closet or bathroom should be attached to or provided for any house or building or land the PS may give notice for the construction of same.

96. PS to ensure that houses or buildings within its limits are kept in sanitary conditions as required by the provisions of the act or any other enactment...

106 (1) Any person who within the PS operates or causes to be operated any factory which causes pollution so as to endanger or prejudice the health of the neighbourhood shall be guilty of offence.

108. A PS may within its limits either independently or in conjunction with any other local authority or any other person establish and maintain for the benefit of the persons in habiting to such area the following utility services:–

   a) water supply
   b) the supply of electricity and power
   c) markets
   d) rest houses
   e) public baths and bathing places
   f) the manufacturer and supply and cost price of squatting plates for latrines
   g) the housing accommodation for the poorer classes
   h) any other form of public services which the PS is authorized to establish maintain or provide under any other provision of this act or any other written law.

126. The powers of PS to make by laws under this part shall include the following

   VIII) buildings, buildings operations and works including –

   a) the definition of areas to which the by laws under this heading are to apply
   b) the regulation of material of new buildings with a view to securing stability preventing fire and safeguarding health
   c) the space to be left about any building or block of buildings to facilitate and secure free circulation of air and facilitate scavenging
   d) the dimension of doors and windows, the level of the floor, the height of the roof, general ventilation and drainage
   e) the levy of fees for the examination and lateration of plans for new buildings or for alterations of existing buildings

2. Municipal Councils Ordinance
Municipal councils ordinance 29 of 1947 amendments Act 18 of 1979 and amendments

The activities and powers of MC is similar to that of Pradeshya sabah in essence.


Similar province of PS are made in her too.

4. Urban Development Authority  Law, No.  41 of 1978 amended by Act No.70 and amendments thereafter

“provide for the establishment of an UDA to promote integrated planning and implementation of economic, social and physical development of certain areas as ma be declared by the Minister to be Urban development Areas."

The powers and functions are given in section 8, includes;

a)  to carry out intergrated planning and physical development within and among such areas..
   h.  to formulate capital improvement programme in such areas
   i.  to formulate and implement urban land use policy
   j.  to develop environmental standards and prepare schemes for environmental improvements in such areas
   m.  to formulate and execute housing schemes in such areas
   n.  to cause the clearence of slums and shanty areas to undertake development in the area
   p.  to approve, coordinate, regulate control or prohibit any development schemes or project or any development activity or any government agency or any other person in such areas..

Relevance of the National legislations and World Bank safeguards to the project

Environmental management framework is being prepared as a part of EA, with provisions for EIA/IEE at a later stage, as part of implementing the safeguard policy.

The project at this stage does not invoke any negative impacts on the natural habitat or sensitive areas under OP 4.04 as the sites of construction has not been identified and also the location, quantity and mode of extraction of building materials have not been identified. Once the sites are identified and the locations for collection of resources and extents have been identified then an EIA has been prescribed to be undertaken for each location, which would consider the impact of the process. It is unlikely that Forestry policy OP 4.36 would be invoked as there are restrictions on the cutting of forest except designated forests by the state and the LTTE had also
banned removal of forest. Provisions are also made for preparation of EMP for each site at the sub project level.

Some areas in Vakarai in Batticaloa do have a population of indigenous people, classified with their cultural standards. If these communities are selected during the subproject then this would invoke the policy OP20 of indigenous people.

Housing per se is not a listed project for EIA under the NEA, and does not need an EIA, especially as this is reconstruction. However there may be settlements which are not in their original place and these areas may be within the sensitive area list of Part IV C, which will be handled by an EIA/IEE at the sub project level when the site is finalized. The project will deal with mining of clay and sand in many places and once it is identified then this would require licensing from GSMB and even an EIA if the mining sites happen to be in a sensitive area e.g. Allai Kantalai, a sanctuary.

Permits from pradeshya sabah for the construction of houses, toilets, sewage pits etc would become a requirement and depending on the numbers this aspect will have to be given adequate attention to ensure protection of ground water from pollution.

There is no serious environmental impact of the project on the environment at this stage. However, at the stage of identification of resources for construction there is a possibility of conflict between prices and the distance of the availability of resources, at least for some sites. Much emphasis needs to be placed on the alternatives as early as possible considering the magnitude of the demand of resources and the existence of many other projects making similar demands.

Potential Environmental Impacts of the proposed Project and the mitigation measures

The Project proposes to reconstruct the lost houses to the community selected on priority. It basically aims to assist in the provision of a basic quality of life to the community, which have been affected by the conflict over time. The environmental impact in such projects may be considered broadly under two headings; one that is associated with the quality of life of the beneficiaries and the other which relates to the natural environment itself.

Impact on Human environment (Quality of Life):

1. Siting in the immediate environment of severe pollution eg: dump yard
2. Basic requirements of building is not followed
3. Use of asbestos for roofing
4. Lack of sanitation facilities
5. Threat of mines in the neighbourhood

Site in the vicinity of polluted environment:

It is possible that the site selected for housing or reconstruction probably is in the vicinity of a polluting environment that may cause health hazards to the occupants.
For example the site may be next to a new quarry, solid waste dump, polluted drainage etc.

It is therefore important that the EA looks into the suitability of site and make recommendations accordingly. If issues exist such as solid waste dumps and polluted drainages then appropriate authorities (Local Government) should be informed and action must be taken to reduce the health risks.

Action is entrusted to the Environmental Consultant of the Project, EIA Specialist to assess the issue and the District Director of project, District Secretary (DS) of the division and the GA (Government Agency) of the district to ensure implementation.

**Basic requirements of the Building:**

A building reconstructed or newly constructed has to get the plan approved from the appropriate local authorities (Pradeshya sabah, Municipla council, Urban council etc.), who would ensure that the basic requirements of a dwelling is ensured i.e it has adequate aeration, lighting etc. The height of the house too would have to be above a particular standard for heat prevention, based on the type of the roof. Failure of such would causes reduction in quality of life.

It is also a risk of having thatched roof if electrical fittings are anticipated. In fact electricity connection will not be granted to those houses. A potential fire risk in these houses does exist and need to be taken special care of.

Designs of the house with plans for construction/repairs with location should get the approval of the Local authority, which is a legal requirement. The Local authority will ensure that a PHI (public health inspector) visit the location and makes the appropriate certificate. This is also very essential for sanitary purposes where the PHI certifies the construction. This should be made a condition for building, to ensure compliance.

*The standard procedures of obtaining these certifications must be informed to the beneficiaries and assistance could be provided by the VRC/ GS in making the application.*

**Use of Asbestos for Roofing**

It has been known for long, the health hazard of the Blue asbestos and many had taken cover of continuation of asbestos for roofing on the fact that the white asbestos does not cause respiratory hazards. However the dust emitted during working to the workers and when it is placed in the vicinity as broken pieces, which are used by kids to play or by others to make smaller boards, is a health risk. Recently the North-east health department had issued a statement of risk, by the asbestos utility. The Asbestos roofing may be cheaper than other forms of roof, but health cannot be a compromise for cost.

The North East also shares high temperatures during the summer and the whole year in general. Shallow roofs constructed for cost effectiveness, could cause high temperatures inside the house which would have health concerns, especially when metallic sheets are used for roofing.
It is recommended that the project does not support the asbestos roof in toto, on health reasons. This recommendations were made in 1995 by the ERRPPII project but had been ignored by agencies, but as the North East health authority had given written opinion it would be a violation and create liability, if necessary. This must be clearly stated to the beneficiary and all agencies assisting the project from the beginning, so that they are able to plan for the alternative.

Lack of sanitation facilities

Toilets are of important part in the housing project. It is also important that proper sanitary facilities are put in place. Soakage pits could be ineffective and the fecal pollution could connect with the ground water polluting the entire system. Certain districts in the province has floods during each major rainy season and causes the water level to exceed the waterseal level, which needs to be taken into consideration at the construction point e.g. Batticaloa.

Toilets must be considered as mandatory for construction in the housing programme. Construction of soakage pit/ septic tank etc must be in consultation with the PHI, NHDA/other technical agency to ensure that proper sanitary conditions are maintained as far as possible. Soil testing may have to be done in certain cases if necessary, but consideration of soils is important prior to construction. Jaffna has a special problem that the geology makes transport of material across easy and alternative designs have to be improvised. A model has been marketed by St Anthony's under BIOCELL, which is a sealed septic tank system which may be a promising aspect for Jaffna, though the cost is slightly higher. The project could consider negotiation of prices or increase of allowance to these for Jaffna as a special environmental mitigation. Project should not support inappropriate designs, as it is a health hazard to the entire community. The sanitation in the houses constructed in the urban areas need to be attended specially.

The technical team of the project must be responsible for this, for providing advise to the beneficiary and assistance. Periodic inspection of well waters in the vicinity would be a useful check on monitoring the sanitary conditions.

Land mines

More than 2 million mines are estimated to have been sown in the North-east, mostly in the North. The sites for housing is usually cleared for mines prior to construction but the entire neighbourhood may not have been cleared which causes a serious threat to quality of life.

It is important the GA/DS obtain a certificate of clearance of land mines from the demining coordination office of the UNDP prior to any construction. It is also important to clear utility space for the community prior to engaging in construction. If an area had not been cleared it may be useful to request the GA for clearing of this on a special priority, if such location has been identified.

Coordination has to be done by the project director/ GA and DS to ensure that the certification is obtained in consultation with the UNDP mine clearance coordination office.
Impact on natural environment:

It is important to bear in mind that this project is in addition to the other activities in the North-east. Therefore impacts of each activity in fact are cumulative on the environment and not isolated processes. Details could be only assessed once the sites are identified. However anticipated impacts are listed below.

1. Site or activities in the nature reservation/protection area
2. Excessive Sand mining
3. Salt water intrusion
4. Excessive Clay mining and land restoration
5. Illegal Timber for construction
6. Coral mining
7. Quarry operation
8. Solid waste disposal
9. Sewage disposal and sanitation

Site /activities near environmentally protected or sensitive areas

If the site of construction or activities related to them, even a proposed private sector venture/industry constructed in the proximity of a lagoon, mangroves, wetlands, nature reserves, stream reservations etc., it would affect the natural environment. It is also considered as a sensitive area under the NEA, requiring an EIA.

The EA must ensure that the areas are not encroaching into the reservation and sensitive ecosystems, once the locations are identified. It is also important at this stage that the sources of supply/extraction/mining building material is identified as far as possible, for example sand for the construction of a site should be from an identified location. All industries starting to assist the project should be subject to standard environmental regulations of IEE/EIA/EPL as appropriate. The project should ensure that these necessary licenses are obtained prior to accepting them as suppliers.

The environmental consultant and the EIA specialist would assess these, which will be implemented by the DS/GA as appropriate. Awareness building should also planned for all stakeholders on environmental regulations and requirements.

Excessive Sand mining

Sand is one of the most crucial materials for the building industry and the river sand is most sought for its properties. River sand is collected from the middle and lower surface of the major rivers of the country. Limited information is available on sand mining and its impacts. A national sand study by the Netherlands economic Institute recorded that 5 million tons of sand was mined around the western coast (Kelani, Kalu ganga and Maha Oya) and Herath (1996) estimates the need of the country to be around 8 million tons (5 million cubes) for the entire country in 1996 and the need would be much higher now. The project requires about 500,000 cubes anticipated for the concrete/sand blocks too) which is relatively high and given the small size of the
rivers in the North east except Mahaweli this figure could be rather large. The potential for sand mining depends on the catchment area of a river and the slope it travels. Most of the rivers arise form the central highlands and radiate outside. The rivers North of Mahaweli in the eastern flank and Kala oya in the Western flank do not arise from the mountains. They drain the water from the central plains. There fore the potential for sand mining is much smaller.

Impacts of sand mining varies subject to the area in concern and the extent of mining and availability of sand by replenishment:

a. Over extraction of sand in the rivers have been known to deepen the riverbed and cause seawater intrusion as in Kelani recently. The salinisation of areas around Punari may be partly a result of large amount of sand mining in Kudamruttu aru in the district.

b. The sand that reaches the beaches help to replenish the beaches that are washed away and removal of sand could arrest this and cause erosion. This phenomena had been witnessed at Kinniya and Muthur, either sides of the estuary of the Mahaweli. Though this is primarily concerned with the damming of the Mahaweli, the impact of the sand mining at mananampitiya and Allai kantale could not be ignored.

c. The excess sand mining causes collapse of the river bed which leads to flooding of the region and loss of riparian vegetation. This is seen in mawadiwembu in Batticaloa.

d. Sand mining near bridges are known to destabilize the bridges as reported from Badulla.

e. Coastal stability is reduced, by sand mining in the coast

Beach sand mining, reduce the amount of sand available for beach littoral processes and induces beach and coastal erosion – panadura, Lunawa

River sand mining reduces the supply of sand to the beach causing erosion of beaches and river banks.- Nilwala ganaga, Gin ganaga, Kalu ganaga, Kelani, Mha oya and deduru oya

Reef braking damages the reef, reduces the size and creates gaps causing increase wave energy on the beach and reduces supply of debris causing erosion- Pasikudah, nilaweli, Kuchweli, rakewa,

Table 3 summerises the sand mining Licenses issued to various agencies/ individuals as at April 2004 by the GSMB. These are valid for a year subject to renewal.

Only certain districts have the license from the GSMB. Delegation of these powers had been given to DS in some districts and the DFO (District Forest Officer) in others as a practice. However the figures given here could be taken as the requirement prior to the project and the requirement of the project would add to the above load.

<table>
<thead>
<tr>
<th>IML(aggregate)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AML(sand)</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
This places a bleak situation about 4 districts, which have been given no permits, and also the quantity issued seems far less than what has been utilized in the districts.

Inland mining of sand is also seen in places where sand deposits are found. Chettimedu near velani and Mankumban near Chavakacheri, Kumburupitiya in Trincomalee are examples where sand removal had left large craters on the ground. Often the entire vegetation is removed causing concern. Sand mining near Navaladi in Batticaloa had caused lagoon erosion.

Dune sands also have been extracted in Manalkadu. This has been reported as an environmental issue in 1998. However the definite impacts are less known, if the total dunes are removed it could cause saline spray on to the land. Destabilising the sand dunes could cause sand storms during high winds.

The district/division must have a resource profile of their own for planning purpose. It is also important that they have a demand and supply estimates of the resources as a single figure. This could be obtained from all agencies involved in construction, the previous year, as a cumulative total of the resources used and the modes of supply from local or outside. Sand demand and sources of supply has to be obtained. Estimates have to be made with the assistance from GSMB the availability of sand for mining. Permits will be issued to sites of construction from a named location, to ensure excess mining does not take place. This could also prevent sand mining near bridges, sensitive ecosystems etc. More assistance would be sought from Police and forest officers to check the transport practices. In case of permits issued for mining from deposits inland the contractor would be required to ensure that restoration of the site is done. Periodic check on the salinity of water near the coast would be a monitoring mechanism to avoid ill effects.

Training is needed for staff to assess the stocks available and seasonal variations. The Forest department and Police are needed for policing of the transport. Permits are issued by Pradeshya sabah or DS in consultation with the GSMB. The VRC and the Pradeshya sabah of the mining site should monitor the sand mining and the transport to the site, for effective control.

**Salt water intrusion**

This has been discussed under sand mining already.

**Excessive Clay mining and land restoration**

Clay is another material used heavily in the building industry for the production of Brick making, tile making and building of huts.

<table>
<thead>
<tr>
<th>District</th>
<th>Unlimited cubes/m</th>
<th>525 cubes/m</th>
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<th>210 c/month</th>
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<td>9</td>
<td>70</td>
<td>8</td>
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<tr>
<td>Trincomalee</td>
<td>7</td>
<td>30</td>
<td>14</td>
<td>5</td>
<td></td>
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<tr>
<td>Jaffna</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vavuniya</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>
Clays that are used for this purposes are widely spread in the dry zone and occur in the flood plains of the lower reaches of major river systems of the island, in silted ancient tanks and river beds and valley bottom of other areas. Clay of the intermediate and wet zones are different and superior. As per data from 1995, 80 million roofing sheets and 600 million bricks are used in the country annually for construction. Our requirement of 560 million is a very high amount, though it is over four years.

The production is limited and needs to be expanded to cater to the project if necessary. However the mining of clay also leaves large craters in the ground, which is not filled or rehabilitated by the miners, which destroys the landscape.

The firewood used for the kilns though small for one kiln in its totality a large amount which also threatens the forest system.

The non standardization of the brick sizes is another issue in the industry, and this in reality causes more cement and sand mixtures to be used for equaling, which threatens the environment indirectly, for want of more sand.

The sand-crete, which reduces the pressure on the clay and firewood, however puts a higher pressure on the requirement of sand.

The mitigatory measures are similar to that of sand mining from inland deposits. More emphasis must be placed on improving the kiln for efficiency to reduce the firewood consumption. Alternate material as paddy Husk kilns should be explored. The technology is available. Fire wood has to issued by permit by Forest department, and the policing is to be done by the Forest department and Police. It is recommended that large areas of firewood plantation are established for the future needs, under this project. The demand for this will be on the increase and never decrease.

The responsibilities are similar to that of sand mining.

**Illegal Timber for construction**

Decline of forest resources in the country and the limited forestry plantations are unable to supply the need of the country and large amount of imported timber stands witness to this in the country. The status is even acute in the North-east where large areas of forest had been destroyed during the conflict for security reasons and plantations have been considerably reduced. This focuses on the imported timber and reapers, shuttering planks and rafters from North-west Province. However the impact of these demands on the North-west also should be considered as an impact on the environment. The large demand also usually escalates the price when the commodity is limited. Under these conditions very often the pressure is on the local forests for timber and rafters, which are supplied illegally. The high cost of transport to remote areas also has the same effect.

Firewood for cooking itself is a large trade and creates a heavy pressure on the forest and in addition the firewood for brick kilns will make a dent in the forestry resources.
Removal of trees in the home gardens as a measure to cut cost would also decrease the greenery in the town/village area causing environmental degradation.

Timber will have to be purchased from the registered distributors and supplied to the site itself. The quality of the timber needs to be checked at the site for which training of staff would be necessary. Purchase of imported timber could be from outstation on an open market. But there is also a possibility if importing the timber directly by State Timber Corporation or another organization for the specific purpose of the project. The Forest Department will assist in the purchase of the timber and the quality check of it, if necessary. New plantations would be initiated for future purposes where the demand will be even higher than today. Promotion of more trees in homesteads and fences will be another positive venture, which is really restoration of what was in the past, destroyed by the conflict. This includes replanting of Palmyrah, which has been initiated by the Palmyrah Development Board already.

**Coral mining**

Coral mining for lime production, which is used in the industry, is seen near Kalkudah in Batticaloa and use of Bivalve shells at Navatkudah, Batticaloa and Kinniya. They have a direct environmental impact and the open burning of the kiln also is a health hazard to those in the neighbourhood, which are themselves. The requirement for lime also would increase as it is traditionally used in construction. Coral mining is prohibited activity but it is difficult to stop as it provides a lucrative livelihood to coastal residents.

The project will desist the use of lime produced from coral but instead use the dolomite lime wherever necessary. There is also a government restriction in using the coral lime in their construction.

**Quarry operation**

The requirement of granite and rubble is also increasing significantly and the quarries would operate more or new quarries would be established. The operation of the quarry itself is an environmentally less friendly mechanism. If the quarry operates close to the site of construction it could have serious health hazards.

It is important that the project confers that these industries with which trade is done are legal in the sense that they have obtained the necessary licenses, which would have ensured that the environmental concerns are properly addressed in the process.

**Lack of specifications**

Lack of specification in bricks, sand cretes, timber, door and window frames etc, generally makes more wastage than necessary. All wastages of natural resources eventually cost the environment. More extraction of resources would be made than necessary.

Specification for bricks, sandcrete are not available but popular sizes are available which varies from site to site. This makes planning more difficult. It would be ideal to
agree on a size at least in each district to unify the processes. Similarly even for timber frames, doors etc people sometimes do not have unified specification which makes the product expensive and also wastage of material during production is higher. Specifications for door, window frames could be agreed to reduce the impact economically and environmentally.

This should be a consultative process with the beneficiaries explaining the importance.

**Creation of new Industries**

Various new industries may be initiated to cater to the needs of the project in one or many districts, which would have an environmental component, associated to it based on the site, nature of business, waste disposal etc.

The project should ensure that they deal with legitimate industries, which means that the necessary considerations are accounted for in the licensing process.

However training and assistance may be necessary in this field as the authority for such, the CEA, is based in Colombo and only recently two regional office have been opened in Trincomalee and Vavuniya.

**Solid waste disposal**

This is one of the biggest environmental problems in the province as well as in the country at large. From the urban centers the problem of solid waste is now spreading to rural areas as well mainly due to the excessive packaging material used in product marketing and lack of land space to practice traditional disposal methods. At present, solid waste problem are seen in Jaffna, Trincomalee, Batticoloa, Kalmunai, Ootamawadi etc, which are all coastal towns with sensitive wetland eco-systems. These wetlands, mainly lagoons, get clogged and polluted when the waste ultimately reaches its waters. The project will facilitate re-settlement of people back in their original homes and hence solid waste generated at a households level will become a problem unless a proper plan is implemented. In addition, construction debris should also be taken care of in a proper manner in order to minimize health and environmental impacts.

As mitigatory measures, the project should encourage and include concepts such as composting of organic waste in their garden itself. For this, people should be made aware and be given the knowledge of such practices. Arrangements should also be made with the local town councils or Prasheshiya sabahs to collect the non-biodegradable waste and dispose of them in their regular sites, so as to not allow waste to build up in residential areas.

**Sewage Disposal**

Water resources are scarce, particularly in the North where groundwater is the main source of water. Therefore, poorly designed septic tanks can pose a huge threat in terms of contaminating groundwater. Therefore, precautions will have to be taken to ensure that septic tanks for reconstructed houses are designed in a manner to minimize groundwater pollution. This has been discussed already in section 5.14.
**Air pollution**

The road network is poor in most of the districts where these reconstructions have to be in place, mostly gravel or sandy. The vehicular transport for materials would add to the already high dust pollution in these areas. Some are seen as red if next to a gravel road, which is also a health hazard.

Tarring of the principle road to the site would be one that would considerably reduce the dust pollution. The finances may be obtained from other agencies.

**Alternative Measures**

Appropriate, low cost houses could be constructed cheaper and more environmental friendly by using alternative measures to standard construction material and procedures. This could be achieved through approaches utilizing alternative materials and alternate technology, but it also involves appropriate training, awareness building and attitudinal changes in the community. Special considerations have to be given for specialized conditions as cyclone prone, flood prone etc. in designing houses where necessary.

**Alternative material**

**Roofing**

**Roofing timber**

Roof is preferred to be in Calicut tiles. However the construction using calicut tiles becomes expensive as (30-40%) the cost of the house is spent on the roof. The timber needed for the laying of the tiles makes it environmentally costly.

**Concrete**

Recent developments have promoted pre stressed concrete beams and rafters for the roofing( NERD), which are only slightly expensive relatively, but cuts the cost on the environment and the durability is higher and quality could be better checked. This would reduce the demand on the coconut rafters in the country.

**Poles**

Use of small size poles have been studied and recommended by University of Moratuwa, which though is cumbersome slightly owing to the roundness of the poles, trained carpenters have been able to handle quite well. The cost is reduced by at least 20% to its equivalent timber and this is also available.
Roofing material

Alternate roofing materials are asbestos, galvanized sheets, steel metal roof, cadjan, plastic sheets, concrete, MCR tiles etc.

Use of Asbestos is not recommended for reasons already given.

MCR tiles

MCR (Micro concrete) tiles have been designed and tested many years ago by ICTAD and NERD and is cheaper than the tiles and also have a cooling effect. This could be initiated as an industry in the areas of constriction and supply adequately for the project. This was recommended in 1995 by the ERRP II, project too but had not been appreciated in the implementation phase. These are not burnt like tiles and thereby save on firewood, which is indirectly affecting the forestry resources in the country.

Concrete

Concrete roof too has been successfully installed in Kappalthurai and serves ideal for Cyclone prone areas. The thin concrete is used and the cost is not much higher than the entire cost of the calicut roof. Various designs are available with University of Mortuwa, NBRO and NERD.

Cyclone sensitive

Steel and the galvanized sheets are warmer in the summer and specially in these regions. Adequate link hooks have to be used in areas prone to higher winds. However it is not recommended to use galvanized sheets as they are known to tare off and fly in the wind causing damage to others as a razor blade.

Bricks

Various alternatives have been suggested for the bricks. In fact preference is given to other material in some places over bricks. One of the biggest problems in the brick industry is the lack of regulation of its size. Various sizes are used in different parts of the province making assessment difficult. It also consumes more cement and sand when sizes are not maintained, for patching it.

Cement-Concrete blocks are alternatives, which have been successfully used in many places and its use is increasing. Cement blocks are made at homes by the owners themselves in most cases. Local industries have also developed to meet this demand. Standard blocks are also available from AMTRAD and other suppliers, which however make it expensive in terms of transport. Local industry could be developed, where sand is available. The advantage of this is the reduction in plastering needs saving on cost.
Pressed earth blocks

One of the recent developments is the pressed earth blocks, which are environmentally friendly as it is made from earth itself, which is available in plenty in the country. It does not use firewood for curing again saving in the environment. The structure itself is adequate even for storied buildings. It has been highly recommended by the University of Moratuwa and NBRO. It is worth to establish an industry to turn out such material for construction, which will save on cost and environment. In Jaffna the CHF is making such blocks using the earth from the demined earth and the constructions they have made are very attractive. Interlocking bricks have been made in this way too which is available in Colombo. This reduces the cost of cementing and also the blocks are smooth and may be used without plastering. Various studies have been done at the University of Moratuwa on the Cement stabilized spoil block walls (with 2%, 4%, 6%, 8% cement) and have shown that cost savings could be from 4% to 25% in comparison with the brick construction, depending on the thickness of the wall. Savings are also made on the plastering. Considerable savings are made in comparison to the Cement –sand hollow block too. It is also advised that extensive use of cement sand blocks should be avoided as sand is in short supply.

Timber

Timber for roof had been already discussed. Mainly timber is utilized for door and window frames and door itself.

Many alternatives are available to reduce the cost by using pre stressed concrete frames/aluminum frames for doors and windows. Recently frames are also available in Plastic and Fibreglass too. Many prefer to have the external door in wood for security reasons but the rest of the frames could be substituted by these materials to effect cheaper and environmentally friendlier construction.

Sand

Alternatives for river sand had been suggested by various experts. This was documented in the proceedings of the seminar on ‘Alternatives for River Sand’ held on 30th May 1997 organised jointly by Department of Civil Engineering, Moratuwa, Coast Conservation Department and Institute for Construction and Training and development. The alternatives are off shore sand, quarry dust, dune sand and sand deposits.

Off shore sand

With the increasing demand for sand there had to be alternative, which could provide sand on large scale to the province and the country at large. Studies have shown that the cost of sand in Colombo if extracted off shore near Negombo is competitive even with the transport factor. Given the fact that the price of a cube of sand is Rs 3500 at some places in the North-east, such alternatives may be worthwhile. Transport may be done by sea to the nearest shore and then use rail or road thereafter. This may provide
a long-term alternative. Considering the need for 500,000 cubes for this project alone, dependence on river sand will cause huge environmental impacts. Therefore, this option must be seriously pursued.

Though the capital investment would be high the steady supply and fixed prices over time will guarantee availability of material. Studies have shown that the quality is acceptable. For any specific purposes river sand may be supplemented if necessary. The sand with shell deposits or coarse material may also be extracted off shore, which may find its use in sandcrete and other purposes. This needs further exploration and study.

**Dune sand**

Puttalam dune sand has been studied and found suitable for most of the construction purpose. The Cost of supply at Colombo is attractive. Studies have shown that similar sand available at Manalkadu, also with low chloride content and has been recommended by the GSMB. An EIA has to be done to ensure that the extraction does not seriously affect the environment. Large sand storage is available at Kaudari munai (Kilinochi district) too, which are distant from the shore and would have less chloride and would be also a potential source.

**Quarry dust**

This is also considered as an alternative to the sand. NBRO has developed many buildings with cement-quarry dust boards. But we really do not have large super quarries for this purpose and even if they do exist the environmental impacts of dust and others would be a serious problem to contend with.

**Sand deposits**

Pure sand deposits have been recognized in some places. But the extraction of these leads to large craters in soil, which are rarely, filled causing serious environmental thrust. Chettimedu at Velani is one such example. Other deposits are available in the neighbourhood in private property. Further deposits have been recognized near Vakaneri, kandakadu which are mostly of pure silica.

**Sand mining in Rivers:**

The common are the six rivers in NW, W and southern provinces. 1.2 million had increasd to 5.5 million cubic meters in 2001. Estimated sand demand in 2006 on the same basis would be 8.1 m in 2002 and 11.8 m in 2006. While the future demands of the North and East are difficult to assess it could be stated that the success peace process will increase its demand. Overall sandmining in rivers at cureent rtes to meet the requirements of the construction industry is clearly unsustainable and could lead to rapid riverbed degradation and further decrease in supply of sand to the coast in time to come.
It should be noted that the river sand mining is a long standing problem and its impacts are in many instances irreversible in the short and medium term. Strict regulations of river sand mining is needed to avoid worsening of the situation, enhance rehabilitation of rivers subject to sand mining in the past and ensure over exploitation is not repeated in other rivers where new development is taking place. Socila issue of minors, alternatives are needed.

Pilot study has been successful in off shore sand exploration. Pilot project is about to commence to promote mining and marketing off shore sand.

Bryne and nanayakkara 2002

Asoka Perera(1997) gives the following estimates of prices for Colombo, inclusive of transport, working the various costs including a 25% profit margin.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Price of alternative Rs per cube</th>
<th>Comparative sand prices</th>
<th>Price difference</th>
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</thead>
<tbody>
<tr>
<td>1. Dune sand from Puttalam dist</td>
<td>2024</td>
<td>1200</td>
<td>824</td>
</tr>
<tr>
<td>2. Offshore sand near Negombo</td>
<td>1100</td>
<td>1200</td>
<td>-100</td>
</tr>
<tr>
<td>3. sand from Avissawella, washing soil</td>
<td>900</td>
<td>1200</td>
<td>-300</td>
</tr>
<tr>
<td>4. Quarry dust</td>
<td>1600</td>
<td>1200</td>
<td>400</td>
</tr>
</tbody>
</table>

It establishes that the potential for alternate sources do exist, which needs further follow up. The current prices of River sand is more than double of what he had quoted in 1997 which indicates the urgency of the problem. This also justifies the CCD embarking on a pilot project.

**Flooring**

Various concrete blocks are made for the flooring, which may be used for flooring

**Alternate technology**

**Foundation**

It has been usually known that excess foundation is laid for even smaller low cost houses as a traditional practice. This stems from the traditional building styles transferred from generations without much rationality. If properly addressed the cost could be reduced to half for this section.

Further technology had been developed by NERD to provide simple pre stressed concrete beams for construction of such houses saving on the foundation. They have
extended this to the flooring too which is made by concrete using pre-stressed concrete. The technology as available and could be easily transported and utilized, even creating a industry.

**Pre fabricated houses**

Pre fabricated houses have also come to the market which are easily installed and are reasonable, and it is worth to explore the possibility of using these for such schemes at least provide the option to the people.

**Architectures and development**

There is lot of development in the architecture and the technology of rural low cost hosing in the country and the world at large. However relatively little is known or used in the implementation as many opt to continue with the traditional methods and material. It is important that a architecture team and engineering team works on these and such are utilized in implementation.

**Sanitation**

Recently a closed BIOCELL has been marketed by the St Anthonys Ltd, which replaces the septic tank, in a watertight compartment. This may be useful in places where land is limited for filtration or like in Jaffna where the geology itself permits easy transport across. However the prices are higher than the ordinary septic tank construction.

**Increased training**

It is important that to be successful in the introduction and application of newer technology that we educate the local skilled masons and carpenters who are then able to convince the local house hold of their importance. Training is also needed to increase the number of skilled staff available in the North-east.

**Awareness building**

The local public also needs to be made aware of the importance, economy and the advantage of the newer material and technology for their adoption in the future. It is not possible to expect changes over night as many of their likings have come from long traditional linkages.

**Exhibition**

It is recommended that an exhibition or model houses be constructed using alternate technology and material for the view of the people so that they have a chance to select the newer technology. It must be accepted that most of the beneficiaries do not have the capacity to read and understand the values of the newer technology and the material. It is what they see they believe.
It is very clear that the alternate material and the technology available seem promising in cost cutting and preventing environmental damages to a large extend. Further the newer technology would also provide new business interventions for supply of material. The Project must pursue this line of thinking as the avenues for materials along the traditional path seem very limited and the price escalation due to scarcity would be expected soon.

**Implementation**

Some of the environmental impacts of the project can be mitigated by certain measures as suggested above while some can be averted by alternate measures by reducing demand for a particular material or process. It is essential that an implementation mechanism is in place in the project to ensure that these mitigatory measures are implemented and the alternate materials and technology are introduced effectively. The implementation also should have effective monitoring mechanism to ensure that we are on the right track and also to effect changes if anything is contrary.

**Recommended codes of practice:**

1. Give effect to the legislations of the state
2. Give effect to the safeguards of the world bank on environmental issues in projects
3. Increase the awareness of the environmental issues to the beneficiaries and the officers and stake holders
4. Resolve any conflict be consensus over discussion as far as possible
5. Hold regular meetings of the stake holder groups to ensure that communication is maintained and issues are discussed
6. Provide appropriate training to implementation staff
7. Ensure that all the suppliers are legal operators with an appropriate license
8. Ensure that the construction of the house is approved by the local authority
9. Ensure that the mine free clearing certificate is obtained
10. Periodically visit the extraction/mining sites to assess the situation
11. Measure the salinity of the river away from the estuary at different points to check intrusion of sea water
12. Recommend and obtain consensus for defined sizes of building material
13. Maintain a record of material extracted at different locations over time
14. Promote planting of firewood plantations and forestry plantations

**Monitoring Plans**

Each geographical area selected for a sub-project will be treated separately for the purpose of environmental assessment. The EA should be complete with an effective monitoring plan in order to ensure that the recommendations made to minimize the environmental cost of the project are adhered to. The following main guidelines should be used in preparing the monitoring plans.
• Monitoring objectives for the particular geographical areas should be identified and spelt out. This would set the overall framework within which activities should be organized for monitoring to reach the ultimate goal of the EA.

• List down and describe the activities to be monitored within the area and the region, as necessary, and identify a performance indicator for each of these activities, as much as possible, in order to measure the effectiveness of the proposed measures.

• Describe the institutional and logistical arrangements that are necessary to put the plan into action. Also, describe the tasks of the person/s primarily responsible for co-ordinating the plan.

• Describe timing and the timescales for each monitoring activity

• Describe the reporting procedures that need to be established to make the relevant people aware of the progress of the plan and to get feedback.

• Estimate the financial implications involved in implementing the monitoring plan.

Proposed institutional arrangement

The implementation of the plan is by the Government agent and the Project director. Deputy director planning of the District would be the person specifically responsible for the environment. He/she would follow implementation of the plan with the assistance from the environmental officers at the DS divisions and the environmental consultant at the Project Office. However it is important that regular meetings are held with the stakeholders of the project, the beneficiaries, NGOs implementing the project, the suppliers of material, Chamber of commerce who would be able to contribute to new industries etc. to make the project really owned by people, rather than the state.

The Project Office and the GA would facilitate the coordination for success.

Proposed reporting procedures

Any issue will be reported by the environmental officers to the DPD, who will take it up at the District Building committee. The issue will be first discussed at the regular meeting of the stakeholder meeting of the environment.

The stake holder meeting will have the DPD as chairman with officers from the VRC, NHDA, NGOs, implementing agencies of the housing in the district, representatives of the mining contractors/suppliers, the representative of the CEA and one environmental officer from each DS division and Environmental consultant from the project.

Capacity building

Capacity building in terms of monitoring, landscape restoration and measurement of salinity, assessment of erosion etc should be by training of the environmental
officers. It is also important that the other stakeholders such as NGOs implementing the project, private contractors, VRCs, beneficiaries etc. too are aware of these procedures and appropriate training should be also given to them. Quality identification of materials is an area of concern for the stakeholders to make their participation more effective.
Guide lines for EIA for each region:

The consultant would attend to the following as a part of EIA once the site selection has been completed for each division/site as appropriate. The TOR for the consultant is appended below:

1. Describe the physical environment of the geographical area concerned (building site) and provide details of the levels of sensitivity of the site in terms of its ecological resources, livelihood resources, vulnerability to natural disasters and other such important considerations.

2. (a) Provide details of the project in terms of anticipated site development activities, types and quantities of raw materials required, amount of water and other infrastructure facilities required, solid waste, wastewater and sewage disposal.
   (b) Identify sources from where the raw materials can be supplied and assess the availability of the material in the identified source and the quantity that can be extracted.
   (c) Diagrammatically illustrate the location of the site and its proximity to resources, hazards and other related issues.
   (d) Assess the risks associated with different roofing material, with particular emphasis on the risks associated with the use of asbestos roofing sheets.

3. Review the section on the legislative framework for environmental management in Sri Lanka and the safeguard policies of the World Bank in the Environmental Management Framework (EMF) prepared for the NEHCP and determine the laws, regulations and policies applicable to this project. In addition, review any other laws that may be applicable but not included in the EMF. Accordingly, determine the approvals/clearances that need to be obtained for the implementation of the project.

4. Based on (1) & (2) identify the direct and indirect impacts that can occur as a result of project activities on the site and off site. Propose adaptive strategies and alternative options to mitigate the identified impacts and enhance the environmental sustainability of the project. Make reference to the checklist of impacts and code of best environmental practices suggested in the EMF in completing this section.

5. Based on the impacts identified in (4) above, prepare an Environmental Management Plan (EMP) for the area concerned using guidelines provided in the EMF.

6. Adopt the standard monitoring plan given in the EMF to prepare a specific performance monitoring programme (MP) for the area concerned. The MP should focus on ensuring adherence to laws, regulations and recommended environmental safeguards.

7. Identify the key stakeholders involved in the process and carry out consultations with them while preparing the environmental assessment.
8. Prepare a draft Environmental Impact Assessment Report which includes all issues discussed above and finalise the report based on comments from the Government and the World Bank.

Synthesis

This programme alone, requires large quantities of building materials e.g., 25% tiles in the country, 10% of sand in the country. If proper planning is not in place this could lead to raping of the system by the escalation of prices in the market on one hand and destroying the environment on the other. Over extraction of sand, clay and even timber would be expected. One of the biggest drawbacks is that we do not have data on NORTH EAST. There are information for most other provinces on the amount of sand being collected in the rivers, coast etc. at least giving an opportunity to predict or control it. Such information is lacking for the North and East. IT IS OF FOREMOST importance that such information is obtained, collected and used in the estimation and prediction. The GAs have undertaken to obtain the total use of building materials in their districts which is a good start. It is important to get the information of the sediment load of the rivers and also some information of the mineral stock in the province, which needs to be done in collaboration with the GSMB. Jaffna had done for Manalkadu sand dunes and Mannar is to follow suit.

It is strongly recommended that the newer technology of Compressed earth blocks are and MCR tiles for roof, concrete beams, concrete frames, concrete floor designs etc are seriously considered as options, and introduced to the beneficiaries for selection. Opportunities for new industries supplying new building material is high and the business community should be informed of the potential. There is provision under the programme to assist such ventures. It is worth touring around the country where this and other appropriate technology is available. If necessary, a visit to India, Pondicheri, Auroville, for better understanding and exposure would be a worthy investment.

It is also important that the environmental checks are in place. This also presumes that training the stakeholders in the process of monitoring also would be in place. Periodic checks on environmental issue and regional communication (from different districts) among stakeholder groups would assist the management of the environment. Awareness building, quality checking are also matters that the project must seriously address across the board, for better-informed participation.

Positive ventures of advocating better environment conscience by awareness and promoting home garden forestry, community forestry, firewood plantation etc are urgently needed to ensure that safeguards are in place for the future environmental management. More than 90% of the rural populations of the North East use firewood as their prime source of energy and when this is scarce or expensive they invariably will turn to the natural forest. It would even be worth to introduce efficient stoves, solar cookers etc as alternatives at this stage.

Skill training is another important component. The wages of a person reaches to Rs.1500 per day in Ampara. There is an acute shortage of skilled staff which may
form a bottle neck to the project. Local youth could be trained into carpenters and masons utilizing them as apprentice at the beginning. There is also a need to train the MASONs, CARPENTORS on the use of new material and technology so that they are able to utilize the newer concepts. Awareness is a key phenomenon for effectiveness of the programme. WUSC is training Carpenters and Masons at present under their regional programme and their services could be utilized for enhancement or expansion of the programme.

Another practical issue that needs clear policy is the restoration of the environment, in places of mining in particular. The contractors must be commissioned to clean up the debris they leave. The mining contractors also will be expected/directed to restore the mined area. It is an advantage to assign an area to one contractor so that they could be identified for the responsibility of restoration.

**Cost of Construction**

The project had increased the grant from Rs 75,000 to Rs 110,000, and anticipates a cost of Rs 160,000 (inclusive of beneficiary contribution). But it also has expanded itself to a 420 square feet construction, which may not be a realistic estimate given the prices of the material and labour. Therefore this imposes a high constraint on the beneficiary. The houses constructed under the Hindu Cultural Ministry cost Rs 135,000 and the GTZ Rs 140,000 and the house of CHF even higher with the toilet. The project also had estimated Rs 200,000 for the urban rural, considering that the costs and labour are expensive in the urban areas. But under the present circumstances where the construction material are scarce in the rural area, the cost of material are much higher in the rural owing to transport, depending on what resources are available in the neighbourhood. It may be worth revising the grant based on availability of material subject to sites after the selection and EIA of the sites. Further the sanitary construction in Jaffna may have to be considered special, as the lime stone substratum is porous and the soakage pit does not content the waste. Additional costs may have to be included for better designs to avoid polluting the water. Escalation of prices of building material between the time of contracting the project to the completion is a matter that needs serious consideration. The total period of implementation is expected to be around 4 years, which is long. Prices are known to have increased by almost 100% in some commodities, considerably in the others. Project will have to have a supplementary budget or have contingency plans for additional finance to ensure success of the project. (It has been agreed recently that the grant be increased to Rs 150,000 for fully damaged houses without the toilet which would be able to provide a better house to the beneficiary).

**Integrated approach**

Environment is an integrated issue, which cannot be handled in isolation. Negative impacts are reduced by the prevention of some processes, mitigation of others and development of some positive activities including the stake holder awareness and training programmes. The necessity of information on the use of natural resources in
the region takes priority in the planning process, more correctly to the success of the programme.

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Annex 1.

List of persons who participated/ contributed in the discussions

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<tr>
<th>No</th>
<th>Name</th>
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<td>12</td>
<td>A Subramania sarma</td>
<td>DS, Sandilipay</td>
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<td>S Raveendra sarma</td>
<td>DDP, Nallur</td>
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<td>S Srinivasan</td>
<td>DS, Chavakacheri</td>
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<td>DS, Sankanai</td>
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<td>A sivaswamy</td>
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<td>17</td>
<td>Mrs R Naguleswaran</td>
<td>ADP, Tellipalai</td>
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<td>S Thiruvakaran</td>
<td>DS, Uduvil</td>
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<td>M Nanthagopalan</td>
<td>A D S, Velani</td>
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<td>21</td>
<td>K Nithiyasundaresarar</td>
<td>Euroville Engineers</td>
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<td>22</td>
<td>V Sri sakthivel</td>
<td>President/NGO council</td>
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<tr>
<td>23</td>
<td>S Santhakumar</td>
<td>NECORD</td>
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<td>24</td>
<td>K V Ganeshkumar</td>
<td>R D C</td>
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</tbody>
</table>
25  T Sabaratnam  DRRS Engineer
26  S Rajathurai  Manager, NHDA
27  DM, NHDA
28  Mrs S Anjalidevi  DS office, Kopay
29  K Pane  Steno
30  A Rajanayagam  Steno
31  S R Sarvethiran  D O
32  S Sunthakumar  Chief Engineer, Building
33  N Sarveswaran  D O, Kacheri
34  AGA, Karainagar
35  N Sivapadasundaram  DDP
36  J X Selvanayagam  AGA, Kayts
37  K Vasantharuba  DEO, Kacheri
38  V Sathiaselvan  ADP, Kachri, Jaffna
39  K Vairvanthan  Kacheri, Jaffna
40  Mrs K Pathmarajah  DS, Vallaichennai
41  Mrs V Arulrajah  DS, Kiran
42  M A M Arifa  ADS, Kattankudi
43  K Jeyananthan  DM, NHDA, Batticaloa
44  M Uthayakumar  DS, Vakarai
45  M A M Ilyas  DEO, Koralai pattu West
46  A Arulnandy  DEO, Vallaichennai
47  K Prabaharan  DEO, Manmunai Pattu
48  T Saravanapavan  Dev. Coordinator, Vakarai
49  S Gokulan  DEO, Kattankudy
50  Mrs R baskaran  DEO, Chenkaladi
51  T Bawathrani  DEO, Eravur
52  T Thamilchelvi  DEO, Kiran
53  S Udayarajan  Kaluwanchikudy
54  T Suntheresan  DEO, Vellaveli
55  N Sri Sankar  DS, Manmunai west
56  A Thavagnanadas  Chief Engineer, Buildings
57  S Giridaran  DS, Eravur Pattu
58  K Vimalanathan  DS, Eravur town
59  K Sivanathan  DS, Manmunai Pattu
60  N Kathirgamanathan  DS, Manmunai North
61  K Karunahara  DS, Poratheve Pattu
62  S Jeyaram  PD, rehabilitation
63  L A Navaratnarajah  DEO, Batticaloa
64  P Gunaratnam  ADP, Arayampathy
65  A karunagaran  ADP, Vavanthevu
66  S Amaladas  DS, MSW
67  H W Yasaratne  DS, Morawewa
68  S D Piyadasa  DS, Kantale
69  M C M Sheriff  DS, Kinniya
70  S Thillainathan  Ad. Secretary, TRO
71  V Kalaivarman  Project Officer
72  N Thamilselvan  DPO, NECDEP
73  M Dhushiyanthini  Project officer, SEDOT