# Rapid Technical Assessment of Damage and Needs for Housing Reconstruction in Tirrah Valley

**December 2013** 











## **FOREWORD**

Due to militancy and ensuing military operations, the public and private infrastructure in FATA has sustained major damages. FDMA, under the National Disaster Management Act, has the mandate to manage the complete Spectrum of disaster management, which includes reconstruction also. FDMA with the Help of FATA Secretariat is trying to make efficient use of the available resources for the reconstruction.

Similar to other areas of the FATA, Tirrah Valley of Khyber Agency was also badly affected by the crisis and a sizeable amount of damages occurred to the Public housing sector. After clearing the area and completing the first phase of return, by utilizing their own resources and some assistance provided by humanitarian agencies, FDMA still faces challenges of providing Shelters to the families returned as their houses are badly damaged and they will have to survive in the extreme cold weather of the area. For the purpose FDMA requested UN-Habitat to carry out a qualitative assessment for the provision of shelter in the said valley. UN-Habitat with the support of FDMA and other organizations carried out a qualitative assessment, which figured out all the damages and suggested easy and fast solution for shelter provision to make the return more sustainable. Besides shelter some other needs are also highlighted in this document.

I hope this document will provide a better guideline and will serve as an authentic source for every stakeholder interested in providing shelters to the returnees of the area, to make the return sustainable. I would like to thank UN-Habitat, NRC and Muslim Aid for taking this initiative, which will serve as a guideline in the early recovery process of Tirrah valley.

Arshad Khan Director General

FATA Disaster Management Authority (FDMA)

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# **Executive Summary**

There is a long history of natural and man-made disasters in Pakistan. One of the worst kind of man-made complex emergency occurred in early 2013 in FATA where houses and markets were targeted by the militants leaving people homeless, displaced and exposed to risks and vulnerabilities.

This technical assessment report provides an oversight of housing typology in the affected area (Tirrah Valley) including building plans, numbers of storeys, walls and roof material, construction practices, particularly on the type and extent of damage to housing and settlements. It also provides information about current living conditions of the returnees, number of families residing in the house, market conditions, cost per room, availability of construction material, availability of skilled and unskilled labour, accessibility to the market, environmental damage and seasonal calendar of communal activities besides the overview of few other sectors, as well as people's preferences for the reconstruction.

According to this assessment more than 14,600 IDP families have voluntarily returned until November 2013. Most of the returned families (79%) intend to stay during the winter season in spite of poor living conditions while only a small percentage of 21% will move to warmer locations. There are 25% houses completely damaged while the roofs of another 45% houses are completely damaged. Therefore, damage to 70% of the roofs, pose a serious threat to the environment and pose challenges to households to survive in harsh winters without roof.

Houses, consisting mostly of mud and stones, range from single storey to triple storey. Double storey houses are predominant in the affected area. Housing typology and debris of the destroyed houses further add to the complexities of reconstruction and repair efforts in scattered population and geographically difficult terrain.

The current living conditions show that 50% of returnees are living in makeshift arrangements including intact houses and 49% live in damaged houses. Returnees have given highest priority to the shelter. They are in urgent need of winterized shelters, roofing kits and winterized NFI kits.

Based on this assessment, it is highly recommended to provide immediate shelter support to the affected population and to formulate housing reconstruction policy as part of early recovery measures.

Bella Evidente

OIC Country Programme Manager

**UN-Habitat Pakistan** 

# **Abbreviations**

Cft Cubic Feet

CGI Corrugated Galvanized Iron

FATA Federally Administered Tribal Areas

FDMA FATA Disaster Management Authority

FGD Focus Group Discussion

IDPsInternally Displaced PersonsIEDImprovised Explosive Device

KIIs Key informers Interviews

NFIs Non Food Items

NRC Norwegian Refugee Council

TTP Tahreek-e-Taliban

UNHCR United Nations High Commissioner for Refugees

UNOCHA United Nations Office for the Coordination of Humanitarian Affairs

# **Table of Contents**

1.	Introdu	ction		3							
2.	Objectiv	Objectives of the Assessment :									
3.	Assessr	ssessment Methodology									
4.	Buildings/Housing Typology										
	4.1	Building	Building Envelop								
		4.1.1	Building plan	11							
		4.1.2	Walls	11							
		4.1.3	Doors and Windows	12							
		4.1.4	Roof	12							
		4.1.5	Latrine	12							
		4.1.6	Boundary wall	12							
5.	Environmental Performance of Buildings · · · · · · · · · · · · · · · · · · ·										
	5.1	Damage Pattern of the Houses									
	5.2	Damage to Houses									
	5.3	Priority	Needs in Shelter Sector	18							
6.	Environ	mental D	amage ·····	20							
7.	Issues and Challenges										
	7.1	7.1 Roof kit									
	7.2	Early Recovery ·····									
	7.3	.3 Reconstruction · · · · · · · · · · · · · · · · · · ·									
	7.4 Design of Permanent Shelter										
Annex A	۹: Typical	Building	Plans ·····	28							
Annex F	B:Other U	seful Info	ormation	31							

## **Context**

Tirrah Valley is part of the Federally Administered Tribal Areas (FATA) and is situated in northeast of Peshawar and located in Khyber, Kurrum and Orakzai Agency with a small northern border sharing with Nangarhar province, Afghanistan. Maidan/Tirrah Maidan is the central place of Tirrah Vally situated in Khyber Agency, concentrated with most of the valley's population, where most of the economic and political activities have taken place.

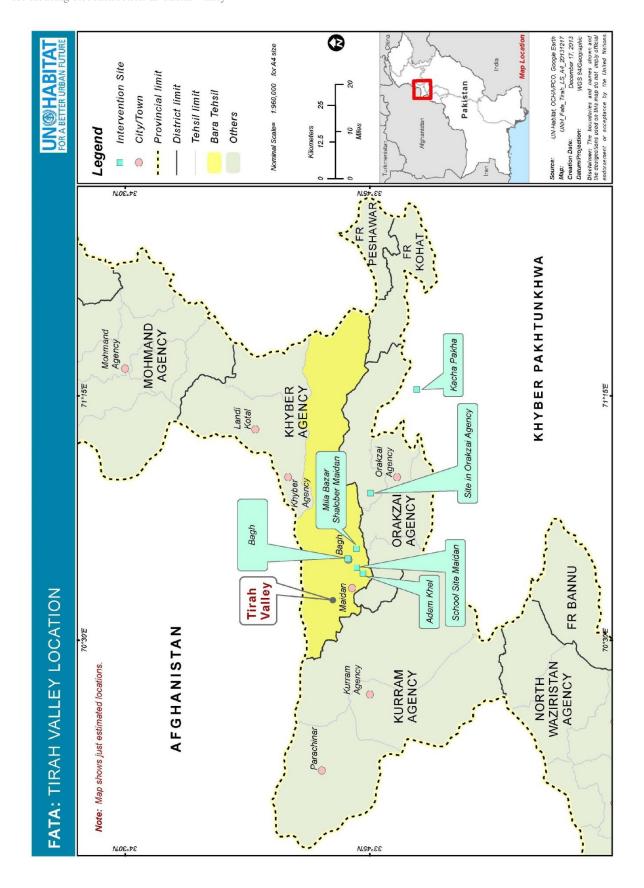
There have been low skirmishes between two armed groups known as Ansar-ul-Islam and Lashkar-e-Islam backed by Tahreek-e-Taliban (TTP) in Tirrah for the last decade without any consequence of displacement, but in mid-March 2013 fresh fighting started between two non-state armed groups. This armed clash caused large scale population displacement from Tirrah and more than17,140 families (97,839 individuals) fled from the affected area. The exodus took three different exit routes, via Orakzai, Kurram and Khyber Agencies towards Peshawar, Kohat, Hangu and Kurram Agency in particular. The displaced population was registered for humanitarian assistance at Jerma, Kohat, in New Durrani camp, Kurram agency and Jalozai camp, Nowshera.

The displacement occurred within very short time giving no opportunity to the affected population for carrying with them any item for daily needs. Even physically challenged people were left along the route of displacement as they were unable to carry them further.

When the opponent group entered Maidan, it used resources that were available, destroyed houses of prominent people directly involved in the fight using IED and dynamites and burnt rest of the houses shops, marketplace, schools/madrasas and harvested crops leaving nothing, while retreating from Tirrah.

The military operation started on 19 May 2013 and ended on 10June 2013 during which the entire Maidan area was cleared from non-state armed actors and military gained the control of the valley. This operation also resulted in the destruction of the hideouts which were mainly in the evacuated houses. After this military operation and on June 25 2013, all 98 villages in Bagh Maidan/Tirrah Valley were de-notified by the FATA Disaster Management Authority (FDMA) and return intention was found. The return intention of the displaced families through UNHCR survey shows that 96.3% of families wanted to return. Government, through FDMA and other actors, supported the return through provision of a return package. Official return commenced on 15September 2013. To facilitate the return, FDMA with the support of other actors set up two embarkation points, one at New Durrani Sadda for Bar Kamber kheil Tribe through Haider Kandao rout and Kohat Jerma for the rest of the six tribes through Orakzai Agency Debori Aranga Pass and one disembarkation point was established at Bagh Maidan in Tirrah. According to FDMA report, about 14,533 number of families have been returned so far and the remaining will return by March. The number of families that returnedare confirmed through Pak Army data and also through FGDs in the place of origin. Besidesthe other difficulties currently faced by the returnees, non-availability of shelter is a major difficulty due to severe winter season.

December 2013 Context

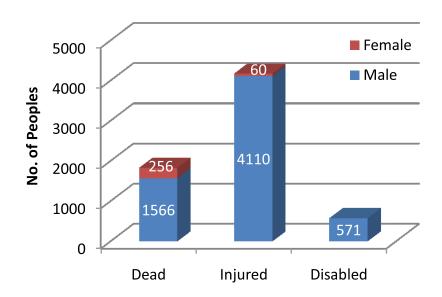


Context December 2013

# **1** Introduction

Tirrah valley has been the most isolated and unattended area in FATA due to its topography, tribal system, resistance to the development from the locals and access to the information. After the creation of the Pakistan, this is the first time that army entered into this area. The conflict of March 2013 resulted in the large destruction and displacement from Tirrah. FDMA estimates the damage of 14000 houses out of which 8000-9000 houses are in Bagh Maidan. The torching of the houses resulted in the burning of roof, grains, furniture, clothes, quilts, blankets, fuel wood and other domestic commodities. The destruction in the area, coupled with lack of physical infrastructure and social services poses a great challenge to government and other humanitarian actors to cope with the situation, especially, due to the unavailability of the complete information of the area in different sectors. Housing, being the most affected one, and also due to the fact that communities will rebuild their houses by their own, it is imperative to know the existing housing typologies, construction technique and trends, availability of the building material, source of the material, its type and cost, availability of latrines, availability of skilled labour and most importantly people preferences for repair and reconstruction. Initial assessments conducted by Inter organization provides quantitative information based on the interviews at place of displacement, and one assessment by UNOCHA provides more about the security situation but there is no situational analysis of returnees at place of origin which could guide the supplementary assistance to affected communities in the repair and reconstruction of the houses. Furthermore, the area is snowbound and the temperature falls below zero from December to March, and accessibility to the market is totally restricted during winter, people require immediate shelter support. Therefore, to address these needs a qualitative assessment of the housing damage and need is being jointly conducted by FDMA, UN-Habitat, NRC and Muslim Aid.

#### **People affected in Conflict**



December 2013 Introduction

# 2 Objectives of the Assessment

The overall objective of this assessment is to provide support to FDMA in early recovery for the shelter sector by providing qualitative information supplemented with the quantitative information supported with evidences about the overall condition of housing in the affected area of Tirrah Maidan.

Following are the specific objectives:

- To provide information about building typologies, availability of both building material and construction skill.
- To collect the information on the extent of damage in the housing and settlement.
- To know the people's preferences about repair and reconstruction.
- To map the return trend amongst IDPs.
- To know the priority needs of the community.

Objectives of the Assessment December 2013

# 3 Assessment Methodology

Based on similar assessments in the past and initial information about Tirrah Valley, survey tools were developed. These tools include FGDs, KIIs, general observations, and technical assessment as well as documentation of house plan and structure.

Two teams, each comprised of one Engineer, two Social Scientists and a member from the Education Department, were deployed for the assessment. These teams were given training on survey tools and on assessment procedures by UN-Habitat. Draft questionnaires were filled by the teams during training and feedback from the team members was incorporated in the questionnaire. Questionnaire was pre-tested in village D and, Bar Shalobarand few changes were made after the pretesting. Roughly there are 98 villages which were affected in conflict and it was difficult to get statistically representative sampling units of the villages within given time, resources and accessibility, it was therefore decided to choose at least one sample from each tribe. There are five tribes (Malak Din Khel, Bar QamberKhel, Adam Khel, ZakhaKhel and Shalober) living in the de notified area of Tirrah Maidan and they share almost the same characteristics. The area is geographically divided in to tribes, the aforementioned five tribes were selected as sampling unit. Assessment team departed on 18th November to Tira Maidan via Orakzai agency and stayed at night in the Debori camp; Orakzai bordering area, where FDMA has established a transitional camp for returnees.

The team stayed with the Army and sought facilitation from the Army for the assessment. The assessment plan was shared with Army officials who ensured their full support for the assessment. Army suggested starting the assessment from Bar Qamber Khel area where they had already informed the activists about the arrival of the assessment team. The team agreed with the proposal and on the first day a large community gathering, representing all the tribes was arranged. The objective of the visit was shared with the gathered community and this gathering was divided into eight groups representing the sub tribe (Khanbe Khel, Wand Gari, Botan Sharif, Chota Darbi Khel, Yar Gul Khel, Tatar Khel, Nasra Din, Drey Plary, andMastiKhel). Eight FGDs were conducted and shelter rapid assessment forms were filled. Parallel to that technical team facilitated the discussion with the group of masons.

On the second day of the visit, multiple FGDs and technical assessment were conducted in Malak Din Khel and Adam Khel areas. Technical team did the technical assessment of the damaged house and also documented the self-recovery by the returnees. On the third day the team visited Zakha Khel & Shalober, five FDGs were conducted with the minimum number of seven elders from the area in each group.

After the FGDs, team walked through the villages to verify the information and to record the observation. Necessary security measures were taken during the walk through in the villages. One typical house in each village was completely documented by the engineers including building plan, foundation detail, walls type; roof types, type of damage etc. and pictures of each component were taken. KIIs were conducted with tribal elders, Army and teachers of local private and public schools. The data collected during this assessment was analysed in the country office of UN-Habitat in Islamabad to present in this assessment report. The team completed the assessment in three days and reached back on 23nd November 2013.

December 2013 Assessment Methodology

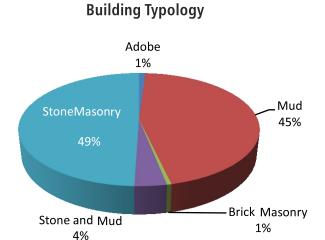
## Pictures taken during FDGs, KIIs and Houses Inspection



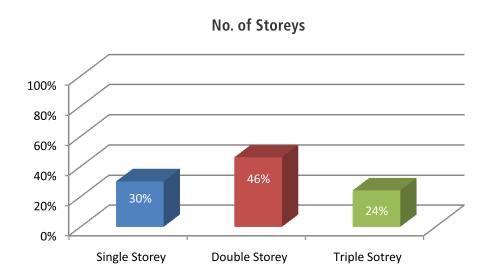
Assessment Methodology December 2013

# 4 Buildings/Housing Typology

Most of the buildings in affected areas are traditional, constructed with local materials. Contrary to other parts of FATA and KP, these buildings are unique in plan and numbers of storey. Numbers of storey vary from 1 to 3 and are built with local construction materials. Besides weather, another reason for constructing multi-storey houses in this area is to utilize maximum land for the cultivation of a highly lucrative cash crop.

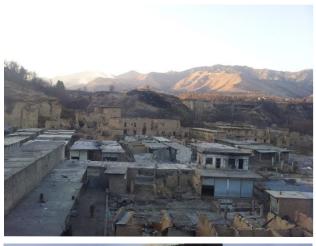


Stone masonry and mud houses are dominant in the area with 49% and 45% respectively while another 4% are constructed using stone in the ground storey while mud in the upper storeys. The remaining buildings are mostly constructed with adobe and brick masonry, but those are very rare in the area only 1% each.



Most of the houses are multi-storeyed, 46% of the houses are double storey, 24% are three storeys while 30% are single storey. It looks like that the ground floor is constructed initially and more storeys may be added later as housing construction is usually incremental.













Engineer takes the dimension of beam



A cave where some houses are found inside



Wooden logs, cleaved wood and twigs



Wooden batten and planks



Wooden logs and planks



Ladder inside the house





Thick Stone walls

Thick mud walls

## 4.1 Building Envelop

## 4.1.1 Building plan

Building envelop is designed in a way that it keeps the temperature manageable during winter. Building plan is compact; length to width ratio is quite low, average numbers of rooms per storey is three and the average size of the room is 18'x15', the average height of room is 10 ft. Rooms are placed in a grid. The length of the room varies but the shorter clear span is mostly 15ft from walls, which provides the uniform dimension for the roof beams which are wooden. A wooden ladder or staircase provides access from floor to floor. This ladder or stair case is generally kept inside the house in a hall or in the kitchen. Access to the house is from one main door. Kitchen is on the ground floor and rest of the rooms are used for living purposes. A Heating stove known as Bukhara is used for cooking and heating purposes. Smoke pipe runs through the top floors and roof.. In the kitchen or in the premises of house a Tandoor (Oven) is also provided for baking of Roti (Bread). Livestock is kept outside the house in kettle shed. Typical building plans are shown in Annex A.

#### 4.1.2 Walls

Wall foundation is constructed with dry stones. Depth of foundation is 2-3 ft deep and thickness of the wall varies with the material from which walls are constructed. For mud and stone walls, thickness varies from 2-3ft and for adobe block its thickness is from 1-1.25ft. In some cases different material for different storey height is also used, in that case dry stone with mud mortar is used in lower storey and mud in above storey. Use of different wall material has also been observed in the walls of same storey as per above sequence. This shows that people preferably

choose stone for construction but due to the scarcity of the stone people opt for mud walls, in the area at higher altitude dry stone masonry prevails. Wooden sticks are laid at the wall section at an interval of two to three ft (vertical) to control the delamination in both stone and in mud walls. One house in Maidan constructed with RCC block has also been observed. Shops are constructed using mud, stone, adobe block, concrete block and insitue with flat and in some cases lean to roof with CGI sheets.

#### 4.1.3 Doors and Windows

Doors and windows are made up of local wood. Doors width is 3-5ft wide and 6'-6.5' high, windows are very few in the house. The size of the window is very small and it is generally 3'x3' with square shape with sill level of 3ft average.

#### 4.1.4 Roof

Most of the roofs of houses are flat mud roof. Heavy wooden logs are used as beams. Over these logs, wooden battens or planks or cleft wood is used, which bears the roof covering material. Over this bearing structure local bushes are used as thatch and mud is placed on the roof. Floors of multi-storey houses are made up of wooden beams and planks and a plastic sheet is laid over which mud flooring is done. Plastic sheet has also been observed in few roofs to prevent the dripping. Due to the heavy snow, thickness of mud is more than 1.5 ft and roof projection is 1 - 1.5 ft.

#### 4.1.5 Latrine

Most males and females use latrine in this area but open defecation was also observed. Most common type of latrine is the pit latrine. This is inside the premises, detached in most of the cases at ground floor, and constructed with the material same as used for the house. This is simple enclosure with a pit. Pit depth varies between 30- 40 ft. There is seldom ventilation in latrine, due to the depth of pit it is less foully. Water is used for cleansing.

#### 4.1.6 Boundary wall

Boundary wall is constructed with stone or mud but there is less trend of boundary wall. The average height of boundary wall is as low as 4ft and in few houses a hedge has also been observed instead of constructed boundary wall.

Buildings/Housing Typology December 2013

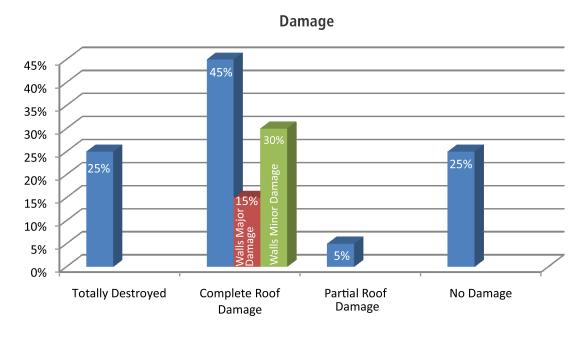
# **5** Environmental Performance of Buildings

The buildings assessed are constructed with local material and technology which respond to the local climate. Buildings keep the cold away in winters due to compact plan, thick walls, smaller windows and heavy mud roofs and prevent heat loss which is produced during cooking and heating.

Though no seismic zoning of Tirrah valley is available but other part of the Khyber Agency lies between seismic zone 2b and 3. This means that Tirrah Valley is also prone to earthquake. Buildings are extremely vulnerable to earthquake. There is no structural integrity in the building, walls are free standing without diaphragm, building height and heavy mass of the roofs and thick walls are likely to attract large earthquake forces and due to lack of strength, ductility and structural integrity buildings cannot withstand these forces and may collapse. Occupancy at various floors may increase the life loss.

## 5.1 Damage Pattern of the Houses

There are three causes of damage to the houses:(1) torching, (2) IED explosion and (3) exposure of walls to weather. When these anti-state actors entered into the valley, they torched and bombed houses of the leaders of opponents and while leaving the valley when forces pushed them back they torched rest of the houses. Those houses which were torched, each and every combustible material were burnt and roofs were collapsed. It was observed that roofs of two and three story buildings were mainly damaged, which resulted in the collapse of walls due to erosion of mud or mud mortar from stone masonry. The lack of maintenance is due to the extended stay of displaced families away from place of origin.



The above graph shows that 25% of the houses in surveyed area are completely damaged and another 45% are not liveable as their roofs are completely damaged while their walls are partially damaged. In addition to this, 5% roofs are partially damaged due to burning of some of the wooden beams or due to lack of maintenance. Remaining 25% are with no damage.

#### 50% ■ Total Houses 45% Damage 40% 35% 30% 25% 20% 15% 10% 5% 0% Adobe Mud Brick Masonry Stone and Mud StoneMasonry

## **Typology wise Damage**

There is no strong correlation between damage and building typology, but due to the rains, mud walls erosion was significant.

## 5.2 Damage to Houses

Following pictures give an overview of different causes of damage to the houses.



## Damage due to Fire





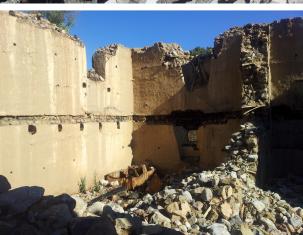




## Damage due to Explosions









## **Damage due to Weather affects**









**Damages to Market Place** 









## 5.3 Priority Needs in Shelter Sector

One of the most important needs in the shelter sector is the provision of immediate shelter support. According to the type of support required to the affected people, four categories are listed below:

- Category 1: completely destroyed houses.
- Category 2a: partially destroyed houses with major damage.
- Category 2b: partially destroyed houses with minor damage.
- Category 2c: partially destroyed houses with negligible damage.

#### Category 1

These are the houses which have been completely destroyed in conflict. The damage could be the result of torching, explosion or any other man-made act. In this category walls and roofs have been completely damaged and required reconstruction of the houses. The only salvaged material of these houses is the stones in case of stone masonry and 20-30% wooden beams. These houses require debris removal and complete reconstruction. Temporary shelter will be required immediately till completion of the reconstruction.

#### Category 2a

These are the partially destroyed houses with major damage due to torching, explosion or any other man made act. Roofs have been completely damaged and walls received major damage. Roofs require reconstruction, while walls require structural repair. These houses require rubble clearance, major repair of walls, fixing of doors and windows and complete roof construction. 20-30% wood can be salvaged and reused. These houses require toolkit to repair the walls, fixing of roof, doors windows, ladder, and also require provision of complete roofing kit. These houses also require temporary shelters.

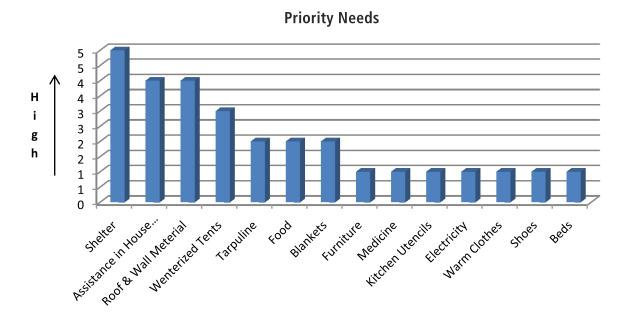
### **Category 2b**

These are the houses which are partially destroyed with minor damage. The roofs are severely damaged due to torching in the conflict and require major repair, the walls are almost intact with

negligible damage.30-40% wood can be salvaged and reused. These houses require minor repair of the walls in patches and roof requires major repair. Houses are inhabitable with roof repair. These houses require tool kit and roofing kit only.

#### **Category 2c**

These are the houses which are destroyed due to weather. These are unattended houses which lacked necessary care and repair due to prolonged absence of displaced homeowners/tenants. Roofs are affected due to lack of repair and walls are partly eroded or mud mortar from joints was removed. These houses are inhabitable and require non-structural repair which can be done by the house owners themselves and plastic sheets should be provided to keep the roof stronger.



# 6 Environmental Damage

Huge damage to the environment especially on 'wood' as the precious environmental resource has been diminished. Most of the wood used in construction is Deodar wood. The wood from this tree matures in 100 years, and as per estimate, 74 cft of wood is used in one room and if average number of rooms is three per storey and average number of storeys is two then a complete house requires 444cftof wood at conservative estimate. To get this quantity of wood, a fully matured tree is required for completion of a house. In some cases one immature tree is used as one beam. This indicates that people cut many small trees to complete one room; this will result insubstantial deforestation.

It will be a great challenge to mobilize communities to stop cutting trees for reconstruction. Introduction of efficient wooden roofing design, efficient cooking and heating methods could be the optimum solutions for the problem besides interventions for tree plantation.

Environmental Damage December 2013

# 7 Issues and Challenges

#### 7.1 Roof kit

In most of the natural disasters, wood is salvaged from the rubble and reused/recycled in reconstruction. But in the case of Tirrah, very small quantity of wood is available from salvage and there is no other source of wood except the natural forest. The planted trees are fruit-bearing (walnut, apricot, etc.) and those are not sufficient to be used for construction. Trees in natural forest (communal) are mainly Deodar and Kail (blue pine) which are slow growing trees and take decades to mature. Formal forestry is not found in the area and communal forests are not replanted by the community. In result of the destruction natural forest are under serious threat.

Climate and building typologies restrict the use of alternate material. 3-4 ft snow that has fallen on flat roof is removed by people manually from the roof top. This requires rigid roof with heavy mud. And to support this weight thick wooden beam or logs are used. Room clear span is almost fixed to 5 yards (15ft) this provides house owner with only option for the beam length which is manageable for him to bring it from forest and handling. One challenge for repair and reconstruction is the provision of fixed length beams/girders. Any length, smaller than the required room span, will not be useable. At the same time this provides an opportunity for uniform packaging of the roof kit. Affected people will likely manage it by their local resources, mainly using the forest wood. Replacing the burnt doors and windows with new is another challenge, especially if the door/window beam is burnt. This requires financial and technical support. Rubble clearance is also a big task.

Though there is no land issue found in the area, every family has its own land but in the congested area place for erecting temporary shelter may be an issue for the houses which are totally destroyed, same is the case with the houses which are severely damaged but repairable. Cultivable land is used for the cropping, and soil extraction and transportation for the construction purpose can also be a challenge in the area where stones are not available. In Maidan round stone from local Nallah in the building are used. No quarry stone is abundantly available in the area. Building typology in the area is more labour intensive as compare to the other traditional houses. It requires roughly three times more labour than a traditional building, therefore skilled labour wages will be increased and availability of roofers may be challenge. There is also likely hood of change of wall' material due to unavailability of stone, transportation of soil and unavailability of artisan.

Since the area is prone to earthquake and buildings are extremely vulnerable to earthquake, lot of efforts require making building earthquake resistant. There are no existing practices in vogue which can show even a low level awareness about earthquake resistant measures in the building. Therefore inculcating this knowledge into the practices and general awareness of the community about the risk is very crucial.

The markets in the Tirrah Maidan have been burnt and dysfunctional. These markets provide grocery and other daily use stuff, and also provide the platform to facilitate the trade done by the locals. Transportation of non-local construction material for shelter will remain a big challenge due to inaccessibility in snow and limited accessibility with other market in all weather.

The government has established its writ in the area now, but still all routes and few areas in the valley are not cleared. Population spread is in tribal based pockets in scattered area, which needs large administrative resources to cover the area.

December 2013 Issues and Challenges

People who have returned are living in houses which are not damaged or partially damaged. There are cases where one or two rooms or one storey is liveable and rest is completely damaged. It was also observed that returnees are living with close kin or in the houses of their relatives who have not returned yet. Makeshift arrangements within the house have also been observed. The current roof fixing will not provide thermal comfort in winter and people are posed to serious threat from winter cold. Team observed that temperature was below zero in mid-November and it will go to -4C\* or below during December to February.

Based on this assessment following recommendation are made for shelter sector.

## 7.2 Early Recovery

A reasonable cash assistance for the shelter with plastic sheet is immediately required for the house owners whose houses are partially damaged, except category 1.a. people will repair their roofs using plastic sheet and their own resources to just pass the winter and in spring they will fix the roofs properly. In the case of other two categories it is not possible to repair the walls and roofs immediately. The houses which have been destroyed or severely damaged will require more than a year to make them inhabitable, therefore no effort will be made to reconstruct or repair those houses till spring. These families require winterized NFI kits, winterized shelters and shelter repair kits immediately.

#### 7.3 Reconstruction

A thorough damage and need assessment is required to classify the damage and eligibility for housing subsidy of each house owner using the above four categories. This assessment preferably be conducted in the early recovery phase. Housing reconstruction policy is required to be formulated with in consultation of all stakeholders. In this case it will support shelter assistance. Housing subsidy needs to be determined for each category. Following are the proposed options for housing subsidy which needs further consultation:

Option1:For category 2a, 2b and 2c housing subsidy should be made to the house owners without any condition. With this assistance, a model roof should be constructed demonstrating the use of economical section of wood, steel girder and other roof improving techniques.

For category 1, the housing subsidy should be subject to the use of improved techniques for reconstruction.

Option 2:Housing subsidy should be given to all affected families without any conditions. Extensive awareness and training programme should be initiated to sensitize the affected community about the building vulnerabilities, earthquake risk and optimization of the wood use through improved construction technique.

Every effort should be made to prevent the deforestation and side by side tree plantation and protection initiatives are required. Forests are communal and protection of forests will not be much challenging under the communal/tribal system.

Issues and Challenges December 2013

## 7.4 Design of Permanent Shelter

One design-fits all, may not be possible on the basis of this rapid assessment at this stage and it is recommended that, using the inputs of this assessment further options should be explored for the responsive design of permanent shelter. People will reconstruct the walls using the available salvage, same as their previous walls. The minimum improvement should be suggested to strengthen the walls using timber band and by improving workmanship.

Roof is one of the important factors which needs to be focussed immediately to prevent the natural forests. Three options for roof are proposed as bellow;

- 1. Improving the existing roof through reducing the size of timber beam, introduction of polythene layer in roof to minimize the roof thickness.
- 2. Demonstration of CGI truss roof with insulation.
- 3. As an alternate of the wooden beam, GI girders and T-Iron can also be introduced to minimize the deforestation with caveat that these have large embodied energy and require large transportation. The minimum length of 20-21ft will be required for roof girder.

December 2013 Issues and Challenges

# Following is the estimated cost of two room house for existing design. Estimate for Mud Walls

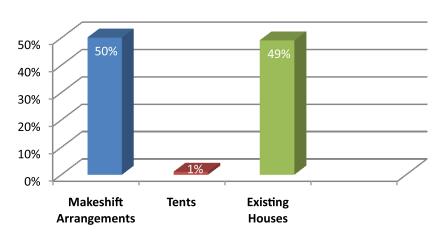
No.	ltem	Quantity	Unit	Rate (PKR)	Amount (PKR)
1	Excavation	1125	Cft	8	9,000
2	Stone Work in Foundation only	1255	Cft	35	43,925
3	Mud for walls and roof	3794	Cft	15	56,914
4	Timber beams (10 "X7 "X20")	78	Cft	1,050	81,900
5	Wooden Planks over beam(3"X6"X4')	310	Nos	350	108,500
6	local Buttay/Durga	916.5	Sft	4	3,666
7	Heavy duty Polythene sheet	1833	Sft	6	10,998
8	Doors (3'X7')	2	Nos	8,000	16,000
9	windows (3'X3')	2	Nos	3,500	7,000
10	PVC Pipe for downspout (Parnalla)	12	Rft	25	300
19	Unskilled Labor	48	Days	600	28,800
20	Skilled Labor	20	Days	1,000	20,000
21	Transportation	5000	Lumpsum	1	5,000
	Total				392,000

## **Estimates for Stone Masonry**

No.	Item	Quantity	Unit	Rate (PKR)	Amount(PKR)
1	Excavation	1125	Cft	8	9,000
2	Stone Work in Foundation and superstructure	3613	Cft	35	126,455
3	Mud for walls mortar, roof and flooring	1394.25	Cft	15	20,913
4	Timber beams (10"x7"x18')	78	Cft	1,050	81,900
5	Wooden Planks over beams in roof (3 "x6"x4')	310	Nos	350	108,500
6	Longitudinal wood reinforcement (3 "x3 "x6')	168	Nos	400	67,200
7	Cross wood pieces (3"x3"x18")	168	Nos	175	29,400
6	local Buttay/Durga	916.5	Sft	4	3,666
7	Heavy duty Polythene sheet	1833	sft	6	10,998
8	Doors (3'x7')	3	Nos	8,000	24,000
9	windows (3'x3')	2	Nos	3,500	7,000
10	PVC Pipe for downspout (Parnalla)	10	Rft	25	250
19	Unskilled Labour	60	Days	600	36,000
20	Skilled Labour	25	Days	1,000	25,000
21	Transportation	10000	Lumpsum	1	10,000
	Total				560,200

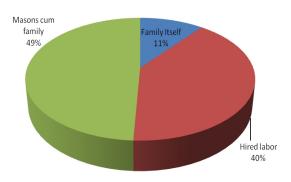
Issues and Challenges December 2013

## **Present Living Conditions**



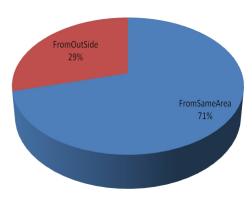
Present living conditions show that half of the families are living in makeshift arrangements i.e., people living near or in their damaged houses but have made temporary arrangement for sleeping using salvaged material. Another 49% are living in damaged houses by propping up walls and roofs. Only 1% of the families are living in tents.

House constructed by



In the house construction,49% of families work as labour for the construction of their houses along with masons, while 11% are skilled enough to build their houses. 40% of the families hire both skilled and unskilled labour for the construction of the houses.

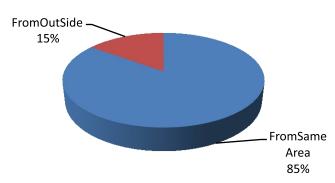
**Labor for Reconstruction** 



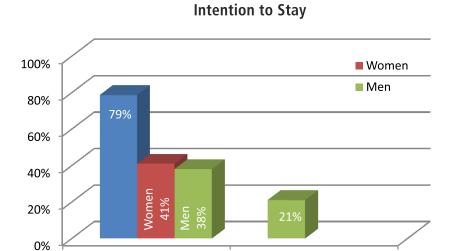
In normal situations when very few houses are being constructed, majority of skilled labour about 71% are available in the same area while 29% labour come from other villages. However, in present situation where 70% houses are to be rebuilt and repaired, many skilled workers would be required. This shortage will increase the labour prices and hamper the reconstruction efforts. Providing skilled training to residents may be one of the options to cope with this situation.

December 2013 Issues and Challenges





For traditional buildings more than 85% of the material is wood, mud, stone, roof thatch material which is available locally, 15% material comprised of nails, straps, cement, and CGI sheets brought from the markets.



As per IDPs' intentions, majority of the families will stay at their places of origin while 21% family heads that have come just to assess the situation for return and will go back to their places of displacement.

People will Move

People Will Stay

Issues and Challenges December 2013

#### Seasonal Calendar for Tirrah Maidan

No.	Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.	Preparation of land for maize crop												
2.	Maize crop cultivation												
3.	Maize crop harvesting												
4.	Preparation of land for Bhang crop												
5.	Bhang cultivation												
6.	Bhang harvesting/processing &marketing												
7.	Fire wood collection												
8.	Labour for livelihood in the same area												
9.	Out migration for livelihood												
10.	Wall nuts collection and marketing												
12.	Construction/repair of houses												
13.	Marriage session												

On special request from the FATA secretariat to design a one school in Tirrah, UN-Habitat documented the existing private schools, building material, topography and climate. There is no government school building found in the assessed area. Most of the schools run in private buildings or in Hujra. In most of the mosque religious education is provided but there are separate buildings for the Madrassa. In the assessed area it was observed that most buildings are situated in the Nallah bed and are prone to exceptional floods. Roof of the school buildings is slopped with CGI sheets poorly constructed. Adobe blocks have also been observed in the walls for school buildings.



Typical school building

The community is willing to provide the land which is not used by them, i.e. Nallah bed and it will be a challenge to acquire proper land which is suitable for construction. Based on this information, UN-Habitat intends to propose a one school design with multiple options as per local requirement.



Damage to school buildings

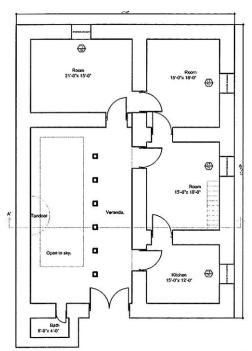


Temporary arrangement for the school in Mosque

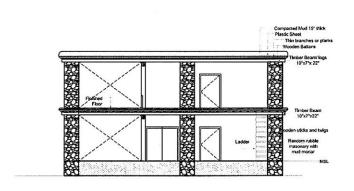
December 2013 Issues and Challenges

# Annex A

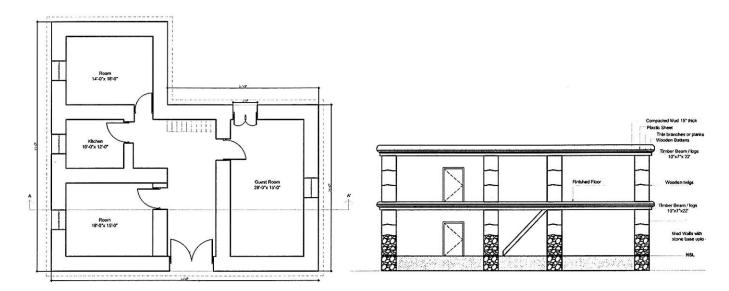
# **Typical Building Plans**



Plan, House A: Fazal Karim, village Bagh, Maidan.

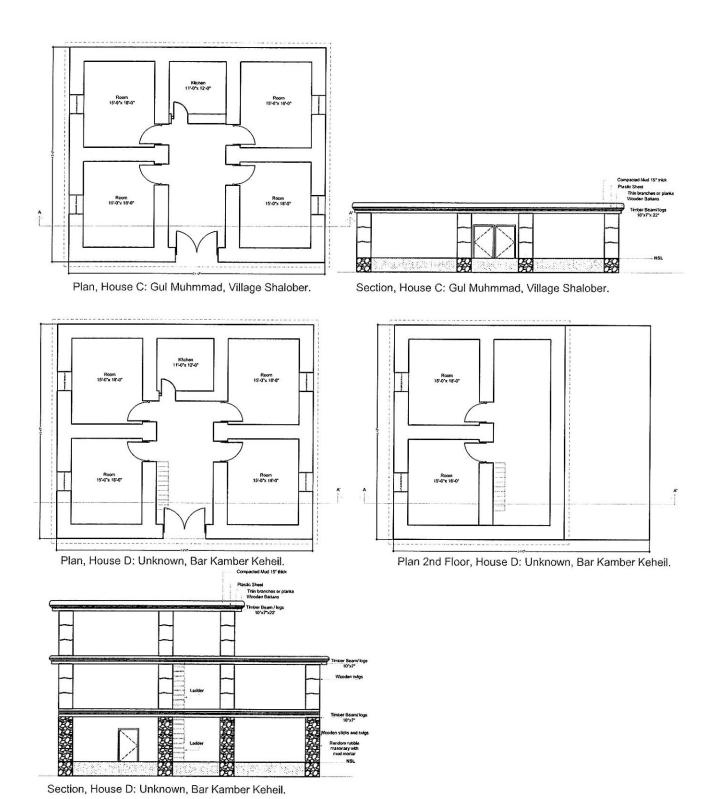


Section, House A: Fazal Karim, village Bagh, Maidan.



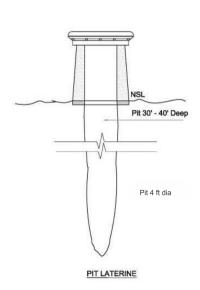
Plan, House B: Muhmmad Feroze, Village Adam Kheil, Tirah.

Section, House B: Muhmmad Feroze, Village Adam Kheil, Tirah.



December 2013 Annex A

Typical x-section of latrine

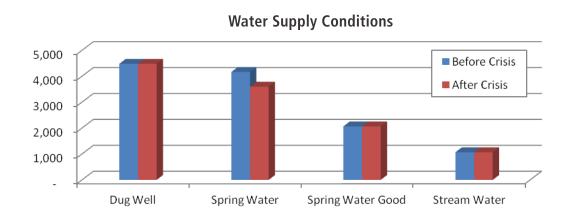


**Picture of Latrine** 



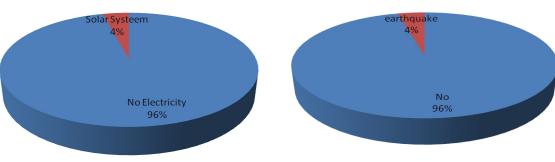
# Annex B

## **Other Useful Information**



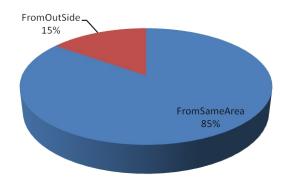


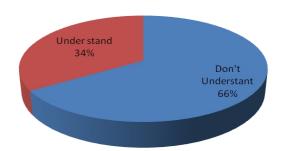
# Settlement Hazards



**Building Material Availability** 

People's Understanding of Urdu



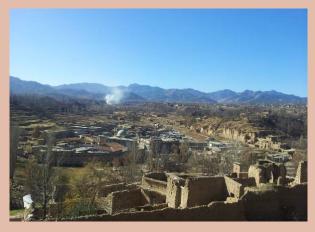


December 2013 Annex B

## Rate Analysis of Building Material in Tirrah Valley (in PKR)

No.	Material	Unit	Rate	Transport	T o t a l cost	Nearest Market	Mode of Transportation
1.	Cement	Bag	500	600	1,100	Jurma Kohat(110 km from Tirrah)	4wheel Pickup carrying capacity of 25 bags per trip =15000Pkr
2.	Steel Girders (4"x7"x17') 2.5kg/Rftweight	No	5,800	1000	6,800	Jurma Kohat(110 km from Tirrah)	4wheel Pickup carrying capacity of 15 girders per trip =15000Pkr
3	T - I r o n (2"x1"x15.75')	No	1,300	187.5	1,487.5	Jurma Kohat(110 km from Tirrah)	4wheel Pickup carrying capacity of 80 T-Iron per trip =15000Pkr
4	Brick tiles (12"x6"x1.5")	No	24	15	39	JurmaKohat(110 km from Tirrah)	4wheel Pickup carrying capacity of 1000 bricks per trip=15000Pkr
5	River Sand (Poorquality)	100cft	3,000		3,000	Locally Available	
6	N a l l a h Shingle/Crush	75cft	3,200		3,200	Locally Available	
7	Timber Beam (10"X7"X 20')	No	10,00		10,000	Locally Available	
8	Door (7'X4')	No	8,000		8,000	Locally Available	
9	Window (4'X4')	No	4,000		4,000	Locally Available	
10	Wooden Planks (3"X6"x4')	No	500		500	Locally Available	
11	Mud	100cft	2,000		2,000	Locally Available	
12	Stone of average (4"X7"x1')	No.	10		10	Locally Available	
13	Dry bushes for roof thatch	Bundl e	200		200	Locally Available	
14	Unskilled labour	M-day	500		500	Locally Available	
15	Skilled labour	M-day	1,000		1,000	Locally Available	









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