PART B

SUPPORT TO DEVELOP REPLICABLE METHODOLOGY AND FRAMEWORK FOR UNDERTAKING RECLUSTERING OF AFFECTED COMMUNITIES AND ITS DEMONSTRATION IN SELECTED COMMUNITY

CEPT UNIVERSITY

UNDP 50 YEARS

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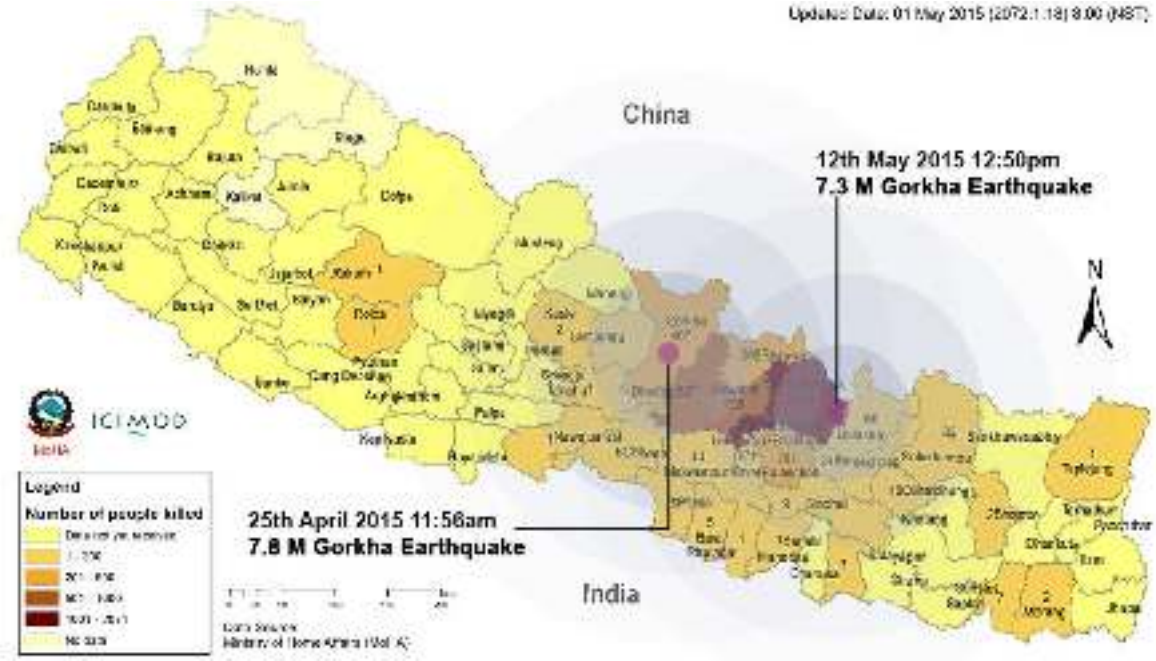
1. INTRODUCTION

1.1. Background

In 2015, Nepal faced a series of earthquakes. It started at 11:56, on Saturday 25 April when an earthquake (7.8 on the scale of Richter) with its epicenter in Gorkha district. According to German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) Earth Observation Center (EOC), the entire city of Kathmandu was lifted one meter up and shifted two meters southwards during the quake[1]. The continuous aftershocks turned into another massive release of energy just 17 days later. The 12 May 12:50 earthquake (7.3 on the scale of Richter) had its epicenter in Sindhupalchok district[2]. As a result of both the earthquakes, massive damage and destruction was caused. In Central Nepal, nearly 9000 people lost their lives while 23,000 people were injured and 5 lakh houses were destroyed.



Source: www.drrportal.gov.np/uploads/photos/35.jpg

[1] Land shift in Nepal: DLR provides aerial images of Kathmandu, 10/05/2015, Revo Science, http://revoscience.com/en/land-shift-in-nepal-dlr-provides-aerial-images-of-kathmandu/

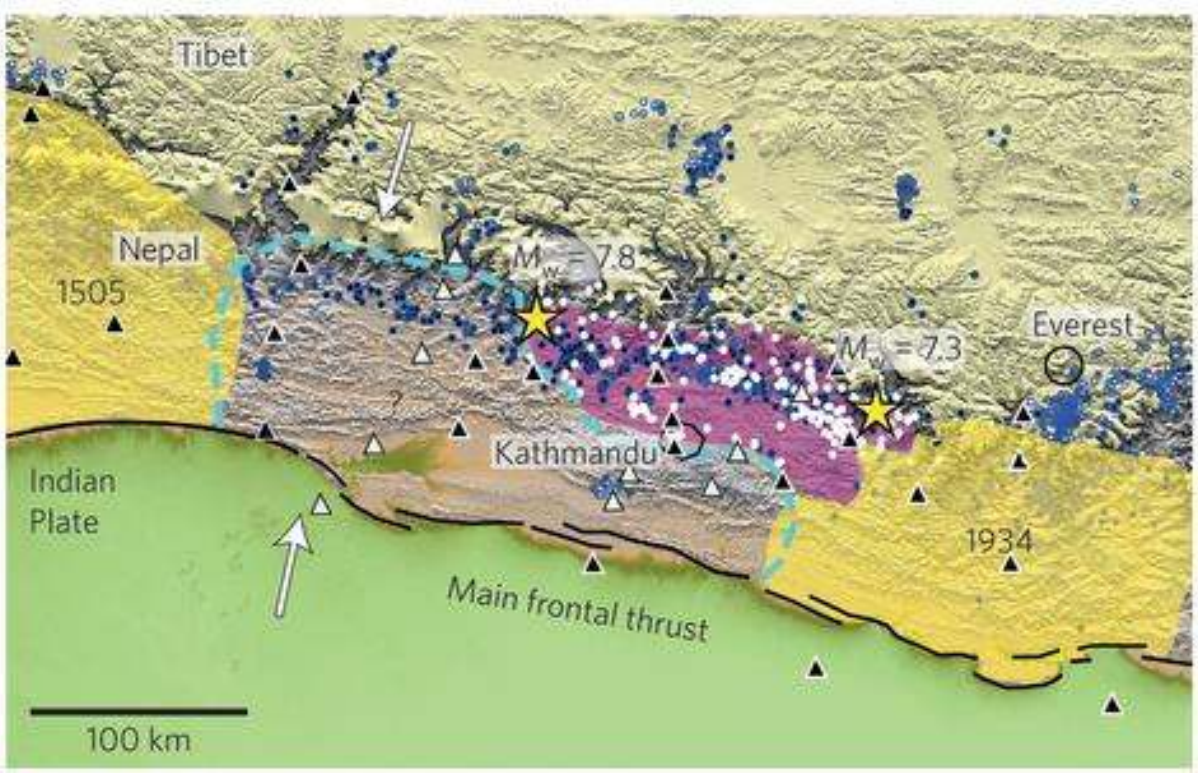
[2] USGS report, Lisa Wald, earthquake.usgs.gov/research/fy16-nepal2015/

Barabhise, Sindhupalchok District, Arial images Before & After Earthquake (Source: www.icimod.org)

Every year the monsoon rains cause land erosion and landslides in the mountainous terrain of Nepal. This became more forceful because the earthquakes and the aftershocks had disrupted the geological formations and the watershed patterns. As a result, land as a resource in Central Nepal was affected, which is used for various purposes such as, homestead, agriculture and infrastructure etc. In the aftermath of the earthquakes and in the monsoon months that followed large debris avalanches and liquefaction took place in earthquake affected areas.

In Subterranean Shifts[3], Roger Bilham discusses the inevitability of earthquakes in the Himalayan regions. The recent earthquake of 2015, was a result of propagation of released energy from the west to the east. The resulting carpet like motion of the earth (Refer above image by Roger Bilham), has shifted the northern Nepal southward on an average of about 3.5 meter. This incremental shift is simply part of the long term approach of India's border toward the Tibetan border which occurs at a rate of 1.8 meter every 100 years.

The 2015 earthquakes have failed to cause a complete fracture along the fault. This indicates that the quake did not release all the accumulated energy yet. This is something to deeply worry about. Geologists say this energy will be released slowly, by creeping, which would lead to a series of small shock waves. Or it will be released more violently resulting in more deadly aftershocks in the future.



Source: http://www.nature.com/ngeo/journal/v8/n8/images/ngeo2498-f1.jpg

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[3] July 2005, Himal: Disaster Politics, Under subterranean Shifts by Roger Bilham

Nepal was offered emergency assistance from all over the world. A lot of effort focused on the immediate response, rescue and relief. In many places the damaged houses have not been demolished yet, debris is still laying everywhere. Emergency projects (for example temporary schools) started to be constructed in Central Nepal. For the most, vulnerable people were affected more by the earthquakes. They attempted, with remaining walls and light materials like bamboo, robe, plastic sheets and corrugated steel sheets, to create homes that would provide some dignity. These quickly-built, buildings are only temporary solutions for people, who would eventually re-build their houses. [4]

Reconstruction did not start even one year after the earthquake. The drawings for buildings that use modern building materials, like reinforced cement concrete (RCC), are checked by the Government to see if they comply with the existing national building codes. In reality, however implementation of actual quality of the building materials used on site is very different from the design. The quality of stone and mud used were not found adequate enough to comply with the standards of construction. People lack awareness on their hazards and the associated vulnerabilities of their locality.

Post-earthquake slum-ification of Thulaghar and Digaun in Majhigaon

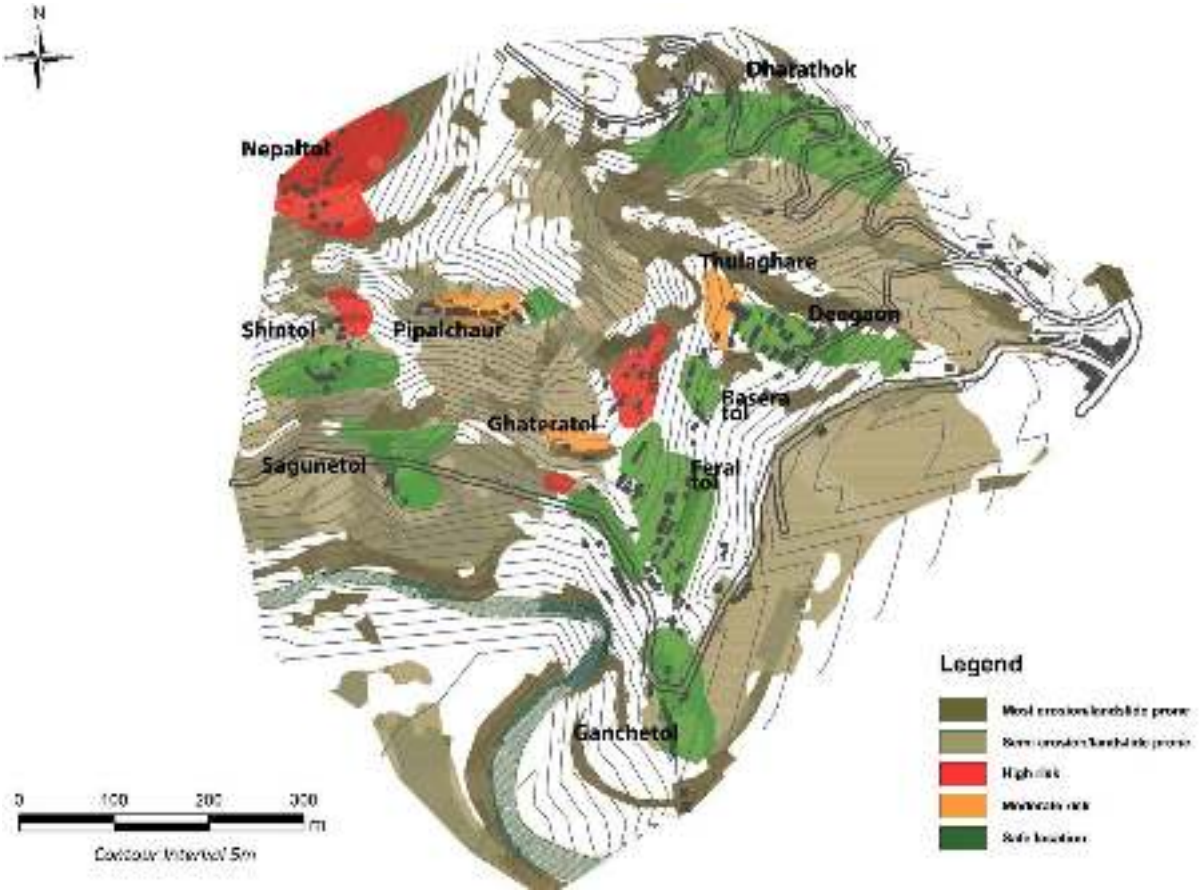
Most of the houses have been rebuilt on the same location or just a couple of meters away from the remaining ruins in one year after the earthquake. People use the remaining walls that still were standing safe on the ground. Floor beams become columns, while infill is often

[4] 30 April 2015, The Washington Post, by Nixon Bamba "How not to rebuild Nepal" Lessons from Haiti five years after the earthquake https://www.washingtonpost.com/posteverything/wp/2015/04/30/how-not-to-rebuild-nepal/?utm_term=.47b5a159595c

much lighter than it used to be before the earthquake. Predominant material for the enclosure for roofs and walls (mostly first floor) is corrugated galvanized iron (CGI) sheets.

The report addresses families whose houses and buildings cannot be rebuilt in the same location because of the existing hazards such as landslides, unstable soil. They need to make an informed choice for land to build their houses that would be less vulnerable and suitable for living.

The report elaborates the methodology used for one village in Sindhupalchowk. Together with the community, it was possible to re-plot their existing land and provide space and land for the families who are in the dangerous areas (indicated red in the vulnerability map). The shift would take place in some location within the village, so there will be continuity in their economic, social/ cultural system. The second design improvement that we propose is public facilities through re-clustering of the buildings. Water, sewage, electricity can be distributed better when the houses are in clusters.



Vulnerability Map of Majhi Gaon, Sindhupalchowk, Nepal

1.2. Objectives

1.2.1. Prepare a Re-cluster Plan

Make a re-cluster plan for one village; Majhigaon. The study proposes a plan that would reduce the impact of a future disaster. In this re-cluster plan better houses and public facilities are proposed. This way the negative impacts of the earthquake could become

catalytic for the fundamental improvement of a habitat for vulnerable community. The situation reduces the impact of the future earthquake.

1.2.2. Follow Participatory Process

The re-cluster plan will have to be done together with the community. The proposed design needs to be evolved in a collective manner with the Majhis and improved through consent. It is quintessential that the beneficiaries own the plan. In the process, trust will be built and an open design process[5] will be followed.

1.2.3. Define Guiding Principles / Manual

Through documentation of the entire process undertaken and the methodology followed, guiding principles would be distilled for Majhigaon that can be used for a manual for other villages in Central Nepal that would need re-clustering. Upon approval from MoUD, the "guidelines for re-clustering strategy for areas with landslides & risk-sensitive land," it will be able to contribute to the national effort for disaster risk reduction.

1.2.4. Disseminate Knowledge

Share the accumulation of knowledge with UNDP and MoUD. Share the findings and methodology with IoE, CEPT and other institutes.

1.3. Need & Importance of the Study

The 2015 earthquakes indicate eminent future disasters within the Himalayan nation. It is thus very important to be prepared for a next earthquake. UNDP Nepal calls this *the creation of a culture of disaster risk awareness*[6]. This study proposes a plan that would reduce the impact of a future disaster.

Houses located in vulnerable zones cannot be rebuilt in the same place as before, because the land is unsuitable. Long distance re-settlement is a possibility. It would however cause discontinuity in the economic, social/ cultural system of the community. Re-clustering can be much better alternative as it does not have the negative impact compared to long distance re-settlement. The need to help this community to address the vulnerability has been identified with the objectives of this study.

1.4. Scope of the Study

The study covers the selection process that led to the choice for the settlement of Majhigaon as a study area. It includes the research and documentation work done on the ground (incl. mapping) and it offers a proposal for a re-cluster plan for Majhigaon.

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[5] *open design process* first got in use in the seventies by architects like Christopher Alexander. More recently it has picked up a new momentum with architects like Anne Feenstra, see; locus-foundation.org/GlobalAward/monographs/2012/feenstra/feenstra_engl.pdf https://issuu.com/iab_archives/docs/april_2012_preview/48

[6] *the creation of a culture of disaster risk awareness;* www.np.undp.org

A participatory approach was adopted, and the study provides insight in the challenges and methods followed for an active involvement of the people of Majhigaon. This study also provides insight in the stakeholder involvement and the process followed.

The scope of study restricts itself to the design phase. The proposed re-clustering manual also focusses the design phase only.

People of Majhigaon looking forward to a better Life

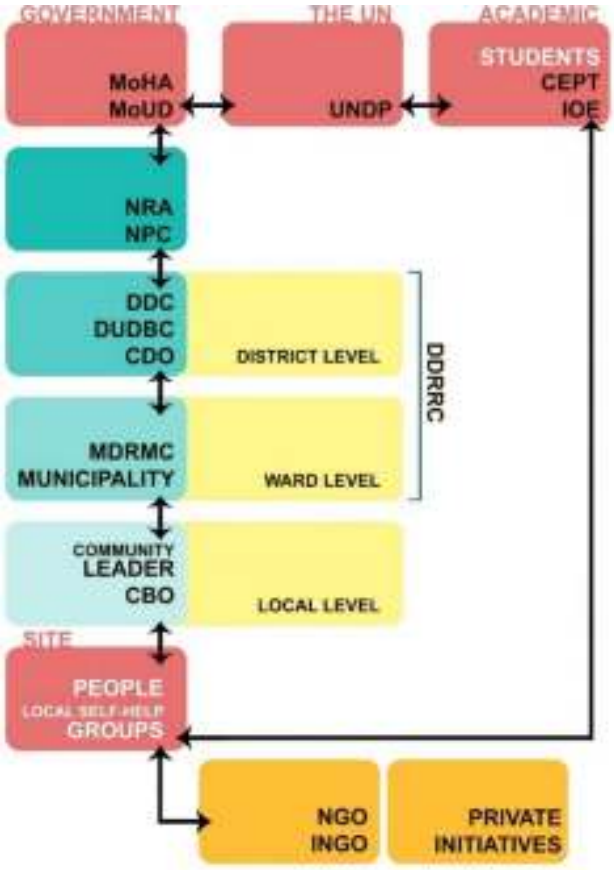
2. FRAMEWORK & METHODOLOGY

A study by the Government of Nepal, department of meteorology and geology identified settlements to be relocated/ re-clustered. This identified need became the base of dialogue between MoUD and UNDP. Academic institutes were involved to define guiding principles (manual) derived from the Majhigaon study. Regular meetings with the ministry, the UNDP, the district and ward level offices and the community bodies were held as a means of sharing ideas and collaboration of efforts. Meetings with Joint Secretary of MoUD, Advisor of UNDP provided the directions while shaping the approach. Discussions with the Agencies active on ground furthered the knowledge of post-quake site developments as well as needs of people.

2.1. PROJECT ORGANIZATION FOR RE-CLUSTERING

In the flowchart given below all the institutes in pink are the chief collaborators. The National Planning Commission and The National Reconstruction Authority (NRA) who are responsible for reconstruction independently work with the Ministry. The District Development Committee (DDC), Department of Urban Development and Building Construction (DUDBC), and the Chief District Offices (CDO) at the district level and the Municipality of the area and Municipal Disaster Risk Management committee altogether to form the Disaster Risk

Reduction Committee (DDRC). At the district level, the DDC is the development arm, DUDBC is the technical arm and the CDOs are the administrative arm.



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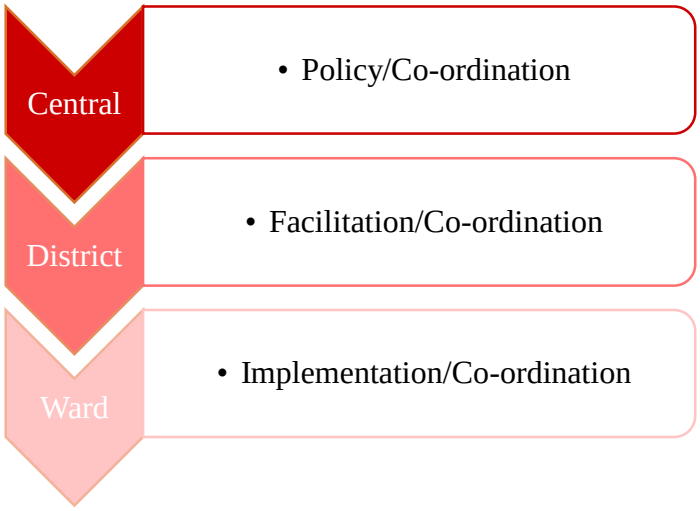
Flowchart presenting the structure of MoUD/ UNDP in which academicians directly approach to people in the study area.

2.1.1. The Government

In order to achieve effective re-clustering programs, NRA co-ordinates with appropriate government, central and local agencies, to create Disaster Risk Management (DRM) options. Here, District Risk Reduction Management Committee (DRRMC) is the disaster mitigation organization working with Ministry of Urban Development.



The different levels of government agencies who participate co-ordinate with the community

2.1.2. Community Representation

Village development committee (VDC) leaders are the most important link with the community. Here the role of **CBOs and community leaders** is highlighted. They also represent the village in ward citizen forum. So it's necessary to have them within the re-clustering organization. However, it should be understood that the community leaders might not completely represent the communities in their opinions. So, it's important to get individualistic and gender differing consultation with all members of community.

2.1.3. United Nations Development Programme

UNDP provides a platform to bring together knowledge of academic institutes and the Nepalese government. Because UN works in many post-earthquake situations all over the world from many years, they are well positioned to share lesson learned and use guiding principles.

Government authorities in collaboration with **United Nations Development Program (UNDP)** are essential in capacity building and providing experts network for support. UN resource expertise is specifically required in monitoring, evaluation and co-ordination of re-clustering projects.

2.1.4. Academic Institutes

The institutions are the theoretical knowledge generators who can also practically work at a local level to be able to come up with a holistic proposal. "Top down & Bottom up Approach" adopted for this project allow these institutes to engage directly with the community on ground realities. The aim would be that the research at the institutional level combined with the actual filed knowledge and interactions would ultimately help the government in developing policies. This is exactly what has been achieved in this study area.

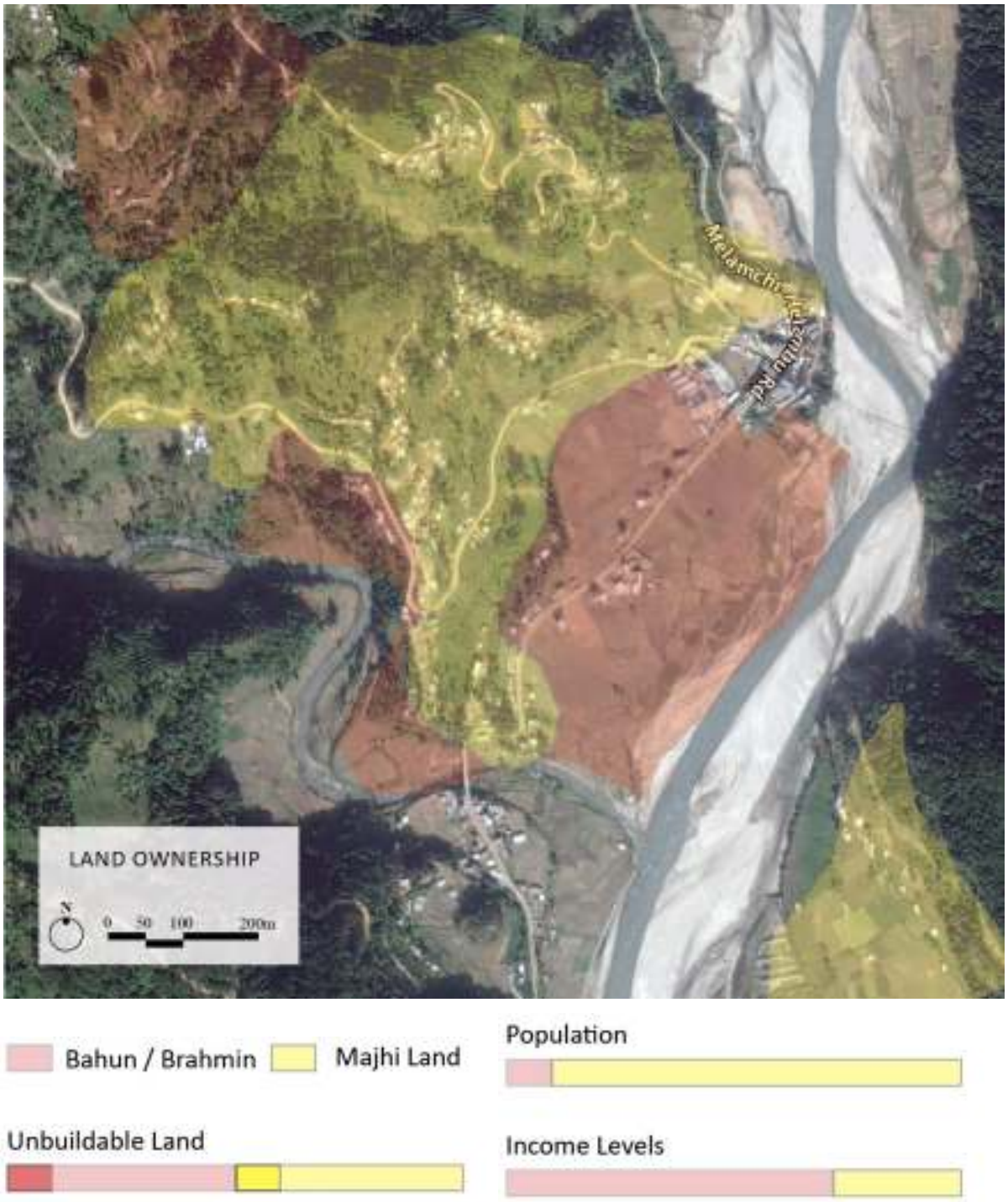
2.1.5. Other Developmental Organizations

With the help of **NGOs, I-NGOs and Government Agencies**, which are working in the similar context, a knowledge-sharing network could be made for the transaction of knowledge. The Agencies active in the study area of Majhigaon are listed below.

- All Hands (US based non-profit working on building toilets and few houses with the help of concrete blocks)
- Save the Children (helped to build temporary school)
- AITM - Asian Institute of Management & Technology
- JICA - Japan International Co-operation Agency (Intends to train the locals with quake coded construction skill)
- Melamchi Nagarpalika (Surveys/Assessments)
- IOM – International Organization of Migration (Debris Removal)
- Build Up Nepal (Sweden I-NGO building individual houses in Nepal)

Such initiatives helped in exchange of information.

2.1.6. Beneficiaries



Land Ownership pattern of the Majhigaon

The patterns show both the Brahmins and the Majhis have been affected by the disasters. The Brahmins have been able to shift to their own riverside lands because they had the economic means. The economically deprived community of Majhis has not been able to shift and they made temporary shelters hoping for government or NGO support. A re-cluster plan would make a positive difference for this vulnerable community.

2.1.7. "Re-clustering" – defining the terms

Reconstruction involves rebuilding of houses on the same location with better resources and technology to mitigate future disasters. Settlements with household damages would benefit from reconstruction especially with the help of several active NGOs and INGOs. It is the most cited option by the people as the land remains same and the house could be reconstructed using the debris and salvaged materials. Most people prefer reconstructing the house on the previous location. If the land is deemed safe, the house can be constructed following the national building codes.

"Relocation refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood as a result of project-related land acquisition and/or restrictions on land use" (IFC, 2012). It is a process whereby a community's housing assets and public infrastructure are rebuilt in another location. Sometimes perceive as the best option for:

1. People already displaced by disaster.
2. Current location judged inhabitable.
3. To reduce further risk vulnerability which is site specific.

Re-clustering is to reconfigure an existing cluster of houses on a safer site to accommodate more households that were affected at nearby location and incorporating services, better road connectivity and other infrastructure which is needed for settlement. Re clustering should prove to be more acceptable solution in the resettling processes. Re clustering if done along with people participation is more fruitful as it ensues the safety of people with sense of ownership and identity. Being in the same livelihood area helps them to continue the source of income.

A well-planned and managed resettlement process can produce **positive long-term development outcomes**. Re- clustering process is also a chance to provide better facilities.

2.2. Framework and Policies

Government has already set up the key coordinating body in terms of National reconstruction authority under the act of National reconstruction act, 2072 and with guiding principles set out in National reconstruction and restoration policy, 2072. NRA is the prime autonomous body assigned for coordinating the whole reconstruction process, international donors, managing resources, devolving authorities to local level and setting out principles for grass root reconstruction work. Along with the national reconstruction policy, it is important to work within the existing legal frameworks like Land Acquisition Act 1977, Local Self Governance Act 1999, Town Development Act 1988, National Shelter Policy 1996, National Urban Policy 2007 and Nation Urban Development Strategy 2015.

With the framework of owner driven reconstruction the government will play an important role in facilitating with technical guidance. Nepalese Government plans to assist the reconstruction process with NRs 2 lakhs along with providing up to 25 lakhs of soft loan in urban sector and 15 lakh in rural sector.

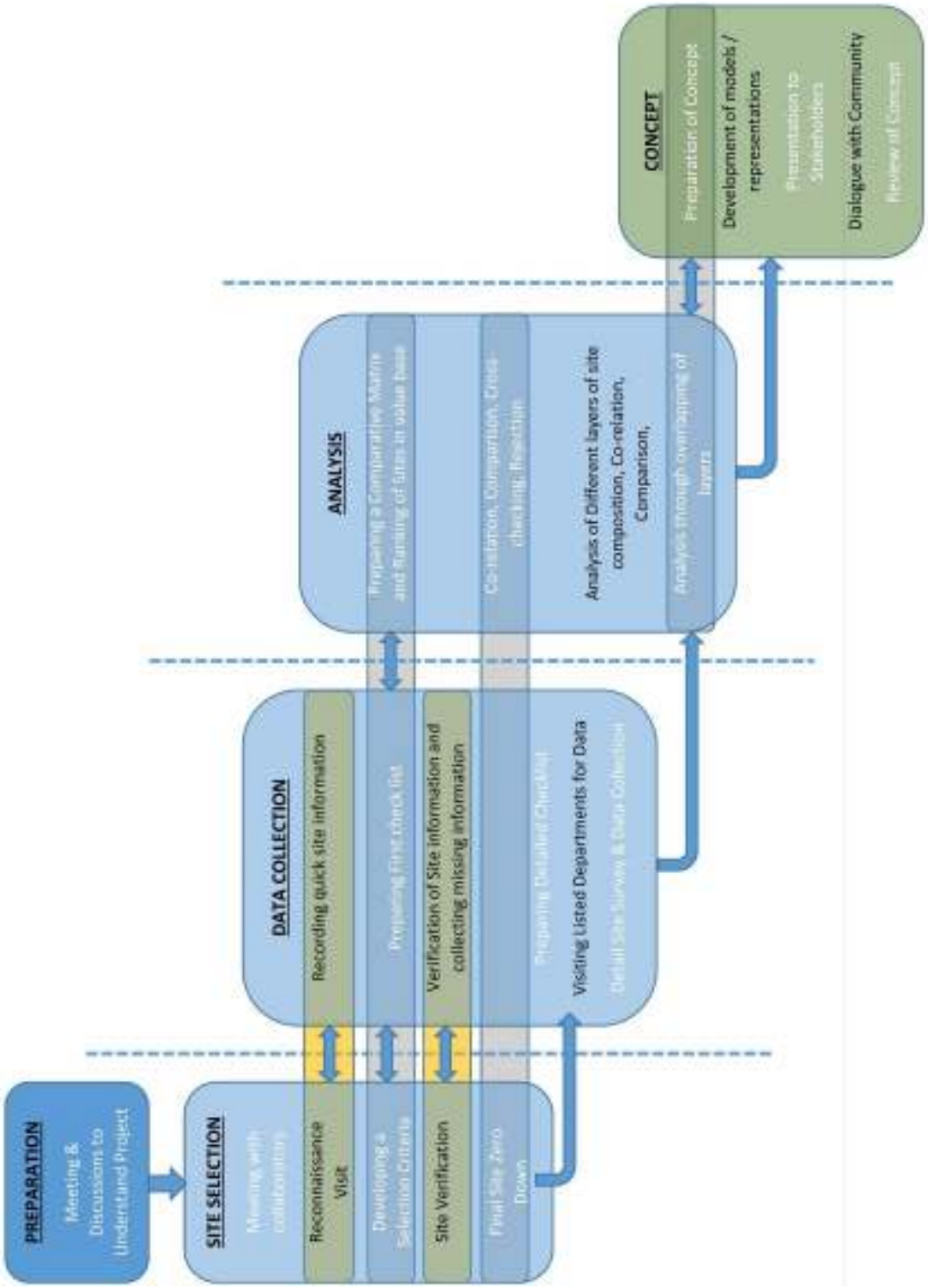
2.3. Schedule of the Project

The project schedule is presented in the diagram below for reference.

Time Schedule for the project activities

2.4. Methodology

The chart shows the systematic but flexible nature of the process. Multiple steps can go simultaneously. After analysis there could be a need to go back to site for data verification. Before the concepts were finalized, a consultation with the local community of the study area was made.



Methodology of the Study

3. STUDY AREA

3.1. Physical Context

3.1.1. Location

27.4733 N 85.3411 E

Majhigaon lies in ward 8 of the Melamchi Municipality in Sindhupalchok District in the Bagmati Zone of Central Nepal.

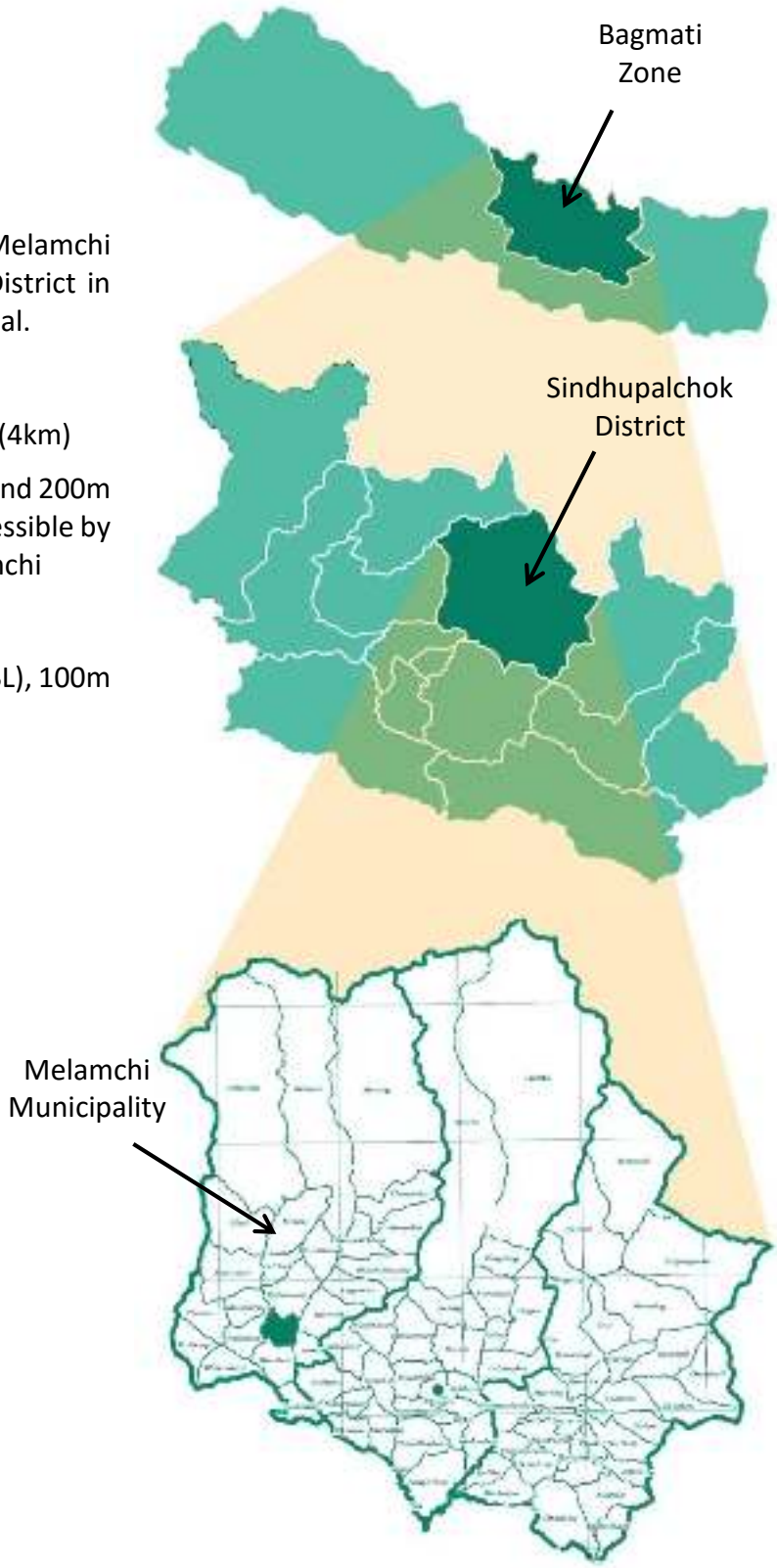
3.1.2. Access

Closest major town is Melamchi (4km)

Nearby town- Bahunepati is around 200m away from Majhigaun and is accessible by bus from Kathmandu and Melamchi

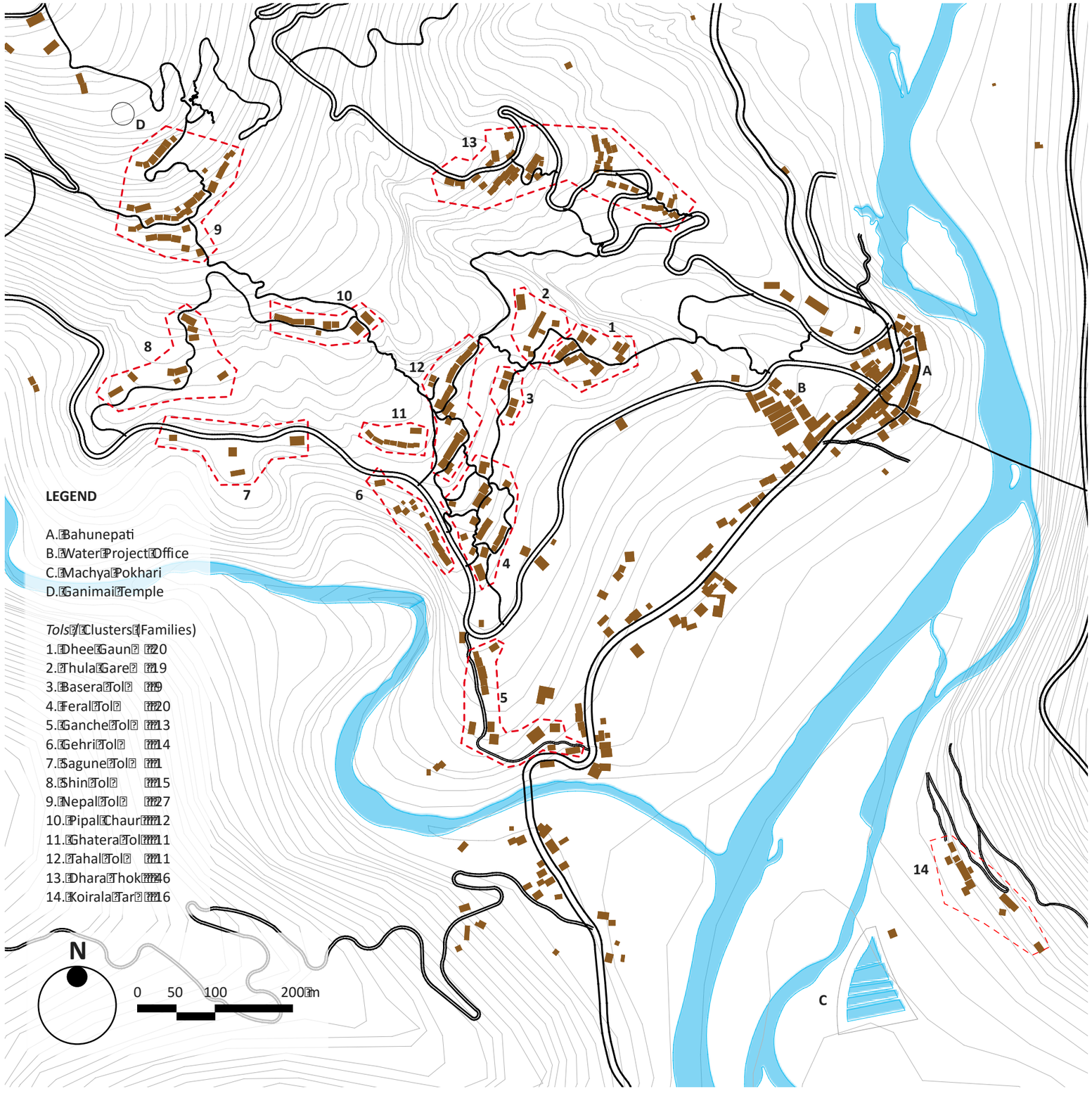
3.1.3. Altitude

830m above Mean Sea Level (MSL), 100m above the Indravati river



3.2. Majhigaon - Settlement Plan

The study area called Majhigaon sits at the conjunction of two rivers Sindhu and Indrāvati. The MWP's office is at the southeast of it. That's the primary entrance to the site. Next to MWP's office is Bahunepati Market on Melamchi Dhulikhel highway. A prominent landmark is Ganimai Temple Tree on the northwest corner of the site. It constitutes of Majhi community who were the primary settlers of this land. It consists of 14 clusters or tols present in the Majhigaon. Across the river is 25 *ropani* of community fish farm *(Machya Pokhari). An existing industry of sand mining from the Indrāvati riverbed has aggravated post the earthquake to satisfy the construction needs.*



Zero kilo to Melamchi Road

Ganche Tol
780 msl

Community Hall
820 msl

Tahal Tol
Community Hall
830 msl

Feral Tol
Community Hall
845 msl

Thara Tol
870 msl

Pipal Chaur
900 msl

Basera Tol
820 msl

Thulaghar
850 msl

Digaon
830 msl

Kalika Devi
980 msl

Nepal Tol
980 msl

Bahunepati
780 msl

Dhara Thok
890 msl

Jalpadevi School
810 msl

Indravati River

Indravati River

3.2.1 Climatic conditions

The study area ranges from 750 to 1050 meters above sea level (MSL Mean Sea Level). The water shed of the valley goes starts is high up around 1800 meters. The altitude range of Majhigaon, Melamchi with the river basin has sub-tropical climate, which is warm and temperate.

The upper range of the site with watershed receives more rainfall than the lower. Heavy rainfall occurs in June, July and August. Rainfall in January and February is the lowest. The summers are much rainier than the winters in Melamchi. In a year, the average rainfall is 1728 mm. The driest month is November, with 8 mm of rain. The greatest amount of precipitation occurs in July, with an average of 450 mm. The Melamchi water project, which intends to supply drinking water to Kathmandu, is bound to have adverse effect on the Melamchi river based crop pattern [7]and livelihood of many local mill owners. [8]

In Melamchi, the average annual temperature is 20.8 °C. June is the warmest month of the year. The temperature in June averages 25.8 °C. The lowest average temperatures in the year occur in January, when it is around 13.3 °C. There is a difference of 442 mm of precipitation between the driest and wettest months. The variation in temperatures throughout the year is 12.5 °C.

[7] Downstream Impacts of the Melamchi Inter-Basin Water Transfer Plan (MIWTP) Under Current and Future Climate Change Projections by Pabitra Gurung and Luna Bharati, Hydro Nepal 2012 Journal of Water, Energy and Environment

[8] Indigenous and Local Climate change adaptation practices in Nepal, Case Study 2 – Government of Nepal, Ministry of Science , Technology and Environment, Pilot Program for Climate Resilience.

3.3 Majhigaon

3.3.1 Physical Aspect Mapping

3.3.1.1 Survey Map

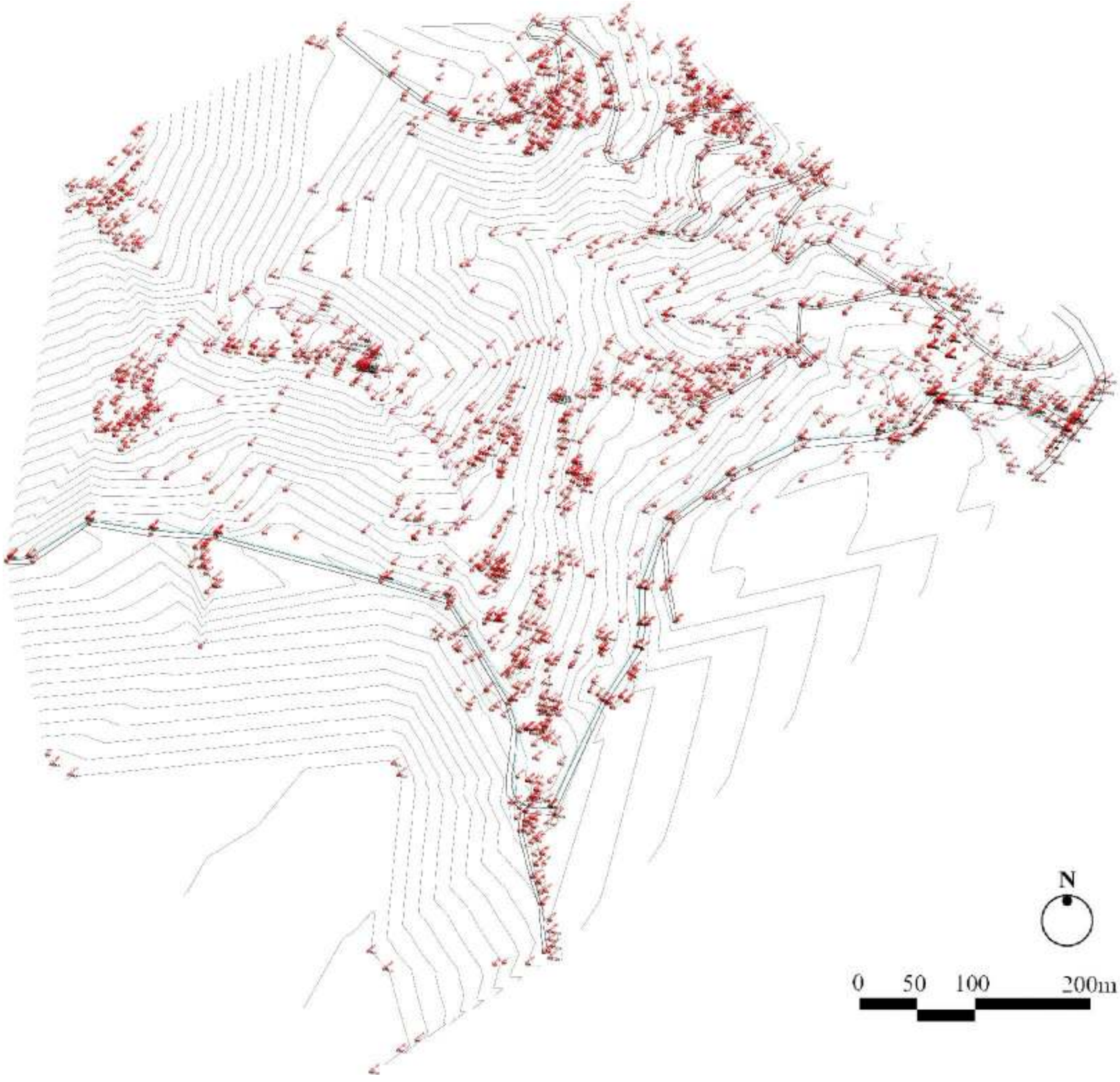
A topographical Site survey gives us the exact topography of the site.

Such a survey is essential for a study area of a larger scale. It gives us the physical sense of the study area.

A topographical survey map also enhances accuracy site understanding. And is useful for further implementation.

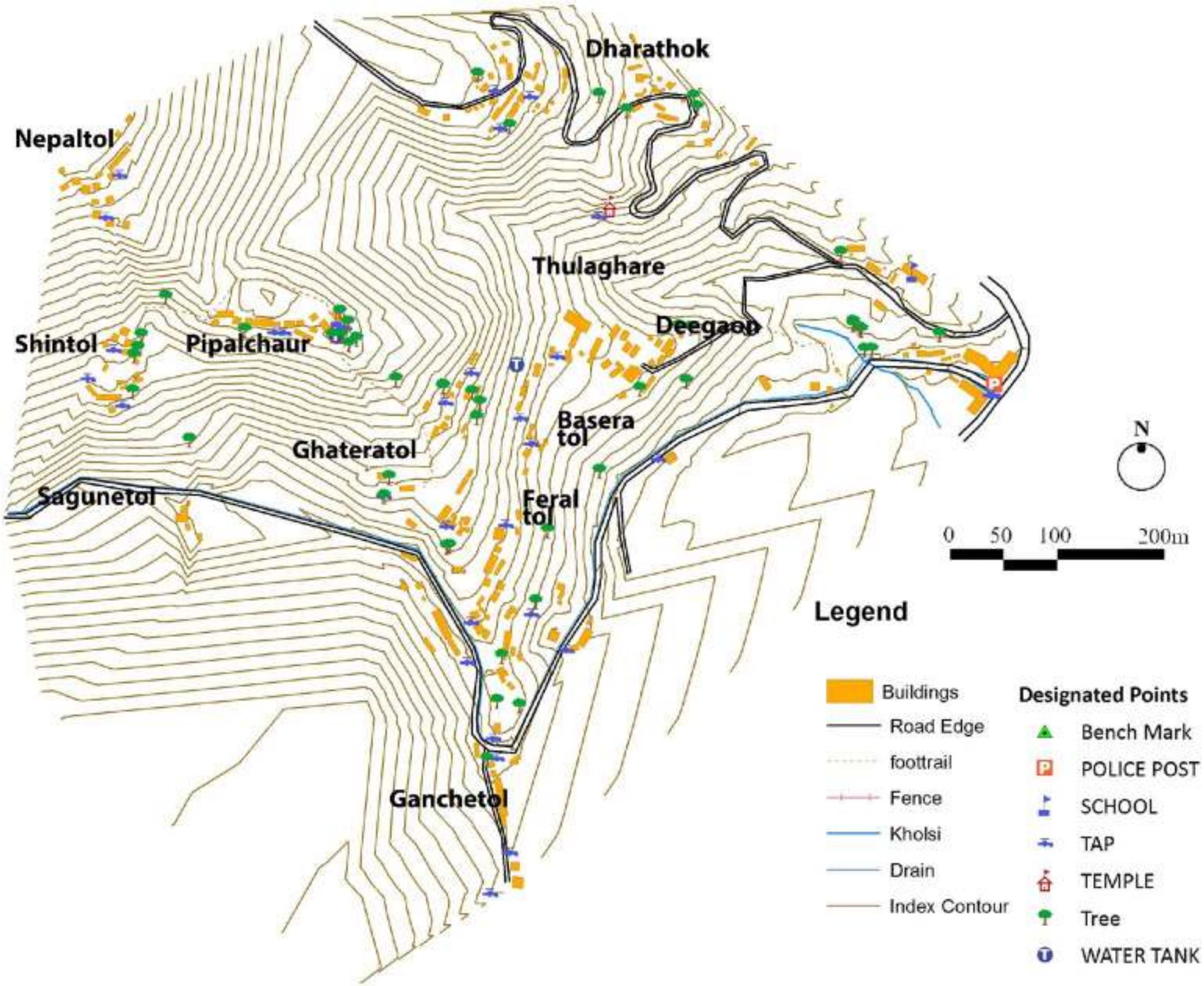
It's also a tool to map the settlement accordingly for further design and action.

This survey was conducted by Bikash Devkota and was received by studio Sindhupalchok on 31st May 2016. An updated survey map was received on July 15 2016



3.3.1.2 The Contours And Settlement Pattern

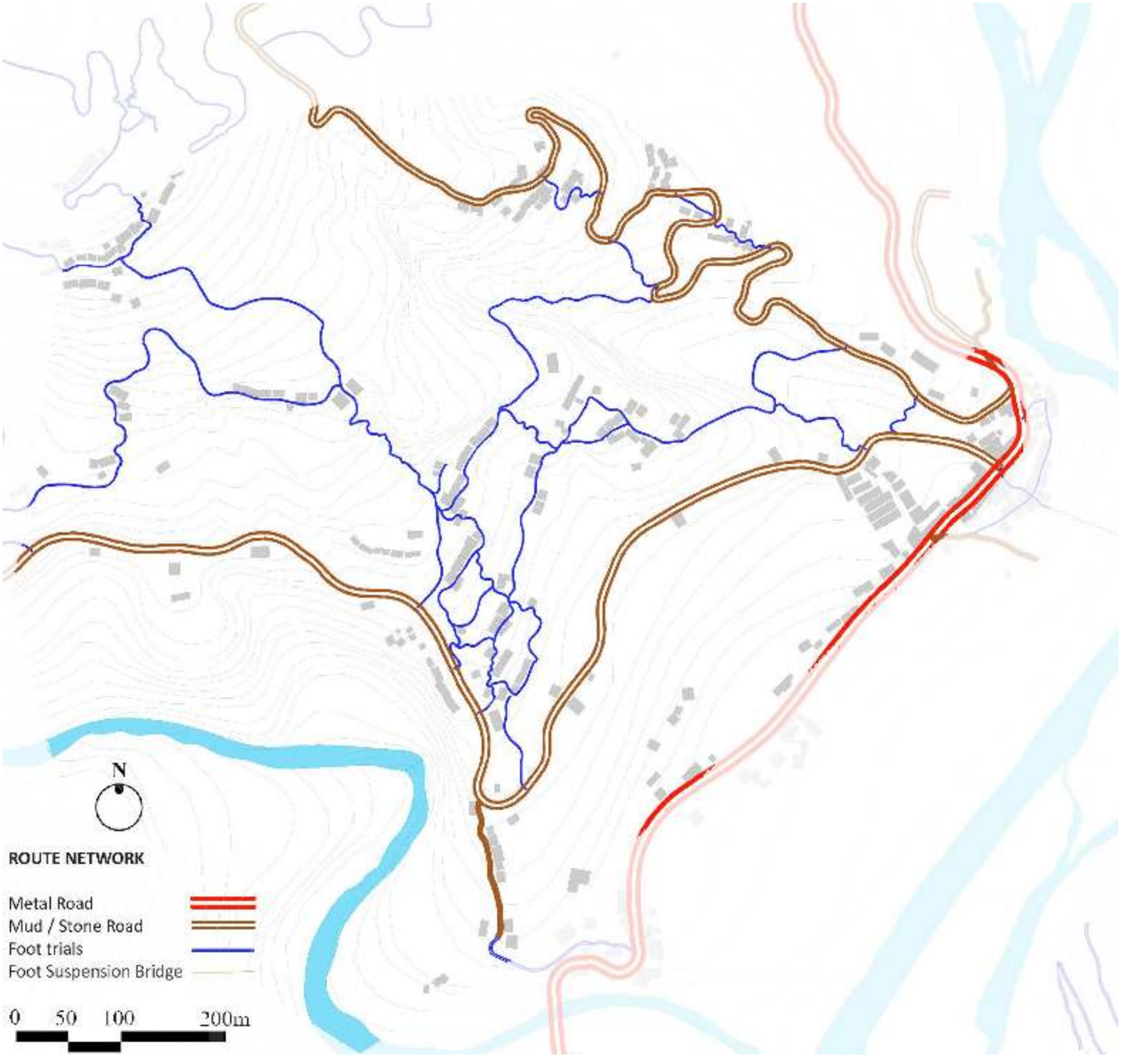
The contours in the sub-regions range settlement of the Majhis is largely contained within the range of 800 M to 900 M. the Nepal thok which is the Brahmin tol reaches up to 1000 M starting from about 950 M. So it is evident that there is an attitudinal hierarchy in the Settlement pattern, which is probably also due to fact that the Brahmins do not want to stay downstream from the Majhis. One of the reasons Brahmins do not want to interact people with who practice pig and pottery farming. After the earthquake, however the Brahmins moved way down and built houses in their farmlands, due to the perceived threat of the landslides triggered by the earthquake near the top of the hill. For this Project the focus was on the Majhis. It is quite evident at first glance that the settlement is built along the contours, which is natural response to the site. Numerous foot trails and two major mud-gravel roads and one metaled road to Melamchi are visible on the North.



3.3.1.3 Connections

Existence of Roads, cart-tract and footpaths influence the rural morphology of the site to a large extent. The Melamchi – Helambu road is the only metal road and is the main access to the site. The two prominent roads present in the site are the Chisapani - Bahunepati road (built by MWP Office) and Bahunepati – Barabhise road. People are used to the walking culture, and depend on shortcuts, hence, the foot trails. It takes around 35 minutes from Kalika temple at the top to Bahunepati below.

Through the preliminary survey of both sites – Mankha and Majhigaon it was clear that the roads and open spaces, public spaces as spouts or trees have high importance and people preferred their houses to be near the networks.



3.3.1.4 Amenities

Electricity

Electricity is there for much more time than Kathmandu. The proximity to Harigaun hydropower 10km away benefits the locals

Water

4 houses share a single tap. The drinking water source is a spring in Sindhula, 3kms away. This water is also used for household scale vegetable cultivation. There are no proper drainage services.

Healthcare

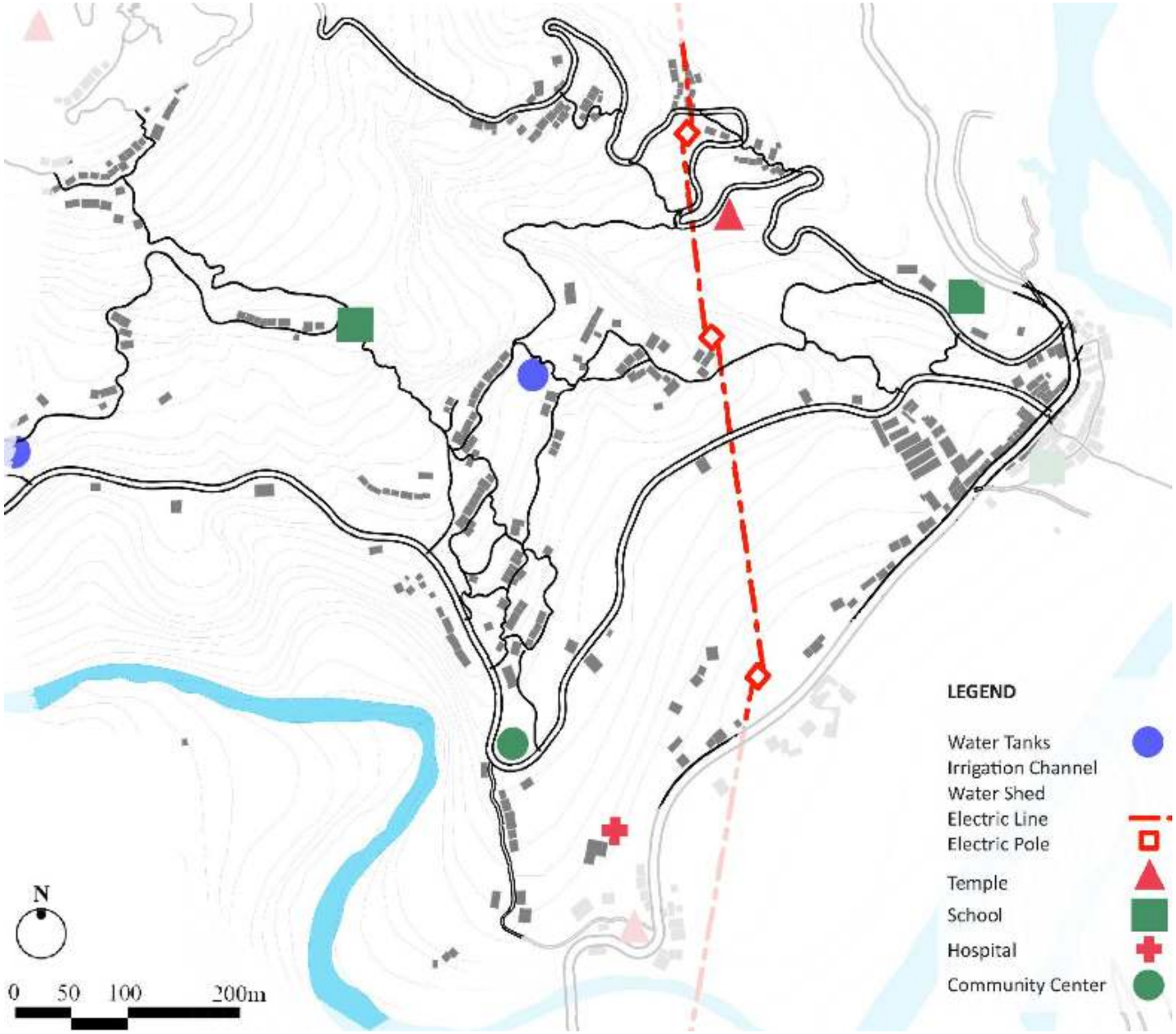
There is one polyclinic where the doctor comes once a week on Thursday for only 2 hours. The rest of times, they need to go to Melamchi or Dhulikhel

School

There are three schools in the vicinity. One is siddhi Ganesh TLC, (3rd grade, Pipalchaur), The other is Jalapa Devi School (12th grade, Dhara thok) & Modern English School up to inter (12th grade, Bahunepati)

Temples

There are three temples in the site, The Ganimai Bhagwati temple at the top, the Ganesh temple near the Sindhukhola.



3.3.1.5 The Hydrological Flow

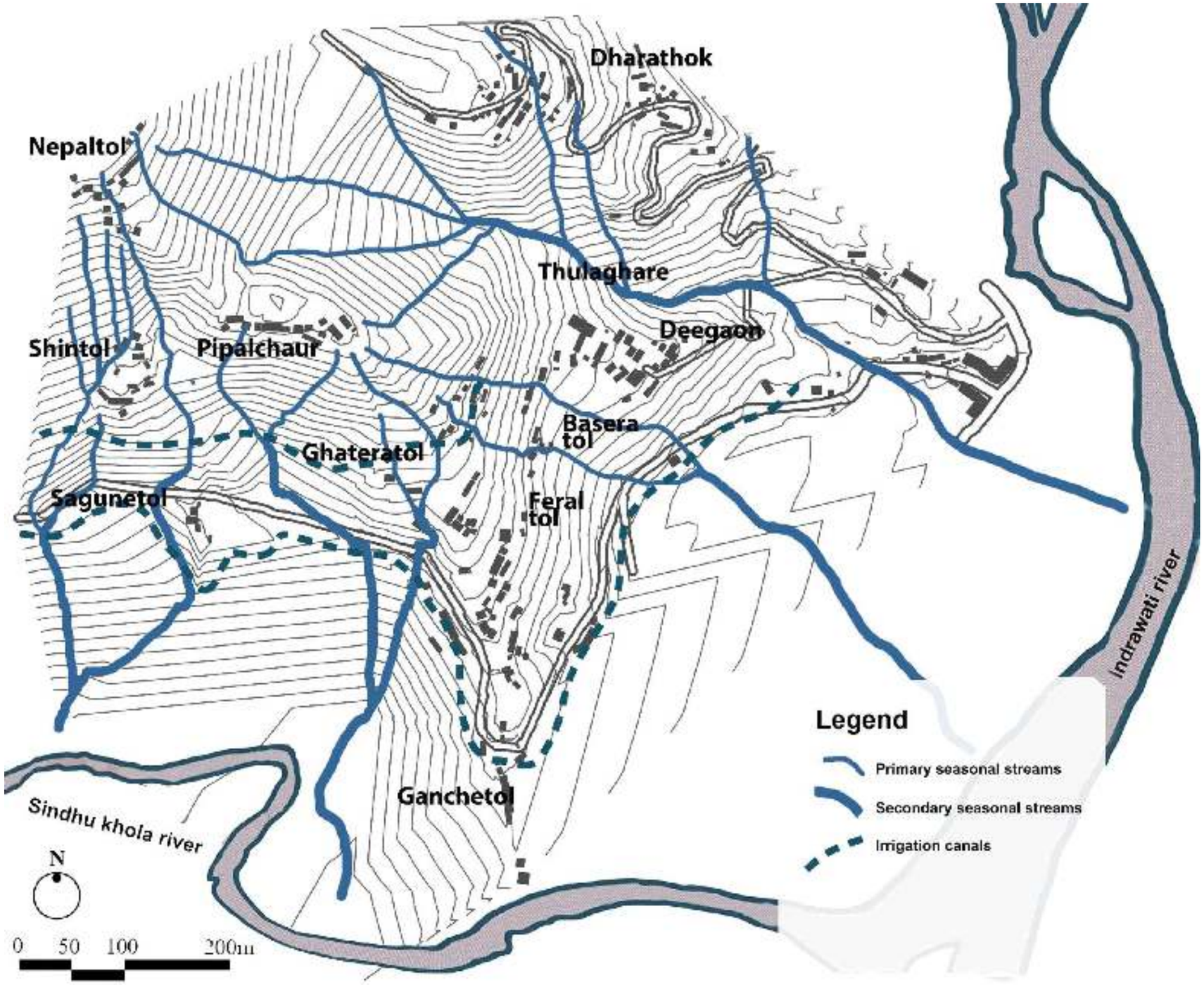
All the seasonal flow lines originate from one zone: the top of the hill, and flow into the Sindhu khola and the Indrāvati rivers. The Sindhu khola is a tributary of the larger Indrāvati and flows into it. Along with the hilltop the rivers form a sort of a smaller watershed.

It is advisable not to build on these channels, which could block the water flow. These water channels should be kept open and buffered to allow the natural water flow across.

Hydrology also helps us understand the possible water locations, best suited for farming due to proximity of water.

A project called The Melamchi Water Project is under construction. It aims to build a tunnel upstream of the Indrāvati in one of its major feeder tributary.

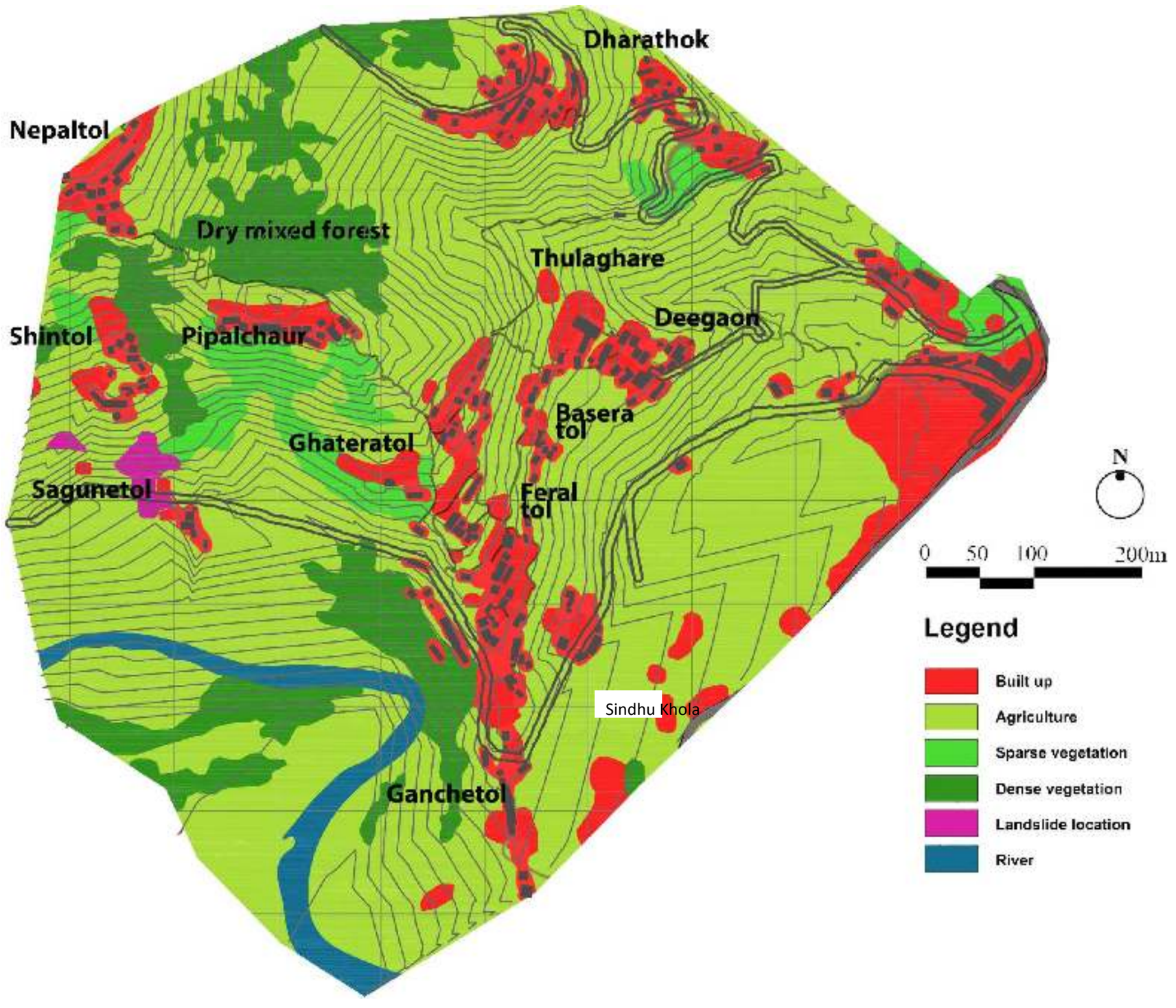
The Melamchi River would divert water about half of its water to Kathmandu city. This would mean a problem in livelihood of the Majhi people as they depend on Indrāvati river for fishing. As sand mining is rampant in the river bed and is not done following any environmental guidelines; number of fishes have deteriorated over the years because of the suspended matter in water due to mining activities.



3.3.1.6 Land use Pattern

Agriculture started with the floodplains of the Indrāvati River and then started along the banks of the Sindhu Khola River. Later on when pressures on farmlands built up, the locals turned to step farming on mountain terraces. In recent time as the population pressure increased even more, people started terracing the steeper slopes, and along with development of roadways, landslides started. The Sal forests are one of the most exploited for extracting timber for construction, as Sal wood is termite resistant and durable.

Community forests are being extensively cleared for practicing agriculture and wood for construction, which is one of the reasons behind frequent occurrence of landslides.



3.3.1.7 Soil Map

Light brown sandy loam-Padamchen Series

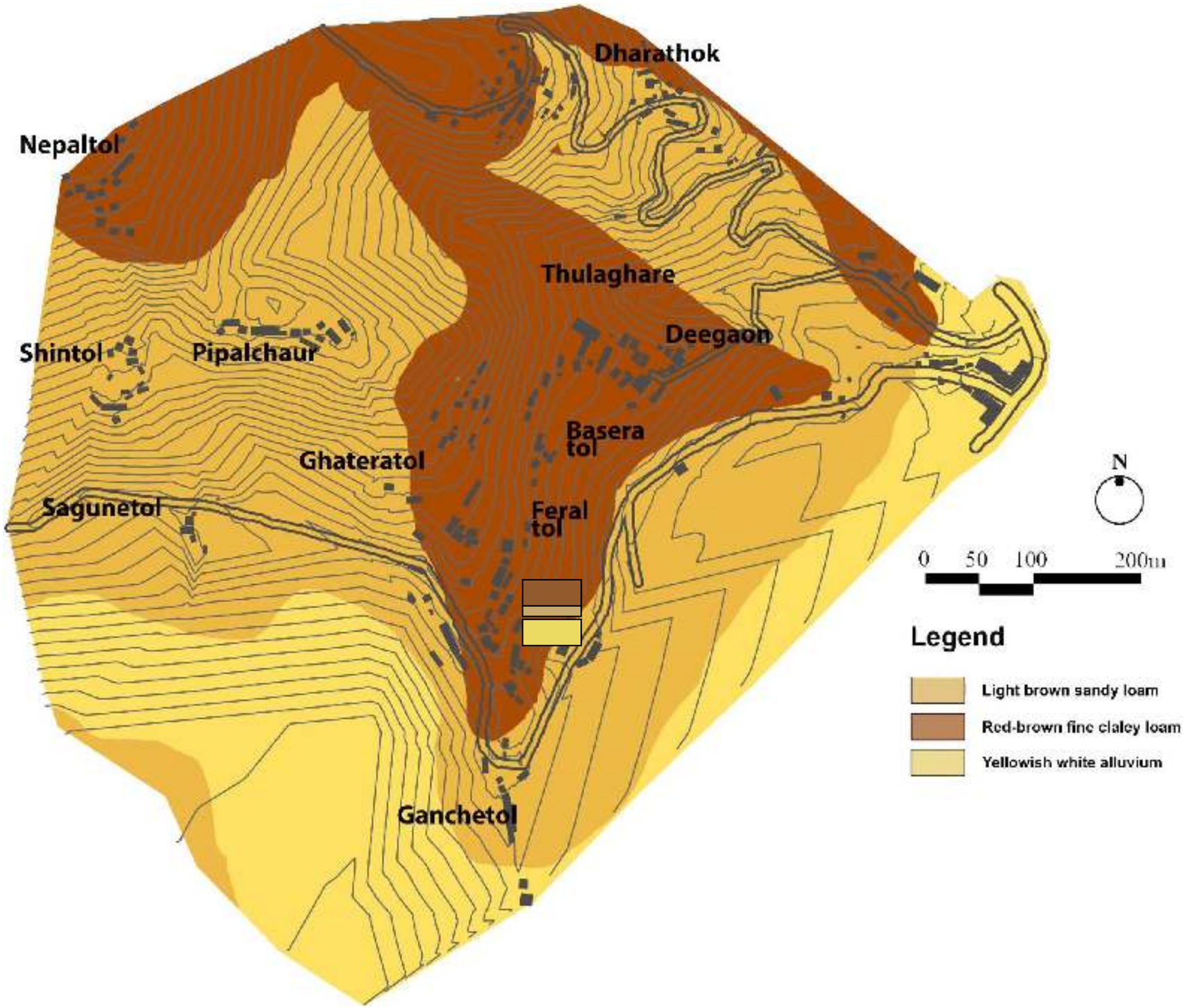
It comprises moderately deep, moderately well drained, fine loamy soils with brown to yellowish brown color and developed from gneissic parent material. This soil occurs on moderately steep to upper hill slope with severe erosion under thin forest vegetation. It is tentatively classified as a member of fine loamy mixed thermic family of Umbric Dystrochrepts.

Red brown fine loamy soil- Hilly series

It comprises vary deep moderately well drained fine loamy soils with dark reddish brown to reddish brown color developed on gneissic parent material. The soil occurs on steeply sloping upper hill slope and is moderately eroded. Soils are under crop cultivation. It is tentatively classified as a member of fine loamy mixed thermic family of Typic Haplumbrepts

Yellowish-white Alluvium

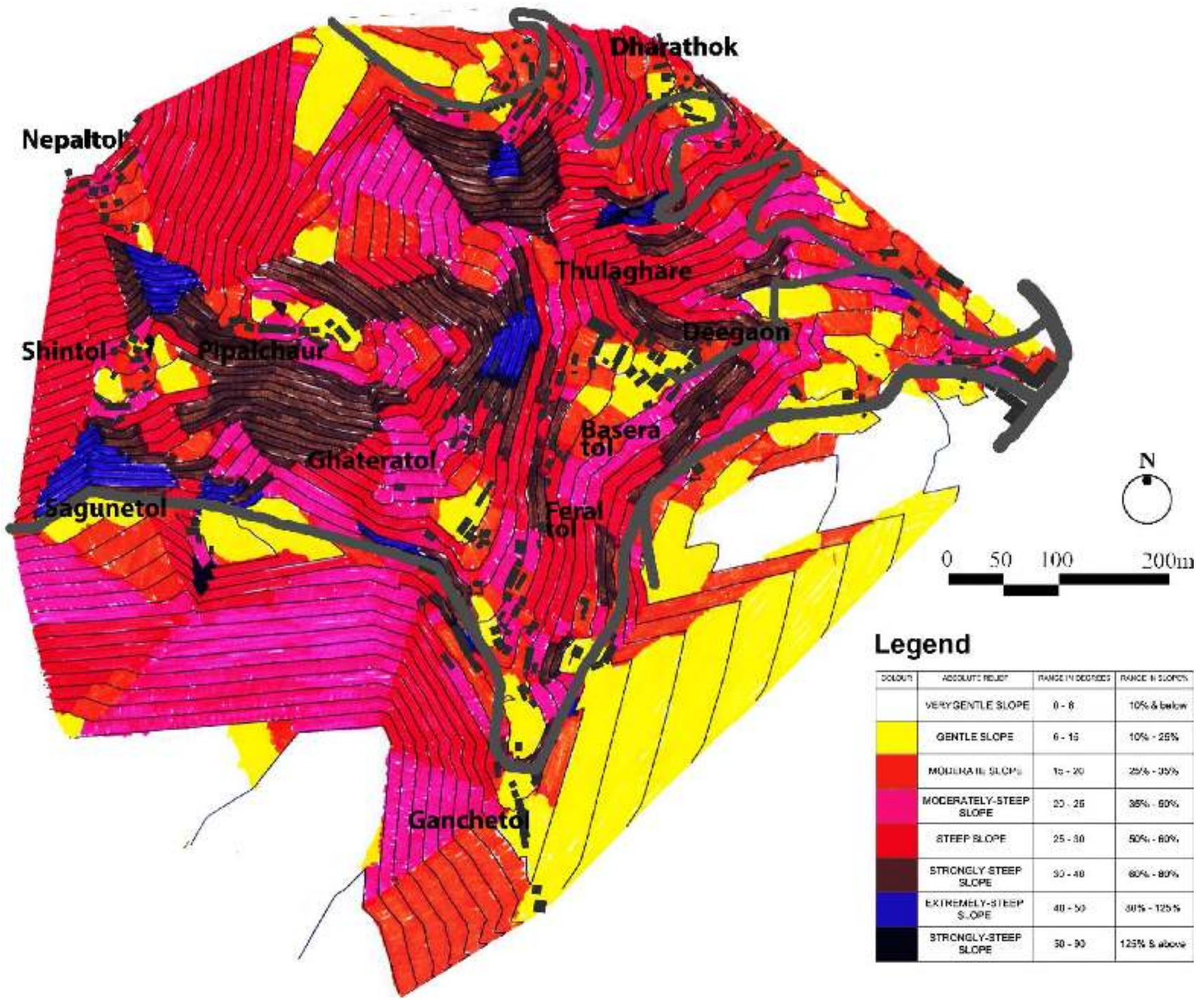
Sedimentary soil deposited thus within recent times, especially in the valleys of large rivers deposit of sand, mud, etc., formed by flowing water. Yellowish to whitish in color based on coarse sand content. It is often found intermixed with rounded pebbles and boulders.



3.3.1.8 Slope Distribution of the Settlement

The Majhigaon settlement is mostly contained within gentle to moderate slopes, which changes to steep slopes only in certain zones. Nepal tol, which is the settlement of Brahmins, is situated on steeper slopes, and due to the earthquakes, was affected by landslides, ultimately leading to its abandonment.

Slopes of 35% to 50% and above are the most landslides prone. Slopes under 25% are good recharge potential zones; ad in this case is mostly used for irrigation. Houses maybe built on steeper slopes (greater than 25% up to 60% in case of traditional mud and stone houses with shallow foundation) but it should be checked whether the slopes above the house is stable. It is possible to construct houses and roads on very steep slopes, but it needs deeper foundation and reinforcements

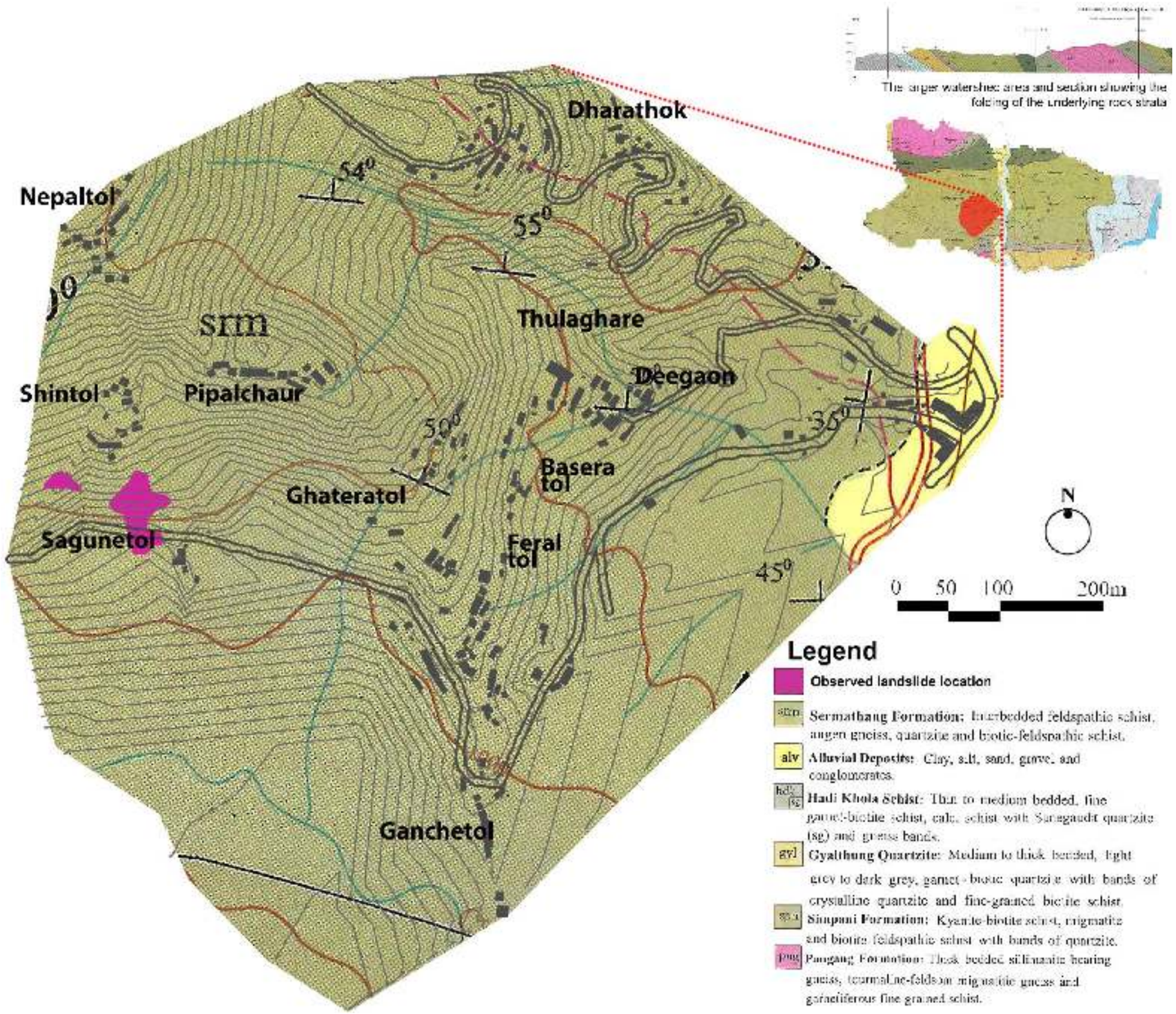


3.3.1.9 The Geological Formations

It's observed that the Sindhukhola flows along the anticline, as do many Himalayan Rivers.

The site is comprised of mostly Sermathang formations, which are made up of Mica, schists, interbedded feldspathic gneiss and Augen gneiss, quartzite and biotic Feld spathic schist.

It is important to notice that these are fold mountains and so the inclines of the folds can be seen in the sections. This also means that the mountains are in their formation stages and are not as stable as their older counterparts



3.3.2 Demographics & Social Composition

It's important to understand that the social context governs a space as much as a physical context does. With rebuilding process underway, it's decisive not to ignore the already existing social context of the people. The basic aspects of life of Majhigaon through which we can understand its people are food, clothing & shelter. Hence, mapping the socio-cultural aspects is necessary.

3.3.3 Ethnicity

As per the 2011 census, all the 75 districts in Nepal are Multi Ethnic'. Majhigaon follows the suit; there are Majhi, Brahmin, Tamang and Chettri in the settlement. Above the settlement are Nepalis, and Tamangs. Bahunepati consists of Brahmins, Shresthas and Nepalis alike. The population of Majhigaon is 253 families – 1077 people.

Majhi (221 families – 908 people)

The word 'Majhi' literally means 'boat-rower'. Traditionally, they use to transport people across the river as a means of livelihood. They belong to (so called) a lower caste owing to their position in the traditional Hindu caste system Overall; Majhi individuals' have Mongoloid features discernible of East Asia. They have migrated from northeastern India. The land holding of this community in their traditional village of Majhigaon has been shrinking over the generations. They are one of the worst affected communities of the society.

Brahmin (27 families – 147 people)

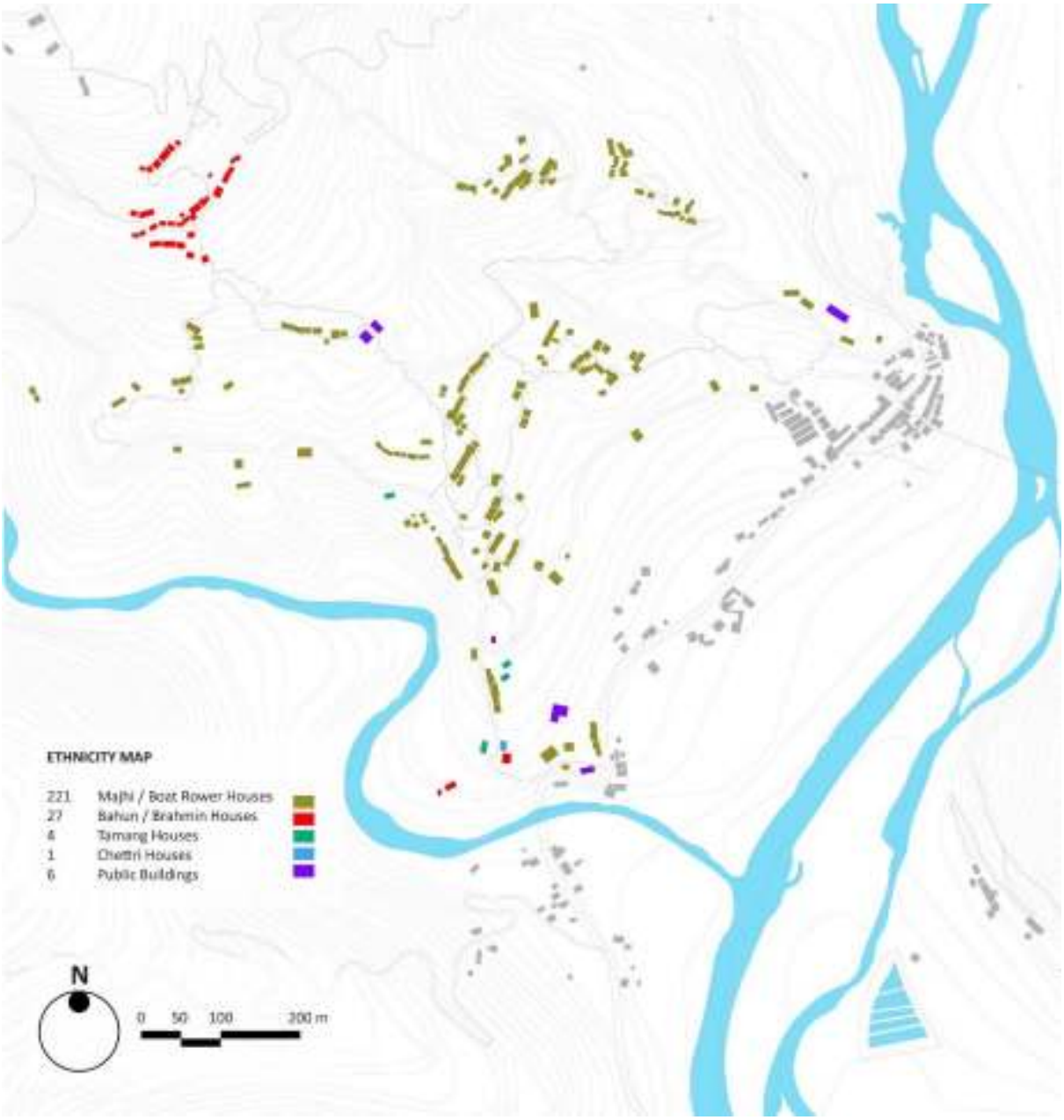
They are considered to possess a high social status in the Hindu dominant society of Nepal. Traditionally they belong to a highly educated class of rich people. They now belong to an agrarian section and own large farmlands in the flood plains of the river. They are housed in between the Ganimai Temple (God) and above the Majhi houses in the section, which explains their high caste position in the society.

Tamang (4 families – 18 people)

The word Tamang originates from Ta – horse and Mang – trader/ businessman meaning horse traders. The traditionally Buddhist Tamang are the largest Tibetan ethnic group within Nepal. They are considered as a low caste community leading to their marginalization. The few Tamang families here mingle well with the Majhi community.

Chettri (1 family – 4 people)

The Chettri *(kshetri-ya)* people belong to the high warrior class and caste. Though most of Chettri's are Hindus they can follow Buddhism too. The head of the lone family of Chettri's in Majhigaon serves as a teacher in the nearby school and are economically sound.



Ethnicity Map

3.4 Socio-economic and Cultural Settings

Cultural Geography includes the study of cultural products and norms, beliefs and their effects on spaces and places.

Religious customs, festivals might have influence in shaping the villages. They function as local points. Through observation of study areas evident that most villages differ greatly on social grounds yet, the internal structure shows little variation. Some of these forms are common and ubiquitous.

This mapping of quantitative aspects needs to be partially done through household surveys. But most of the data can be collected through interactions with the community after gaining the confidence of the people and through personal observations.

Schools

There are two schools in the vicinity. One is Siddhi Ganesh TLC, up to 3rd grade, that was used as a relief shelter as well. The other is Jalapa Devi School up to inter (+2). Children of all castes and communities come to these schools. Majority of the population in Majhigaon is educated up to only 7th standard.

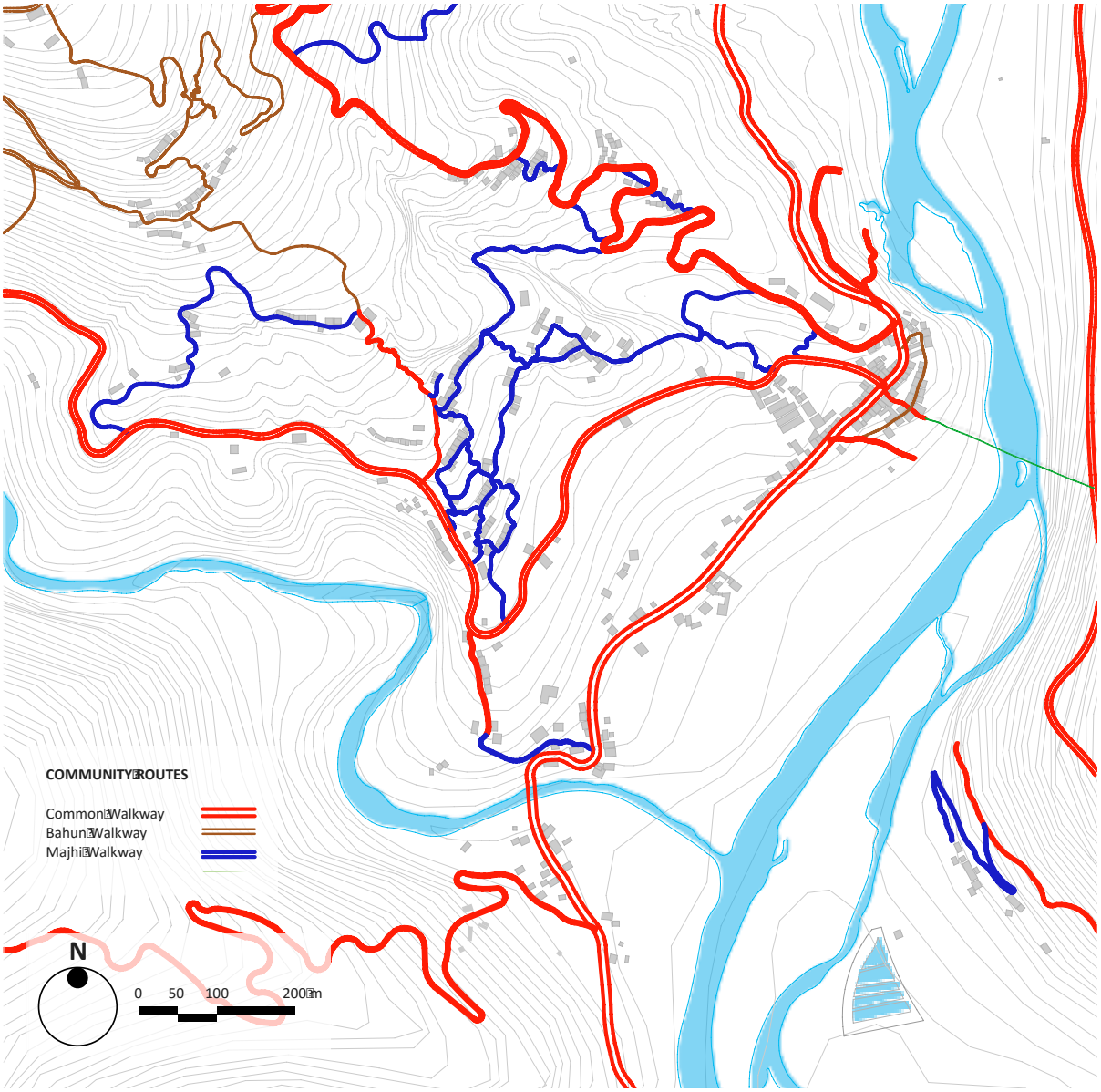
Healthcare

There is one polyclinic where the doctor comes once a week on Thursday for 2 hours. The rest of times, they need to go to Melamchi or Dhulikhel. The villagers demand a health post, which could be visited by govt. doctor on regular basis.

Food Habits

As seen commonly in Nepal, the food habits of the two groups are also contrasting. Majhis eat fish, pork, chicken, mutton and buff regularly and thus have pig and buffalo rearing around their houses. On the contrary, Brahmins consume only fish, chicken, mutton & lamb. Similar to the Kathmandu valley, their primary food is rice, dal, vegetable curry, pickle with fish in addition

3.5 Community Routes & Uses

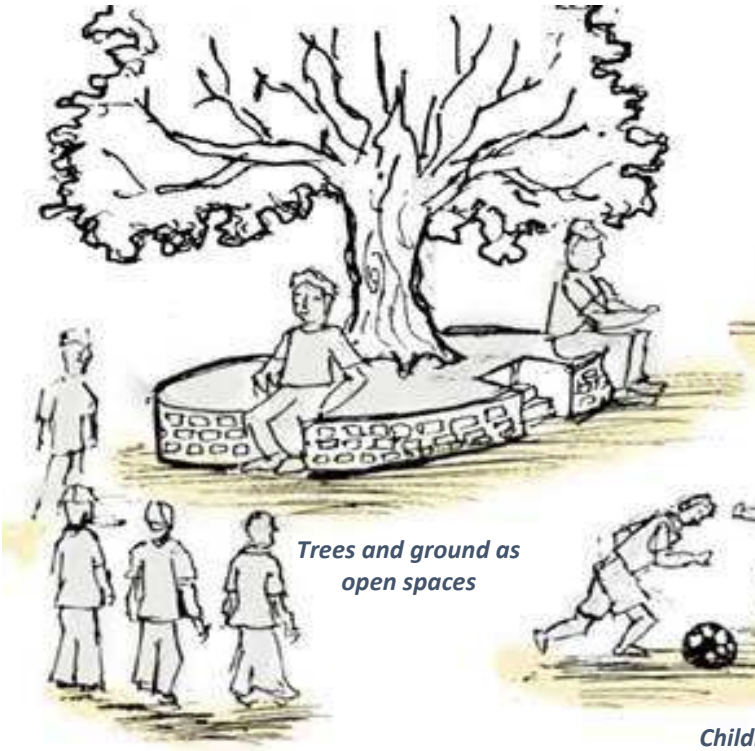


Community Routes map

This map shows the routes as traversed by the two castes within the settlement study area to their house. Here it is observed that the both the Brahmins and the Majhis avoid routes and have different accesses to their zones from the common routes. This physical difference represents the social difference between the castes

3.6 Shared Spaces

The open space next to the schools and the community center are the major open spaces in the settlement. These are used for all kinds of purposes, from children's playing, to social gatherings, marriages, drying the agricultural produce, to festivities and religious celebrations. The map next also shows the routes used by each community to traverse the settlement to their house. Different castes do not cross the zones of the other castes.

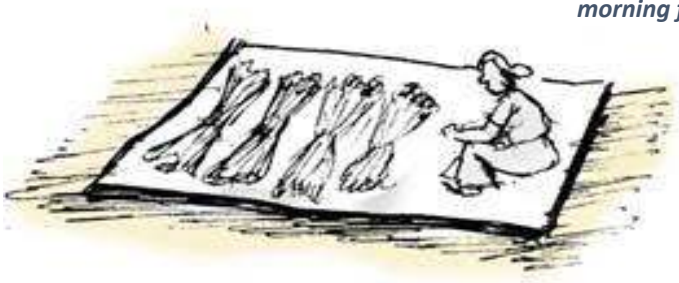


Trees and ground as open spaces

Children Playing next to the community centre in tahal tole

Locals gathering outdoors in public and semi public areas

Locals visiting the temples/ religious spaces every morning for prayer. Special activities happen during



Local people drying their agricultural produce in the open spaces

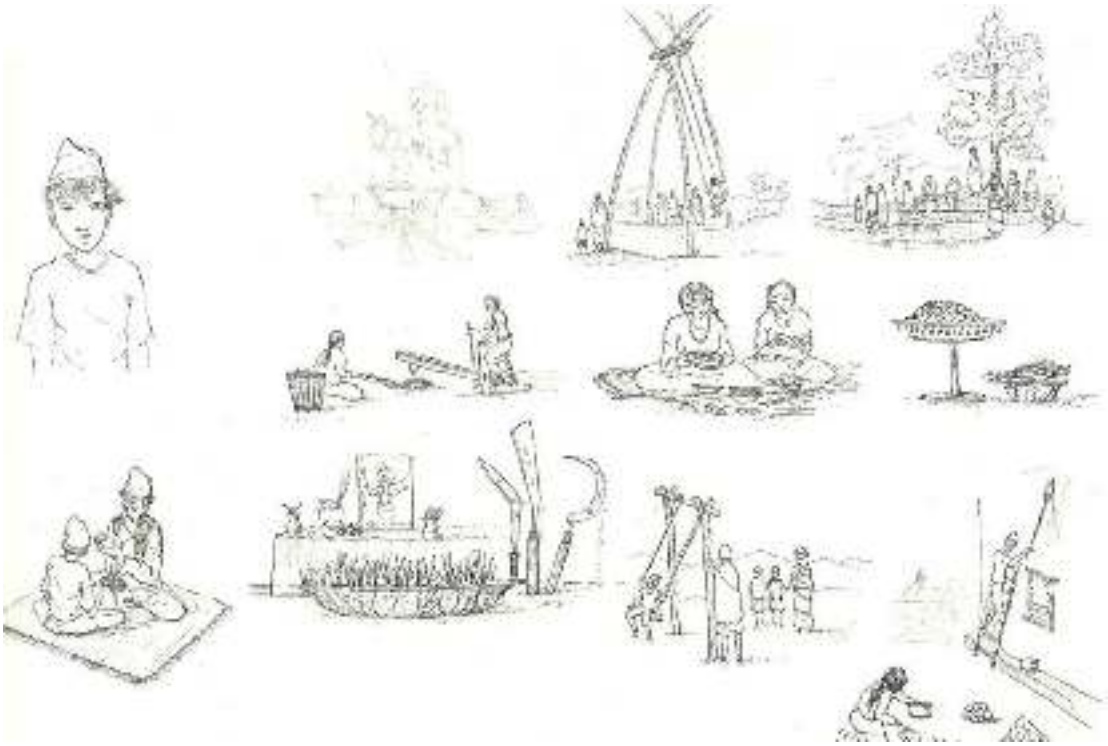
3.7 Culture and Festivals

The festival of 'Teej' is celebrated on the third day of the Indian month of Shravan. This is a celebration that welcomes the monsoon season and is primarily celebrated by women folk. Women and girls come together around a tree. The tree plays a vital role in in the celebrations and brings all the women folk of the village together. The whole day is spent under the tree where they sing, play, dance, tell and share stories with each other.

During the lunar New Year farmers of Majhigaon worship the equipment and materials related to the agricultural practices. They perform pujas and pray to these equipment. They believe that the bounty during the last harvest is solely because of the equipment used during harvest. Thus they pray to these equipment to aloe them to progress and make profits in next harvest season.

During the Tihar (Diwali) festival people in this village repair their houses and paint walls with the help of Geru (red mud) & white stone crush, which is locally available in this area. The yearly maintenance of the houses is carried out for the celebration of this festival.

In Dashain (Dusshera) people build a very beautiful swing. It is generally structurally stable and is a temporary structure. It is made using bamboo. During Dhanya Purnima, a fair is also held near the Kalika Devi temple for three days. The locals consider this fair very auspicious for them. Within culture of Majhis many festivals like Tika, Topari etc., are celebrated. In these festivals too local materials like bamboo, equipment's and instruments given importance culturally. Culturally the people are attached and strongly believe in the importance of materials that are locally available and easily acquired.



Different cultures and festivals of Majhis

3.7.1 Daily Life Cycle

MEN

The day of the man begins with farm work early in the morning at 6 after a tea. They usually perform the farm work till mealtime at 9-10 in the morning. Post meals they go for their alternate jobs. In the evenings (6-8) a form of socializing has been their alcohol addiction. The late evenings are usually spent indoors. The bedtime is 11.

MAN

WOMEN

The woman wakes up before everybody else in the family. She has to take care of the household chores including the cooking. Post the morning meals, woman usually find their way to the farm to take care of it. Then they return post khaja (light lunch) around 1:30 to do other alternative forms of work before heading home for household work again. They spend their later evenings in front of the television. The bedtime is 11.

WOMAN

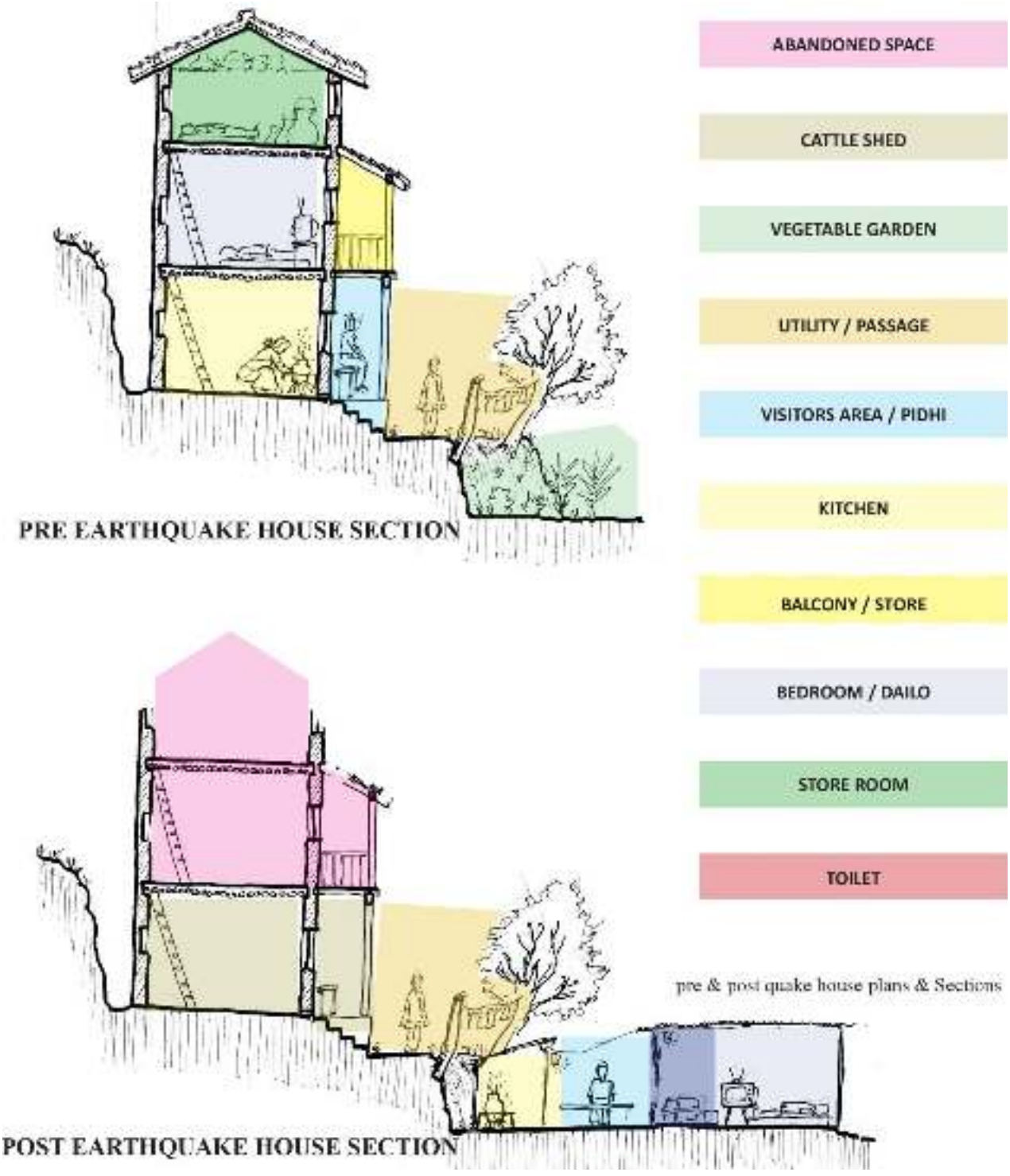
CHILD

The children in Majhigaon wake up the last. They have their meals and do their homework, while the mothers are busy with house chores. Post that they leave for school till late in the evening. They also go out to play later on in the evening with their neighbors in the open spaces. Children are more outdoors bound. Even their late evenings are spent in front of the television. The bedtime is before 11.

CHILD

3.7.2 Functional Space Distribution

The traditional use of spaces within the house has been upturned during the post-earthquake phase. The private, semi-public and public spaces are interchanged. The traditional use of spaces depended on the occupations within the community. These uses should be considered into the rebuilding plans for the settlement.



3.7.3 Inside Outside

In Nepal, houses in the rural context are oriented along the contours and mostly facing valley side.

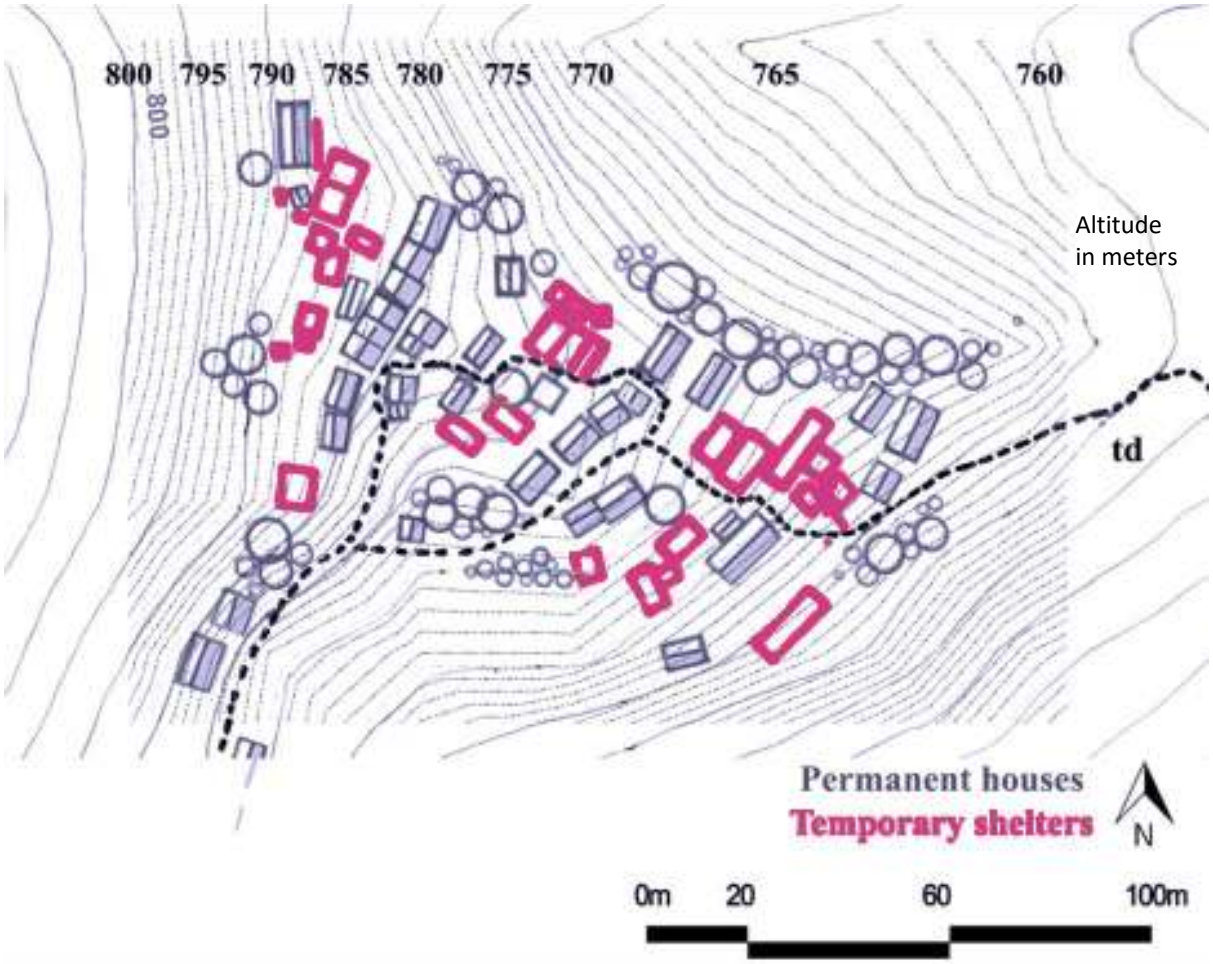
Typical section of houses has four components based on built versus open i.e. **Aangan, Siri, Gharo and Kareso**. Where **Aangan** is front open space of house. Which is welcoming side of a house.

Siri is semi-open space, which is gives shade and space where people entertain guest. Gharo is houses, closed space. Kareso is backside of a house towards cliff, which is for gardening and sometime for livestock, along with its storage. Kavshi is semi-open space on first floor for shade from light and rain and drying area of a house.

Post-earthquake situation where the temporary shelters are made from the corrugated sheets, which was an immediate quake response of the communities all over. The people have built the shelters on their own with timber and sheets in a communal way of building one house after another helping each other. The season of monsoons has arrived and the present temporary structures are not well suited for the rainy season. These structures do not provide relief even in the summer or winter.

The collapsed completely or partially houses are not used for housing but for animal rearing especially pig. There is no open defecation and there are toilets built for temporary purpose which built post earthquake. The lack of drainage, unhygienic conditions due to pig rubbish, foul stench have already started to turn the clusters into slum.

The delay in re-clustering or reconstruction process poses an imminent danger of these temporary structured settlements of becoming informal settlements. This causes a backward step in terms of rural development and stale future of these quake affected areas.



Plan showing Existing Situation of Thulaghar and Digaun tols, Majhigaon.

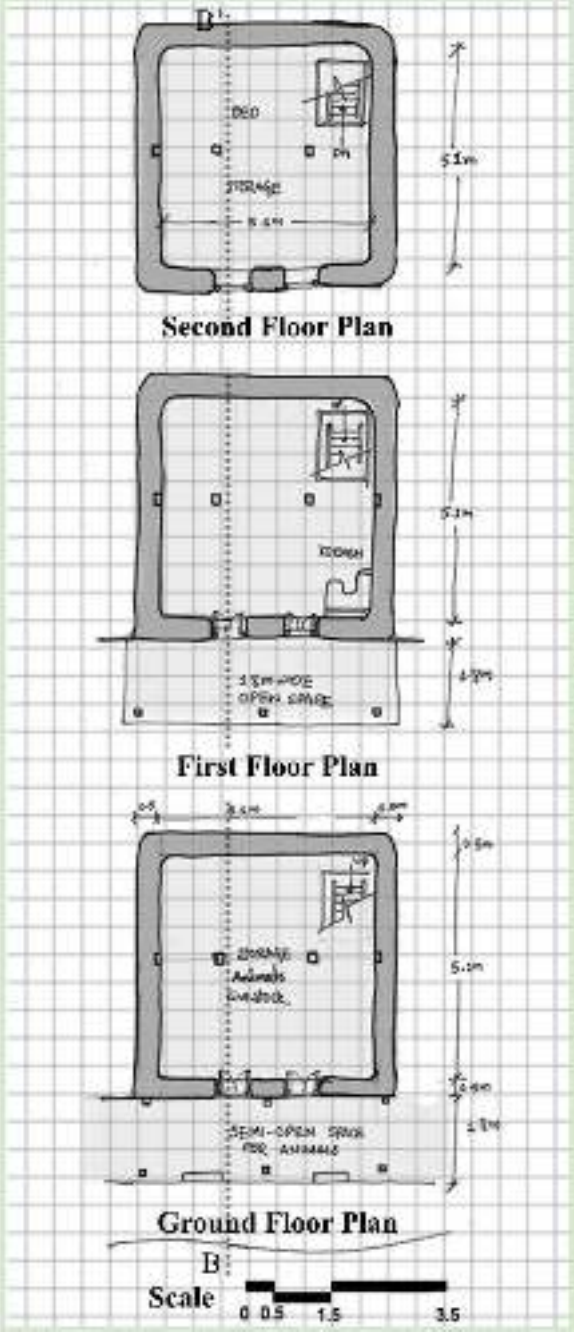
3.7.4 Construction Techniques Used

Prem Bahadur Majhi

Occupation : Agriculture
Caste : Majhi
Material : Mud, Bamboo, Slates, river round stone, Quartzite Metamorphic rock & Wood.
- Building was built by family members.
- This building was survived in 1934 major Earthquake. That time age of the building was three years old after construction.

Key Plan

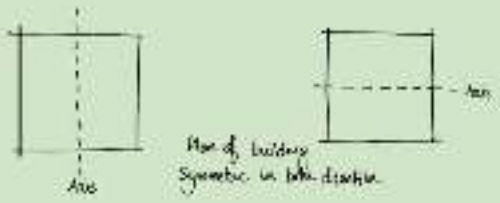
Sketch showing Front View



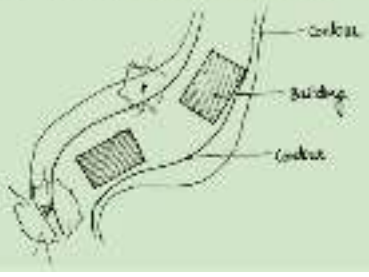
Observations and Inferences

1. Ground floor of a building is for livestock, which help to maintain temperature within a building.

2. Plan of a building is symmetric in both direction. Which most suitable shape for earthquake zone.



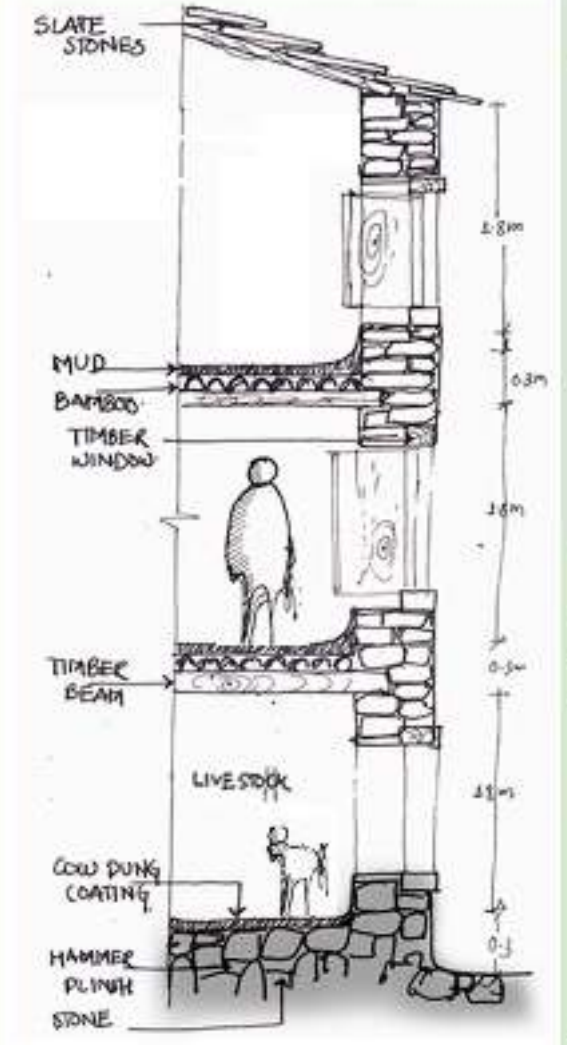
3. Building is parallel to the contour.



Prem Bahadur Majhi

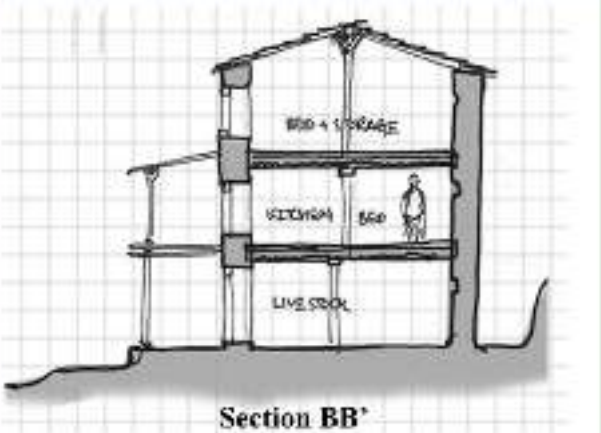
Construction Technique

- Construction Knowledge from ancestors.
- Load bearing mud mortar stone wall (mix of rounded river stone , Quartzite rock)
- Slates were placed on a timber supported roof without any joinery.
- Combination of bamboo, timber, mud layer on floor to increase thermal comfort with a building.

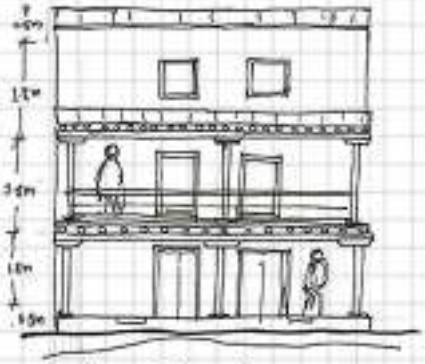


Wall Section

Scale 0 0.5 1.0 2.0



Section BB'

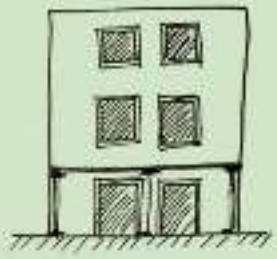


Front Elevation

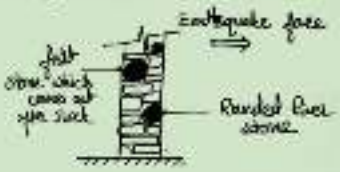
Scale 0 0.5 1.5 3.5

Observations and Inferences

1. Building opening position and its equal sizes are in symmetric. which is best way to transfer earthquake force without any damage.



2. Round river stones were used for wall construction, which are weak point for structure during earthquake shock.



3.8 Environmental mapping

People stay in great poverty and mostly grow what they eat. They have very less primary income. Very little of the crops they grow is surplus for selling in the market. They depend on the forests and farmlands for almost all their requirements from food, firewood, water from springs, fodder for their cattle, preliminary medicines, and other products like honey and wax.

There is a deep knowledge of types of soils, weather patterns, local plants and trees and related fauna.

a. Sal Dry forest/Sal Wet Forest-100m-1100m

1. Sal forests have always been used also for grazing and collection of fodder, fuel wood, litter and many other products.

2. Canopy height is around 30-35m

3. Not a prominent second storey , minimal undergrowth.

4. In wetter areas, it is evergreen; in drier areas, it is dry-season deciduous, shedding most of the leaves in between February to April, leafing out again in April and May

Flora species: Gauga Pinnata, Schima Wallichi, Albizia Lebbek, Terminalia Crenulata, Terminalia Chebula.

b. Chir Forest

1. Chir pine is widely planted for timber in its native area, being one of the most important trees in forestry

2. Canopy height is around 30-35m.

3. Usually, the accumulating carpet of needles on the forest floor under these trees makes it unsuitable (unfavorable condition) for many common plants and trees to grow.

4. Mostly evergreen

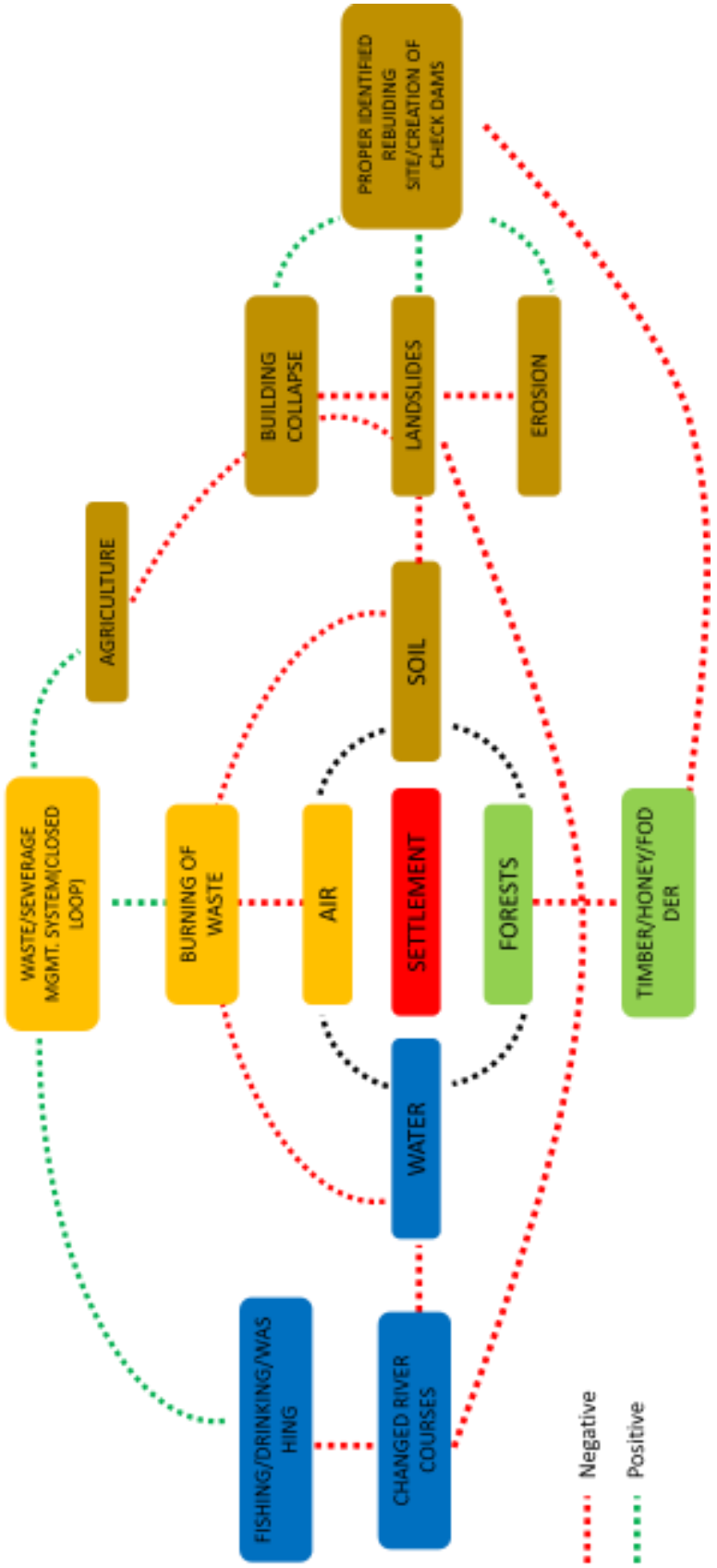
c. Dry mixed Forest-1100m-1700m

1. These are characteristic of areas in the tropics affected by seasonal drought.

2. The seasonality of rainfall is usually reflected in the deciduousness of the forest canopy, with most trees being leafless for several months of the year.

Flora species: Castanopis Tribuloides, Dendrocalamus Sikkimense, Schima Wallichi, Betula Cylindrostachya, Terminallia Belesica, Toona Ciliate, Litsea, Boehemeria Rugulosa, Ficus Garica, Heynea Trijuga, Grewia, Michelia Champa, Cedrela Sp

Under Storey: Eurya, Macaranga, Meliosma



Systems chart showing the inter relation of people and their natural habitat and the probable threat that might come due to earthquakes

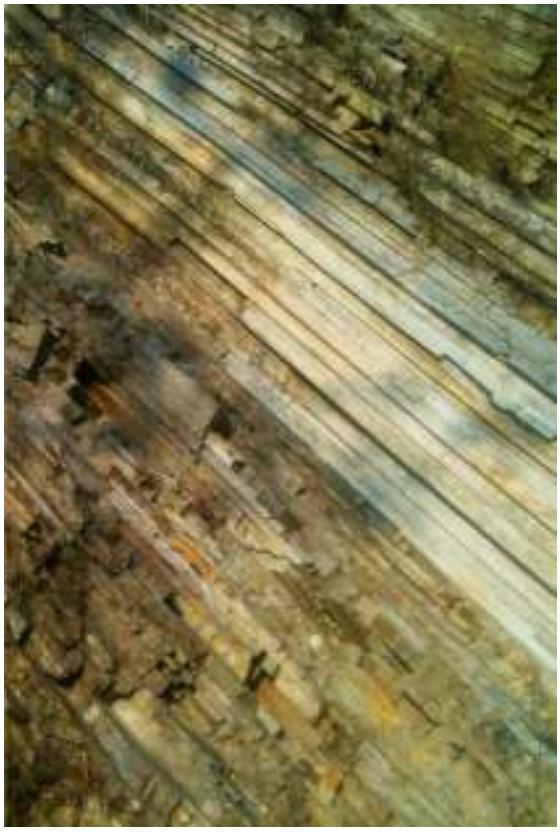
3.9 Geological Vulnerabilivty Risk Assessment

3.9.1 Geological Analysis

Geology plays a vital role for slope stability and natural hazards are a major factor controlling of slope movement. The site was visually observed for cracks and deformations by the visiting team and an additional inspection by a geologist to identify land vulnerability. Eventually educating the local mass about the hazards in the process are the key responsibilities of the agency. The Studio Sindhupalchok team also accompanied the geologist in visual geological survey along with the geologist.

3.9.2 Geological description of the contextual area

Lithological and structural variations also determines the slope and slope stability of the hills in the area. Besides, lithology is also equally important to determine the hazard vulnerability of landslides, soil creep and floods. Vegetation and vegetation density is also equally reliant on the lithological condition of any area. Rock and soil investigation were done in the field in and around the village. Detail geological mapping of the area was carried out in the field. The rocks variation, joints and geological structure were studied and reported. Geological map resourced through the MoUD, prepared by Department of Mines and Geology, which was prepared in a 1:25000 scale, was used in the field. Geological map gives the information on lithology, geological structures, status of joints and fractures in the area.



Exposed rock section near Kalika Devi showing the dip angle of the underlying strata

3.9.3 Geology Survey – Majhigaon

Visual Inspection

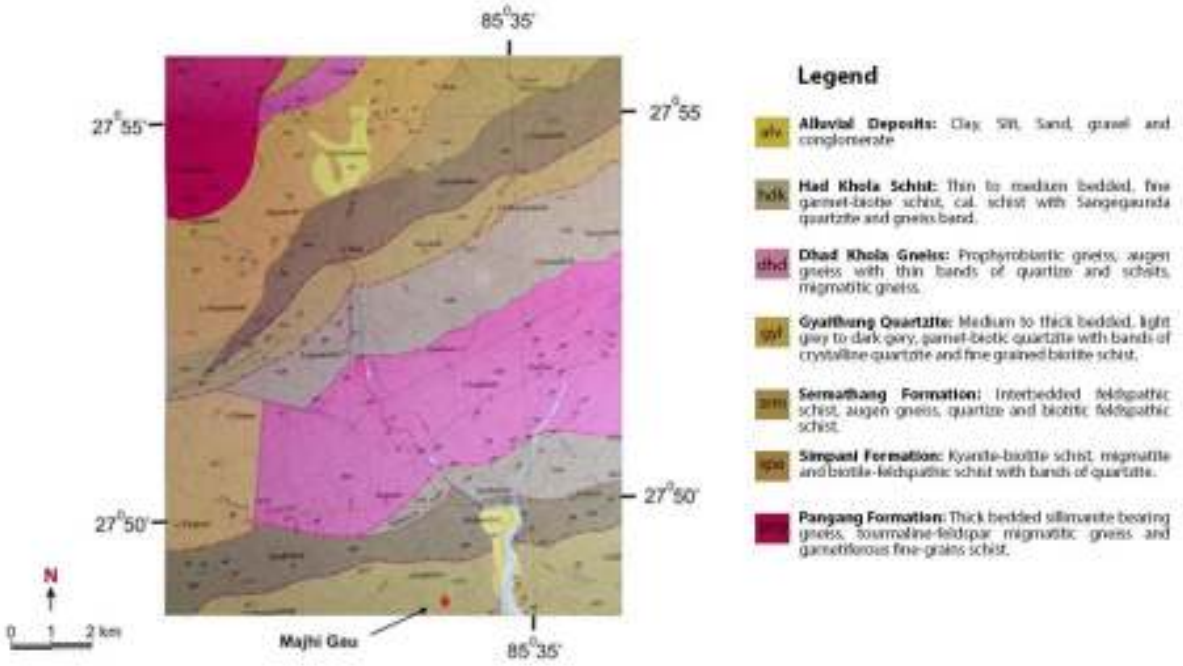
Geologist Basant Raj Adhikari conducted this survey during the site visit on 8-9th May 2016 conducted this inspection.

The cracks in the fields were clearly visible on the upper clusters of Majhigaon. The landslides along roads, loose topsoil was also noted throughout during the initial site visits. Many people have fled the houses due to fear of landslides and are now settled in temporary shelters on sites they believe to be safe.

Prof. Ajay Lal showing crack in Majhi Gaon

3.9.4 Regional Geology

The area lies in the Higher Himalayan group of the Central Nepal Himalaya, which consists of higher Himalayan crystallines of large masses of augen and banded gneisses and also record relatively higher grade of meta-morphism than their corresponding formations included under the Kathmandu Complex (Dhital, 2015). The higher Himalayan group of Pre-Cambrian age consists of 6 formations in this area



Moderately weathered biotitic schist exposed along the earthen road.

Natural Hazard

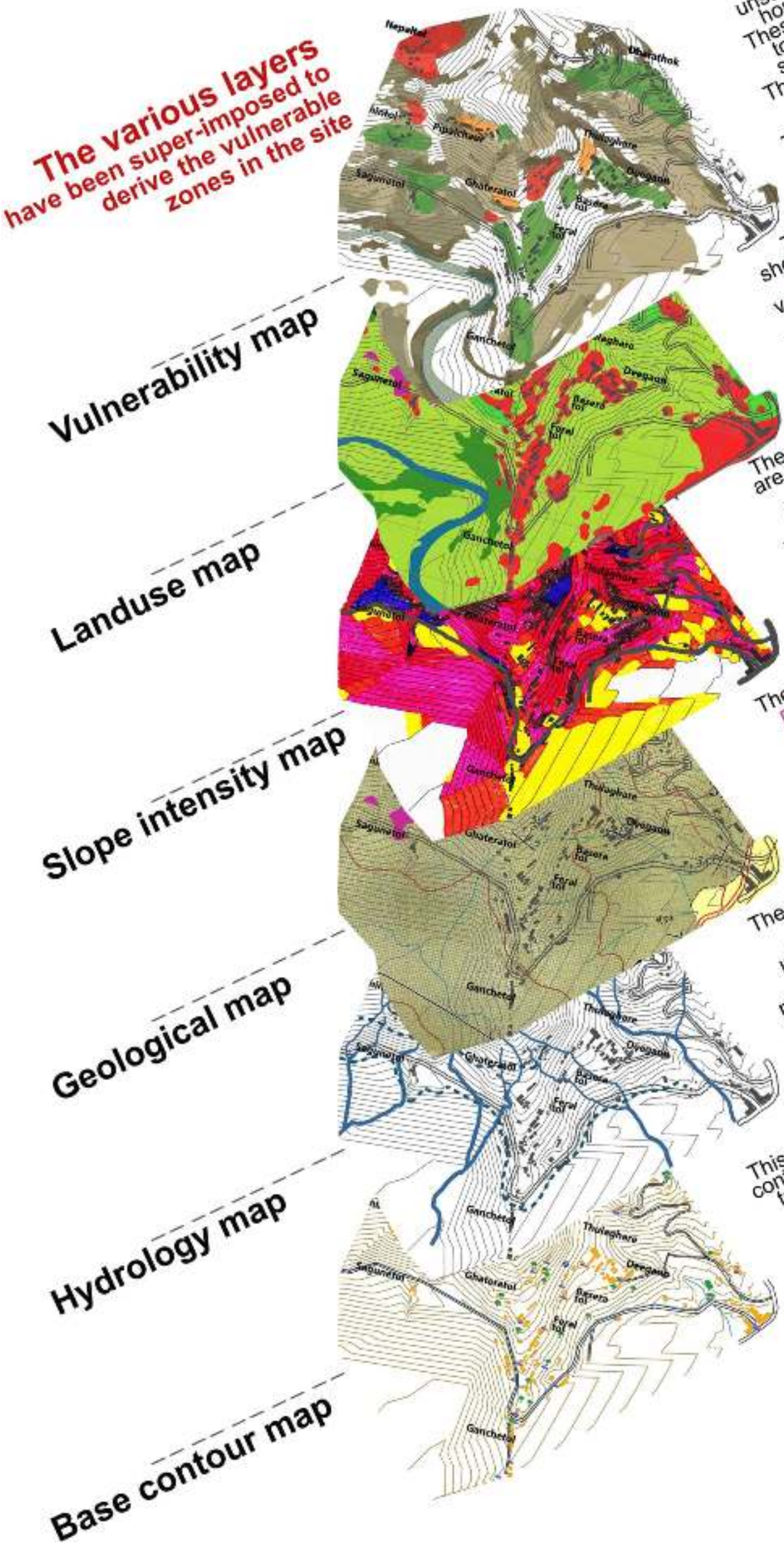
The area is geologically stable and no change of large scale natural disaster. There is steep slope on the upper part of the village but the rock dips opposite of the slope indicating stable slope however small scale slope failure might occur. There are some slope failure and gulley erosion in the village which should be protected by using different kinds of measures (Image slope failure and gullery erosion).

Slope failure and gulley erosion

Recommendations

1. Retaining wall and bio-engineering works are proposed for slope protection of the uphill side of the earthen road.
2. Proper management of forest is recommended to avoid the small scale slope failure in the village.
3. Proper drainage management should be done to control the rill and gulley erosion.

3.9.5 Stacking Layers For Vulnerability Map



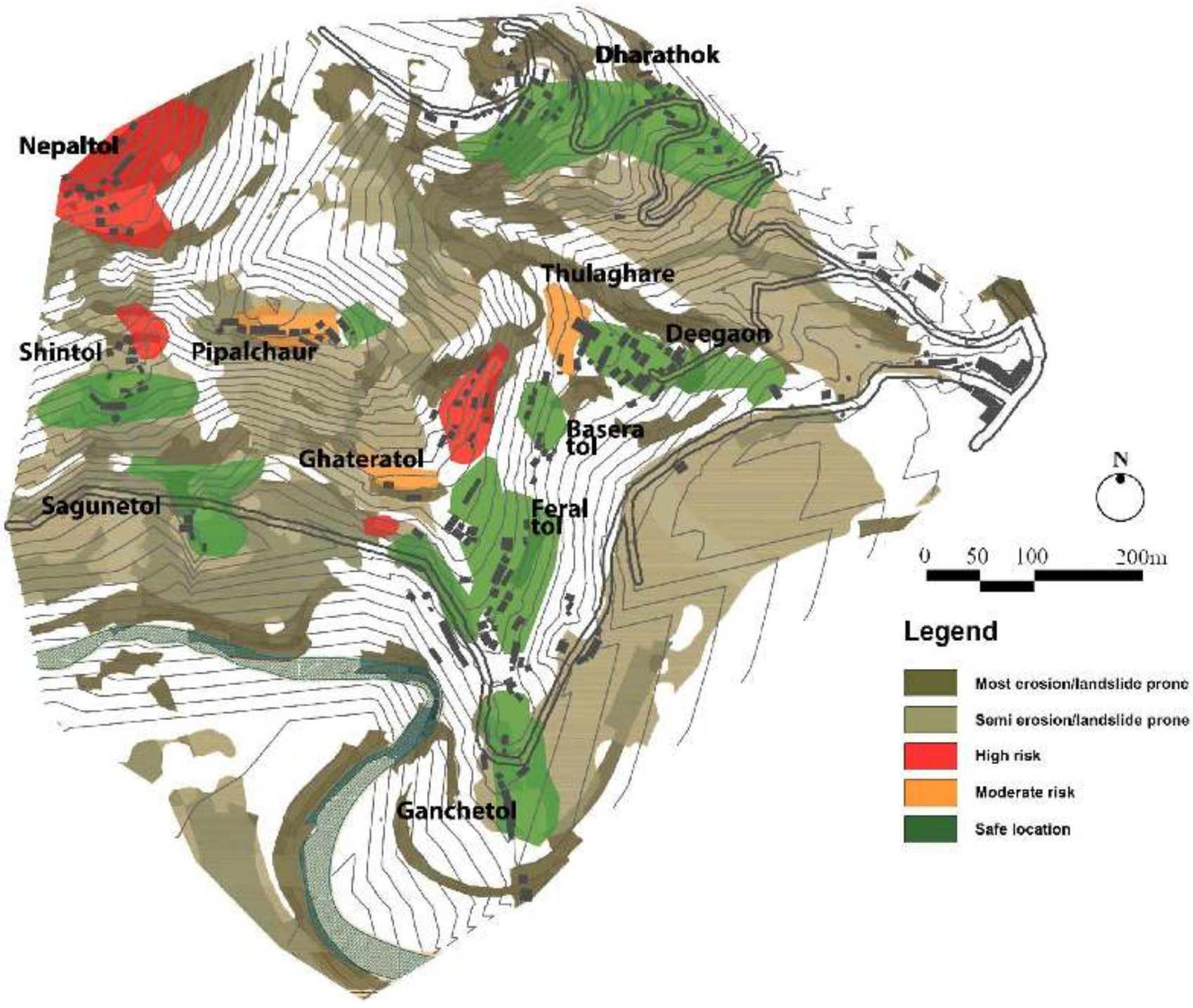
3.9.6 Vulnerability Mapping

The mapping is mainly done to estimate erosion prone and landslide prone areas. This is the result of stacking the base map with the slope map, the hydrology map, the landuse map, and the geology map.

Landslides are usually brought about by a combination of various factors, where steepness of the slope, the seasonal drainage line, the underlying rock strata and the aspect of the slope (south facing ones are most prone) are the main factors.

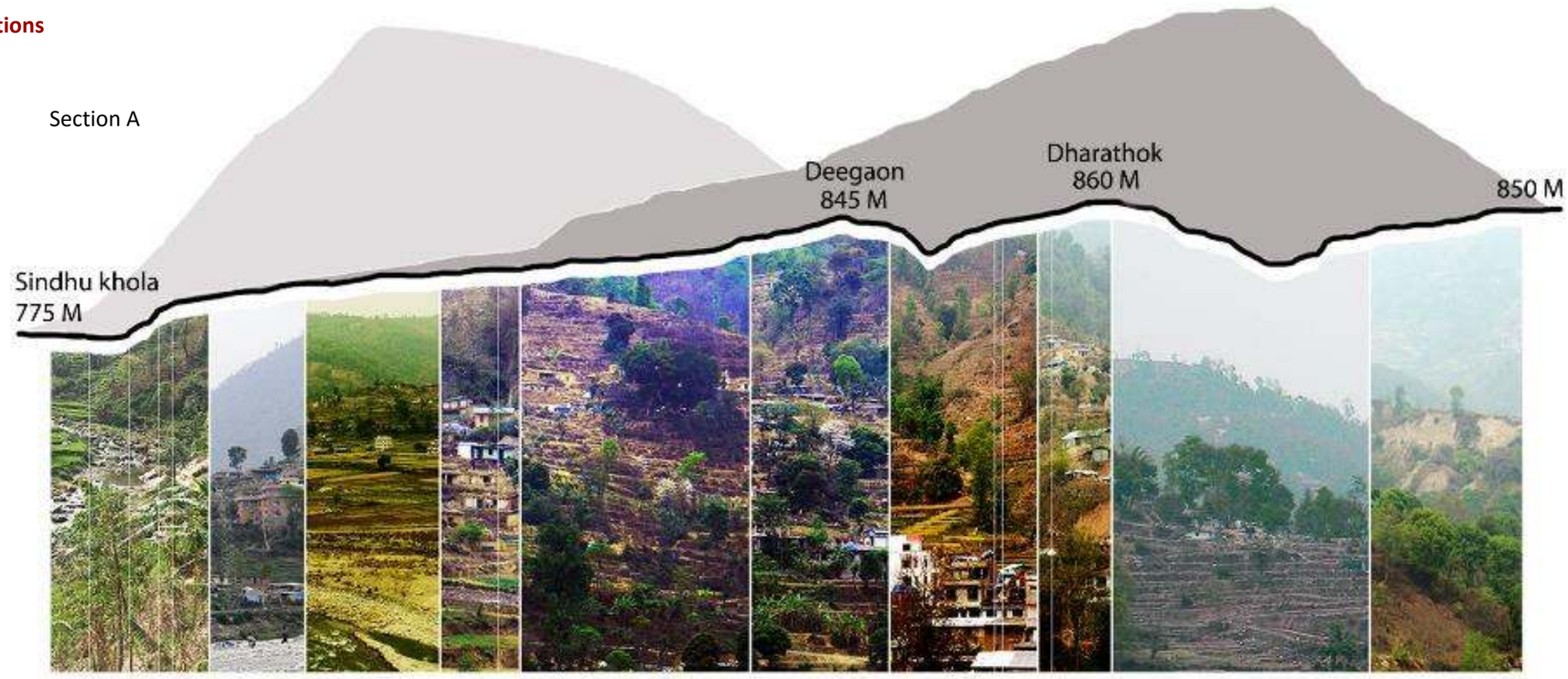
The dark grey zones indicate high erosion probabilities and need to be conserved, either by improving the agricultural bunding or by making bunds and improving the permanent and semi-permanent vegetation cover.

The tols or settlements, which are most vulnerable, are also marked according to most vulnerable; meaning which have to be immediately shifted and semi vulnerable; meaning which may be shifted later.

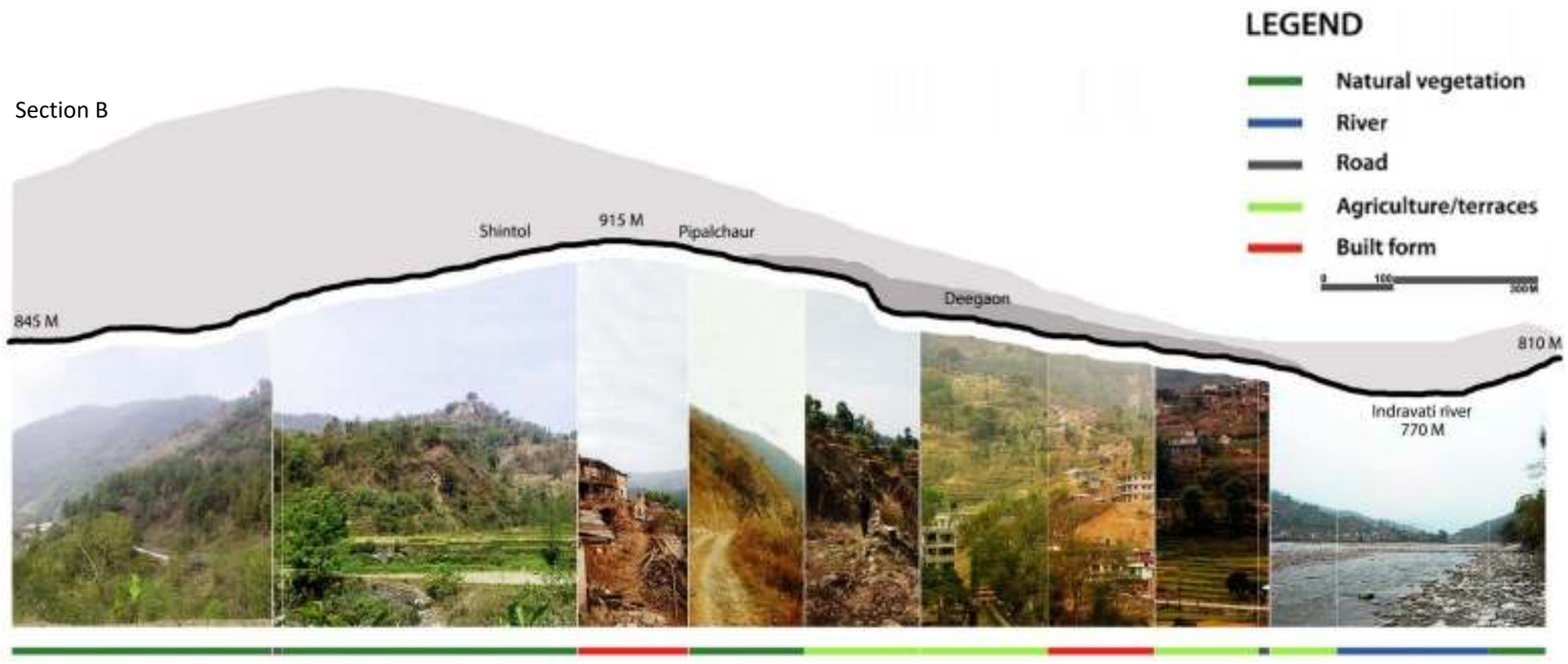


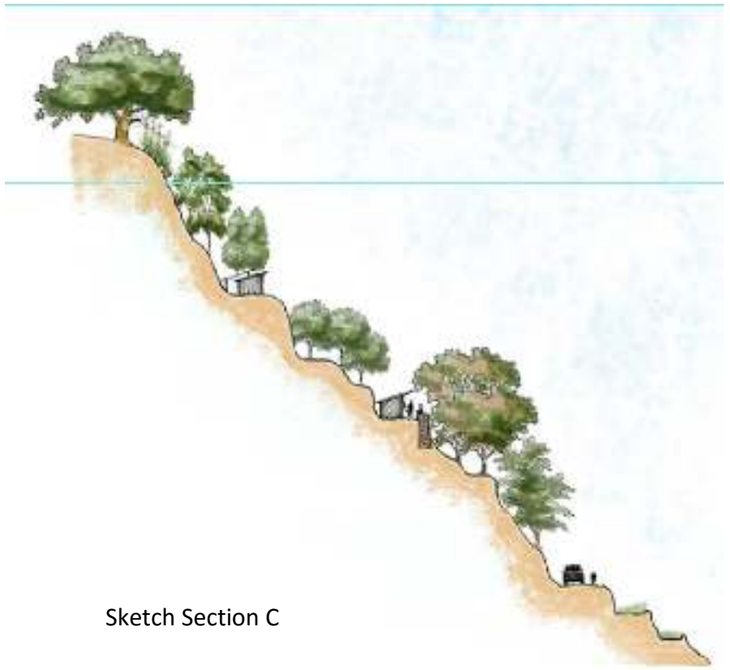
3.9.7 Vulnerable Study Area Sections

Section A

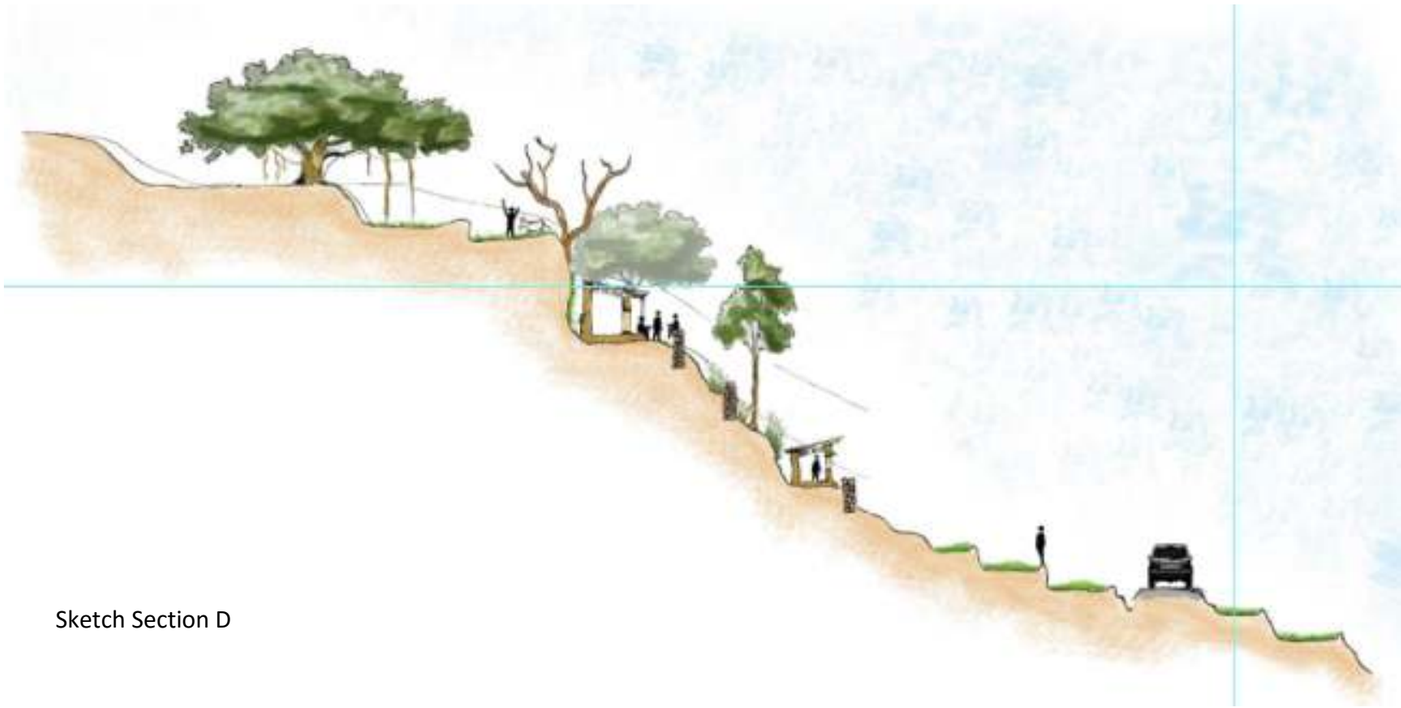


Section B





Sketch Section C



Sketch Section D

Sketch Section C (Nepal Tol and Shin Tol)

Both are classified as high-risk zone. The steep unstable cut slopes combined with the absence of adequate soil holding vegetation and the existing natural drainage lines makes this highly prone to erosion and under-cutting, which may lead to failure of foundations in the future

Sketch Section D (Thara Tol)

It is classified as a high-risk zone. It can be observed here that people have built retaining walls out of stones at various levels but the topmost slope after which the settlement starts in the section is cut and is almost vertical and is under very little vegetation cover. It has a high chance of failure in future in case of heavy rainfall and subsequent flow of water.

3.9.8 The Vulnerable Zones

The vulnerable zones have been deduced based on the super-imposing of various layers which have been shown in the diagram on the left of this page

For similar studies it is important to first undergo a detailed topographical, geological and visual survey in the beginning and then prepare maps of the various layers of the site

Each layer highlights a few important aspects and the layers can be then overlaid to infer the combined vulnerability of the site

Landslides and excessive erosion are the two main problems on slopes and may cause failure of foundation and hence loss of human life and property, or may adversely affect the soil fertility which may lead to a decrease in agricultural produce and economically affect people.

3.10 Land ownership

The study of land was done as parts for three important functions

It includes the understanding of land policies, mechanisms for collection of land from people to giving them back, Development of land through valuations, re-adjustments, scope for provision of services. Identification of Issues in the existing process is also part of the development of implementation process

Issues:

Cadastral Plan Majhigaon does not have a recent survey cadastral plan. The Scanned image provided by the govt. authority needs to be digitized causing discrepancies in areas and overlaying.

The settlements need to be **resurveyed** for there is land loss due to landslides and land movement after the earthquake. The government offices need to share the data with the municipalities, as villages are no more part of VDCs.

Some of these earlier cadastral maps are **mainly isle land type or free sheet maps**. They may not have accurate connection to each other. These existing cadastral data (maps and records) will be digitized and superimposed on digital topographical maps, map by map and the cadastral database will be prepared as per the accuracy of maps.

Cadastral Plan of the study area Majhigaon is attached here. It fails to show the recent ownership and hereditary division of family land.

Issues:

Legal Land Ownership People in rural areas may not have the ownership certificate but live on the land since many generations while paying the taxes. The land parcels are divided within the community and usually have in-family divisions. People may Squat or encroach also.

Provision of certificates to the Landholders with incorporating the subdivisions in the plans is necessary to demarcate ownership. Community owned Land (Guthis), Govt. Land identification and development is other issue. In Majhigaon the issue of land ownership was not encountered as the community leader had **previously collected the ownership certificates** and other documents. This needs transformation of permanent land ownership certificate to owners through the Ministry of Land Reforms.

Some of the parcel may not be registered or have litigation or could be mortgages. If the total area of the project and the summation of area of all parcels as per the land records are same or more or less same, it will not be the problem. Because, new parcel may not be the same and after land pooling the owners will have undisputed, accurate map and document for future. The **mismatching of adjoining sheets will be solved.**

Issues:

Consensus: Majhi people had voluntary consensus for land pooling backed by formal/ Legal procedure. The approval signatures of the people in Majhigaon have been collected by the community leader and the formal request is made to the public authority.

But in other cases Govt. authority would need to build. The role of **community leader** along with community committee are the key persons to be contacted. In the absence of the leader the agency needs to identify the important **decision making people** from the community.

Issues:

Land administrative boundaries: Some clusters lie within two jurisdictions. Some are recently moved from being part of VDC to municipalities. The administrative boundary is not defined in some cases in rural areas.

In such cases **Town Development Act TDA** could act above the local bodies. Some settlements like Majhigaon are recently added to municipality from earlier VDC level creating scattered databases.

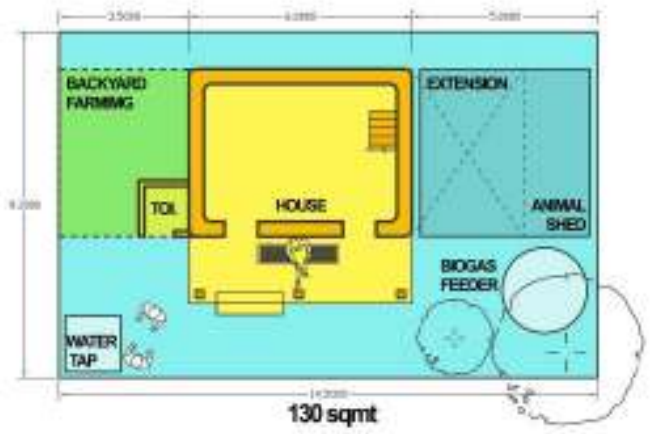
Issues:

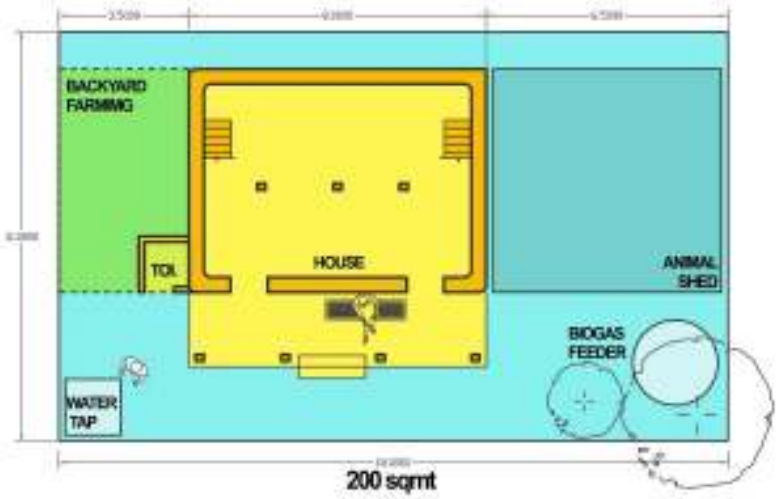
Minimum Plot Size: A minimum plot size area has to be calculated for re-distribution. The readjustment of plot usually takes away a part for networks and services. With plots of already small size, the final plot could end up being less useful for housing.

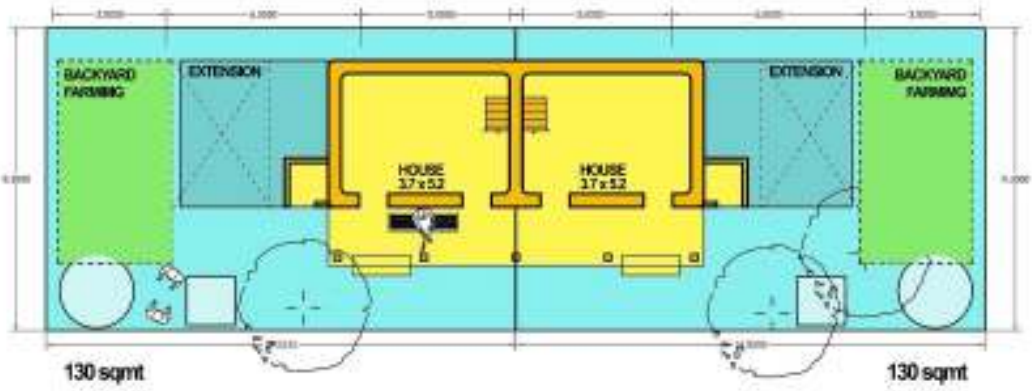
Standardisation of plot: Standard plot size is calculated considering the existing land holdings and way of living. There need to 2 to 3 standard sizes of plots say 4 anna, 6to8 anna, 8to10 anna etc. (16 annas = 1 Ropani). For Majhigaon we try to standardise the plot size to 130 sqmt and maximum of 200 sqmt. The plots size calculated includes area for the built house with verandah, external toilet, animal shed, backyard farming, individual water tap facility, a front open space and a perimeter of around 1 m around the house for movement.

Please write details of land ownerships in Majhigaon here. Land classification, forms of tenure, linking with communities and families (quantitative and qualitative)

3.10.1 Standard Plot Sizes







Plot sizes of 3 categories 130 sqmt (4 anna), 200 sqmt (6 anna) and 300 sqmt (10 anna) are proposed.

Issues:

Land Readjustment: The land readjustment requires to resize the plots for improved facilities and safer homes. The owners who have more land than the standard need to make it available for resettling. Needs to done internally.

Land swapping/ Exchange is the preferred option as government does not have to compensate through other schemes.

Location of Land Parcel: The land owners are very much attached to their land, they prefer their relocated plot at the same place or at least close to it. For maintaining equality, the donor of the plot would be entitled to get the original plot of the resettled member in his plot.

The **plot might not be suitable for housing but could be used for agriculture**. An alternate land valuation plan need to be made to compensate the donor in terms of monetary benefits.

Issues:

Affordability: A process for the redistribution and reallocation of land needs to be developed. Generally a lottery system is used for such projects which could disregard the prevalent monoculture values. Also, the livelihood option, previous locations, Occupation and financial status needs to undertaken.

To make affordable the land contribution the land owner's due should be made minimum for service plot by making or inspiring the contribution in terms of labour for the construction of the infrastructure such as road widening, trench digging and other manpower services **(labour based construction).** It means by developing the self-help contribution in the development of the infrastructure the affordability of the land owner could be improved or could be made much higher, ultimately this means urban poor get more benefits with less contribution (land or cash). It may help land owner to increase affiliation to his land too.

Please write about these issues in context of Majhigaon. Existing situation analysis of land ownerships in Majhigaon.

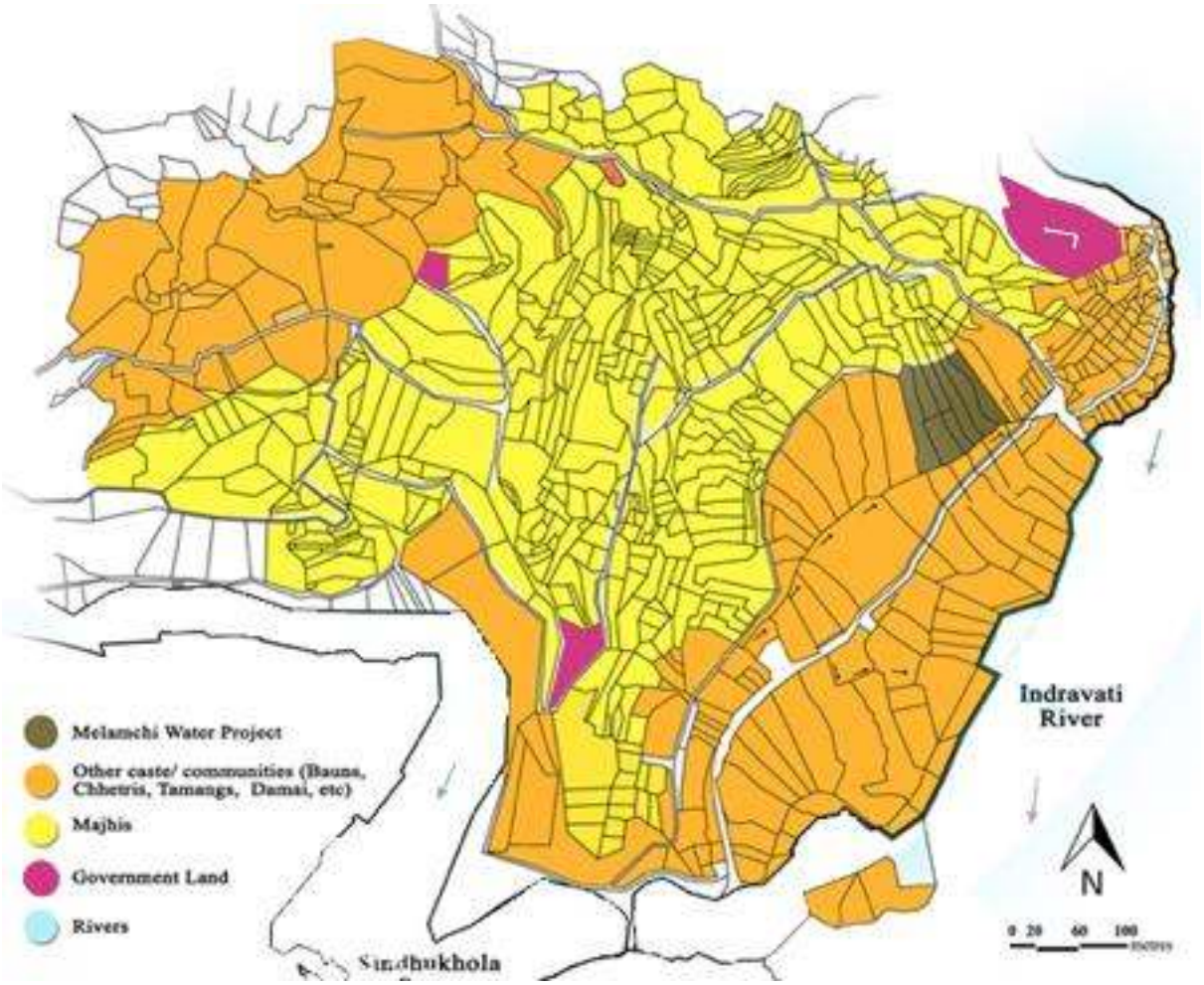
Issues:

Land Redistribution Process: A process for the redistribution and reallocation of land needs to be developed.

Generally a lottery system is used for such projects which could **disregard the prevalent monoculture values**. Also, the livelihood option, previous locations, Occupation and financial status needs to undertaken.

Another issue suggested by the owners in the community discussion was the shifting of people from the Ghetara tol. People proposed to accommodate the resettles in a separate

location in the cluster. This was to maintain the unison in the original community as well as the new community.



Through household surveys it was clear that most of the land of Majhigaon was privately owned, and the land division was mostly by family division. The land value could not be known.

The land belonging to the **Majhis** is situated on the hill. From the plot sizes it is clear that the plots belonging to the Brahmins and other castes are comparatively bigger and evenly shaped. The plots of the Majhi people where the clusters are located are subdivided and are smaller compared to the open land. The land adjoining the main roads belongs to the upper caste.

3.10.2 Finance

- A subsidized loan option would be made available to the affected people to carry out the rebuilding work.
- For housing an additional 15 lac NPR soft loan would be available for people with subsidized interest rates for the reconstruction process. The coping mechanism for different families would be different.
- One of the techniques could be: After the plot readjustment government could provide fix amount to the people and the people could choose how to and where to buy the plots as per their economic condition. For other projects, Government might not be able to provide land to the affected people in this case such option would be helpful.
- The re-clustering project being funded by the government does not need the service plot for sale for infrastructure development. The new government policy has a stipulated amount of budget especially for 're-clustering' projects.
- Micro-finance: Also, it is suggested that the loans should be given to women of the family. Studies have found that women can deal with the money in better way than the men.

4. PARTICIPATORY APPROACH

Building has always been a socio-communal act, where people come together. A participatory approach is where everyone who has a stake in the intervention has a voice either of a person or by representation. In a participatory approach, people are the epicenter of the approach. The bottom up and top down approach is a participatory approach that is initiated from both

top down (government agencies) and bottom up (local people) for a successful collaboration and interaction as means of participation. The intent is to participate and collaborate with them in this reconstruction phase. In a re-clustering project, ignoring the existing social context could lead to a failure for the entire project. Hence, along with place, it becomes of primary to understand people, their culture & their sociality.

Discussion with the individual members of the community

4.1 Participation with the Community

Post disaster re-clustering examples worldwide on a majority, showcase a mismatch between the reconstructed environments and social beings that use them. This becomes a disaster post disaster. These examples claim a people inclusive approach as a basic norm since the past few decades. Yet, they end up creating environments where people lose their independent building nature while turning on to technical professionals (architects, planners, agencies) for the construction of their houses

Architecture in Nepal over the ages has always been this socio- communal act, where all the spaces, houses were built together by members of the community. This act of building together establishes the existential nature of community participation in Nepal. The post earthquake re-clustering act should aim to retain the independent nature of construction, while empowering the people to be responsible of their own environments

A focused group discussion for design development with the women in the community

Advancing on these socio communal directives of traditional Nepal, the inclusive nature of re-clustering commends working with people. The adopted participatory approach intends to allow agencies to participate with the people in the reconstruction process. The community would evolve the final outcome, while we participate with the community. So that if any agency approaches the community, the people can stand up and convey their want and the agency will have to fit in the suggestions. Hence the need of a plan understandable by the people and approved by the people needs to be presented through complete engagement with people.

In Majhigaon, the first step in route to gaining confidence was spending time with the locals. The series of visits to Majhigaon assisted the locals to identify with the team. The IoE students were pivotal for initial communication with the community. The gender issue was solved by inclusion of female assistants during the site. The team was involved in kind exchanges like old utensils gifted the Majhi women. The team was also the agencies active at the site like Build Up Nepal and save the children to involve them within the process. The team efforts of staying & sharing their food and dialogues helped people open up to us over time, increasing our knowledge of their lives & necessities.

4.1.1 Phases of Participation

Participation of agencies with the community should be contiguous to re-clustering from start to end. This engagement through people inclusive approach can phase into two distinct sections of design & Implementation.

In the first phase, social engagement approach promotes involvement of agencies with the locals for Re-cluster design. The design phase involves rapport with locals, documentation & analysis of existing setting of social & physical systems. The vision for these agencies is to understand the locals, their knowledge, their issues, the materials, the context, while engage with them to evolve a Re-cluster design. This design may then be communicated for working with agencies.

The second phase will involve locals in implementation of design through construction. In this phase, the land issues are resolved. Here, the locals contribute through labor to build together all the houses of the settlement while, working with the local materials acknowledged by them.

This report concentrates on the first phase as the part of the on field process. High willingness of the community aided the pace of rapport establishment for the team. Majhigaon. Post, survey, documentation and analysis, the team learned from its errors. The team was also in contact with different experts throughout the process whose valuable inputs derived the design forward. In Majhigaon, Re-cluster design evolved throughout the process of dialogues with the community.

4.1.2 Community Consultation & Survey

The household survey looks into the family details & dependencies, occupations, land, plot & building information and income levels. The community survey also identifies the community spaces, traditional uses, sources, forests, electricity, water & healthcare. It also inquires about the lives lost, the injured, post quake damage. The government agency survey identifies the list of key informants for data collection. Most of the statistical information about the community and its clusters can be deduced through household surveys. Meetings with anthropologists suggested that the questions included in the survey might not provide fruitful answers. The questions needn't be specific and interrogatory. A psychological set of questions can be asked in a friendly and conversational manner can provide truthful answers. But this requires a long Rapport building process to gain the trust of communities, which can be time consuming.

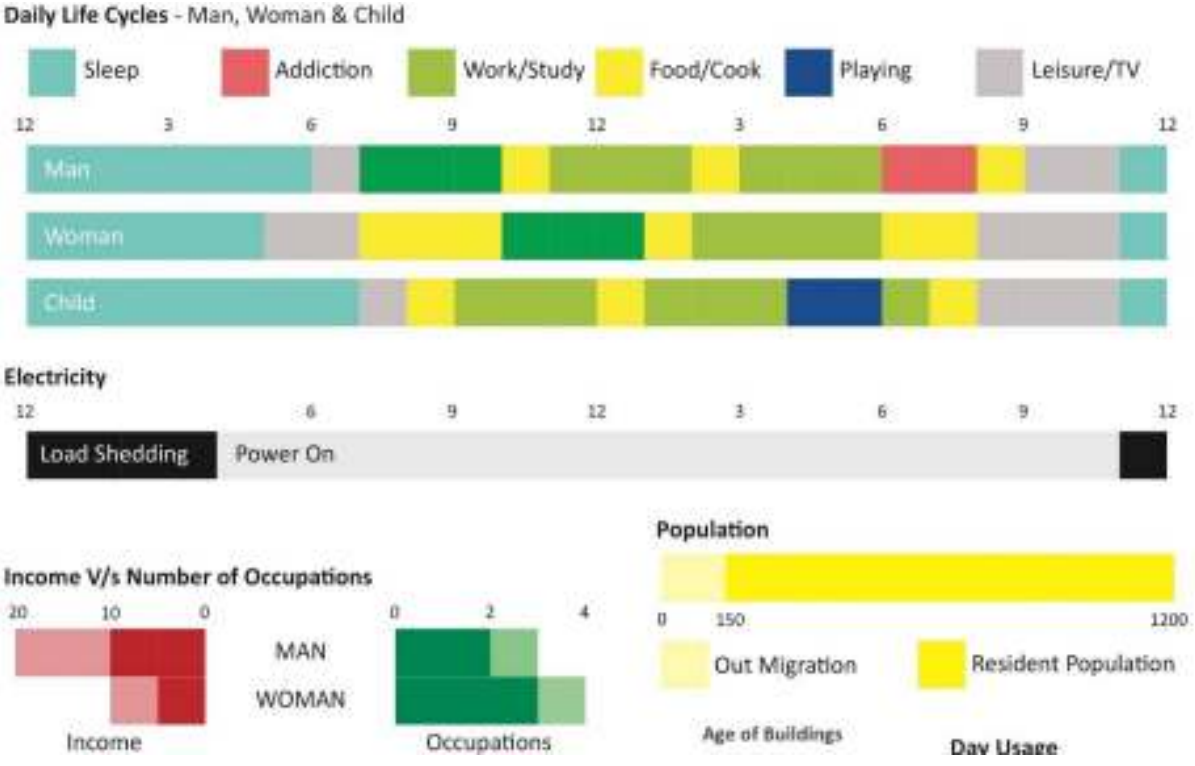
In Majhigaon, the team worked to do a stratified survey. That is to do a survey of one in three houses of the 253 houses in Majhigaon. The locals misinterpreted us as government representatives and insisted on us verifying each house. As a rapport gesture towards the community, we surveyed all the houses. This may not be possible everywhere, hence the committee can help the agencies with it

4.2 Community Perception of Re-clustering

Post rapport building, a community consultation session was conducted with the community. The agenda of this was to understand their sense of spaces.

In these Focused Group Discussion and Cognitive Mapping, the community was presented with the local types of houses and asked about which were closer to their desired space.

It informed us of three aspects - A House, A Cluster and Livelihood Opportunities.


Daily Life Cycles - Man, Woman & Child
Sleep
Addiction
Work/Study
Food/Cook
Playing
Leisure/TV
12
3
6
9
12
3
6
9
12
Man
Woman
Child
Electricity
12
6
9
12
3
6
9
12
Load Shedding
Power On
Income V/s Number of Occupations
20
10
0
0
2
4
MAN
WOMAN
Income
Occupations
Population
0
150
1200
Out Migration
Resident Population
Age of Buildings
Day Usage

Design dialogues with the Majhis

4.2.1 House

House - Women preferred single houses, as they were comfortable, while, men were happier with row houses being inclined to services.

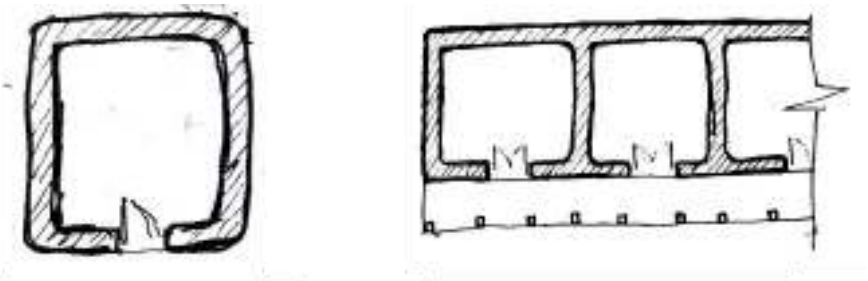
Circulation - Women preferred interconnected rooms, which saved interior space, while men preferred segregating passage for circulation.

Toilets & Taps - Women preferred toilets & taps outside, as they are the ones who'll be cleaning them. While, men inclined on modern ideas of habitation preferred toilets & taps inside

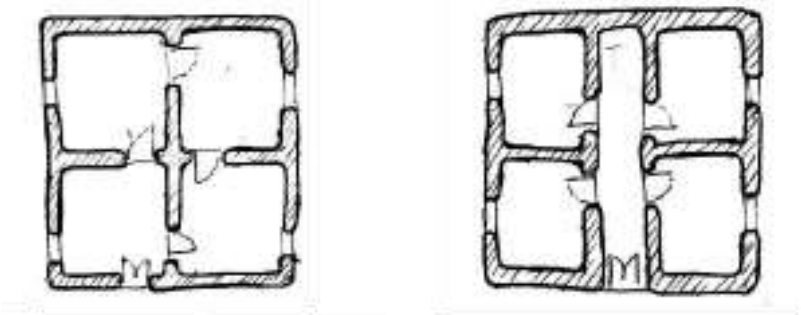
Floors – The community preferred taller houses in the beginning, but agreed later on to G+1 understanding the context of earthquakes.

House	Women	Men

House Typology



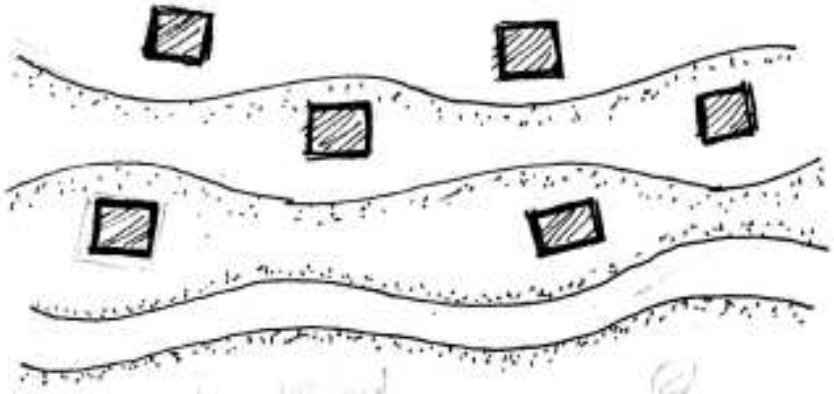
Circulation



Toilets and Taps

Floors (Talo)

4.2.2 Cluster



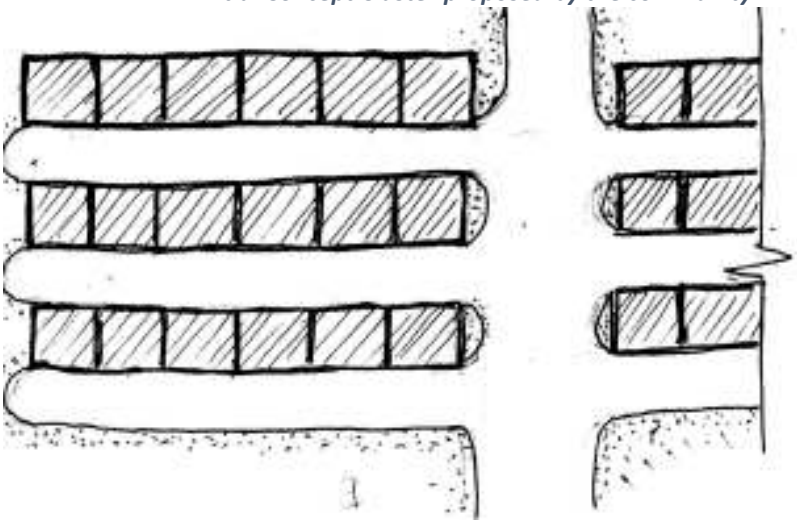
1. Existing morphology of the community

Scattered houses - This can be recognised as a typical cluster in this settlement. Here, the houses are aligned to the contours, while the houses and all separate and individual. Shin Tol & Feral Tol are particular examples of this type

Positives - Individual houses are on their own land, which gives them independence. There is also a scope for expansion in case of future necessity.

Improvable - Services & access to every house is very difficult. It is also more individualistic in nature.

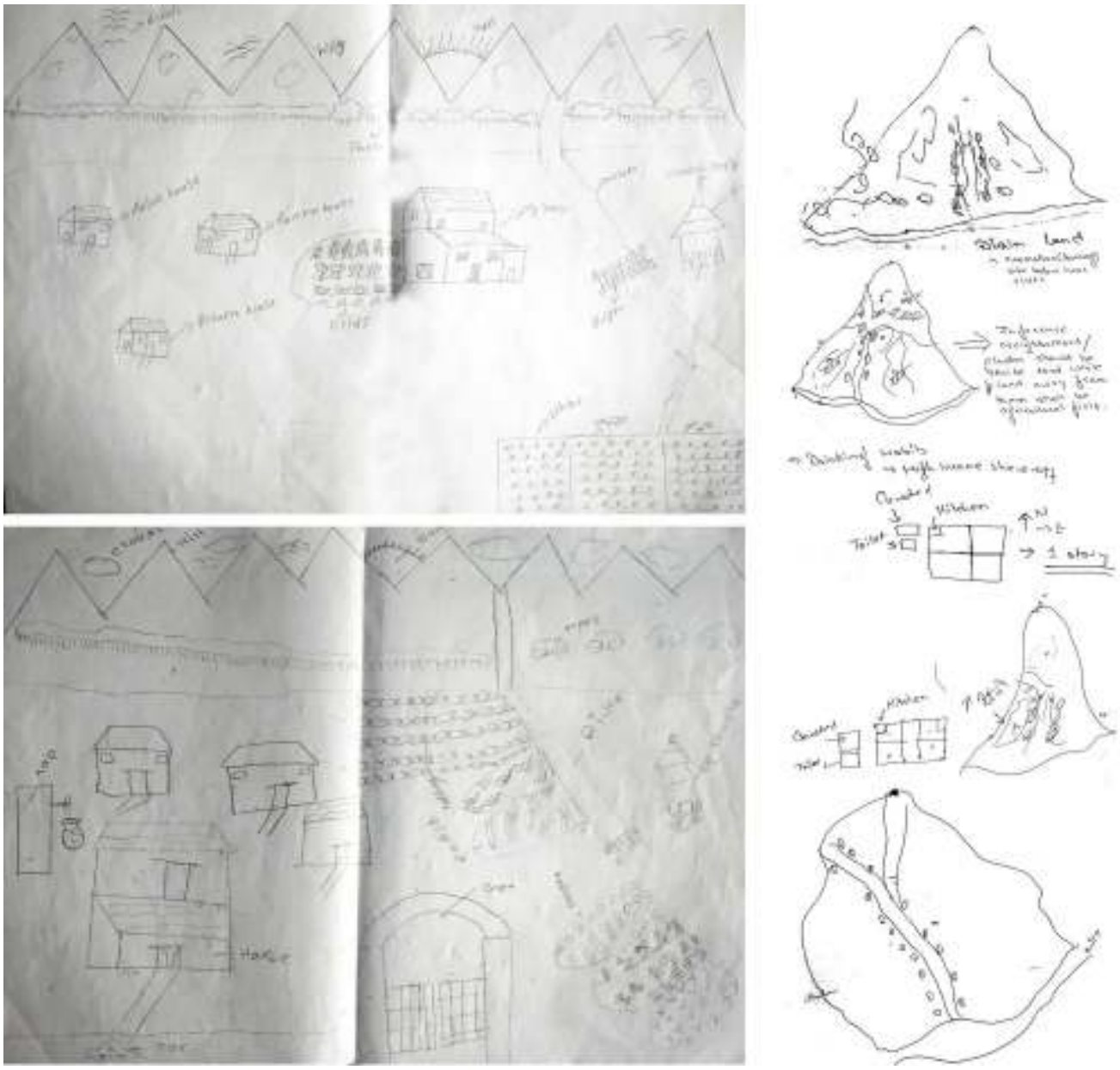
2. Initial Concept Cluster proposed by the community



Row Houses - This is the design that has been requested by the community to the Nagarpalika. Here, the houses are aligned to the contours, which form rows of houses. Digaun, Tahal Tol, Ghatera Tol are examples of this type.

Positives - The road access to each and every house is present. There is a scope for formal distribution of services Improvable – It Is more military like has no scope for expansion or land exchange. There is no open space or thought for cattle areas

4.2.3 Cognitive Mapping



Another appealing tool is cognitive mapping. Cognitive mapping helped us understand the desires of the community. We had these as fun activities across both the genders and different age groups.

Here, the people drew out their house in the village. This told us the important markers like the temple, the various farms, the cattle, the mountain & the river being repetitive.

The children even drew houses of their friends, as to who they want as their neighbour. The water taps, the cattle also formed an important part of the drawings.

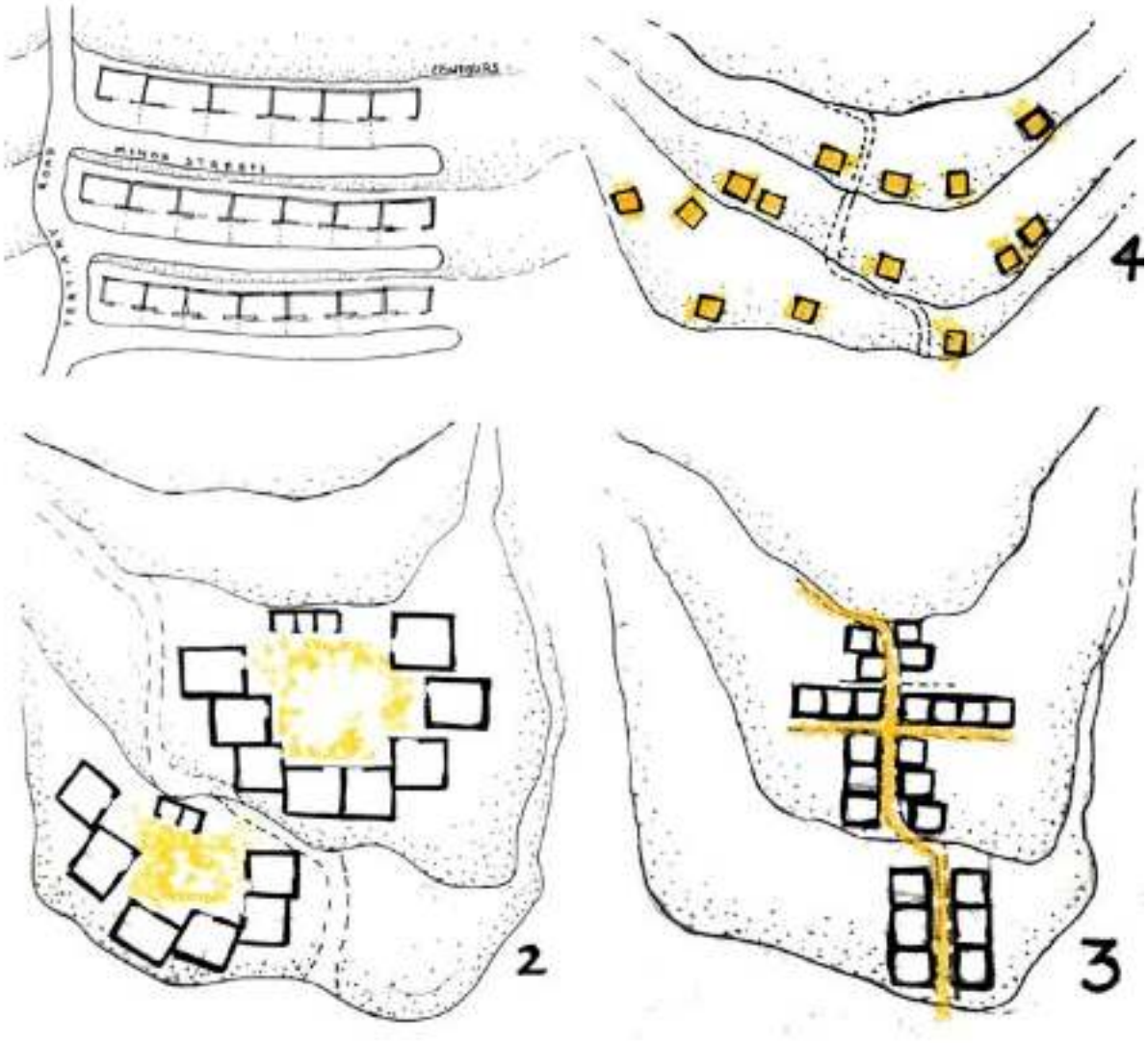
It informs us about everyday life of the local people.

4.2.4 Re-cluster Planning and Design Requirements

These were determined from the overall understanding of the community through participation and discussions over a period of time.

The team assessed the situation in Majhigaon during its reconnaissance visit. The team noticed high willingness for the project and also did a visual damage assessment. An initiation meeting with the concerned public in the presence of the community leader arranged separate meeting with concerned officials in presence of community leader

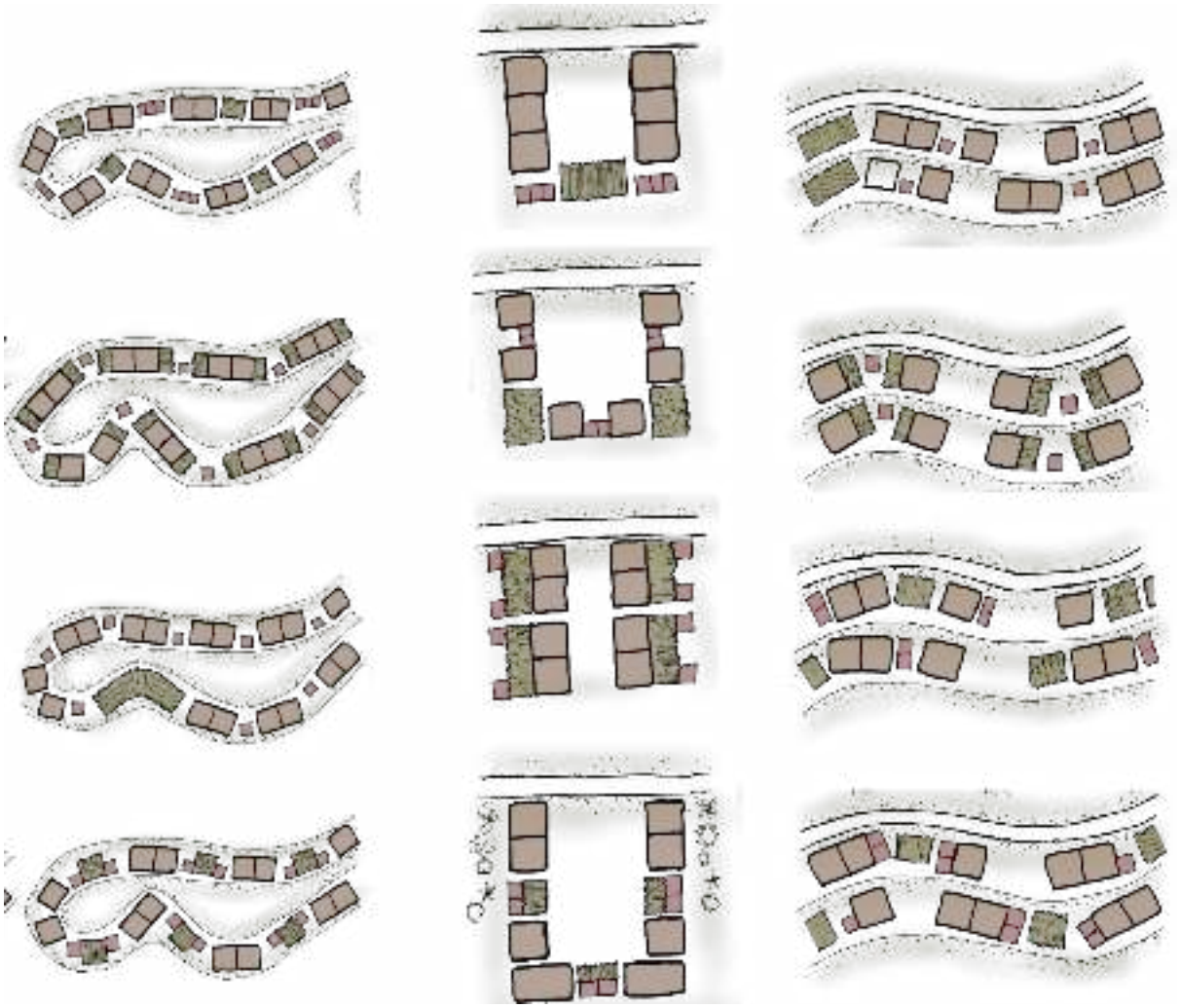
The second visit finalized the site of Majhigaon the community. The team also identified the existence of a CBO in the settlement. The team then initiated rapport, documented and mapped the physical & socio- cultural aspects. They conducted the survey while trying to understand the people of the place.



Discussing the cluster typologies with the local people

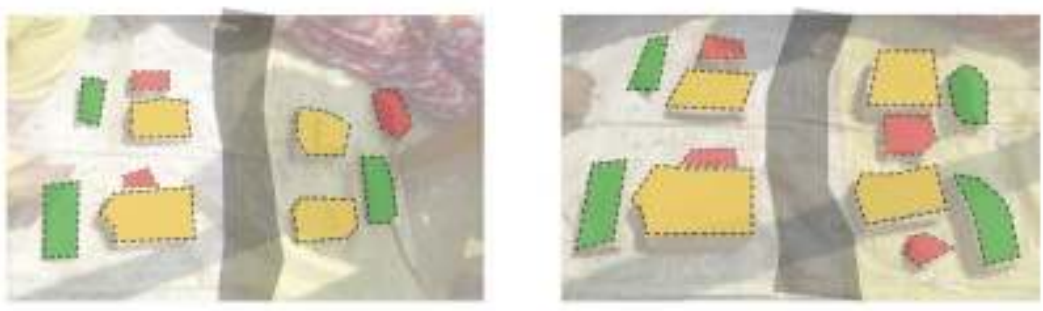
In the third visit, the team discussed 4 basic cluster options with the community and got their opinions reviewed. The analysis from the household surveys and earlier study settlement visits were also discussed. A common FGD was held, in the presence of the community leader, which didn't help yield the desired 69communication from the people. Also, individual

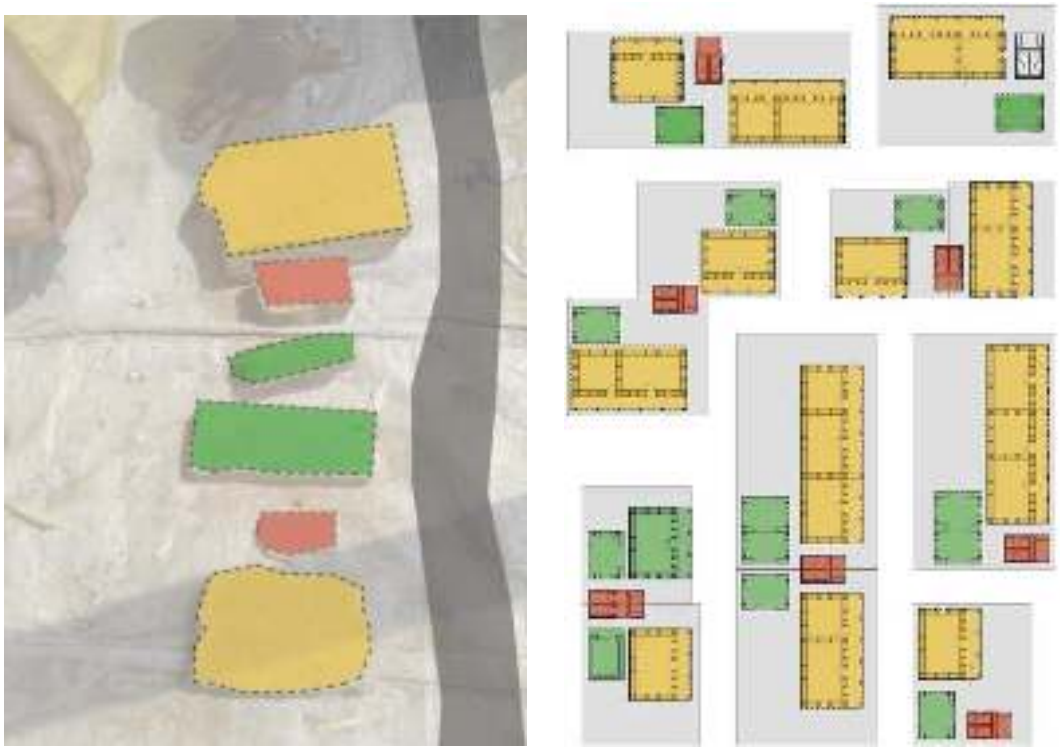
discussions with the community, with women, were consequential in understanding the evolving perspectives of for the re-cluster design



Cluster compositions designed with the people

In the fourth and last meeting was with intention to discuss the Re-cluster plan. Final community inputs on land readjustment, land values etc. were discussed. Cluster (tol) plan ideas, concepts for animal rearing, house designs were developed in collaboration with the community. Again men and women separately discussed without the influence of community leader in order to have perceptions of the individuals and gender parity of the community inputs.





Stone compositions by people of Majhigaon

5. RE-CLUSTER PROPOSAL

The attempt of this re-clustering proposal is to re-cluster the families in a safe zone and not just rebuild houses. Studio Sindhupalchok attempts to create a holistic proposal, which should sustain the re-clustered lives of the community. The proposal is divided into 3 parts, derived through an understanding of the local Clusters and conditions.

The first part is re-cluster plan for the community; the second is detail housing while the third is livelihood opportunities to sustain the re-clustered life.

5.1 Re-clustering of Settlement

The community interactions gave us an insight into the aspirations of people while re-clustering. As a basis for this proposal, some of the key concepts developed after the discussions and meetings with people, government and the UN were utilized for this re-clustering plan of the settlement.

A few families of Majhigaon have been identified as vulnerable to land defects. There is a necessity to re-cluster these identified families into safer sites. These plans are represented through re-clustering.

The rest of the families, which already reside in safer zones, can be re-clustered in the same space along with better services.

The sewage disposal issues in the clusters are sorted through provision of Biogas plant systems. These systems intake the disposable sewage and cattle waste, while providing biogas. This can be further utilized for cooking.

The re-clustered tols retain the lanes, and proximity to smaller open spaces. These smaller open spaces will be used for drying the agriculture produce, for safety evacuation during earthquakes, for children playing, for social gatherings.

There are two parts, which prelude the re-cluster plan.

The first part informs us about the infrastructure requirements of the settlement.

The second part informs us the basic principles for selection of the site.

5.1.1 Infrastructure of Settlement

Infrastructure and Services have been deemed as the opportunity this earthquake re-clustering projects have provided for earthquake. The re-cluster proposal should try to address this need before hand. The three primary elements of the infrastructure are roads, water and electricity. The secondary elements worth consideration are proximity health, education and community open spaces.

Roads

The need and presence/ absence of existing accessibility and other community infrastructure would allow us to determine the amount of percentages required to be deducted during the land.

A better access would also allow for the fire engines and ambulance to the place.

The extension and widening of the entry road to Digaun is the only proposed road. This would enable all the re-clustered tols to be within 2-5 minutes distance of a motor able access road.

Water Supply

Majhigaon has access to the rivers and natural springs for its use. So, there isn't an issue of water supply (both drinking water and water for farmlands) for the Majhis. The neighbors will still share the water taps.

Health

The existing polyclinic facility is sufficient for the community. The proposal suggests better facilitation of the polyclinic along with increased frequency of doctor visits.

Education

The existing three schools (Siddhi Ganesh, TLC, Jalpadevi, Modern Boarding) within the proximity of the study area, are sufficient. The Jalpadevi School needs repairs for further sustained use.

Community Open Space

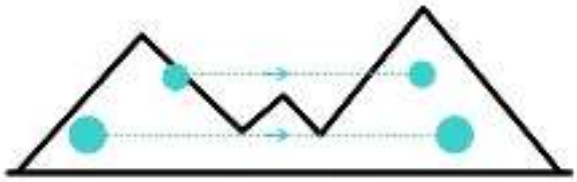
The community open spaces next to the schools should be retained. The community should build up the community center next to Tahal tol completely for future use.

5.1.2 General Guiding Principles for Re-cluster Site Selection

These sites are selected based on the principles identified from the understanding and needs of the people and the process.

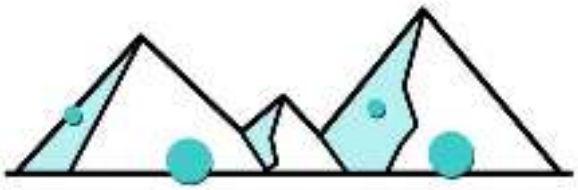
a. Altitude

People prefer to shift to places with relatively similar altitudes. The daily life cycles and culture might get influenced due to the height.



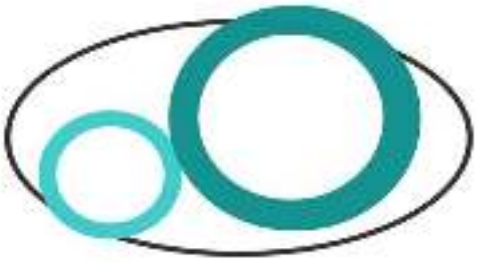
b. Distance

Re-cluster projects usually are about shifting the clusters within their livelihood and indigenous zone. The effort is to keep the new location as close as possible to the original cluster.



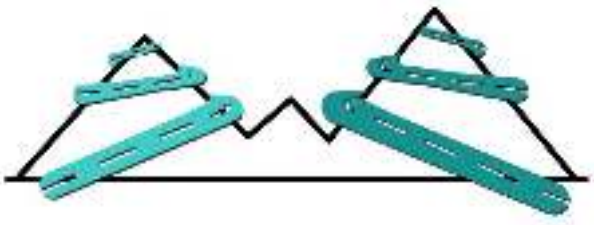
c. Orientation

Understanding the orientation of the original cluster (Facing ridge/valley, facing direction, towards river etc.) and providing similar conditions is favorable.



d. Cluster Unison

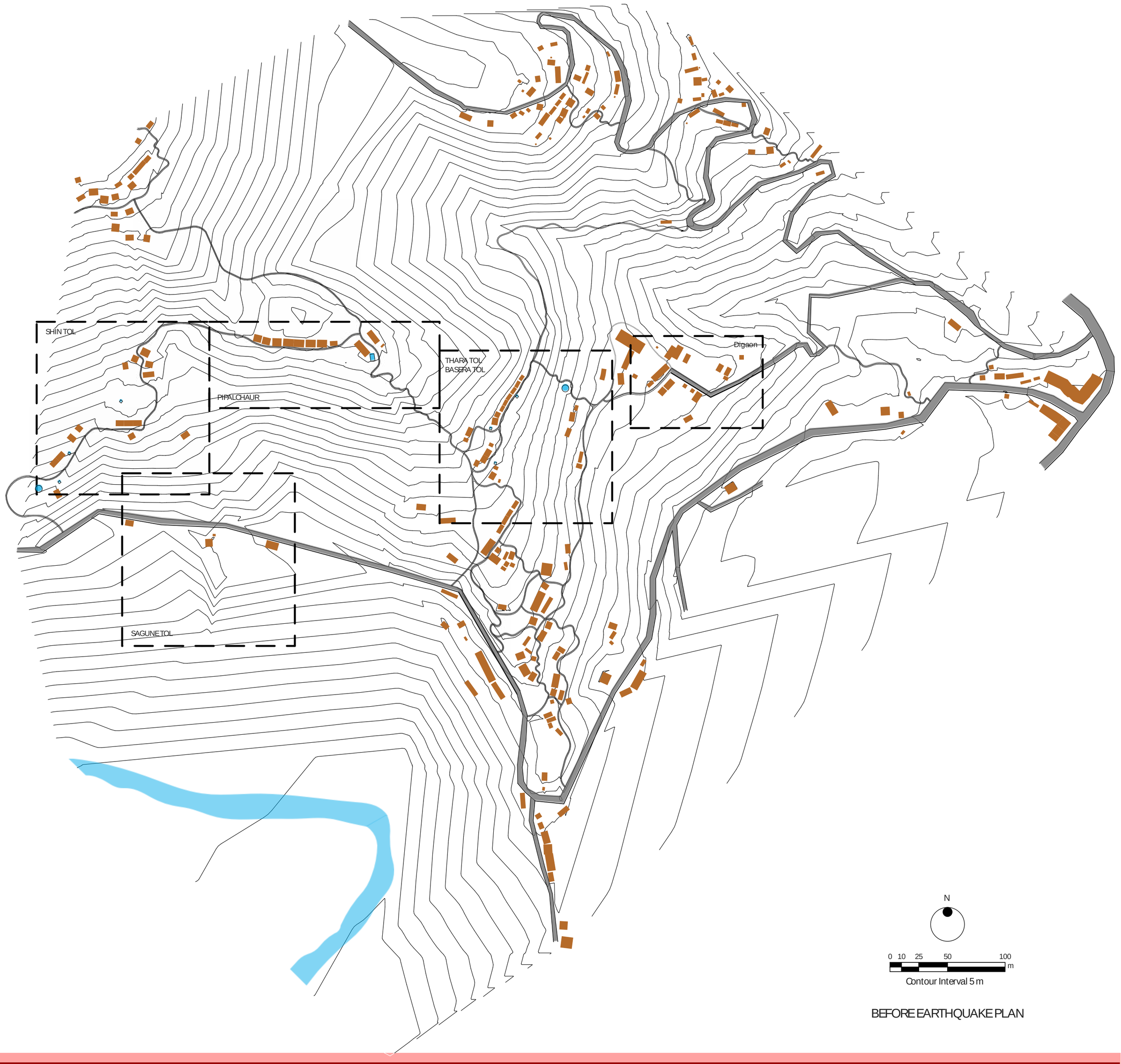
Although, new plan would include clusters within clusters, there needs to be certain arrangement where a cluster can be together with its original inhabitants. Forced mixing can have negative effects. This helps to retain their specific cultural norms, customs, way of living etc. if any.



e. Approach

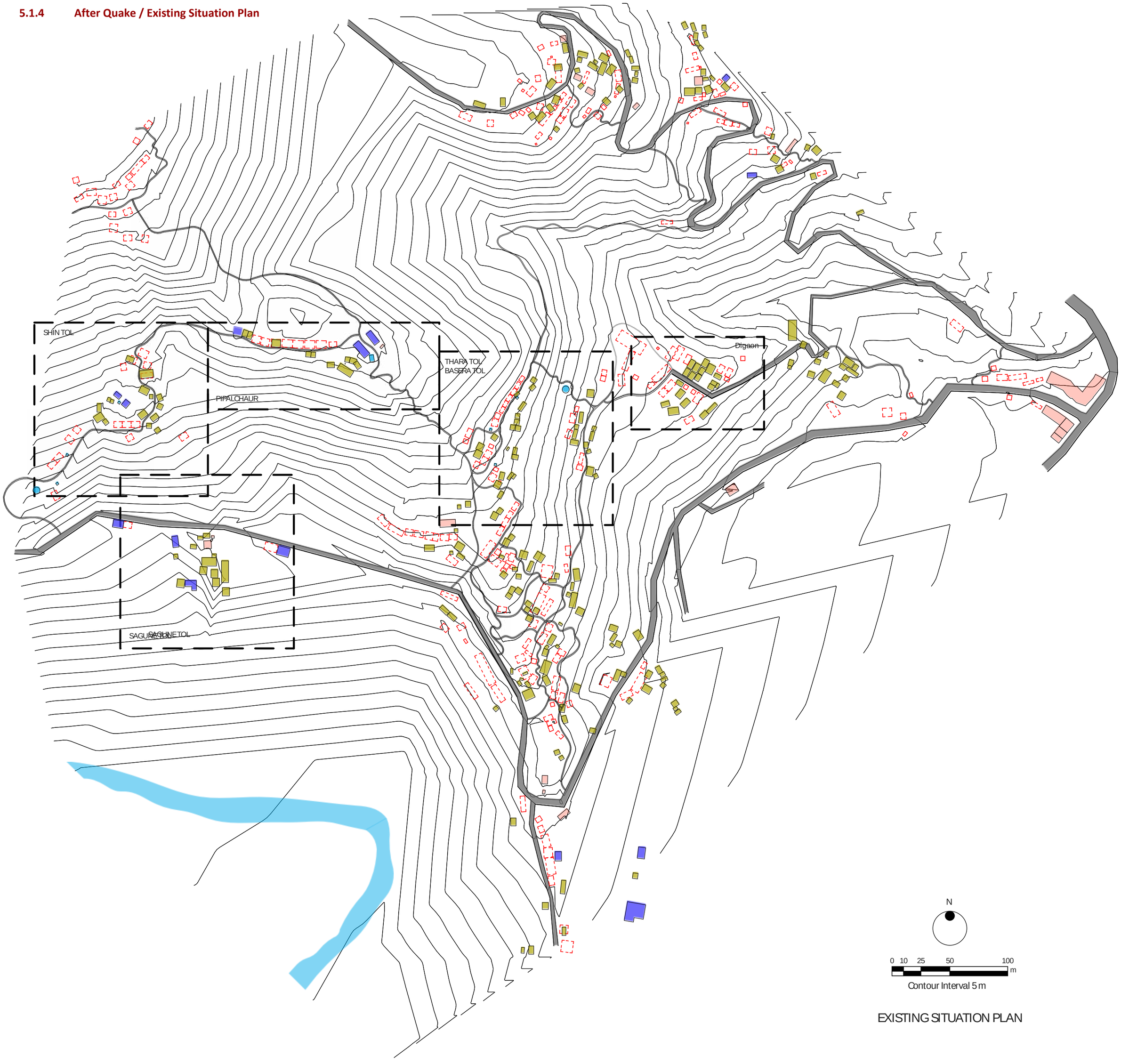
Minimum road with a width of 3 m need to connect the main cluster to a secondary road network.

5.1.3 Before Quake Plan



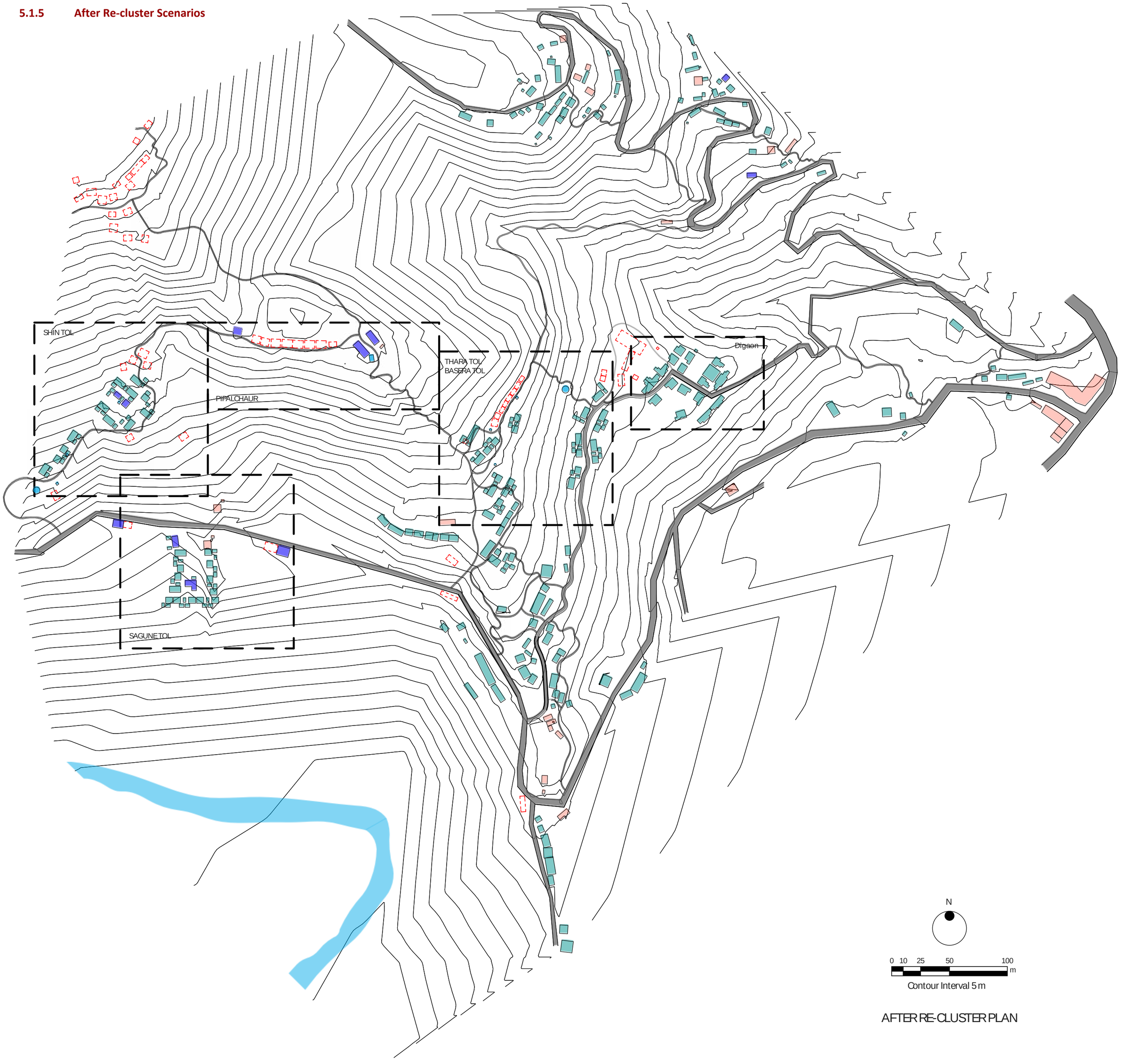
BEFORE EARTHQUAKE PLAN

5.1.4 After Quake / Existing Situation Plan

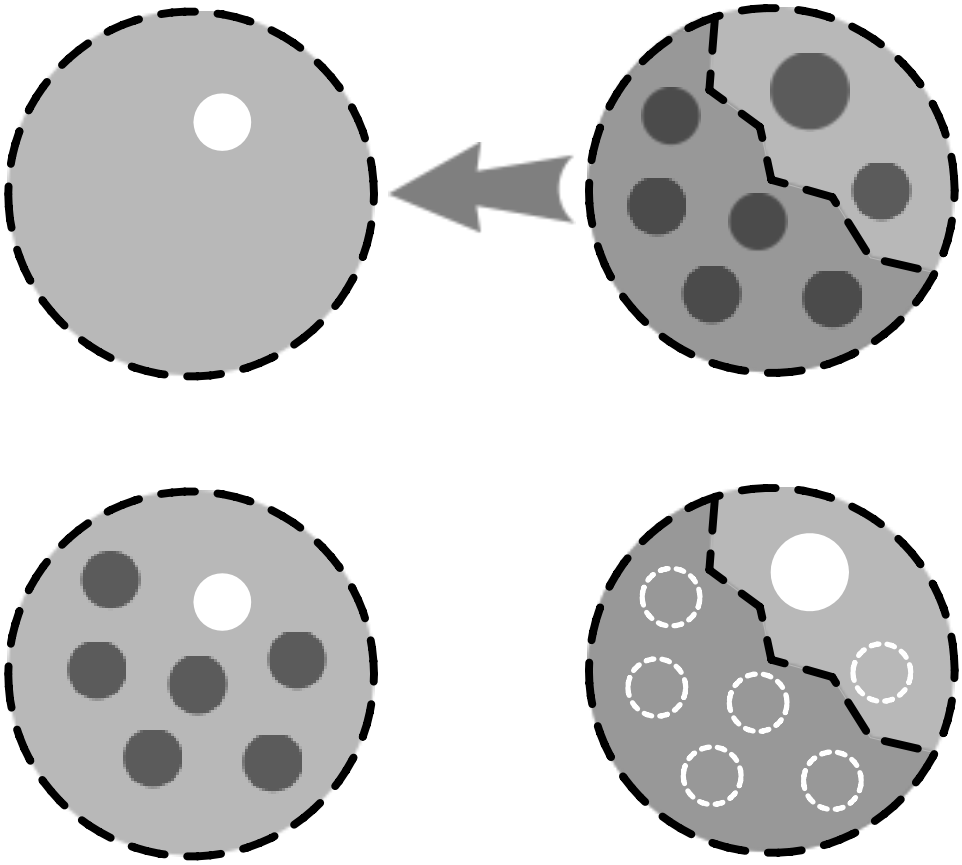


EXISTING SITUATION PLAN

5.1.5 After Re-cluster Scenarios



AFTER RE-CLUSTER PLAN



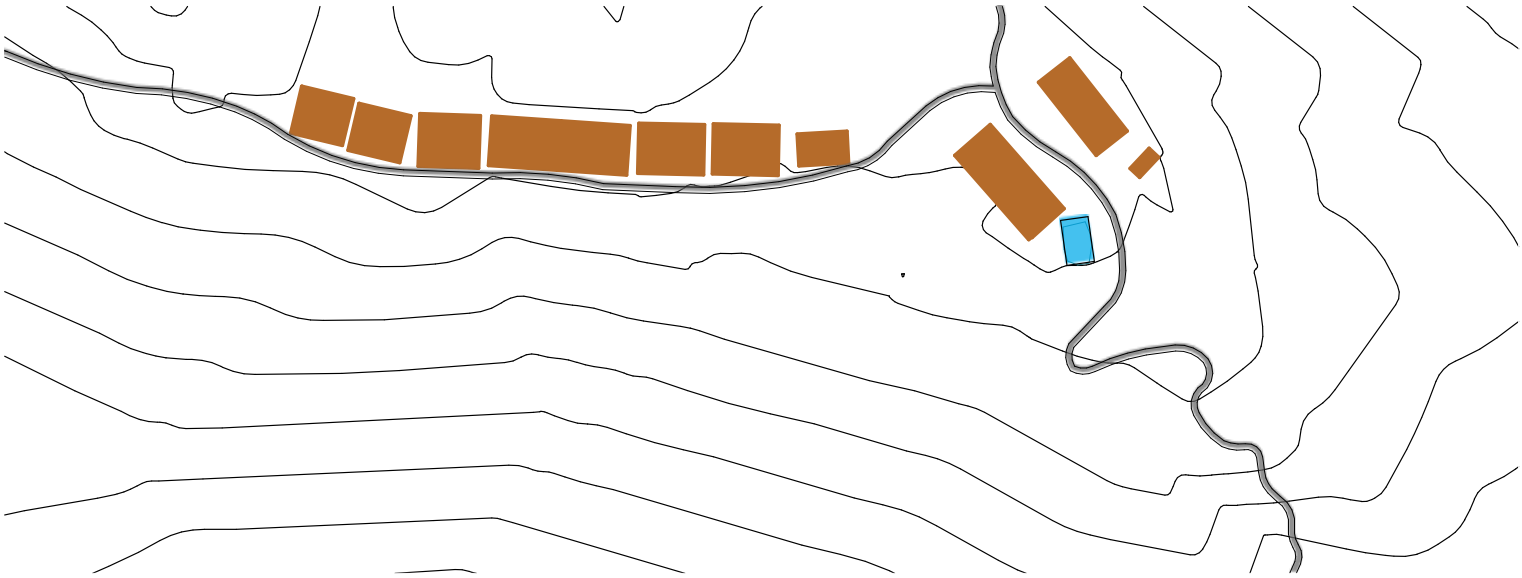
5.1.5.1 Scenario 1

Land Affected Cluster Families are shifted to a Safer Cluster.

In this scenario, all families in land vulnerable cluster are shifted to a safer zone. The land vulnerable cluster may or may not be completely vulnerable. The safe cluster may or may not have existing houses. As it would be unadvisable to leave a few houses (one or two) here just because they are safe as it would cause social isolation of these families. Hence all families are shifted. Larger common spaces may be retained for community use.

PIPALCHAUR CLUSTER SHIFTS TO SAGUNE CLUSTER

The example of Pipalchaur shifting to Sagune cluster, in Majhigaon represents this scenario. Here, 12 families of the adjacent land affected cluster Pipalchaur are shifted to Sagune cluster which retains an already existing house. The common open space & school are retained and left accessible for community use.

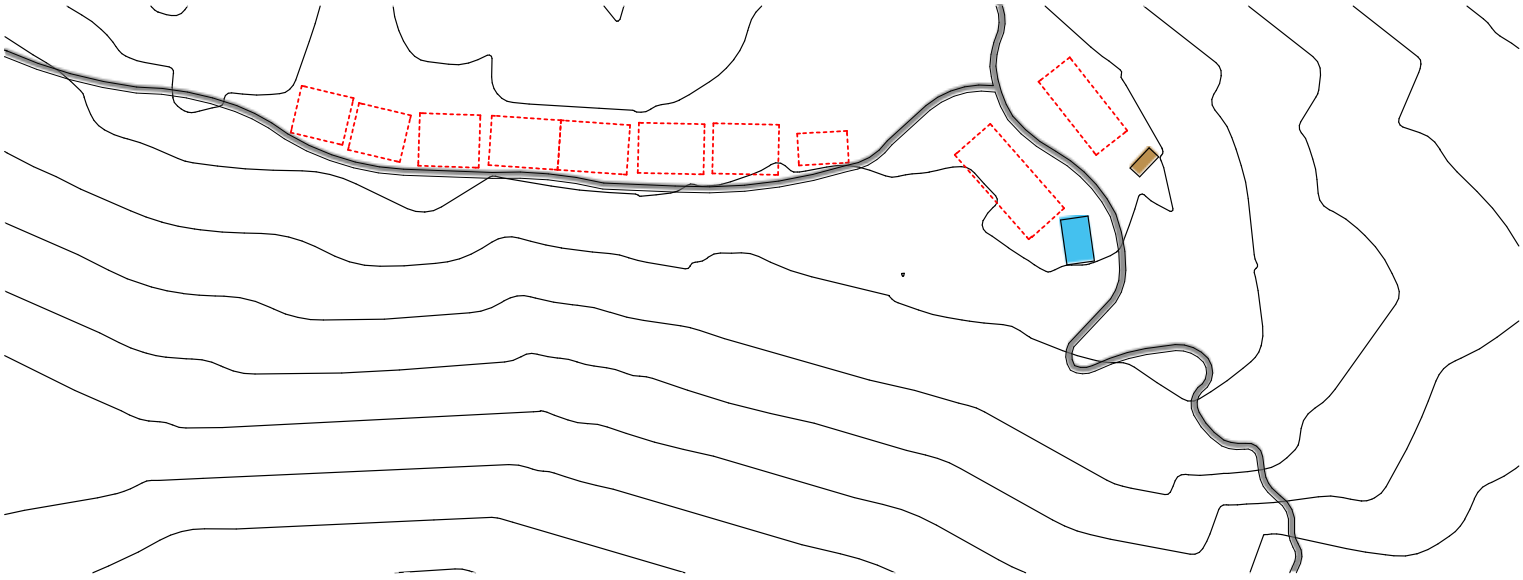


Pipalchaur
Before Earthquake Plan

N

0 10 25 50 m

Contour Interval 5 m



Pipalchaur
Existing Situation Plan

N

0 10 25 50 m

Contour Interval 5 m

Before Quake Houses

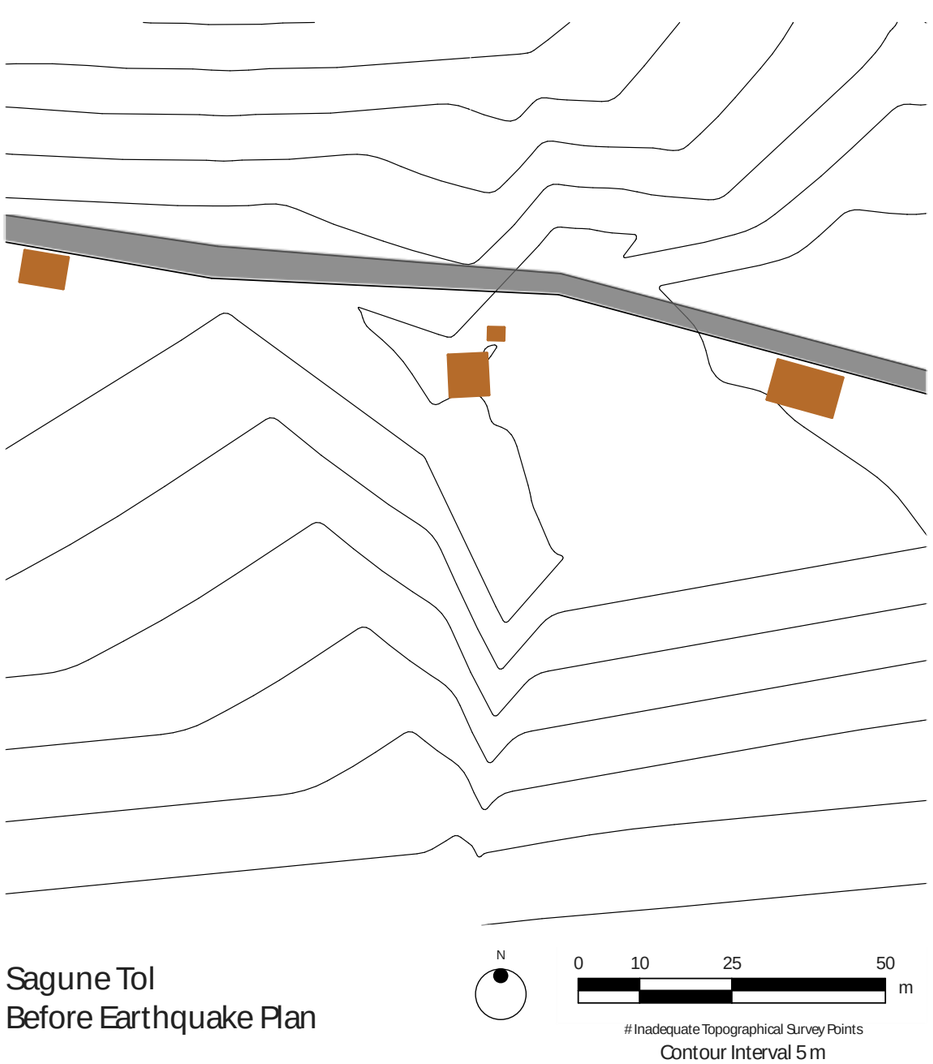
Post Quake Standing Houses

Ruins

Temporary Houses

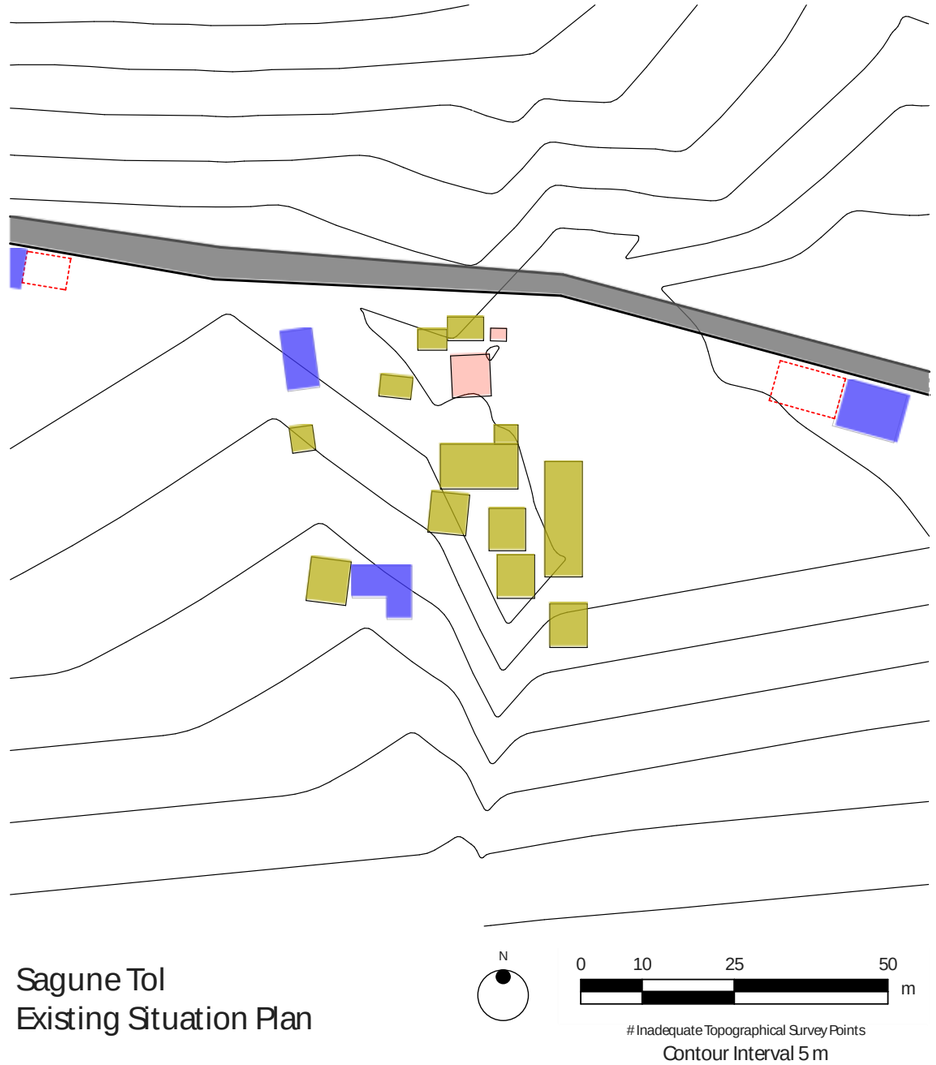
Post Quake New Houses

Water Tank / Tap



Sagune Tol
Before Earthquake Plan

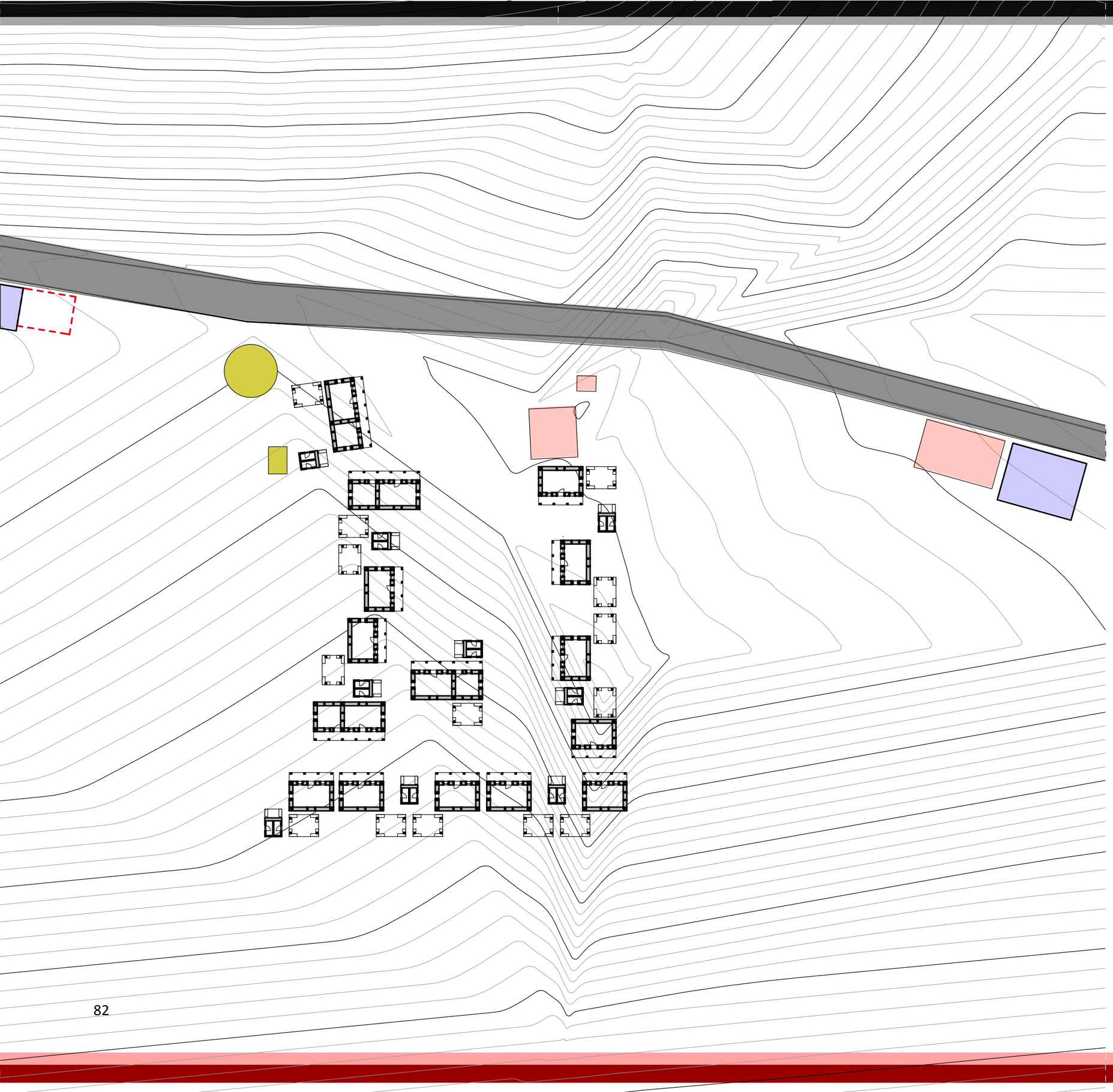
Inadequate Topographical Survey Points
Contour Interval 5 m

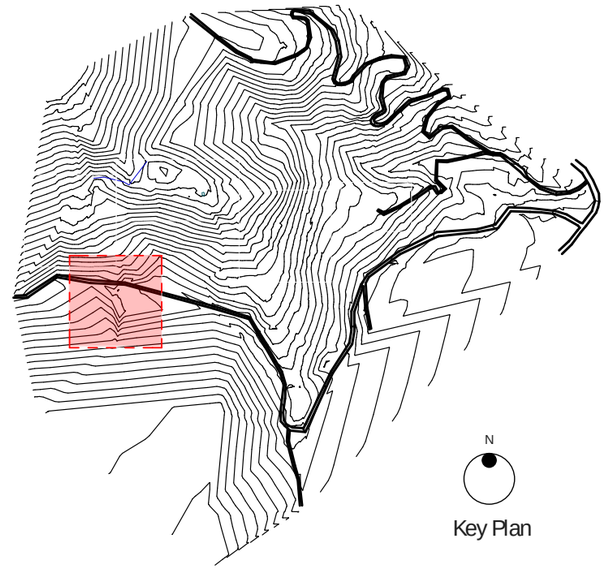


Sagune Tol
Existing Situation Plan

Inadequate Topographical Survey Points
Contour Interval 5 m

Before Quake Houses
Ruins
Post Quake Standing Houses
Temporary Houses
Post Quake New Houses
Water Tank / Tap





Key Plan

Ruins

Post Quake Standing Houses

Post Quake New Houses

BioGas from Sewage Treatment

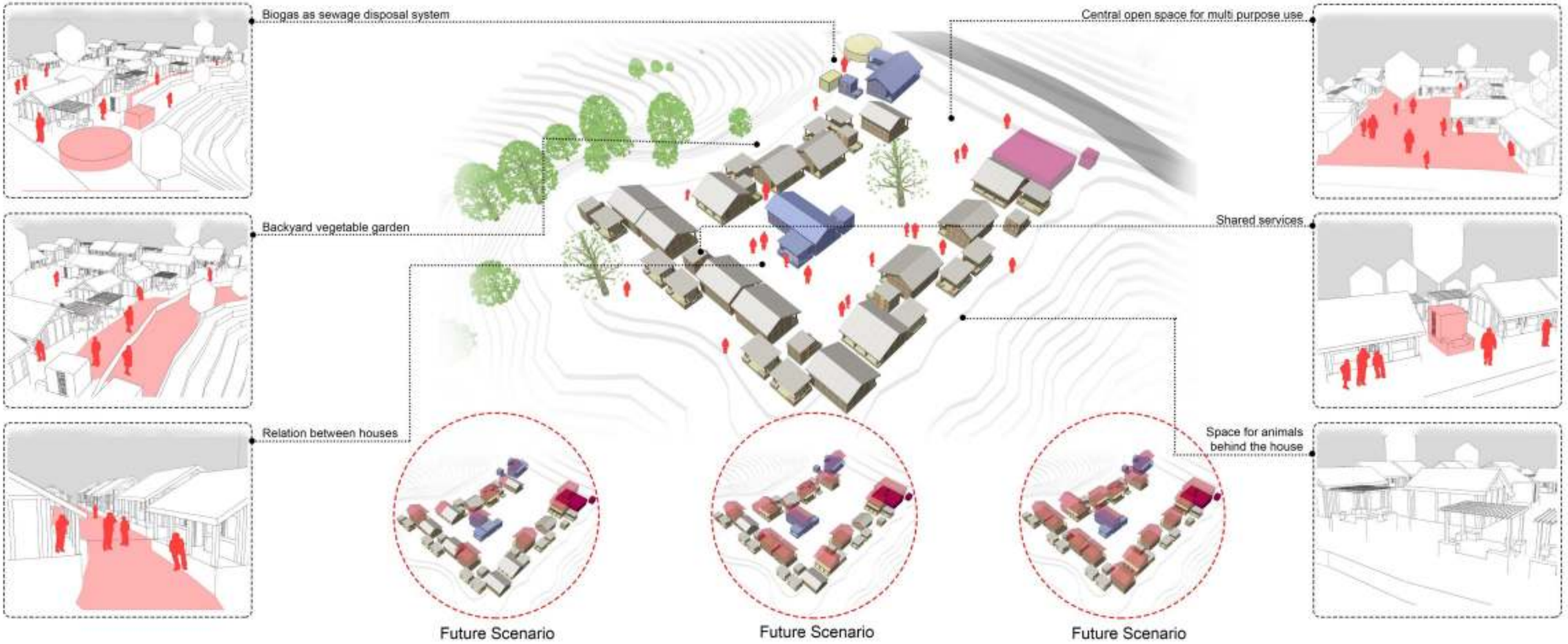
Water Tank

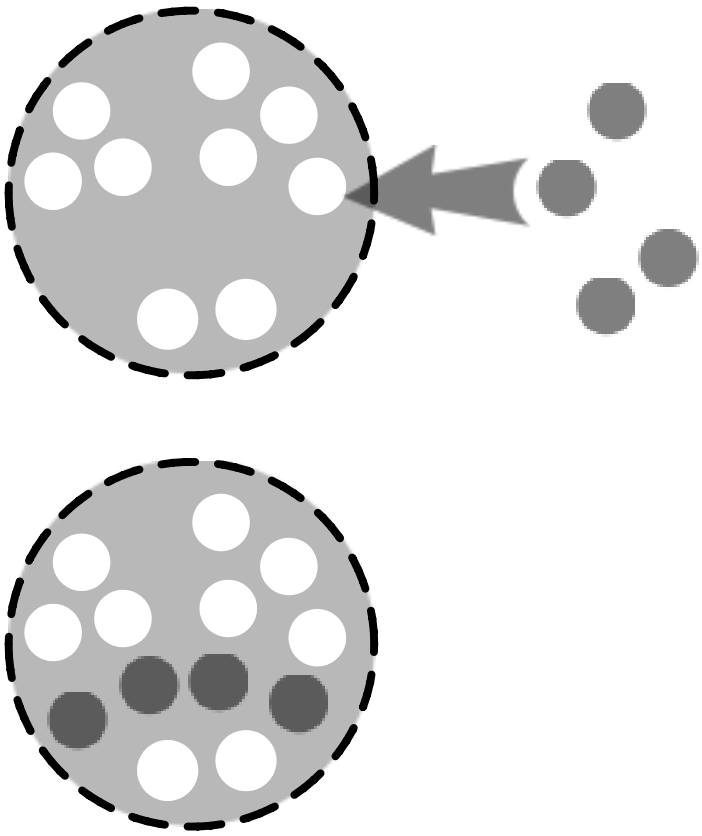
Pipal Chaur to Sagune Tol
After Reclustering Plan

0 10 25 m

Inadequate Topographical Survey Points

Contour Interval 1 m


Biogas as sewage disposal system
Central open space for multi purpose use
Backyard vegetable garden
Shared services
Relation between houses
Space for animals behind the house
Future Scenario
Future Scenario
Future Scenario



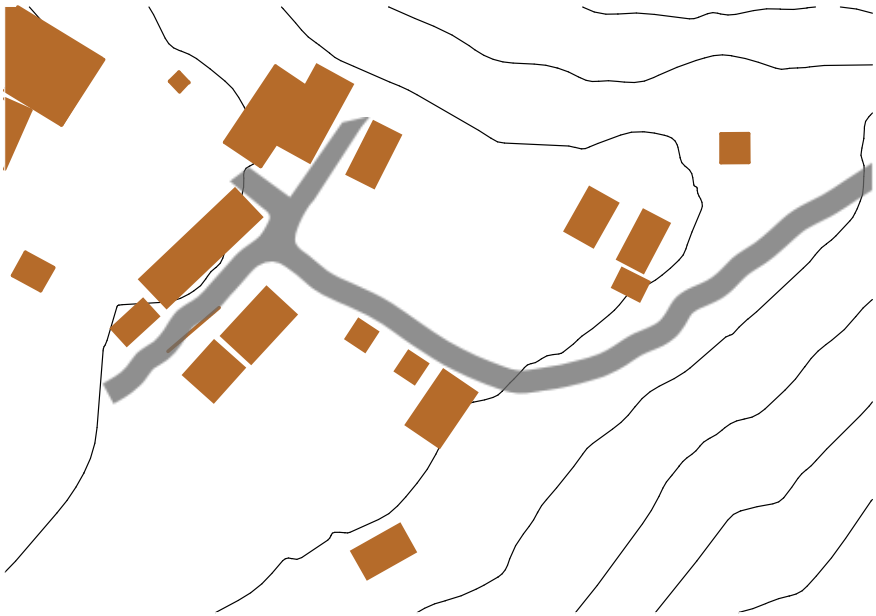
5.1.5.2 Scenario 2

Safe Cluster Accommodates Affected Individual Families

In this scenario, an already existing cluster community accommodates a few individual land affected families within their cluster. Houses in this cluster may or may not be wrecked by the earthquake. But the land is definitely a safe zone

DIGAUN

The example of Digaun cluster, in Majhigaon represents this scenario. Here, 5 families of the adjacent land affected cluster Thulaghar are accommodated with the 19 existing families of Digaun.

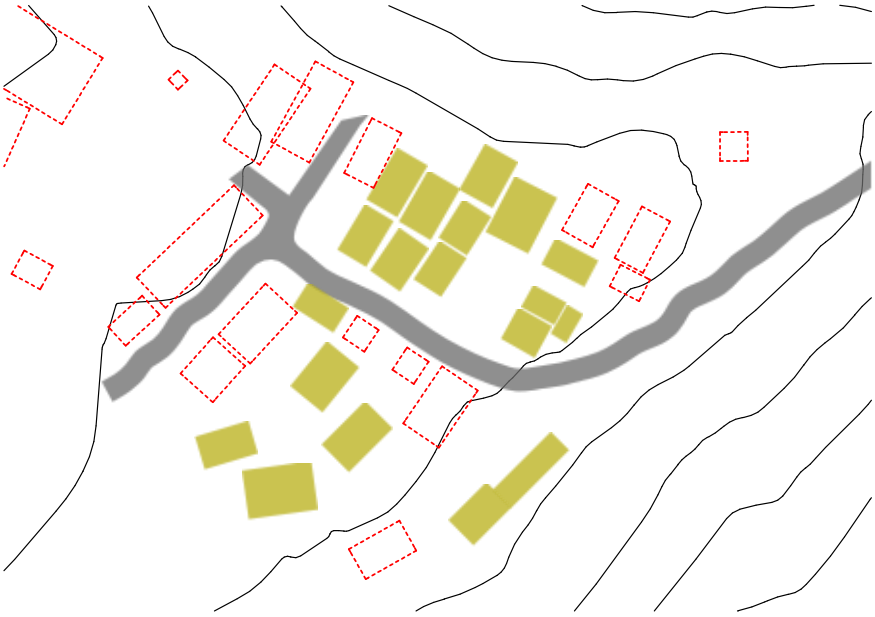


Digaon
Before Earthquake Plan

N

0 10 25 50 m

Contour Interval 5 m



Digaon
Existing Situation Plan

N

0 10 25 50 m

Contour Interval 5 m

Before Quake Houses

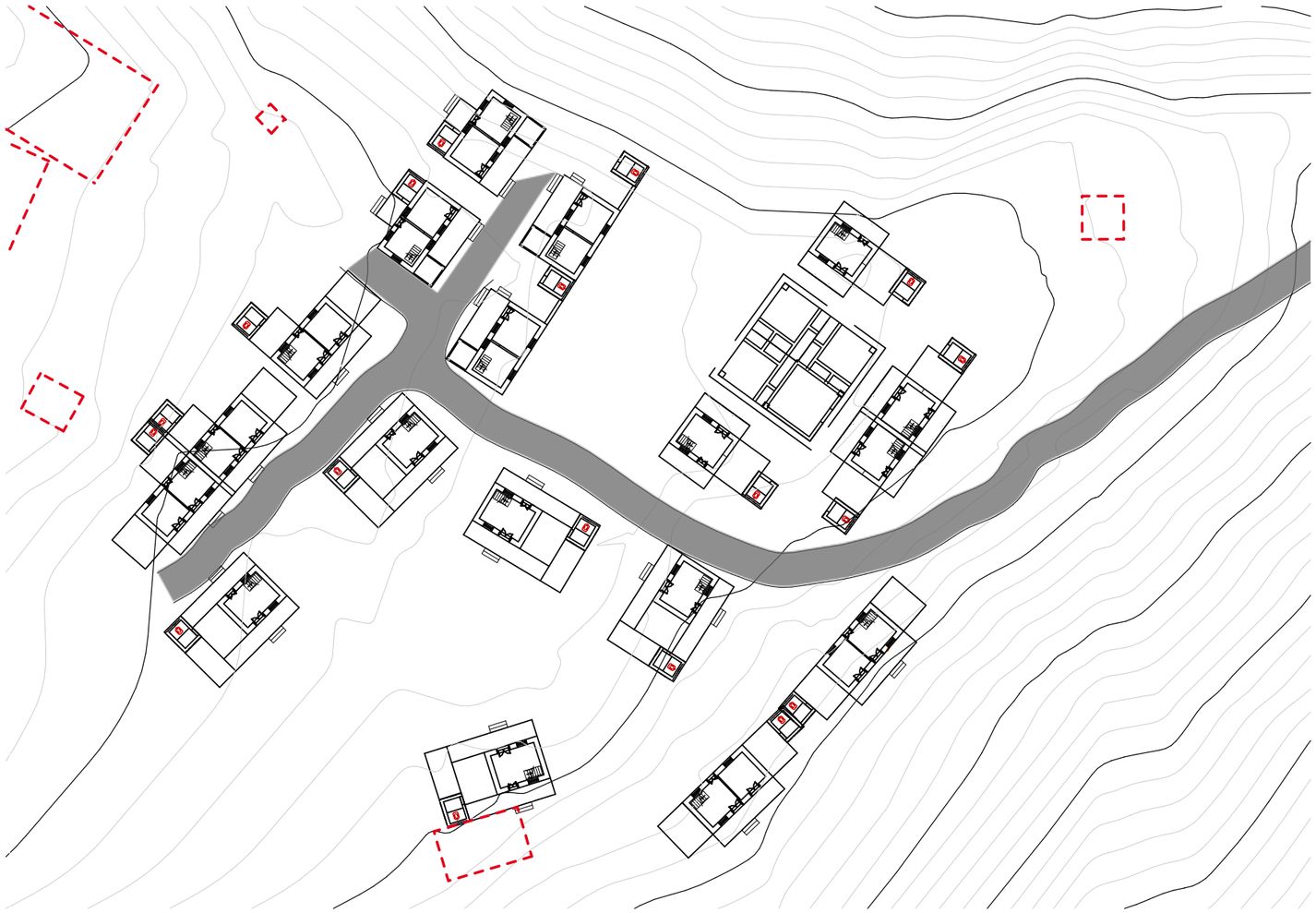
Post Quake Standing Houses

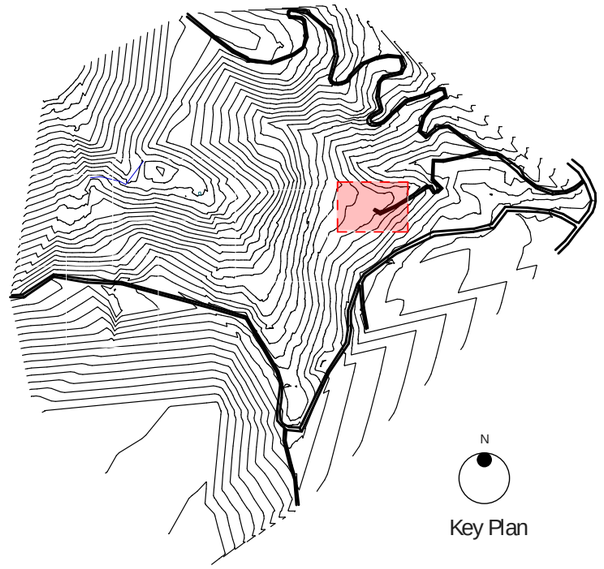
Ruins

Temporary Houses

Post Quake New Houses

Water Tank / Tap





Ruins

Post Quake Standing Houses

Post Quake New Houses

BioGas from Sewage Treatment

Water Tank

Digaun Tol
After Reclustering Plan

0 10 25 m

Contour Interval 1 m

Vegetable garden on back side of house

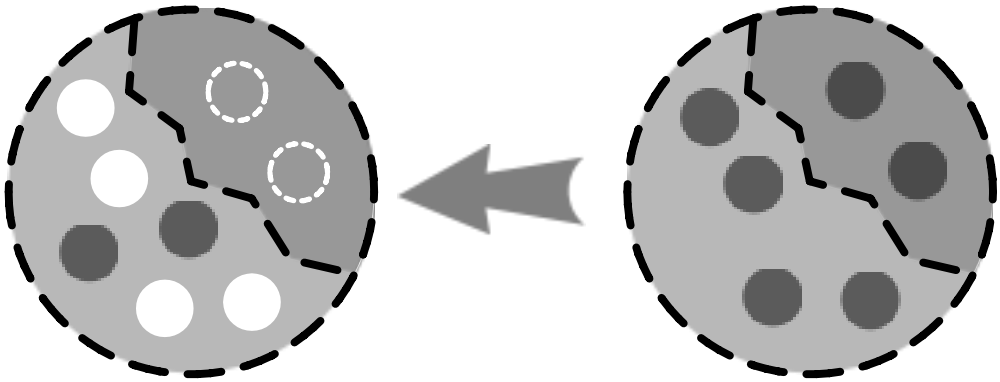
Fish pond

Relation between houses

Open space for multi purpose use

Pig Farming Cluster

Space for animals next to house



5.1.5.3 Scenario 3

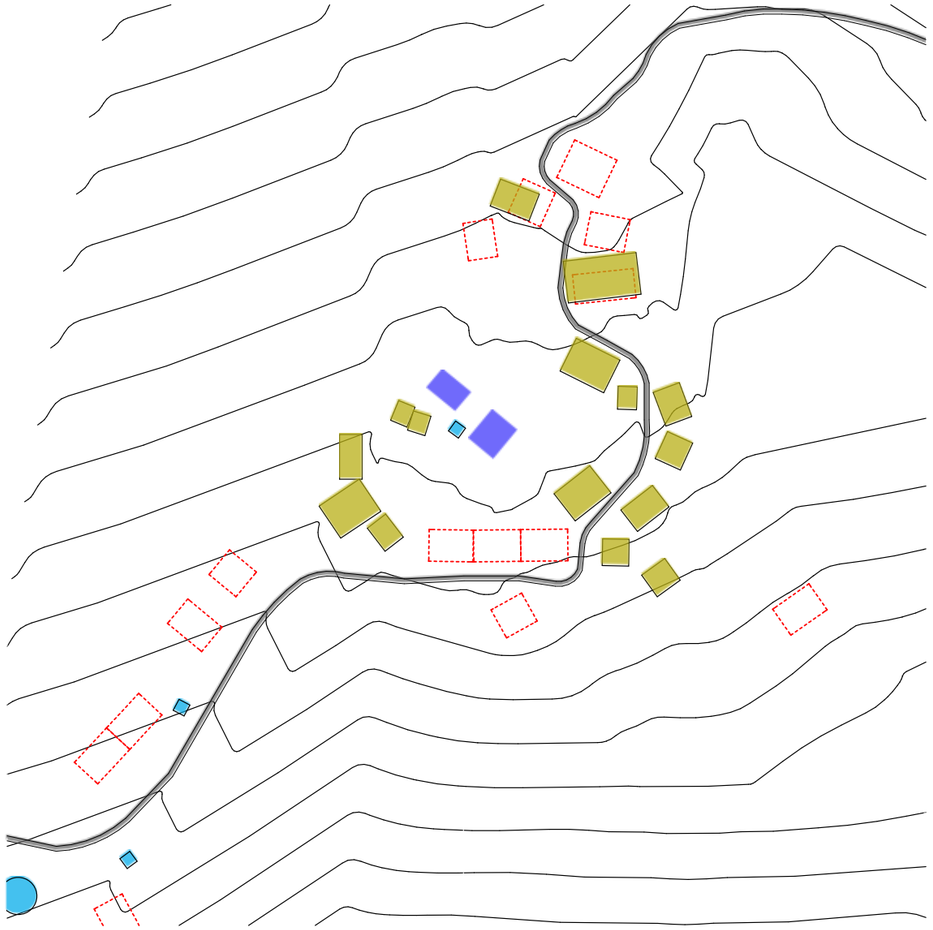
People Accommodates Land Affected Individual Families Within The Same Cluster

In this scenario, a cluster community accommodates a few individual land affected families within their own cluster. Houses in this cluster may or may not be wrecked by the earthquake. But the accommodated land is definitely a safe zone. The affected land may be utilized by the community as per their desire.

SHIN TOL

The example of Shintol cluster, in Majhigaon represents this scenario. Here, 4 families of the land affected Shintol cluster are accommodated within the cluster itself. Here, the 14 families of Shintol are re-clustered within Shintol itself.

Shin Tol
Before Earthquake Plan



Shin Tol
Before Earthquake Plan

Before Quake Houses
Ruins
Post Quake Standing Houses
Temporary Houses
Post Quake New Houses
Water Tank / Tap

Key Plan

Ruins

Post Quake Standing Houses

Post Quake New Houses

BioGas from Sewage Treatment

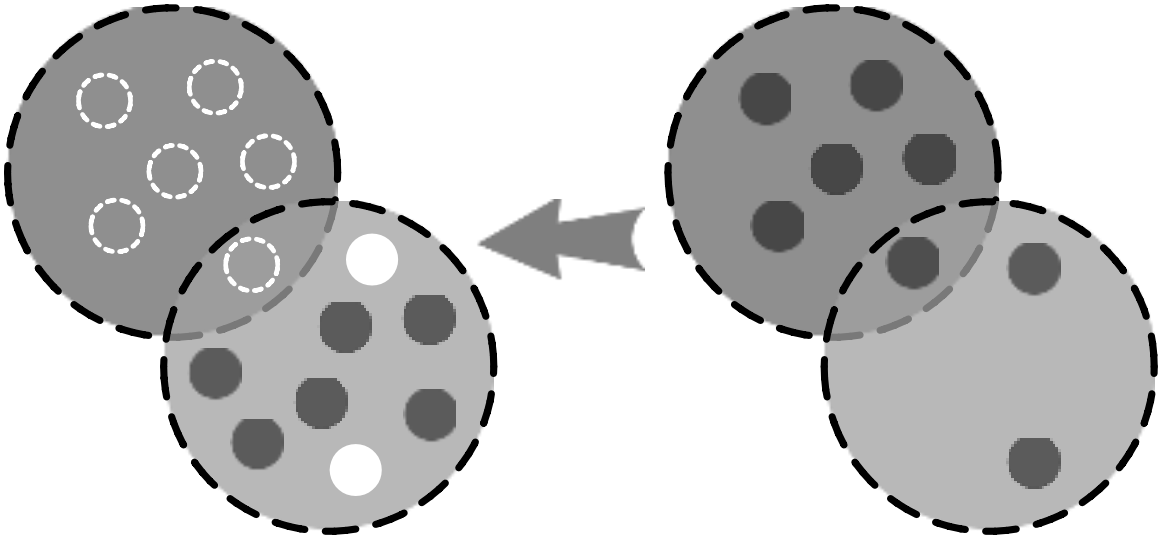
Water Tank

Shin Tol
After Reclustering Plan

0 10 25 m

Contour Interval 1 m

90



5.1.5.4 Scenario 4

Land Affected Cluster is shifted within the Adjacent The Cluster

In this scenario, a land affected cluster's families are adjusted to an adjacent shared safe cluster. The shared space may be utilized if only it falls within the safe zone.

BASERA CLUSTER ADJUSTS THARA CLUSTER

The example of Basera cluster adjusting Thara Cluster, in Majhigaon represents this scenario. Here, 17 families of the land affected cluster Thara are adjusted with the 5 families in the shared Basera Cluster. This also brings it within the proximity of the proposed road.

Thara and Basera Tols
Before Earthquake Plan

Thara and Basera Tols
Before Earthquake Plan

Before Quake Houses
Ruins
Post Quake Standing Houses
Temporary Houses
Post Quake New Houses
Water Tank / Tap

Key Plan

Ruins

Post Quake Standing Houses

Post Quake New Houses

BioGas from Sewage Treatment

Water Tank

Thara and Basera Tols After Reclustering Plan

0 10 25 m

Contour Interval 1 m

5.2 Detail Housing

Housing is the urgent need of the community. There are a lot of private initiatives with more than 23000 NGO's and Government Agencies and Private Initiatives pressing on the need, there's a need to regulate the chaotic re-clustering projects.

Based on the participatory approach, the proposal advocates use of local materials & technology with a combination of quake codes as a beneficial means for sustainable, empowering future.

The proposal suggests study of local materials, their availability and proximity to the re-clustering site.

It also suggests use of quake resistant building codes. The codes followed in the preparation of this re-cluster plan are listed in the references at the end of the report.

The detail housing is divided into three parts, the first is the study of local materials, the second is the possibility of local labor and the third is about the proposed typology of houses for Majhigaon.

5.2.1 Detail Housing in Majhigaon

The existing house forms are classified into typologies. The housing suggests inclusion of the existing housing spaces, into the re-clustering plan.

These house forms usually are incremental in nature. This pattern is inhibited into the recent the new housing typologies.

Separate Cattle shed and toilets are recommended for each family based on multiple discussions with the community.

Height of the build forms be restricted to two floors, that is G +1, based on the quake vulnerability zone, the re-cluster site belongs to.

Use of kitchen gardens in the backyards as in the present plot space for the house, is recommended to be retained based on the availability of land.

The proposal also recommends housing compositions to be designed in collaboration with the community.

5.2.2 Building Materials

As a result of the earthquake many buildings and structures (like walls) have collapsed or have structural damage. An enormous amount of debris consisting of stone, timber beams, bricks, slates and other building material would be available for the reconstruction. Because local people see the value of these materials in several places segregation has already taken place. The timber beam are placed together, the natural stone has been piled up.

Study of site available material with a consideration of low cost material, low incubated energy material and high-incubated energy material with its response to climate and behavior during earthquake. Geologist Prof. Basant Raj Adhikari helped find out details of every material along with its positive and negatives for using for building construction.

5.2.2.1 Locally available Materials/Low incubated energy material

a. Quartzite Metamorphic rock

Compressive strength property of this stone varies. It is strong when it is placed parallel to the layered structure. Whereas it is very weak when it is placed perpendicular to band.
Availability: Very easily available in Majhigaon,
Material Property: Good material expect its weight. Good in compression but weak in tension.
Climatic response: thermal capacity of thick stone wall makes stone large temperature difference.

b. Rounded River stone

Rounded stone gives very less area of contact with other stone when it is used for construction.

Availability: Very easily available due to Indrāvati River.

Material Property: Poor material, easily disassemble from wall.

c. Slates

Large and heavy flat stone.
Good for compression and very weak for point force.
Availability: Available in Majhigaon.
Material Property: relatively heavy so not advisable for roof in case of earthquake. The traditional (non-mechanic fixing) way has disadvantage of easily slide down from roof.
Climatic response: - protect from hail, heavy rain and sun.

d. Bamboo

Bambusa Balcoa

Availability: Available in Majhigaon.

Earthquake effect: good material, lightweight material

Climatic response: - protect from weather. It also needs treatment (Glucose removal) for durability.

e. Wood

Sal tree and Chilaune trees - Sal has very good compression and tension strength where as Chilaune is only good for compression.

Availability: Available in the neighboring community forests of Majhigaon.

Earthquake effect: Good material due to its properties.

Climatic response: - provides thermal insulation.

f. Reed Grass

Reed grass is very lightweight material than slate roofing, Except for fire safety it is very good material for roofing.

Availability: Available in and around Majhigaon.

Earthquake effect: Good material because it is lightweight.

Climatic response: - provides thermal insulation.

g. Sand

Sand is an essential additive for creating bonding mixtures along with concrete and surkhi

Availability: Available in the Indrāvati riverbed next to Majhigaon.

Earthquake effect: Good material because it is lightweight.

Climatic response: - provides thermal insulation.

5.2.2.2 High Incubated Energy Material

These are new building materials which are produced in factories. It costs a lot of energy to make this material and to transport it. Majhigaon is relatively easy accessible by Melamchi-Helambu road, around two and half hours from Kathmandu. Lower energy materials can be produced locally with the help of cement. Stabilized concrete blocks.

a. Corrugated sheets

After 2015 major earthquake most of the organizations and NGOs provided corrugated sheets to earthquake affected people for their temporary structure. It is a lightweight material but during weather conditions of summer, rain and winter living within this material would be very difficult as It is good conductor of heat.

b. Concrete and Steel

Nearest town to the study area is Melamchi, which is around 5kms. So concrete and steel is available. But there is an issue of transportation to the site due to lack of vehicular access to the areas within study.

5.2.3 Owner driven construction recommendation

This method is **inspired** by the **local agrarian culture**. In Nepali it is known as 'Sahyog Krushi'.

Majhis people have very less manpower and lands to cultivate. So adjacent farm neighbors' come together to cultivate in one's farmland, in return they get money or food. After completing first farmland they move to next farm, until they finish all their farms.

Similar approach can be used in re-clustering and reconstruction processes where they themselves built their own houses with the help of local mason of a village. Which helps them to understand earthquake resistant construction technique and it will transfer to all the people from different age, group etc. This will also help them to build their future house, if any.

There are around 25-30 masons in Majhigaon but following masons are well known for their skill work and traditional knowledge about building construction.

1. Laxman Majhi – Thula Ghar
2. Sukuman Majhi – Dhada Thok
3. Dal Bahadur Majhi – Thula Ghar
4. Bakhat Bahadur Majhi – Thara Tol
5. Jit Bahadur Majhi – Thula Ghar
6. Surya Bahadur Majhi- Shin tol

Among all, Dal Bahadur Majhi is the most experienced, he has more than 30 years of experience and he started building construction at age of sixteen. He has exquisite knowledge of material, construction techniques, components and other small details required for construction of a house.

Laxman Majhi
Thula Ghar

Bhakta Bahadur
Thula Ghar

Surya Majhi
Shin tol

Laxman Majhi: Who started building houses when he was 14 year old. He constructed buildings using local material such as mud and stone. He believes that local material is the

only material, which can with stand in that particular area temperature. He's also good in timberwork. His family members are also involved in building a house. He lives in Thula Ghar. He is very good at making wall construction. And his earning from building houses is thousand rupee per day.

Bhakta Majhi: Who started building houses when he was 18 year old. He constructed many houses with in Majhi Guan. He didn't construct any building after earthquake because he believe that our traditional construction is not standing in earthquake magnitude more than 7, so he is planning to learn some techniques from NGOs and then start building new houses. He is very good in making components out of timber. And his earning from building construction is thousand Nepali rupee per day.

Surya Majhi: Who started building houses when he was 20 years old. He constructed houses with the help of local material and also with cement, brick, RCC. He already built two houses after earthquake with the help of concrete block material (Collaborated with NGOs). He learned few earthquake resistant construction techniques and he also explored new material for building construction. His earnings from building construction is thousand five hundred per day.

The reason to highlight local masons is to involve them into the process of re-clustering which will be mutually beneficial for the masons and the community. The local masons are aware of not just the local construction techniques but also the sociality of the spaces within their own community.

5.2.4 Housing Typologies for Majhigaon

As for Majhigaon the individual units comply all the factors found during the study. The proposal derives its recommendations from study and location, context specific implementation of earthquake resistant architecture codes.

The design is specifically divided into the occupations followed by people. This broadly classifies them into four parts. That is Agriculture, Fishing, Animal Rearing (Pig) and others. The spaces required are carved out based on the needs of the users through the study of their occupations and functional usage of spaces.

These houses retain the functionality of spaces in the existing structures as per community needs for the house, the kitchen garden, the cattle shed and the outdoor toilet.

Residents suggested for a common pig-rearing unit outside the cluster during the initial visits but were skeptical about the same afterwards raising questions of maintenance, fodder and caring. So, Animal rearing was preferred individually in the same plots to avoid the above.

In case of an occupation change for the future generation, need for addition to address the incremental housing strategy, the future expansion of the house for the next 10 years is taken into consideration.

Use of local materials and salvaged materials is oriented into creation of region and community specific design.

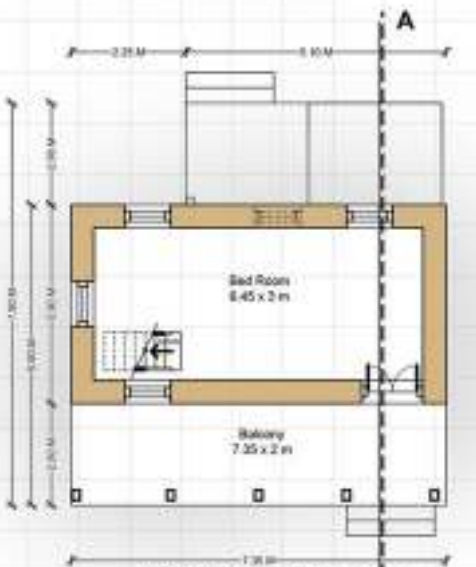
The costing for the houses is considered based on these designs. It also considers usage of salvage materials and finance from NRA to be granted to each affected household. For the purpose of Majhigaon,

It also considers the time and labor taken to build up the house. It specifies the labor contribution options from each and every family and coming together of the community to build each house.

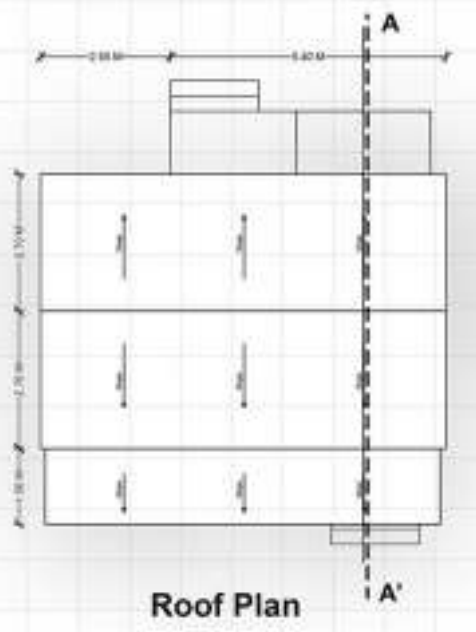
These designs may be utilized by the 79 Majhigaons in the surrounding context and thousands others across Nepal

5.2.4.1 Type A

Ground Floor Plan



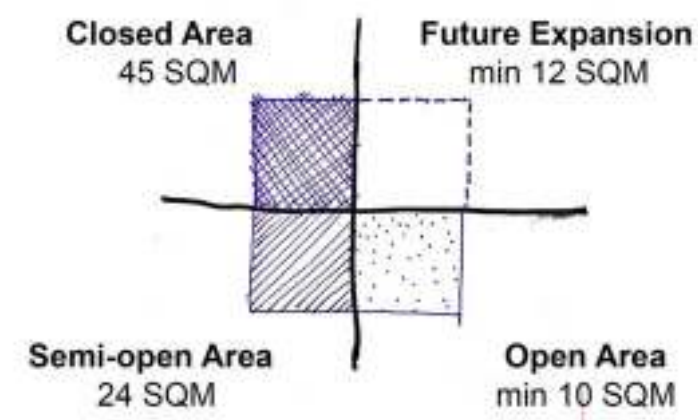
First Floor Plan

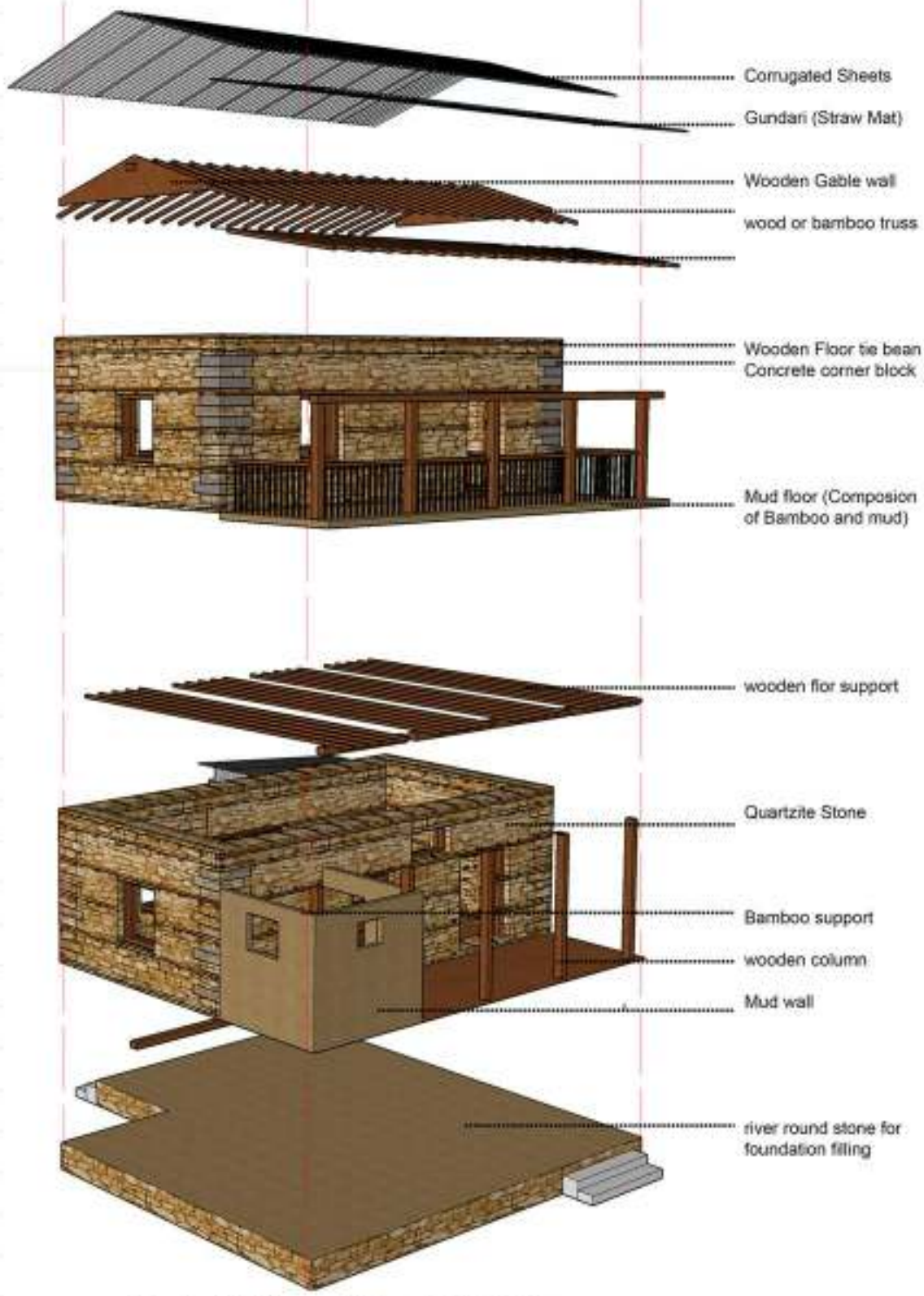


Roof Plan

Section BB'

Type A
Labor and service





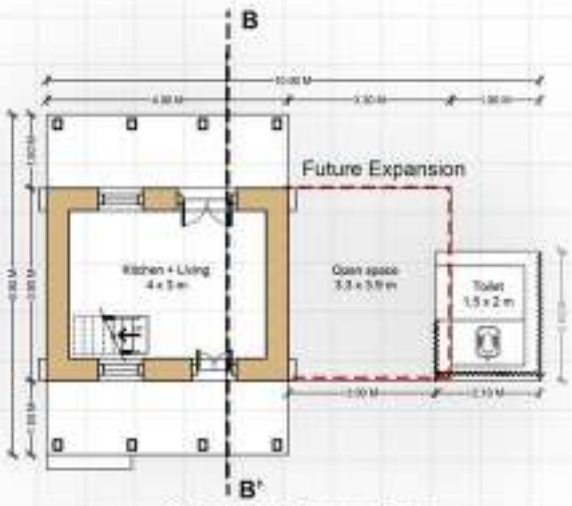
Exploded View of Type 'A' Building

Corrugated sheets area	63.17
Cost of corrugated sheet per sq.m=Rs. 363.63	363.63
Total cost of corrugated sheet	22971
Gungri Layers	126
Cost of Gundri Per sq. m	75
Total cost of Gundri	9476
No. of Concrete blocks	108
Cost per concrete block	200
Total Cost of Concrete blocks	21600
Volume of concrete blocks (Per 0.04)	4.32
No of doors	
1.6 x 0.9 x 0.45	4
Cost of 1 door	2500
Total door Cost	10000
Volume (Per 0.64 m cube)	2.56

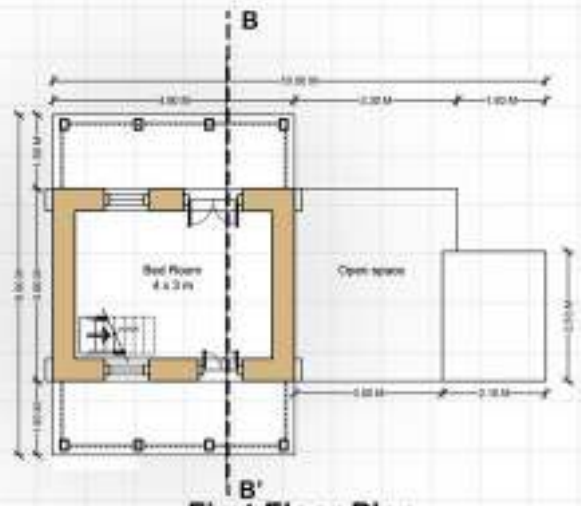
No of windows	
0.9 X 1.5 X 0.45	8
Volume (per 0.6 m cube)	4.8
0.9 X 0.45 X 0.45	4
Volume (per 0.18 m cube)	0.72
Cost of 1 window	2000
Total window Cost	24000
Total volume of the entire house	49.11
Stone+Timber	36.71
Volume of Stone (Cubic meter)	29.368
Volume of Timber (20%)	7.342
Cost of Timber per cube meter= Rs. 10,000	10000
Total Cost of timber	73420
Bamboo Volume (10%)	3.671
Binding wire	3000
Total Cost of the building	164466

Miscellaneous Charges (5%)	8223
Middle total	172689
Transportation Cost (15 %)	25903
Worker Charges Assuming 31 days to complete the task	31
Head Mason (Rs. 1000 per day- 1 Nos)	31000
Mason (Rs. 700 per day- 2Nos)	43400
Helper (Rs. 300 per day - 2Nos)	18600

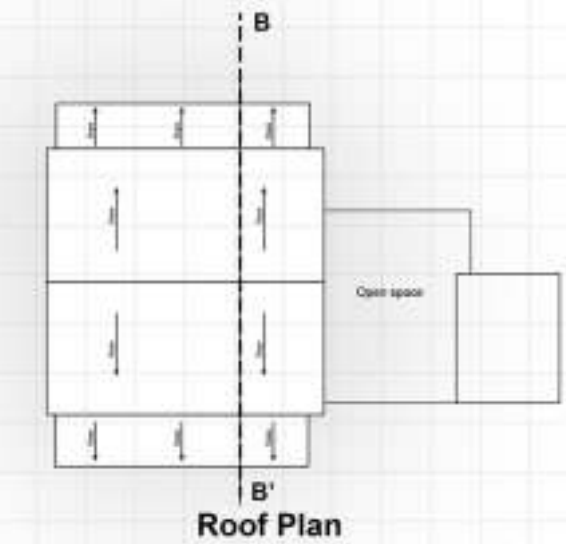
5.2.4.2 Type B



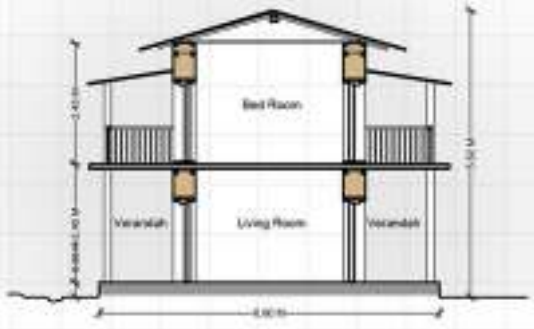
Ground Floor Plan



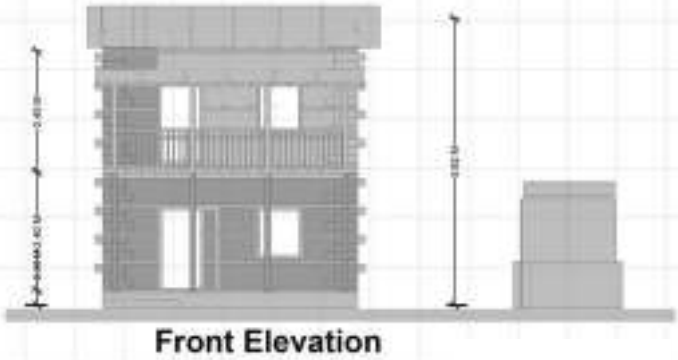
First Floor Plan



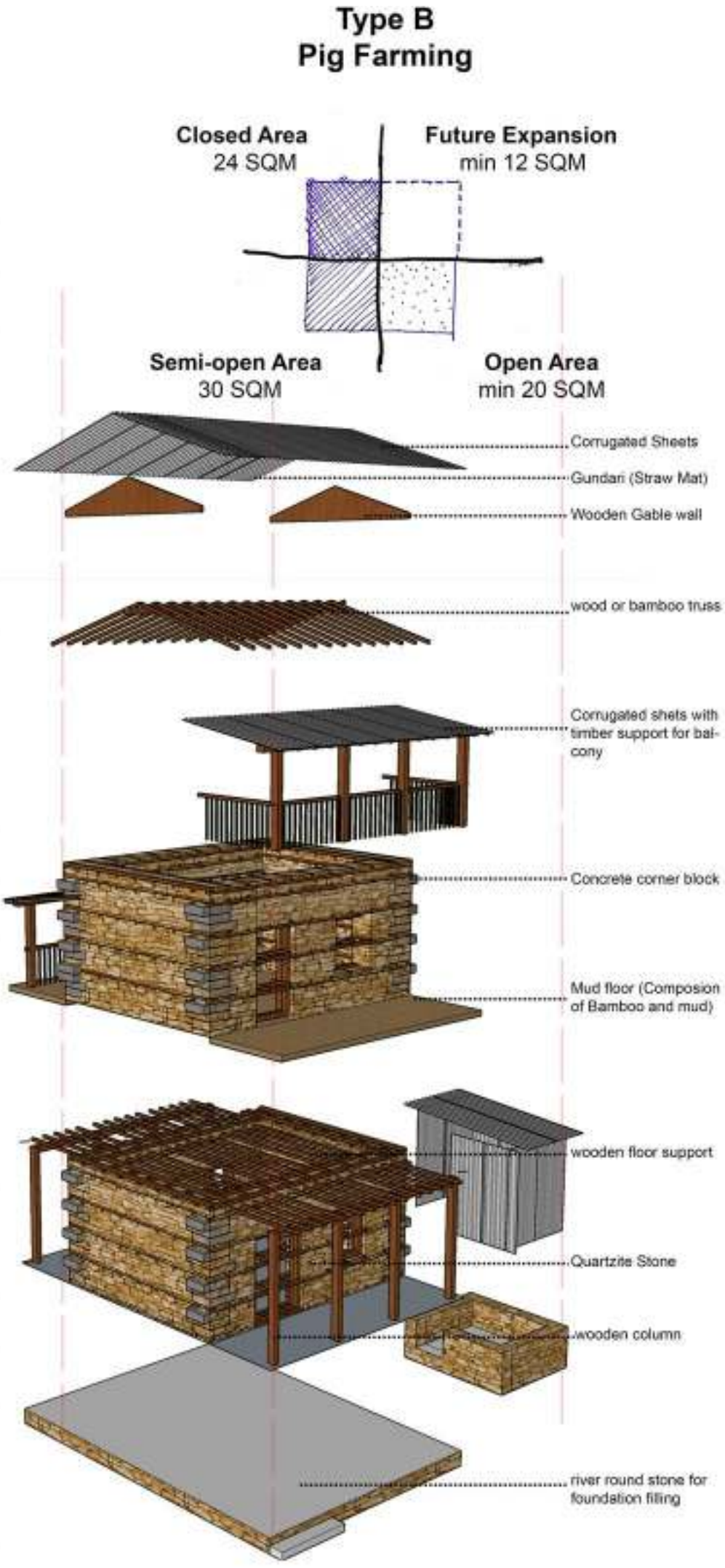
Roof Plan



Section BB'



Front Elevation



Exploded View of Type 'B' Building

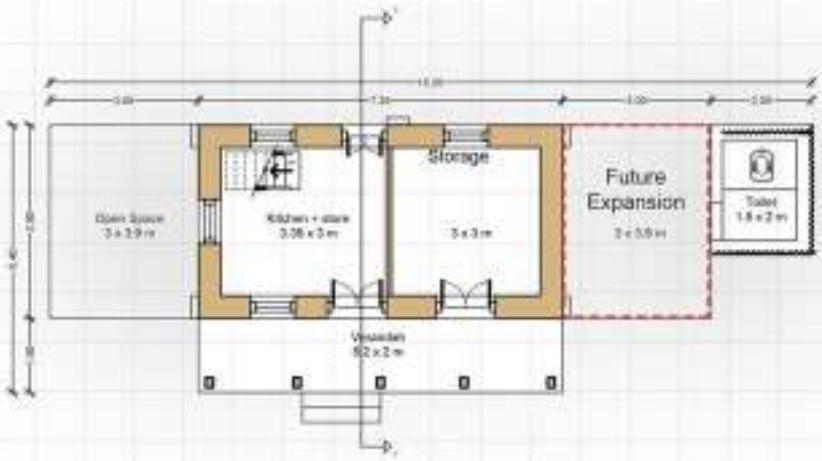
Corrugated sheets area	60.6
Cost of corrugated sheet per sq.mRs. 362.63	362.63
Total cost of corrugated sheet	**22000**
Gungri Layers	121
Cost of Gundri Per sq. m	75
Total cost of Gundri	**9090**
No. of Concrete blocks	96
Cost per concrete block	200
Total Cost of Concrete blocks	**19200**
Volume of concrete blocks (Per 0.04)	3.84
No of doors	
1.6 x 0.9 x 0.45	4
Cost of 1 door	2500
Total door Cost	**10000**
Volume (Per 0.64 m cube)	2.56

No of windows	
0.9 X 1.5 X 0.45	4
Volume (per 0.6 m cube)	2.4
0.9 X 0.45 X 0.45	0
Volume (per 0.18 m cube)	0
Cost of 1 window	2000
Total window Cost	**8000**
Total volume of the entire house	35.36
Stone+Timber	26.56
Volume of Stone (Cubic meter)	21.248
Volume of Timber (20%)	5.312
Cost of Timber per cube meter= Rs. 10,000	10000
Total Cost of timber	**53120**
Bamboo Volume (10%)	2.656
Binding wire	**3000**
Total Cost of the building	124446

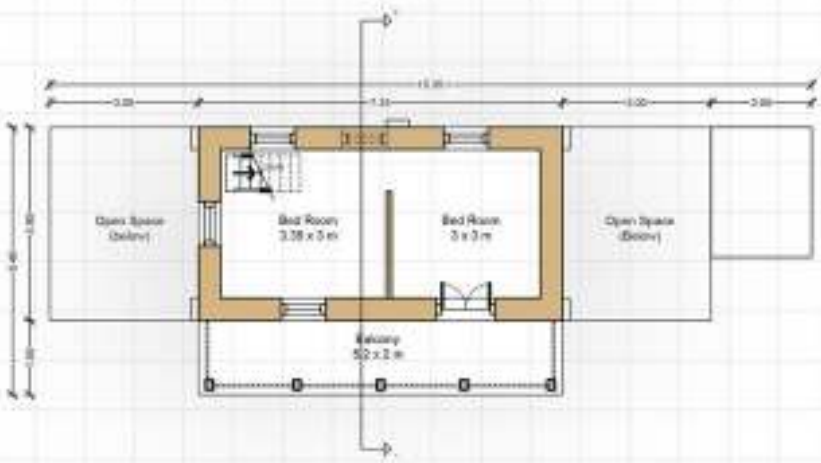
Miscellaneous Charges (5%)	6222
Middle total	130668
Transportation Cost (15 %)	19600
Worker Charges Assuming 31 days to complete the task	31
Head Mason (Rs. 1000 per day- 1 Nos)	31000
Mason (Rs. 700 per day- 2Nos)	43400
Helper (Rs. 300 per day - 2Nos)	18600
Final Total Cost of the Building	**243269**

Total cost of the building is 243269 Nepali Rupee

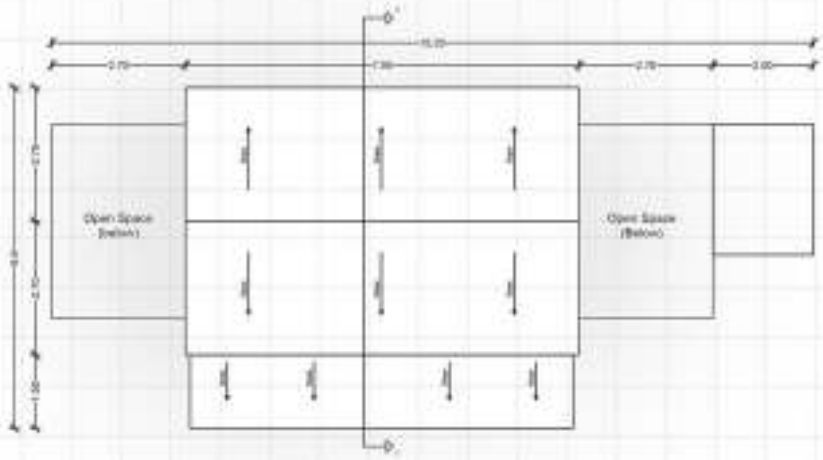
5.2.4.3 Type C



Ground Floor Plan

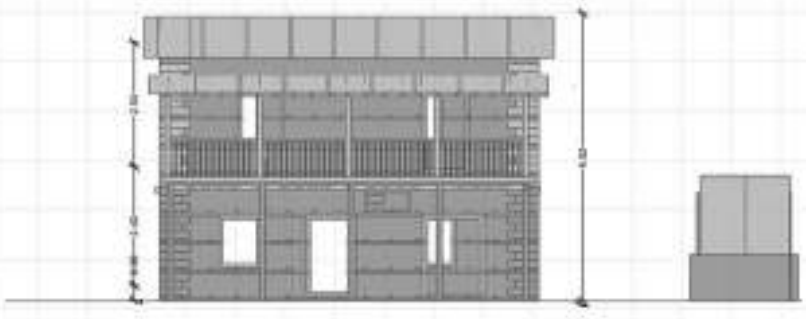


First Floor Plan

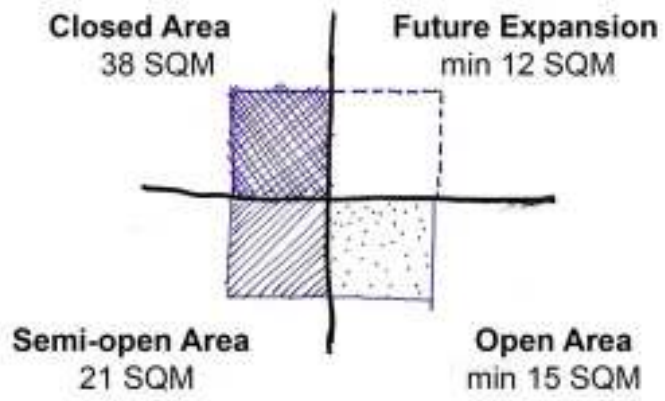


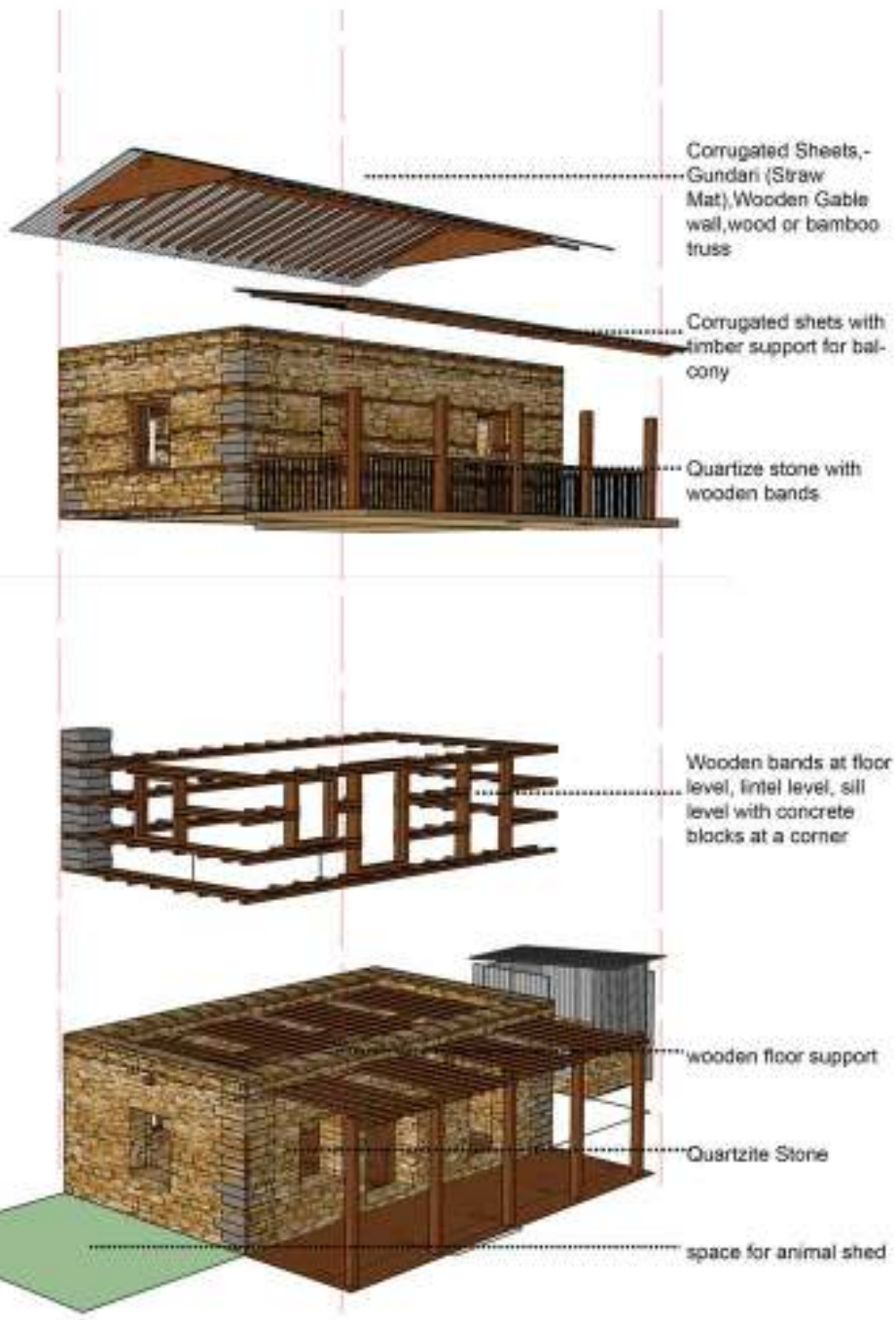
Roof Plan

Section CC'



Front Elevation





Exploded View of Type 'C' Building

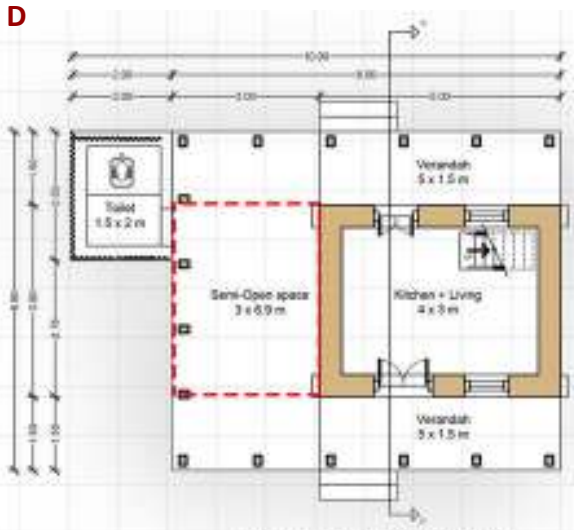
Corrugated sheets area	110
Cost of corrugated sheet per sq.mRs. 363.63	363.63
Total cost of corrugated sheet	42908
Gungri Layers	236
Cost of Gundri Per sq. m	75
Total cost of Gundri	17700
No. of Concrete blocks	120
Cost per concrete block	200
Total Cost of Concrete blocks	24000
Volume of concrete blocks (Per 0.04)	4.8
No of doors 1.6 x 0.9 x 0.45	4
Cost of 1 door	2500
Total door Cost	10000
Volume (Per 0.64 m cube)	2.56

No of windows 0.9 X 1.5 X 0.45	8
Volume (per 0.6 m cube)	4.8
0.9 X 0.45 X 0.45	2
Volume (per 0.18 m cube)	0.36
Cost of 1 window	2500
Total window Cost	20000
Total volume of the entire house	47.35
Stone+Timber	34.87
Volume of Stone (Cubic meter)	27.899
Volume of Timber (20%)	6.976
Cost of Timber per cube meter= Rs. 10,000	10000
Total Cost of timber	69748
Bamboo Volume (10%)	3.487
Binding wire	3000
Total Cost of the building	187448

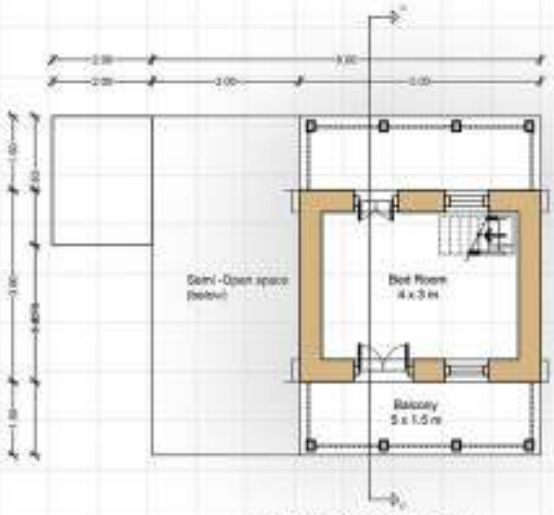
Miscellaneous Charges (5%)	9367
Middle total	196716
Transportation Cost (15 %)	29507
Worker Charges Assuming 31 days to complete the task	31
Head Mason (Rs. 1000 per day- 1 Nos)	31000
Mason (Rs. 700 per day- 2Nos)	43400
Helper (Rs. 300 per day - 2Nos)	18600
Final Total Cost of the Building	319223

Total cost of the building is 319223 Nepali Rupee

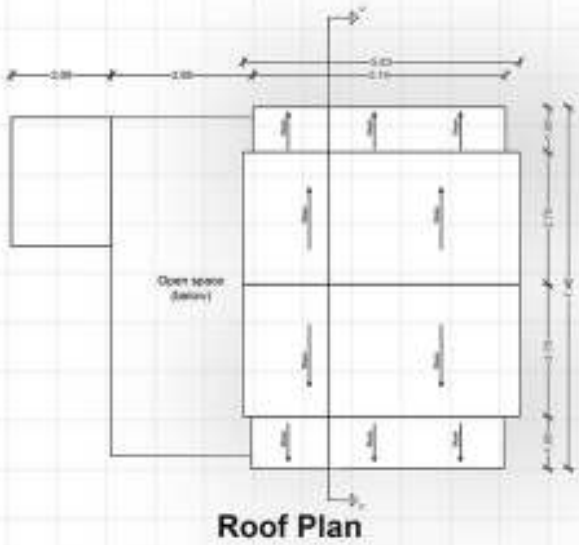
5.2.4.4 Type D



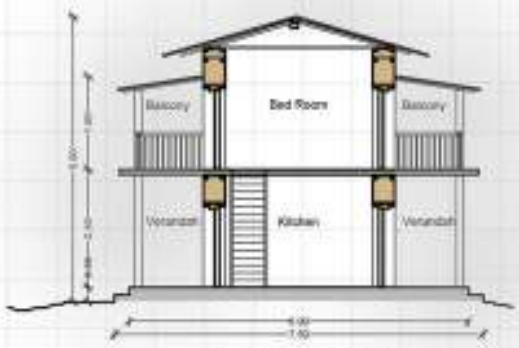
Ground Floor Plan



First Floor Plan

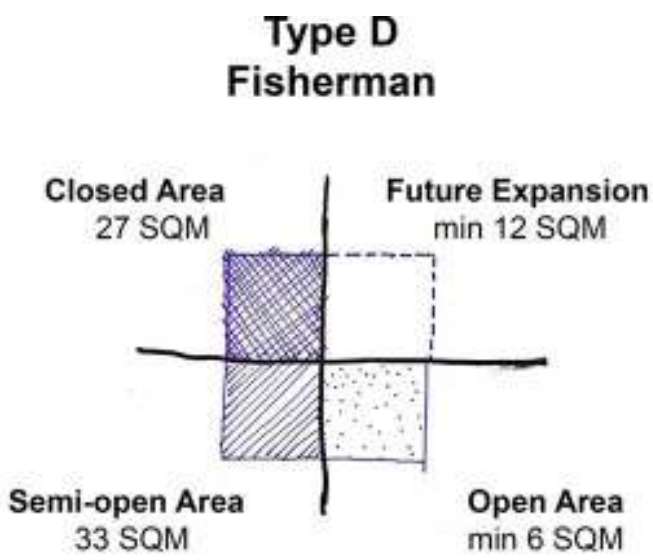


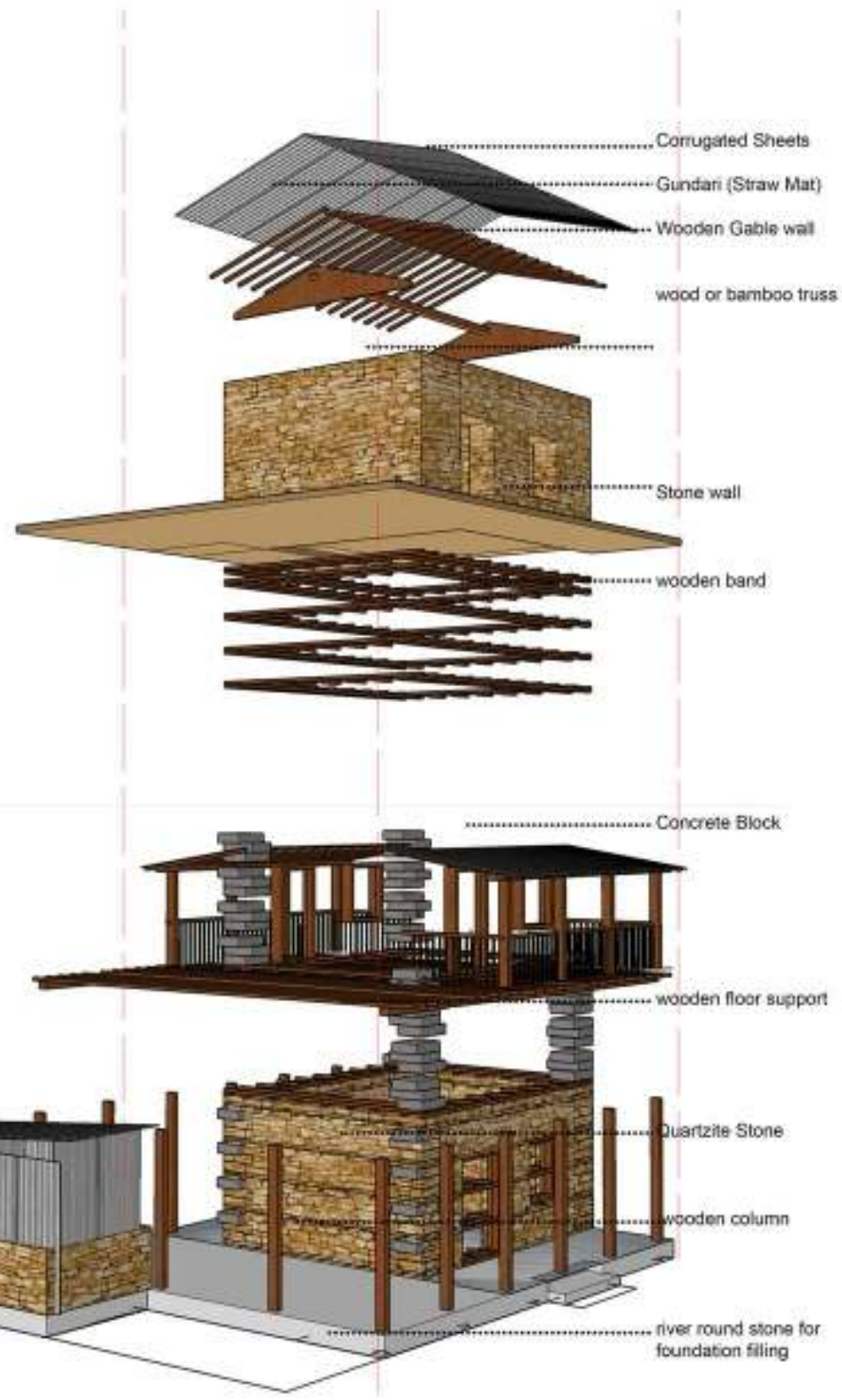
Roof Plan



Section DD'

Front Elevation





Exploded View of Type 'C' Building

	Type 4
Corrugated sheets area	85.96
Cost of corrugated sheet per sq.m=Rs. 363.63	363.63
Total cost of corrugated sheet	31258
Gungri Layers	172
Cost of Gundri Per sq. m	75
Total cost of Gundri	12894
No. of Concrete blocks	96
Cost per concrete block	200
Total Cost of Concrete blocks	19200
Volume of concrete blocks (Per 0.04)	3.84
No of doors	
1.6 x 0.9 x 0.45	4
Cost of 1 door	2500
Total door Cost	10000
Volume (Per 0.64 m cube)	2.56

No of windows	
0.9 X 1.5 X 0.45	4
Volume (per 0.6 m cube)	2.4
0.9 X 0.45 X 0.45	0
Volume (per 0.18 m cube)	0
Cost of 1 window	2000
Total window Cost	8000
Total volume of the entire house	38.9
Stone+Timber	30.1
Volume of Stone (Cubic meter)	24.08
Volume of Timber (20%)	6.02
Cost of Timber per cube meter= Rs. 10,000	10000
Total Cost of timber	60200
Bamboo Volume (10%)	3.01
Binding wire	3000
Total Cost of the building	144552

Miscellaneous Charges (5%)	7228
Middle total	151779
Transportation Cost (15 %)	22767
Worker Charges Assuming 31 days to complete the task	31
Head Mason (Rs. 1000 per day- 1 Nos)	31000
Mason (Rs. 700 per day- 2Nos)	43400
Helper (Rs. 300 per day - 2Nos)	18600
Final Total Cost of the Building	267546

Total cost of the building is 267546 Nepali Rupee

5.3 Economic Sustenance

Success of the re-cluster plan in turn also depends on its ability to get people out of the existing crisis. In order for people to be able to re-cluster their houses, economic empowerment is necessary. This is especially vital in case of the financially deprived Majhi community.

A part of the houses may be funded NRA, but the other parts are needed to be self-funded. This requires economic empowerment, revival and further sustenance of it.

Here, there's pivotal to study the existing occupations of people, through which we can understand the scope for economic revival.

One of the important factors is the proximity of the livelihood opportunity. It is appropriate that the suggested livelihood option should not be farther than the existing one. It should also not be of lesser economic value, against the existing livelihoods in current practice.

This economic sustenance is classified into two sections.

The first addresses the urgent needs like and opportunities like reconstruction, which are presented to the people. They are for an immediate gain. Hence, **Short Term**.

The second addresses the sustenance of the economic lifestyle. Their effects maybe registered in the longer run. Hence, **Long Term**

5.3.1 Existing Occupations

Occupations in Nepal have been traditional family occupations, continued since ancient times. They are mostly performed in complete cooperation of all family members, thus the nature of work is more generalist than modern jobs that call for specific skills and individual performances.

opposite farms lands to the river

Agriculture

Agriculture is a primary occupation of the people in Nepal. Almost every household holds a piece of agricultural land. Brahmins hold almost five times more farmland than other castes. Over the years, Majhis have sold most of their farmlands and now subsist on small plots of land. These small plots get further subdivided into smaller plots based on the number of children. In these small land plots they are able to produce subsist for only three months in a year, while the major portion of the year they work on Brahmin farmlands. Thus with so little produce, there isn't enough surplus, making the Majhis dependent on other occupations like fishing as a source of income. For a Brahmin, agriculture is the main occupation which is sufficient for them as the only source of income throughout the year. They also grow vegetables in small gardens near their houses.

Bisen Farm Lands

The vegetables & fruits include bananas, litchis, mangoes, bottle gourd, mustard, radish, carrot, bitter gourd, french beans, cauliflower, cabbage, gherkin, potatoes, onions, chilies & tomatoes.

The mustrad in farms

Animal Husbandry

All families as a part of the Nepali culture participate in animal husbandry. There was a primary loss of cattle during the earthquake, when the numbers reduced to half than what was previously owned. The cattle that are reared are Chickens, Goats, Pigs, Cows and Buffaloes. Old houses, unsuitable for living are being used for animal rearing. Each family owns some amount of cattle, depending on of animals they can care for as family.

Fishing

For the Boat rower Majhis, Fishing has been one of the primary occupations for the Majhis since several generations. Hence, they are the only community in the proximity that fishes. Their dependency and closeness to river make them primary stakeholders of the rivers. You can find up to 35 varieties of fish like Asala, saur, bam, kabre, tithe, bele, baghi, bhuta, bhuduna, saerai, silandro, cheppa, jakita, saale and tuchhe in the river. The number of fishes during the monsoon goes up, while the fishing season is stopped. Post the CMC's Melamchi Water Project; the regular of natural water habitat has troubled the Majhis. The daily catch of 5-6 kgs of fish has gone down to 2-3 kgs now. Each kilogram of fish sells for 200-300 NPR. They have also leased 25 *ropanis* of land across the Indrāvati river from the government for the purpose of fish farming.

Majhi's Fishing (www.innepal.com)

Others

Some families have small *pasal* (shop) which they sell groceries while others works in Brahmin households. A tamangs and Majhis are into Alcohol Brewing, which is primarily consumed by the local Majhi Community. There are also around two-dozen masons in the Majhi community. A few work as drivers in the surrounding *Balu* industry. Out migration is only work bound. More than 100 locals have migrated to India, mostly Delhi & Gujrat (KLC Company) to work as drivers. This compliments their highest expectation of a job in the community is to become a driver away and earn 25,000 a month, which is far less, compared to other communities of Nepal.

Majhi Selling Fish in a Dolalghat Market (www.countercurrents.org/sangeetha190513.htm)

For the Brahmin, a few educated ones have shifted to the Kathmandu valley. A few work as teachers, or do other professional jobs in Kathmandu Valley. They also own shops in Bahunepati. A considerable amount of the younger Brahmin generation has migrated with due desire for further education and work.

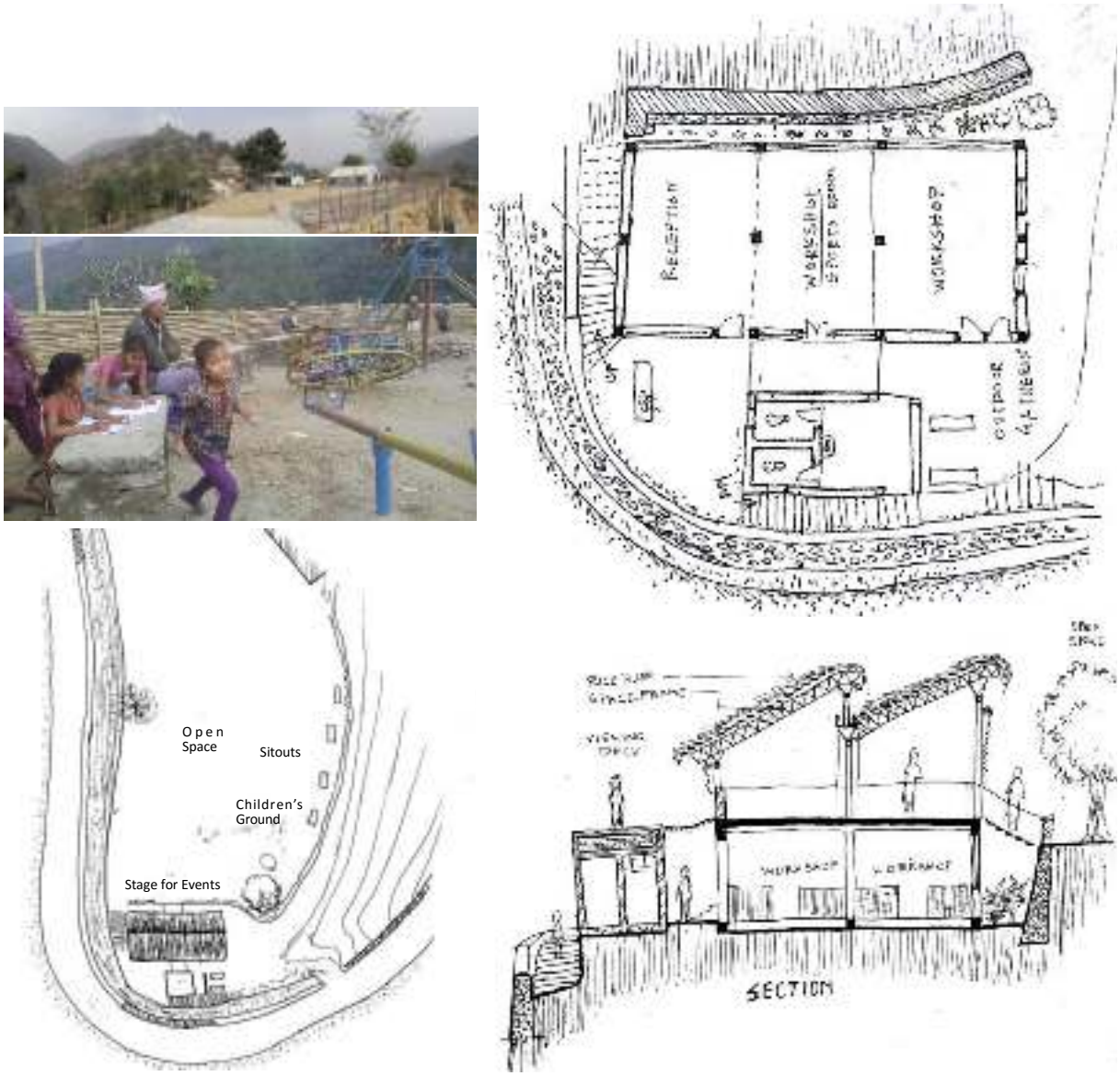
Sand Mining Industry (www.countercurrents.org)

5.3.2 Livelihood Opportunities

Based on the existing occupations, the context, and their understanding the proposal suggests the following livelihood options as opportunities, which are specific to Majhigaon.

5.3.2.1 Short Term Livelihood Opportunities

Community Centre / Construction Skill Training



Existing activities next to open area in photographs, Plans and Section of Proposal

With the focus on People rebuilding their own houses, the Majhis need proper skill set to execute this. There are around 25 skilled masons in the village.

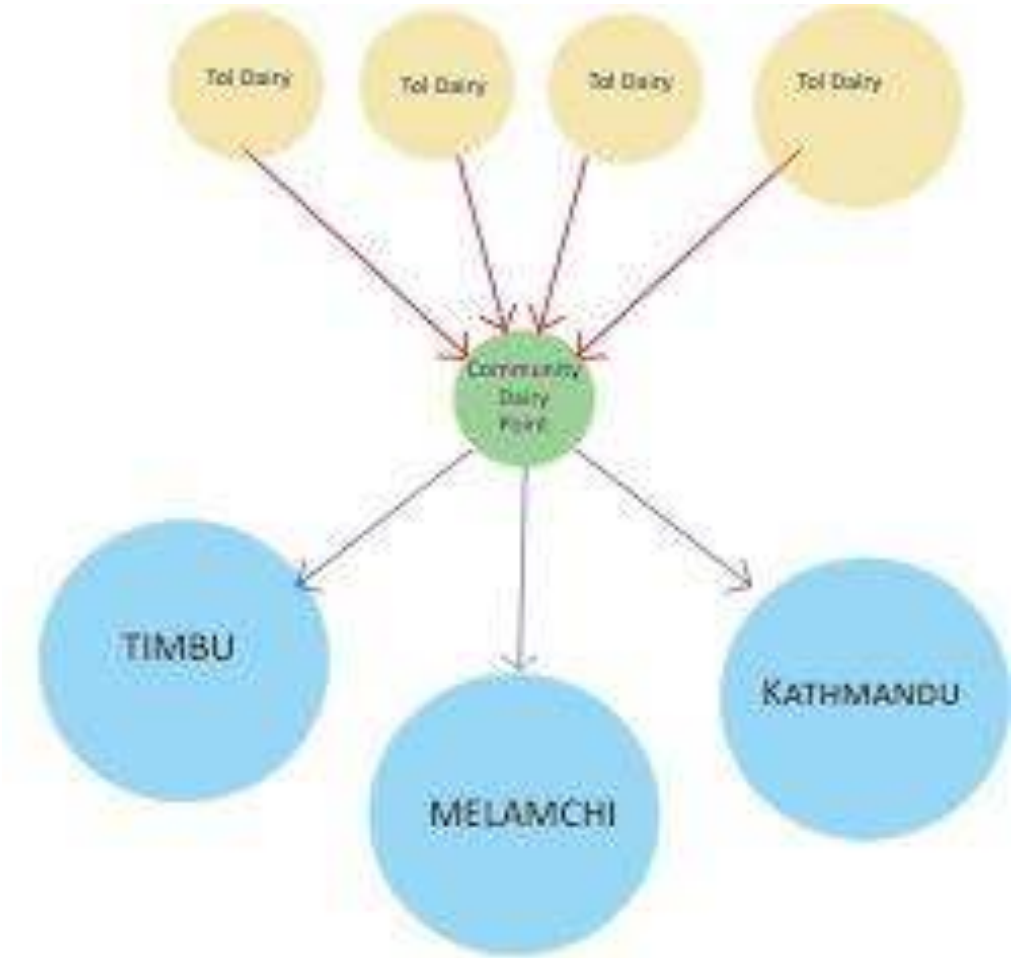
NGO's like 'JICA' have decided to train around 500 people in the area. This could help them build not only their own houses, but, others as well, thereby, becoming a quick income source. But, there is a need a space for a skill-training institute. In this proposal, an existing space for the community hall next to a open space, is proposed as the skill training institute. This space over the time will be converted into the community space, overtime.

Home Stay for Bird Watchers/ Visitors

Surrounding Forest Cover, Snow Mountains, Natural flora and fauna in the study area

During interactions with the community, it was found that among Bird Watchers and Nature Enthusiasts, Majhigaon and its surroundings are a common ground. Serene Landscape, Flora & fauna are engaging. Bees, Birds, Butterflies, Apes, Snakes are plenty afloat. The seasonal flowering trees, the snow tops, the curving river present a beauty.

A few people in the community have a plan to build a separate guesthouse for these visitors. Working on the same idea, a further proposal for 'Homestay' is presented. The enthusiasts visit the village to see & experience the authentic village culture and Majhi people can utilize this opportunity to the maximum. Also, this needs no extra infrastructure.



A systems chart of the suggested Dairy Co-operative proposed

This is not just a short term proposal, but one, which will act as a subsidiary income, means in future for the Majhi community.

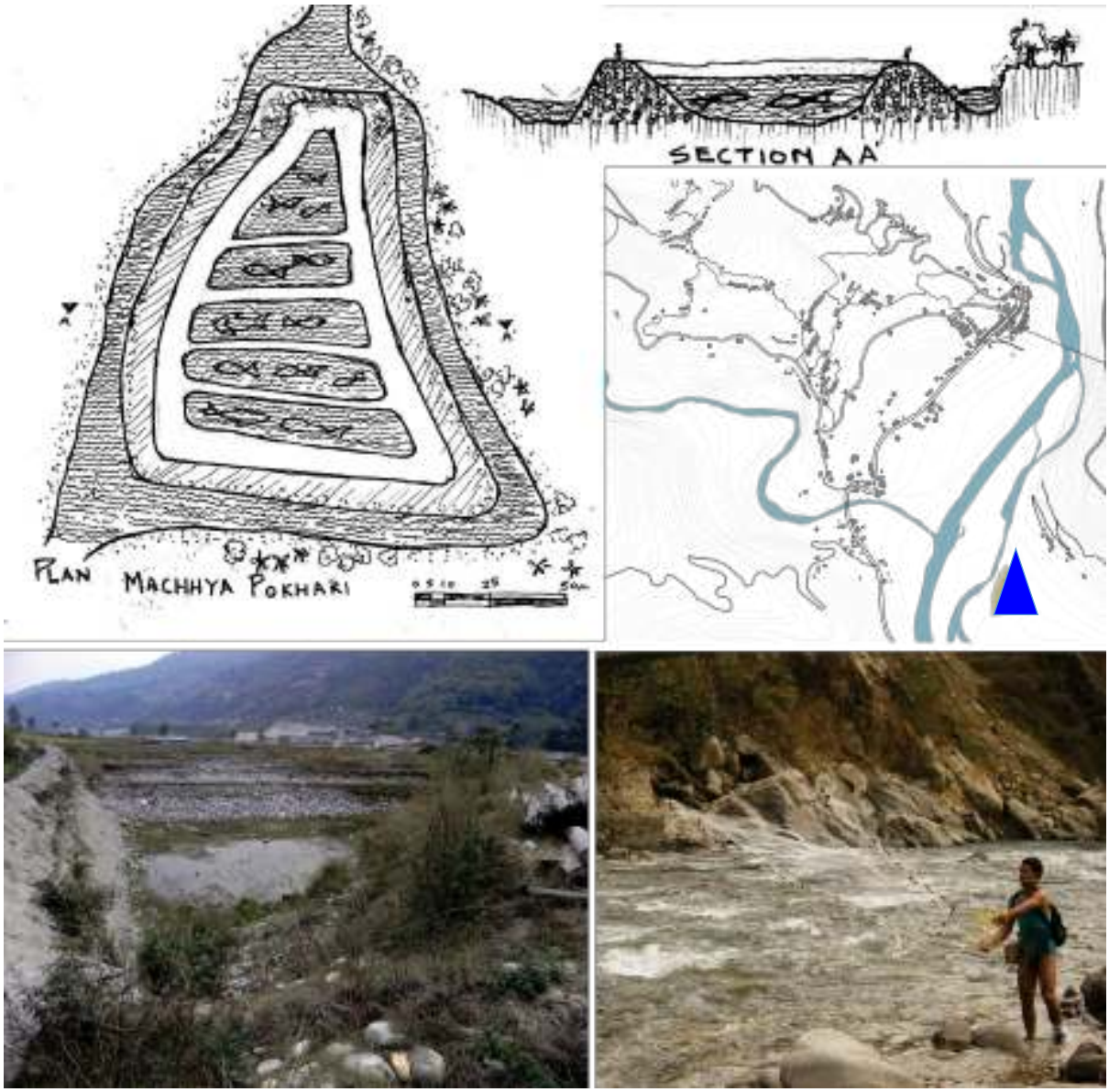
5.3.2.2 Long Term Livelihood Opportunities

Co-operative Dairy

During the consultation process it was found that the people didn't want their cattle shed next to their houses. But, they wanted them to be easily accessible. Animal Husbandry is one rurally rooted industry. The site is full of cattle, goat, pigs and hen. Also, people sell their dairy products to 'DDC', which acts as a middle agency, and delivers their products to Kathmandu, Melamchi and Timbu.

As per the re-cluster proposal, a decentralised dairy system would work best. In this, each tol (cluster) has a separate cattle zone, so that it's easily accessible to the tol (cluster). It is usually at the beginning, so that the inner tols will have hygienic spaces reserved for themselves. All these decentralised zones, will contribute to a central collection point, from where they can sell it to their clients, eliminating the middle agency and gain profit.

Machya Pokhari



Plan and section of the Fish Farm; key plan, existing condition of Machya Pokhari, Majhi man catching fish

Before the quake; Majhis identified an area of 25 ropanis for fish farming next to Koirala Tar. This is government owned land, leased out by the community. As one of the primary occupations of the community is Fishing, the idea is to enhance their strengths.

There are 35 types of fishes in the Indrāvati River. A Majhi typically catches around 3-4 Kgs of fish in a day. It sells for around 300 NPR in the surroundings, and is sold off to Kathmandu for consumption.

The initial cost of the Fish Farming Lake is 5 lakhs NPR, while each year it would provide a substantial income even in the face of Melamchi Water Project. The community will share this income.

Improved Agricultural Practice

The techniques used by Majhis for farming are age old ones. The proposal recommends upgrading their practices and helping them conserve Sahyog Krushi through government and private initiatives. This will increase their grain produce and suffice them for the year. This creates a sustainable economy. The surplus may

6. Annex

6.1 Selection of Study Area

6.1.1 Preliminary preparations

Acclimatization, Understanding the architecture on contours, observing the life on hills, Meeting experts and study of previous work from libraries form the initial part of preliminary studies. Meeting Experts (Jennifer Duyne, Camp Hope, & Professors at CEPT - Anjana Vyas,

Inigo Bonal, Sankalpa, C. N. Ray, Deepa Maheshwari, S. S. Rao, Urvi Desai) in India and IoE (Deepak Pant, Indra Acharya, Inu Salikhe, Basant Raj Adhikari) in Nepal was the initial step.

Understanding of Earthquakes, architectural practices, Sindhupalchok district features and organizational structure of the process (identification and development of field tools like interviews, group discussion and methods like baseline survey, risk sensitive analysis with creating an inventory).

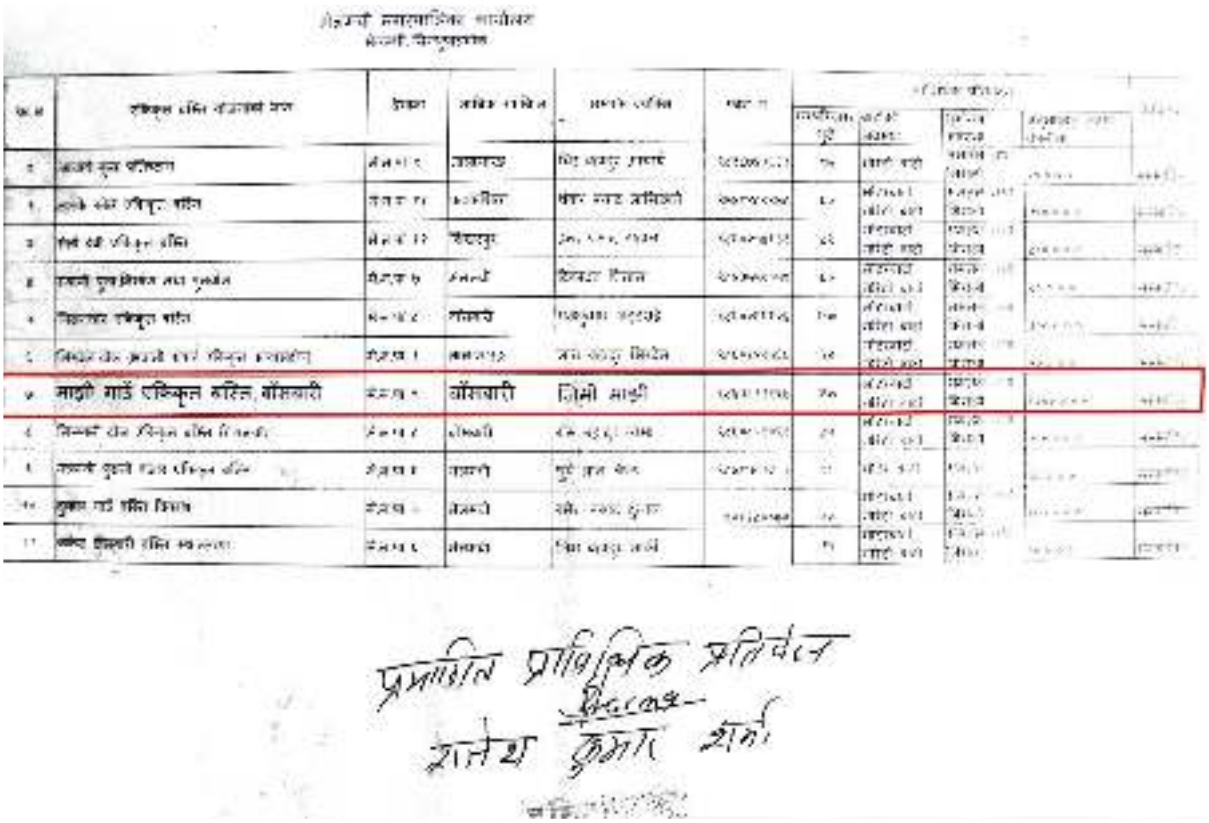
Initially a comparative site study would be done to get a better understanding of the context and derive certain conclusions.

- A discussion with Jennifer B. Duyne (HRRP), UNDP and Ministry (MoUD) Authorities Padma Mainali and Shiv Hari Sharma is part of the preparations.
- Post-earthquakes, logistics and safety is a critical factor and the site visits were planned accordingly.

6.1.2 Search for pro-active communities / Consensus

Selection of a study area through a process from the choice of probable ones is one of the most important aspects of the project. Post-earthquake govt. obviously needs to reach out to every village but some villages possess a greater threat, which needs to be identified.

Willingness:



Source: DUDBC, division office, Sindhupalchok

If the request is already in place by the people, it helps as it shows willingness of the people for such projects and also makes it formal for administrative approval.

6.1.3 Study Area Selection

Study Area Information and Study

Studies of news of damages by disasters like earthquakes, landslide, flood etc. through interactions with experts from academic and other professional institutions.

Consultation

Before establishing any sampling frame it is very essential to carry out the consultation with related stakeholders. Creating a network of individuals and organizations.

Selecting the Probable Study Areas

Analyzing the lists provided by Government and the UN and deciding on a set of affected areas along routes in Sindhupalchok District.

Preliminary Visit of Study Area Settlements

This visit was to understand willingness and observe the vulnerabilities.

Study Area Selection Criteria

The study area selection matrix *(Refer Appendix 6.2)* for finalization of a site should be based on priority parameters. This study area selection matrix catalogues the subjective as well as quantifiable data so as to have a comparative study. First component would include willingness and land loss as key parameters. The second part includes Livelihood components, economic sustenance and building details. The final part includes the logistic suitability, as it would be important for the representatives of the ministry and UNDP to visit the study.

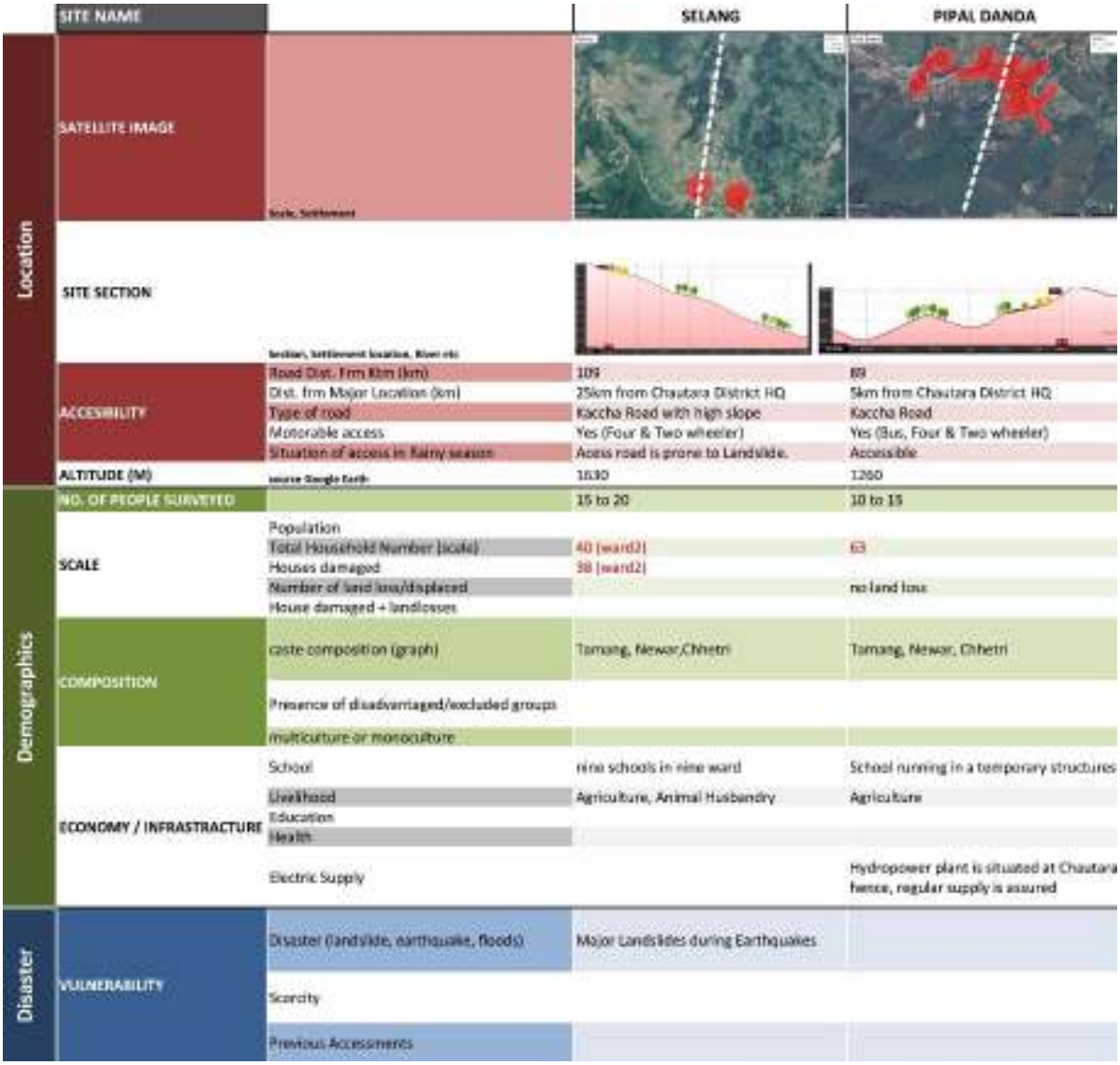
Reconnaissance Visit

This visit was to finalize the willingness and observe the scope for intervention. It was thought essential to keep another study area as a backup.

'Public Consensus' meeting during reconnaissance visit to Mankha

6.1.4 Study Area Selection Process

The site selection matrix has parameters for study area selection. 5 sites namely – Selang, Pipaldanda, Gathi, Mankha, Majhigaon are compared for the selection process. The first set includes the location of the study area, study area profile (ridge, valley, plains, etc.), demographics followed by the damage due to earthquake. The damage is further categorised as household damage, land loss or both. This required study area with land loss are crucial for re-clustering than areas with mere household damage. Land loss could be due to landslides, cracks-ruptures etc.



	SITE NAME		SELANG	PIPAL DANDA
Location	SATELLITE IMAGE			
	SITE SECTION			
	ACCESSIBILITY	Road Dist. Frm Kbm (km)	109	89
		Dist. frm Major Location (km)	25km from Chautara District HQ	5km from Chautara District HQ
		Type of road	Kaccha Road with high slope	Kaccha Road
		Motorable access	Yes (Four & Two wheeler)	Yes (Bus, Four & Two wheeler)
		Situation of access in Rainy season	Acess road is prone to Landslide.	Accessible
	ALTITUDE (M)	source: Google Earth	1630	1260
Demographics	NO. OF PEOPLE SURVEYED		15 to 20	10 to 15
	SCALE	Population		
		Total Household Number (scale)	40 (ward2)	63
		Houses damaged	38 (ward2)	
		Number of land loss/displaced		no land loss
		House damaged + landlosses		
	COMPOSITION	caste composition (graph)	Tamang, Newar,Chhetri	Tamang, Newar, Chhetri
		Presence of disadvantaged/excluded groups		
		multiculture or monoculture		
	ECONOMY / INFRASTRACTURE	School	nine schools in nine ward	School running in a temporary structures
		Livelihood	Agriculture, Animal Husbandry	Agriculture
		Education		
		Health		
		Electric Supply		Hydropower plant is situated at Chautara hence, regular supply is assured
Disaster	VULNERABILITY	Disaster (landslide, earthquake, floods)	Major Landslides during Earthquakes	
		Scarcity		
		Previous Assessments		

Partial Zoom in of the Study Area Selection Matrix (refer Annex 6.3)

The second part has the available economic structure, livelihood options, Disaster vulnerability. The next set includes parameters like interests of concerned groups like ministry, UNDP, initiation from local level, political situation, construction techniques etc. The final parameter are the logistics and accessibility as discussed earlier.

The study area selection matrix for finalization of a study area should be based on priority parameters. This study area selection matrix catalogues the subjective as well as quantifiable data so as to have a comparative study. The idea of the matrix is to quantify the above collected data and sort it in a priority wise order. Each parameter was allotted points accordingly. The study areas, which at the end of marking receive more score, would mean higher probability of selection. Here, the method of **"Selection by Elimination"** is followed to eliminate the less probable site at finalize the most suitable one.

The view of the two toles from south side of Thulaghar

Location/Settlement Names				SELANG	PIPAL DANDA	GATHI	MANKHA	MAJHI GAON
1. Willingness	Community willingness	50	20	15	15	10	20	20
	Request made to LG for Reclustering		15	-	na	-	na	15
	Confirms the UNDP/DUDBC/LG Identified Site		15	15 (UNDP)	15 (DUDBC)	15 (UNDP)	15 (DUDBC)	15 (DUDBC)
2. household numbers/Damages type	House damaged + landlosses	40	10	5	-	10	15	15
	Number of land loss/displaced		10	4	-	5	10	10
	Houses damaged		15	8	8	10	8	10
	Total Household Number (scale)		5	-	-	-	-	-

Earlier this was a single matrix where all the totals would be compared and a final site decided. But after discussion with the UNDP, and Prof. Anne Feenstra it was decided to divide the matrix into 3 main components. First component would include willingness and 'land loss' as key parameters. If any site fails to gain point in these parameters, it is not contested further and eliminated in the initial phase itself. Thus in above chart 'Pipaldanda' does not have any land-loss issue and hence it is not contested in further charts. (As below)

3. Economic development Strength/livelyhood opportunity	Agriculture + Hortculture + Livestock + Tourism + Cottage Industries + Community Forest	30	5 each	5 + 0 +0 +0 +0+0		5+0+5+5 +0+5	5+5+5+0 +5+5	5+5+5+0 +0+0
4. Disaster Vulnerability	Landslide	30	15	5		15	15	10
	Earthquake Hazard (Ridge and Valley)		10	10		10	10	10
	Scarcity of Resources		5	4		4	4	4
5. Stakeholder Informations	Number of active CBOs	25	10	na		-	10	10
	Aid/relief agencies		5	5		5	5	5
	public line agencies		5	5		5	5	5
	distinct cultural groups		5	5		5	5	5
6. Local Materials / Construction Technique	Local material resource available	20	10	4		6	6	6
	Technological knowhow		5	-		-	-	-
	Modern material/tech. used		5	-		5	-	5
7. Type of Settlement	Presence of disadvantaged/excluded groups	15	10	-		5	5	5
	Multicultre or Monoculture		5	5		5	5	5

Similarly, in the above part of the matrix, Selang is discontinued in the further part.

8. Logistic Suitability	Motorable Access	15	4			2	3	2
	Student's Accomodation		4			1	2	2
	Proximity to Healthpost, hospitals		4			-	1	2
	Situation of Access in rainy season		2			2	2	2
	Electricity		4			1	3	3
Total Score obtained						142	174	181

The final part includes the logistic suitability. For the thesis purpose it is crucial to involve this criteria. But for other such projects this criteria can be omitted as per suitability. From the matrix it was concluded that **Mankha and Majhigaon** be selected as the final two options. A single final site was not selected to have a final on site comparison and also to have a backup option. The two sites will be comparatively studied in the process in the initial stages.

However, this idea of a points for parameters was debated as it is difficult to rate some aspects by points as they cannot be black or white but be in the grey areas and it depends on the observer's perspective

6.1.5 Final stage of selection

To identify the characteristics, nature and category of the relocated people the consultation was made for about half day at the municipality at Melamchi, VDC headquarters at Chautara, and the UN office.
Division of teams in two groups for time-saving and covering maximum number of sites
Small interactions with the communities at Sangachowk, Chautara, Pipaldanda, Mankha, Gathi and Melamchi, Majhigaon, Selang, Navalpur and Salagari.

"Selection by Elimination"

Each parameter was allotted points accordingly. The study areas at the end of marking receive more score would mean higher probability of selection. Here, the method of "Selection by Elimination" is followed to eliminate the less probable study area to finalize the most suitable one.
An idea of another matrix was proposed which offered points for each parameter (to quantify the available data) for comparative analysis. The experts citing that the factors are not quantifiable and the process misses out on many intangible qualitative aspects rejected the ranking matrix.
After the reconnaissance visit to Majhigaon and Mankha, Majhigaon was finalized as the site for intervention. Both the sites have similar problems pertaining land loss and damage. People in Mankha who promised of cooperation and had shown willingness were found to have dispute regarding the land issues. Some people had reservations about sharing or providing land for lower class, which would eventually jeopardies the land pooling process for re-clustering. Due to lack of time and conditions of this project Mankha was rejected and kept as a second option.
Majhigaon thus is the selected site for re-clustering process.

The view of the two tols from North side of Thulaghar tol, Majhigaon

6.2 Study Area Selection Matrix

	SITE NAME		SELANG	PIPAL DANDA	GATHI	MANKHA	MAJHI GAON
Location	SATELLITE IMAGE	Scale, Settlement					
	SITE SECTION	Section, Settlement location, River etc					
	ACCESIBILITY	Road Dist. Frm Ktm (km)	109	89	97	84	45
		Dist. frm Major Location (km)	25km from Chautara District HQ	5km from Chautara District HQ	8	7	1
		Type of road	Kaccha Road with high slope	Kaccha Road	Kaccha Road with high slope	Kaccha Road with high slope	Kaccha Road with high slope
		Motorable access	Yes (Four & Two wheeler)	Yes (Bus, Four & Two wheeler)	Yes (Four & Two wheeler)	Yes (Four & Two wheeler)	Yes (Four & Two wheeler)
		Situation of access in Rainy season	Acess road is prone to Landslide.	Accessible	Difficult acess prone to Landslide, Boulders	Access road is prone to Landslide	Rubble, prone to landslide
	ALTITUDE (M)	source Google Earth	1630	1260	1450	1435	960
Demographics	NO. OF PEOPLE SURVEYED		15 to 20	10 to 15	20 to 25	10 to 15	12 to 15
	SCALE	Population					
		Total Household Number (scale)	40 (ward2)	63	120	337	350
		Houses damaged	38 (ward2)		119	almost all	almost all
		Number of land loss/displaced		no land loss	land lost	35, Sangare has 10 HH displaced	
		House damaged + landlosses					24
	COMPOSITION	caste composition (graph)	Tamang, Newar,Chhetri	Tamang, Newar, Chhetri	Majority are Newar, Sherpa, Few Tamang, couple of Christain families	Majority are Tamang, Followed by Brahmin, Chhetri, lastly very few Buddhist & Christains	Manjhi, Nepal Thok / Basti
		Presence of disadvantaged/excluded groups					
		multiculture or monoculture					
	ECONOMY / INFRASTRACTURE	School	nine schools in nine ward	School running in a temporary structures	Kali Devi Sec. School		Siddhi Ganesh primary school / TLC, Schools are damaged
		Livelihood	Agriculture, Animal Husbandry	Agriculture	Agriculture	Argiculture, Dairy, Community forest	Fishing, Agriculture, Animal husbandry
		Education			Very poor, highest is amin	Mostly literate, 50%	
		Health				No Health access	
		Electric Supply		Hydropower plant is situated at Chautara hence, regular supply is assured		Regular Supply	
Disaster	VULNERABILITY	Disaster (landslide, earthquake, floods)	Major Landslides during Earthquakes		Landslides in 2002 AD & 1985 AD (2058 BS & 2041 BS),Land Ruptures, Landslide vulnerability	Risk of Landslide, landslide after earthquake, Cracks present in Baldhu and Sankhe, Deforrestation	Landslides, Land Ruptures
		Scarcity			Drinking water source damaged, using water for irregation	4-5 houses get one water tap, Wood for building, foor sufficiency	
		Previous Accessments			By a Korean NGO, Drone survey proving cliff erosion		
Willingness	CONCERNED GROUPS	Community Response		Prepared for reclustering with incorporation of prevailing social structure and livestock		Prepared for land provision within community for relocation	Willing for reclustering
		Ministry of Urban Development (MoUD)		Prepared for Reclustering if it could facilitate daily livehood	Prepared to Recluster, Awaiting government approval	High willingness for Reclustering	
		Initiations from local level	Face Nepal helped in rebuilding transitional shelters	Three houses have started reconstruction on their own of which one is a concrete structure		Aama Samuha, Youth groups, Children groups, Local Governances	As an Initiation from local level, 20 ropanis of land has been allocated for resettlement. They have submitted a Concept Intregated Development Plan to MoUD and Divisional Office. If required, people are ready to exchange land. The desire is to build row houses along the road.
		UNDP	Ward no 6 Basimle, Arubote, Kune Gau and ward no 9 Deurali, Shera, Kuwapani are prone to landslide. Ward no 6,9 and 5,7,8 all have heavy ground cracks. Terrified people have requested resettlement to safer zones as reported.		land lost		
Recluster Opportunity	LOCAL MATERIALS / CONSTRICTION TECHNIQUE	Local material resource available	Stone, Earth, Timber		Bamboo, Timber, Stone, Earth	Bamboo, Timber, Stone, Earth	Stone, Earth, Timber
		Awareness of construction Technics					
		Modern material/tech. used					
	LIVELIHOOD OPPORTUNITY AND CHALLENGES			Agriculture, dairy, proximity to Chautara market	Khotesal producing resin can be increased and intregrated into livehood, Milk, Drinking water source diverted to irigation	Mustard, Millet, Paddy, Community Dairy & forest, opportunity for animal farm, Perennial Water resources, Land price cheap.	Animal husbandry, Mason training there can serve larger area, fishing activities though ceased but can be alternative.
Other Information	POLITICAL SITUATION						
	SITE CAMP-STUDENT FACILITIES	Lodging/Fooding	Insufficient facilites for working, & staying	Proximity to Chaurata assures good facilities	Difficult to manage facilities for working & staying	Locals prepared to facilitate students	Proximity to Melamchi assures good facilities
		Electricity	Hydroelectricity National Grid, Lamsang	National Grid	24hrs	24hrs	
		Access in Rainy Season					
	STAKEHOLDER INFORMATIONS	CBOs				Active	Active Manjhi community leader, Jimi Lal Majhi
		Aid/relief agencies			Mistle Top, MDA organisation	Save the children, Face Nepal	Save the children, Face Nepal
		Public line agencies				Active local governance group	
		Government Initiative			Free of Open Defeacation' zone implemented by government	Free of Open Defeacation' zone implemented by government	
		Distinct cultural groups					
R	Remarks				Historic route to Khasa ,Tibet people used to work at Tatopani as labour force	Intangible heritage public land less 150 to 200 sqm	

Sindhupolchowk District

6.3 Cadastral Map

6.4 AIT Re-clustering Project (reference case study)

[A] Extension to New Houses; [B] Linear House Lane; [C] Plan and Section of Arubothe Majhigaon; [D] Temporary Shelter for Cattle [E] Temporary Shelters.

The case is a local settlement called Arubothe Majhigaon, which is across the river to the selected study area of the same name. This new Arubothe Majhigaon was constructed right after the earthquake in the same location itself. A group called 'AIT – Asian Institute of Technology' based in Thailand has built 46 houses and a community hall for the whole village. This is done in Nepal Association. The houses are built at a cost of 4lacs NPR per house. They are constructed using thick ACC Sheets and GIS for roofs while the salvaged materials were used for foundations. For example, the roof slates were used as tiles for the street floor and steps.

The positive learning's from this Majhigaon are community labor input; land is contributed by locals themselves (similar to land pooling); plantation; access road and salvaging material for construction. For example, roofing slates being used for flooring. The negatives impacting are that the row houses ignores the settlement pattern of the past, inadequate climate protection, cattle area not defined, non participation of the community in terms of design process.

6.5 Household Survey Form Used

Form no. ……..
Date of Interview: …….
Name of Interviewer:……

Settlement: ……
House No:……
Name of Interviewee: …….

1. Background Information

1.1. Name of Household Head: ……
1.2. Age:…….
1.3. Sex(M/F):……..
1.4. Caste & Religion:…….
1.5. Mother tongue:…….

2. Household Information

2.1. Are you Displaced?.....
2.2. Are you migrated?.....(yes/no)……..from where ……& Cause of migration
2.3. Information of your household

SN	Name	Age	Gender	Marital Status	Occupation	Education	Differently Able
1							
2							
3							
4							
5							
6							
7							

3. Land Information

3.1. Ownership……
1.Owned, 2.Leased,
3. Squatting, 4.Other
3.2. Plot No:……..
3.3. Plot Area:……..
1.less than 4 anna, 2. 4 to 8 anna
3. 8 to 16 anna 4. more than 1 Ropani
3.4. Land Division
1. Family Division 2. Self sub-divisio
3.5. Land Value (Commercial)……
1) Less than 50,000 2) 50,000 to 1lakh
3) more than 1 Lakh

4. Livelihood

4.1. Farm area
1) less than 1 Ropani, 2) 2 to 4 Ropani
3) more than 5 Ropani
4.2. Farm distance (time)……
4.3. Expenditure……
4.4. Saving……
4.5. Occupation (for eg. 1 or 1+2)
1. Labor 2.Agriculture
3. Fishing 4.Transportation
5.other
4.6. Household asset (for eg. 1 or 1+2)
1. Cycle 2 Motorcycle
3 TV 4 Gas Cylinder 5.other
4.7. Crop production(no. of muri)……
4.8. Livestock
1. Cow 2 Buffalo
3. Pig 4 Cock & Hen 5. Other
4.9 Local Skill
1……2 ……..……3……..…

5. Building Information

5.1 House statues
1. Completely collapsed 2. partially collapsed
3. Not affected
5.2 current function of the above house
……..
5.3 Period or Age of building:……
5.4 Number of storey (before earthquake):…….
5.6 Floor Height (before earthquake):……..
5.7 Building: 1. Traditional 2. Modern
5.8 length:…….. 5.9 Breadth……

6. User perspective

6.1 Do you know resettlement plan
1. Yes 2.No
6.2 Do you know reconstruction plan
1. Yes 2.No
6.3 How would you response
1. Strongly agree 2. Agree
3. Disagree 4. Completely disagree
6.4 Would you provide land for displaced people
1. Yes 2. No
6.5 List three important things you want to include in the proposed cluster plan
1……
2……
3……
6.6 Whom would you prefer as your neighbour?
1. Extended family 2. Same caste
3. Any 4. Specific……
6.7 Where would you like to resettle?
……

6.6 Ecological tourism

The area falls in the sub-tropical moist deciduous zone / sub-tropical dry deciduous zones and supports mixed forests of Oak, Pines and Sal trees. Altitude varies in the region in the ranges as low as 800 M near the river basin to about 1500 M and above to places where rhododendrons can be seen. This allows for the sight of a variety of birds, some of which have also adapted to live of the farmlands.

So there is a scope of ecological tourism in the site, and as such small groups of bird watchers can be seen sometimes.

6.7 Project Team

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