SES

Social Inclusion and Energy Managment
for Informal Urban Settlements

CASE STUDY
URBAN UPGRADING IN A PERI-URBAN INFORMAL SETTLEMENT
THE CASE OF DINGUR NEIGHBORHOOD, MEKELLE

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Erasmus+

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ACRONYMS

CWSP: City Wide Structure plan

LDPs: Local Development Plan

SP: Structure Plan

CSA: Central Statistics Agency

HHs: House Holds

CBOs: Community Based Organizations

GIS: Goegraphical Information System

CGIS: Corriguted Galvanized Iron Sheet/Steel

SWOT: Strength, Weakness, Opportunity and Treat

WHO: World Health Organization

MSE: Micro and Small Enterprises

NGO: Non-Governmental Organization

KWHM: Kilowat Hour Meter

PV: Photovotaic

MAGS: Multiple Access Service Gateways

BTS: Base Transceiver Station

ABCD: Asset-Based Community Development

ESMS: Environmental and Social Management System

RAP: Rapid Assessment Program

EC: Ethiopian Calendar

BAR: Building Area Ratio

KWHM: Kilowatt-Hour Meter

EEPC: Ethiopian Electric Power Corporation

CONTENTS

CHAPTER 1
ANALYSIS

PART 1/1
EXECUTIVE SUMMARY

Upgrading in place consists of retaining many or most of the existing structures (streets, houses, natural landscape etc.) but organizing resources or incentives for improvement of those structures; this upgrading of places also includes upgrading of infrastructure to improve health and quality of life in the neighborhood. In modernizing infrastructure, there may be buildings to be demolished to create necessary right-of way, for example, but this is minimized so that most residents can remain in place. This is the lowest cost strategy and is most likely to enable poor families to afford to remain in situ. However, it has also limitations such as the quality of housing improves only incrementally, to keep within the limited resources of its occupants or retaining the structures of the neighborhood to be upgraded, and it is unlikely to increase the density of an area unless there is substantial vacant land.

The upgrading project is chosen to be carried out at the outskirt of Mekelle city in a place or neighborhood called *Dingur*. *Dingur* is chosen because the community has frequently demanded to upgrade and sell their property but were not able to do so without detailed urban plans such as local devel-opment plans (LDP) of which Upgrading is one. Beside this approach was preferred due to low cost and limited displacement. The upgrading project study included socio-economic dynamics and characteristics, housing conditions, housing facilities, existing land use, physical and social infrastructure problems and socio-economic and demographic needs of local communities.

This upgrading project is, therefore, expected to integrate such opportunities in a way to empower community life including unemployed youth, widowed and divorced destitute mothers, and the elderly that make up 15.9%, 18.9% and 10.5% of the community respectively. The basic problems identified by this study are a lack of basic utilities and social services, poor housing conditions, relatively low income residents with small scale agricultural activity, irregular pattern of roads and blocks, ragged topography and swampy areas, lack of legal land ownerships etc. Having identified the main problems and shortcomings, proposals and recommendations are forwarded which could help support to improve the livelihood of the community and shortcomings based on the local context opportunities available. ◆

PART 1/2
GENERAL BACKGROUND

2.1 General Objectives

The main purpose of the study is to increase the relevance of urban planning studies by introducing multidisciplinary topics like participation/social inclusion, housing, and environmental components to the existing academic courses, and to prepare an upgrading project for the study area by investigating the existing situation of *Dingur* area and come up with possible solutions.

2.2 Specific Objectives

- To analyze the existing socio-economic situation and to identify possible socio-cultural risks and benefits that can affect local communities,
- To identify possible impacts and propose mitigating measures such as to enable or motivate socio-demographic and environment safeguard activities
- To assess the spatial features with focus on housing conditions
- To identify the existing land uses
- To assess the existing physical and social infrastructures
- To draw possible recommendations and concerns which will improve lives and empower social life by taking it into consideration at planning, realization and after the implementation of the upgrading project
- Improve the controlling mechanisms of squatter settlements around the area with proper planning
- To enhance new development and bring new vitality to the area by adding new functions.
- To identify priority problems related to the existing road and transport system

2.3 Scope

The analysis of the *Dingur* area upgrading project which covers an area of 1,370,000m^2 (137 hectares). The thematic issues in this section are existing housing and land use. These issues include socio-economic dynamics and characteristics, housing conditions, housing facilities, existing land use, physical and social infrastructure.

2.4 Methods of Data Collection

The analysis is done by using the primary and secondary data types with qualitative and quantitative methods of analysis. As primary data a census household survey, a ground survey and observations were made to collect the necessary data on socio-economic condition and spatial situation of the area. Moreover, secondary data were used from the previous City Wide Structure Plan (CWSP) and various statistical abstract and bulletins.

The data collection techniques used in the preparation of this upgrading project was through observations by conducting field visits and reconnaissance surveys to understand details of the existing conditions of the upgrading site. A complete ground survey was conducted to collect spatial and topographic features on 1,370,000m^2 (137 hectares) of the upgrading site.

In line with the above, a survey was made for the whole residents of *Dingur* upgrading area. 458 households were interviewed from the upgrading project site as part of the census type assessment.

Generally, the methods of situation assessment made for various thematic issues in *Dingur* area of Mekelle city includes:

- Review of the previous studies and documents,
- Census house hold survey using a structured questionnaire,
- Reconnaissance survey through site visit,
- Sample Traffic counts around the site,
- Ground Survey,
- Interviews,
- Expert in-depth analysis,
- Stakeholder discussions

In addition, the stakeholder that participated during the study include the following:

- City level administration
- Local administration
- Mekelle University ◆

Figure 1

Methodological flow diagram
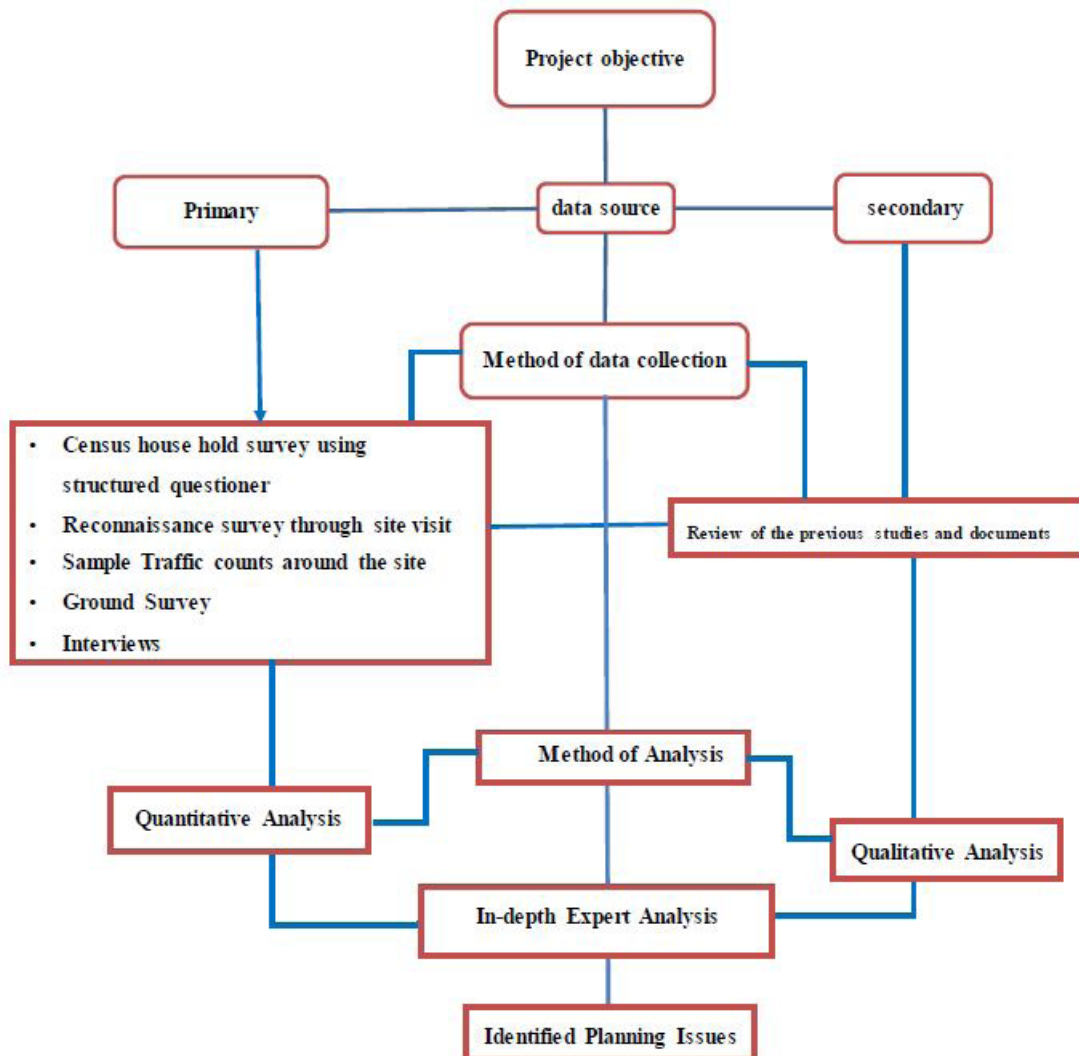
Source: Prepared by the author, 2017

PART 3
SOCIO-DEMOGRAPHIC ANALYSIS

3.1 Background Justification and Methodologies

3.1.1 Introduction

Following the preparation of a structure plan, a LDP such as an upgrading project is a next step that leads the plan to implement it into practice, which is applicable at a level of urban upgrading, renewaland expansion development supporting the implementation of the structure plan. Upgrading project implementation is aiming to enable a given neighborhood to be more suitable for living, working and recreation. It is an enabler for local communities to make and activate small-scale business enterprise, healthy social environment and community empowerment outputs.

During a planning year in 2009 EC, many upgrading plans (LDPs) were prepared for different settlement areas of Mekelle city including other parts of *Debri* area. Some upgrading projects were implemented but many others were outdated and the sites remained frozen from any development intervention.

3.1.2 Background Information & Historical Review of Upgrading Project Areas

Dingur that includes *Genha* neighborhood is found at *Debri tabia* of *Adi-haki* sub-city, which is found south-west of Mekelle city. It is surrounded by *Adi-da'ero* in the northeast; *Mai'emuri* to north, the industrial zone and *Meles* academy to the southeast and farm and grazing land to the east direction. The study area is characterized by semi-urban/rural characteristics and was annexed to Mekelle city seven years ago. Based on site observation, the shortage of basic infrastructures, urban plan/LDP and issue of existing tenure (e.g. *metesha*/plot allocation, land speculation) are going to be critical challenges during the implementation of the upgrading project. These days, the site is attracting different people for different project intervention purposes, which include among others industrial zone, condominium housing development, urban agriculture activities, and residential housing development purposes.

This socio-demographic assessment will therefore be a helpful instrument in designing and implementing socio-cultural and demographic sensitive analysise for the implementation of the upgrading. Such socio-demographic situation analyses are carried out to support and as input for preparing and implementing upgrading project objectives for the development of *Dingur* settlement areas.

458 households were interviewed from two sites at *Dingur* settlement area; out of this 71%, from *Dingur* and 29% from *Genha* sub-locality as shown in the table below.

Table 1

Total No. of households participated for the upgrading study at *Dingur* site

NO.	SUB LOCALITY	FREQUENCY	PERCENT
1	Dingur	325	71.0
2	Genha	133	29.0
	Total	458	100.0

Sources: Household survey, 2017

3.1.3 Resources and Engagement to collect primary data

This study used secondary data as well as field observation as means of additional data collection. 5 supervisors and 15 data collectors were employed to undertake a census type of data collection method and finalized it within a week.

3.2 Survey Findings of *Dingur* Upgrading Site

3.2.1 Socio-economic and demographic characteristics

Age and sex composition: this study has tried to examine socio-demographic status of the households situation that live at *Dingur* and *Genha* locality.

Out of all household heads, 229 (49.9%) and 230 (50.1%) are male and female respectively with 100:99 sex ratios. This sex ratio is is a reflection of the rural character. The majority of the residents are aged between 18-65 years. 72.5% are found at 18-50 years, in the mostproductive age; while 16.1% is found at the age of 51-65. A significant number of old aged population is found at *Dingur, which* accounts for 10.5%. The percentage of middle and old aged population at *Dingur* is higher as compared to the average of Mekelle city as a whole. This age structure indicates that *Dingur* is less influenced by young people rural-urban migration. This result is an indication to give special attention for old people and to provide special basic services (see table, below for age and sex structure).

Table 2

Age structure by sex proportion

	<18	18-50	51-65	>65
■ %	0.9	72.5	16.1	10.5
■ F	1	172	33	24
■ M	3	161	41	24
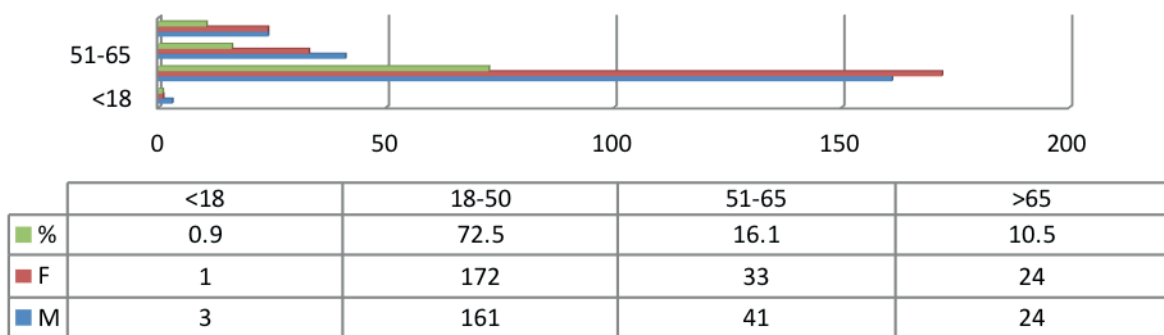
Source: Household survey, 2017

Marital status: 70.2% of the *Dingur* residents are married; while 11.3% are widowed, 10.5% single, 7.6% divorced and 0.4% separated. It is a surprisingly large rate of widow/widowed and divorced population (sum of 18.9%) for such arural and semi-urban settlement area when compared to the 2007 national average of 10.5% for both cases together (Central Statistics Agency, CSA) or when compared to the regional average of 7.2%. Why is there such a large number observed at *Dingur*? What is its implication in relation to the implementation of the upgrading project? One assumption, which needs further investigation, could be that males who live at the urban fringe do have more access to engage in doing unsafe sex with commercial sex workers in the city center and such practice makes them vulnerable to contagious diseases (e.g. HIV/AIDS) and death. As a result many female headed households remained widowed. The other assumption might be that due to the low cost of house rent in the periphery than in the city proper that low-income groups move to this neighborhood to afford the rent.

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It is therefore important to give special consideration for this group during a resource allocation and development of project proposals (e.g. MSEs or business activities). Besides, it would be important to control and follow-up the individuals not to spend the loan money on unnecessary expenses. Thus it needs strict follow-up to invest the resource on economic and social empowerment purposes (see chart, below).

Table 3

Marital status of residents at *Dingur* neighborhood

	single	married	divorced	widowed	separat
Frequency	48	322	35	52	2
Percent	10.5	70.2	7.6	11.3	.4
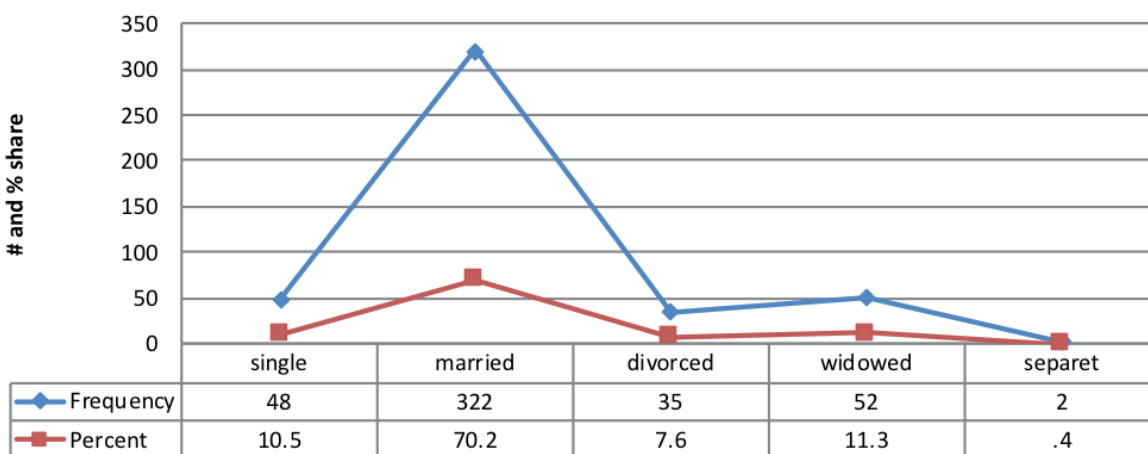
Source: Household survey, 2017

Religious composition: religious composition among the 459 target households at the *Dingur* upgrading study site is: 97.6% Christian orthodox, 2.2% Muslim and 0.2% of other religions.

Furthermore, a physical inventory has been made on existing religious and other social infrastructure at the upgrading study area. Accordingly, it has 3 worships and 3 cemeteries. It will be necessary to meet existing standard requirements and to serve existing and new household heads that are expected to settle at these sites after the upgrading implementation with aplus of 2,295–2,650 in the number of existing population (No. of Households x 5).

Figure 2

Religion composition
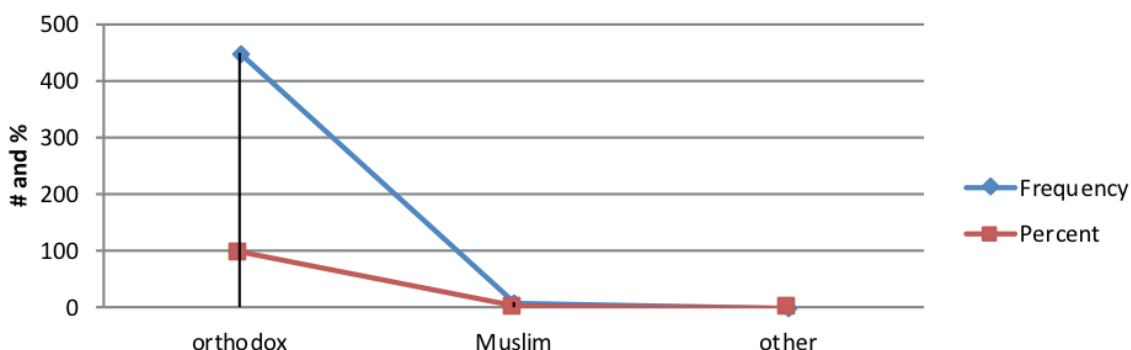
Source: Household census, 2017

Educational status: census study on educational characteristics of people living in *Dingur* upgrading study site showed that 64.1% of them are reported illiterate, 24.0% primary education, 8.7% secondary education and the remaining 0.7% do have diploma and higher education (see detail, below). Such results indicate that still efforts are required to improve education status of the community for a better utilization of the upgrading project implementation and an effective neighborhoods redevelopment.

Occupational status: the majority of residents assures their livelihood with agriculture which accounts for 46% of occupation. According to the census outputs, the second largest population group at the upgrading study site is that of unemployed youth with 15.9%. Some others engage in informal activities which include daily laborer and other activities (see below for additional info). Efforts are required to strengthen and transform rural type of socio-economy into urban life which includes urban agriculture and modern business activities.

Table 4

Educational status of people living at *Dingur* including *Genha* sites,

EDUCATIONAL BACKGROUND	FREQUENCY	PERCENT
Illiterate	294	64.1
Primary school	110	24.0
Secondary school	40	8.7
Diploma	2	0.4
Degree	3	0.7
Non reported cases	10	2.1
Total	**459**	**99.8**

Source: Household survey, 2017

Table 5

Occupational status and means of *Dingur* communities' livelihood

MEANS OF INCOME	FREQUENCY	PERCENT
Missing value	1	0.2
Governmental employee	5	1.1
Business & trade activities	49	10.7
Pension and related sources	4	0.9
Dependent on family	7	1.5
Unemployed youth	73	15.9
Agriculture	211	46.0
Agriculture and other (mix)	10	2.2
Other	99	21.6
Total	**459**	**99.8**

Source: Household survey, 2017

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Length of stay and migration trends to upgrading study area *(Dingur)*: more than 38% of the residents have lived more than 30 years and most of them were born and raised at *Dingur* upgrading site; while with relatively equal rate 33% people live less than 11 years at the project site and are considered as migrants. The other 29% have lived in *Dingur* between 11 and 30 years. The report indicated that there is significant number of new households establishing at *Dingur* upgrading project area. During the time of data collection the research team observed that new unplanned residential houses were constructed at *Dingur* either through *Metesha/plot allocation* or purchase mode of land acquisition in which will constitute a challenge for the upgrading project study and implementation (see table 6).

Table 6

Duration of stay at *Dingur* Neighborhood
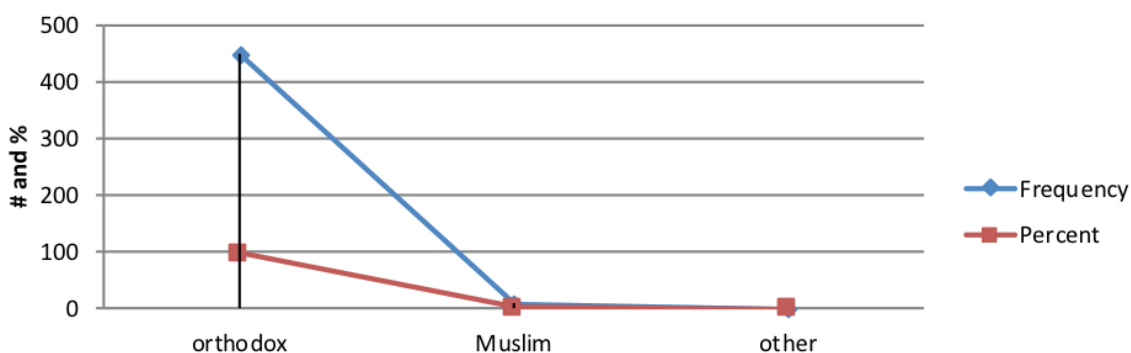
Respondents were asked to indicate their place of origin. The majority of them mentioned that they are from *Dingur-Debri* and surrounding areas. Mekelle city and south-eastern zone are the second major areas of origin. As presented in the chart below, few originated from the eastern zone of Tigray and very few from other places. Why do new people come from Mekelle and other places to the upgrading project site? It is understood that a key reason is to search low cost shelter and to access land assets at annexed villages which is impossible to get at the urban center and possibilities eroded due to unaffordable costs.

Table 7

Place of origin

	Debri & suroundings	Mekelle city	south-east zone	Eastern zone	Other places	sum
# by place of origin	281	73	65	24	16	459
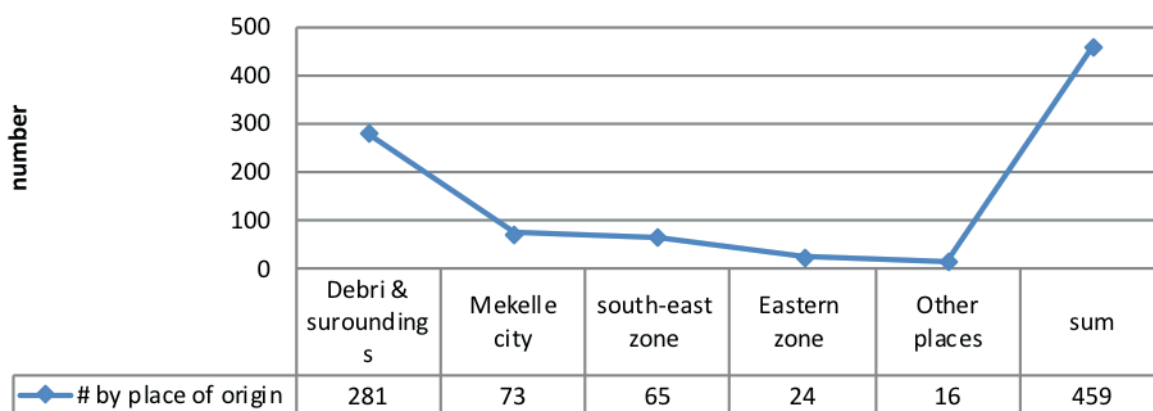
Source: Household survey, 2017

Furthermore *Dingur* in-migrants reported to have come from different parts of the south eastern zone of Tigray *(Enderta, Gabat, Hawtseba, Kokolo, Maianbesa, and Maikayh, Adikolo, Sesela, and Mekelle)* and other areas. Most recent settlers come to access land at the upgrading area in which such land holding practice is going to be a threat in legalizing land ownership.

3.3 Brief understanding on its tradition and social infrastructures (coverage and qualities)

Tradition (historic/cultural background):
it is common to hear different names which indicate where senior citizens come from. Some study participants mentioned that *Dejat* GebreTekle with a support of *Debri* leader, priest Hailu is initial founder of *Dingur-Debri*. *Debri* is a church's name which serves also for a place name. *Dingur* means rocky area. Other key informants reported that availability of fertile land attracted W/ro Wubnesh to establish *Debri* area as settlement place. Some other people argued Bilata Jibril was a founder. Whoever is a founder, *Debri-Dingur* settlement area was known as *Adi-Dejat GebreTekle to mean a place of Dejat Gebretekle* and land use was administered under church ownership. The specific upgrading site is *Dingur* which means rock-strewn and *Genha* is also its part.

Ashenda, Chelanqua, Meskel and epiphany public festival celebration decorated with horse run events are original cultural events of *Dingur-Debri* settlement area of the *Enderta* region. *Dingur-Debri* area is endowed with better natural resources of ground water, fertile farm land, fruit/vegetables, different color stone-rock (e.g. black), the Saint George monastery church with '*Tselamo*', holy water found at Saint Micheal which can serve as basic resource inputs in implementing development activities.

Existing social infrastructure (coverage-access and qualities): there are three basic social infra-structures, which include one nucleus health center located at *Dingur*, one elementary school located around *Dingur-Debri* (1-8th), two worship centers which include cemetery sites (Selassie and Giorgis at *Dingur* area). The school and health center have accessibility issues in terms of coverage and quality due limited road infrastructure. Traditional religious affiliated helping associations such *Eddir*, *Mahiber*, which include *Equb*, etc., are in place. Efforts are also undertaken by health extension workers, by teaching residents on how to prepare and use toilets, kitchens and sanitation facilities.

3.4 Communities' satisfaction and perception on social infrastructures

Health institution: 30.7% of the households have mentioned that the health institution is not accessible to them and 13.8% reported it is far away, in terms of distance. The rest of the respondents do not have a problem to access the health services. In relation to overall quality of the health institution, 45.2% households noted that it is below standard, offering low quality services because it is not always operating, does not have qualified workers (e.g. midwifery/ equipment, medicine etc.). Efforts are in place to upgrade it into a health center but still it is functioning at a rank of health station level. For the coming years, the upgrading project site with its adjacent settlement areas is required to have one complete/upgraded health center and two health posts.

Educational facilities: The upgrading project study households were asked to give information related to access and satisfaction with education facilities. According to the respondents, at present status, there is no critical problem in terms of access, distance and quality. However, for a coming future, it is seemingly necessary to propose one elementary school, to upgrade the existing one to preparatory school and build one technical school.

Housing situation: Every household [#459] reported as the owner of a residential house which was received through *Metesha* and family donation mode of receiving land/housing units. During the time of data collection for upgrading studies, the survey team observed that little attempts were in place among family members in reporting as independent households even if he/she claimed to have its own separate dwelling units; and the study team felt there might be quite a few exaggerations in number of households. Housing units are scarce with housing facilities. Most of the residents lack independent toilet, shower and kitchen facilities. The upgrading study area settlement patterns in *Dingur* are unplanned rural patterns with no road infrastructure. Issues of legalization and standardization need to be verified prior to upgrading. Hence, attention is needed to implement upgrading study outputs with minimum displacement risks.

Public space and facilities: community space in the study area is scarce and it includes park, sport fields, a library, museum, recreational center for children and elder people, etc. Elder people use a grass land, natural greenery areas as place of socializing and to carry out public events. During the dry season children use a grazing land as sport field and playing ground. Regular sport games are being done at school level. However, there is a need to have modern playing and recreational centers for elder people and children including access to sport fields and play grounds.

Farming is a leading livelihood sector in the study area and grazing land serves as a public space. Second leading means of livelihood at the study and nearby areas are vegetables/fruit production and meadow sites. These parcels can be potential assets to use in a near future. Community groups were asked to give response concerning availabilities of helping associations or Community Based Organizations (CBOs). To this, not more than 7.4% gave yes as an answer. Mainly, traditional type of helping associations like *Eddir* associated with some other CBOs is operating at *Debri* which include *Dingur* areas (see table below).

Table 8

Availability CBOs services

Q. IS THERE ANY CBO WHICH PROVIDES SUPPORTIVE SERVICES TO THE AREA		
Responses	**Frequency**	**Percent**
yes	34	7.4
no	259	56.4
no response	129	28.1
Total	**459**	**100**

The issue of unemployment is becoming a critical agenda among young people even at the level of semi-urban settlement areas. More than 10% of the respondents reported that unemployment at *Dingur* area is a critical problem in which the upgrading implementation shall focus to solve it in a sustainable manner.

Opportunities: Due attention has been given to understand community perception and readiness among communities living at the study areas towards opportunities, threats and readiness in implementing the upgrading project at their localities. 27.2% participants indicated that upgrading project is a great opportunity for them.

Question: Would the upgrading project implementation have opportunities? And what possible impacts can you trace?

Table 9

Perception of the community on upgrading project impact

DINGUR SETTLEMENT AREA	FREQ.	PERCENT
Prefer to be silent-no services	140	30.5
Yes, opportunities are in place	125	27.2.
No, it will not have opportunities	5	1.1
Yes, and the opportunities are: Access to infrastructure development	70	15.5
Ensure good governance	37	8.1
Create job & income opportunities	54	11.8
Job, infrastructure, other benefits	28	6.1
Total	**459**	**100**

Source: Household survey, 2017

Constraints: Perceived constraints related to the upgrading project implementation include the following:

- 88.2% of residents reported that no problem whatever gaps will be created because advantages outweighs the constraints;
- 19.2% mentioned that the upgrading project would affect in dislocating them from their social set up and settlement patterns, which include social networks. There is a fear of displacement from the center to the periphery with little compensation;
- Issue of existing land tenure created as a result of *Metesha*/plot allocation and land purchase will be another concern during the time of upgrading project implementation;
- Some mentioned that it will enable them to act jointly against issues related to illegal land holding and other issues such as to ensure good governance practice and socio-environment safeguards;
- social networks will be interrupted but will need to be managed under neighborhood assets map case management;

Community desire to support the upgrading project implementation: residents confirmed that their contribution and support will be in place during the time of upgrading implementation. They will accept displacements with minimum impacts and reasonable cost of compensation. Their support will include supportive comments and advocacy to other residents for their positive participation and contribution rather than becoming reluctant to accept the upgrading project implementation. Besides, residents will participate in ensuring social protection and good governance which are expected as a result of the upgrading implementation.

3.5 Conclusion and Recommendations

3.5.1 Conclusions

Dingur, like many other annexed village settlement areas, was not benefiting from intended intervention such as infrastructure development activities. This was, among other things, due to a delay in implementing urban upgrading projects.. Such a delay gives an opportunity to flourish land speculation and illegal settlement. Despite the availability of social infrastructures, they are not accessible for all neighborhoods and residents due to a lack of local plan and road infrastructure. Thus, the study and implementation of an upgrading project in the neighborhood is good opportunity.

3.5.2 Recommendations

- **Ensure wellbeing of local people prior to use land for expansion and investment purpose:** Prior to every other thing the upgrading project is expected to meet socio-economic and demographic needs of local communities. This ensures local development and prevents from negative impact in relation to social safeguard practice rather than to search expansion area to benefit inner cities. This is to say that the upgrading project maintains social ties and livelihood instead of encouraging urban renewal and redevelopment.

- **Requirement to integrate local needs with investment projects**: *Dingur* upgrading site is advantageous in accessing the nearby new industrial zone as economic institution that is located to the North West and has Meles Academy as social institution. Such institutions will enable its community to build their socio-economic benefits and improve livelihood. This upgrading project is, therefore, expected to integrate such opportunities in a way to empower community life (e.g. unemployed youth (15.9%), destitute mothers (widowed and divorced population with a rate, 18.9%), old people communities (10.5%), etc.);

- **Social groups of communities who are in need of special attention**: like the percentage of young, also the old age population at *Dingur* is higher (10.5%) as compared to the average percentage in Mekelle city and the regional average (7.2%); and hence special attention is required to allocate land for old people day care and recreational center development as a mandatory;

- **Consider and integrate the future demand of religious and social services**: The majorities of the project area communities are orthodox in religion but it does not mean there are no other religions. 2.2% Muslim and less than 0.5% other religion affiliated people (with no specific site for worship & cemetery purpose) are currently at the site. But religious population is expected to increase and additional households are expected to demand worship and cemetery areas (e.g. one model cemetery area is required to be located at a central place of both upgrading sites, *Dingur & Gefih- Gereb*). Besides, for the next coming planning years, the upgrading project site with its adjacent settlement areas is required to have one complete/upgraded health center and two health posts and furthermoreto establish one elementary school, to upgrade the one existing to a preparatory school and to build one technical school.

- **Build up community livelihood on potential existing local assets and skills:** primary means/sources of livelihood (local assets, skills and practices) of *Dingur-Genha* community members is (i) crop production with less emphasis on irrigation oriented urban agriculture; (ii) small scale trade/business making (e.g. crop and fruit products); (iii) engage in gravel stone/rock-strewn/quarry excavation (iv) engage in construction technology skills such as masonry, painting, etc. skills. It is then important to integrate and build up proposals in the context of existing key means of socio-economic bases and the livelihood situation of target communities;

- **Need to explore/establish cultural and festival center that addresses local tradition, expresses uniqueness and shares recreation with public facilities center of *Dingur - Debri* and surrounding areas:**

- *Dingur* in specific and *Debri* in general is a place for different people with their traditions from localities with different name of *Enderta woreda*. Hence *Dingur* of *Debri* is serving as a place of transition to socialize with the urban culture of Mekelle city. Besides, some traditions/public festivals that are under practice at the specific project area, some of them include Ashenda, Chelanqua, Meskel and epiphany public festivals celebration decorated with horse run events which include with potential ground water and *Tselamo*'s holy water found at Saint Micheal. It is important to allocate land and establish a cultural center equipped with a swimming pool which can be used by *Dingur* and surrounding settlement areas.

- **Public services/facilities center**: The community needs to have accessible recreational centers at appropriate and central places which include parks, sport fields, a library, museum, recreational center for children and elder people, etc.;

- **Proper handling of existing land holding legalization and regularizing**: this study observed that many unplanned residential houses were constructed as existing land holding at *Dingur* either by *Metesha*/allocation or in purchase mode of land acquisition because in a short period of time (less than 11 years) 33% of the households were entering to a *Dingur* village as new comers;

- **Ensure local development in alignment with the social safeguard system**: ensure effective rehabilitation mechanisms in the upgrading project to affected people (enough compensation) of the ESMS and RAP management system as well as to ensure effective social safeguard management system and local development;

- Enhance the local capacity and governance system prior to the implementation of this urban upgrading project in order to minimize bad experience seen on the past;

Proposals
Population size: at present *Dingu*r inhabited with total population size of 2,295 people. During end of upgrading project, under the context of structure plan (10 years), implementation the population will increase to **4,000 – 5,000** people and hence planners are requested to allocate enough land size that enable to establish and improve different type of social infrastructure purposes. ◆

Figure 3

Neighborhood assets map for effective upgrading implementation; adopted from ABCD approach
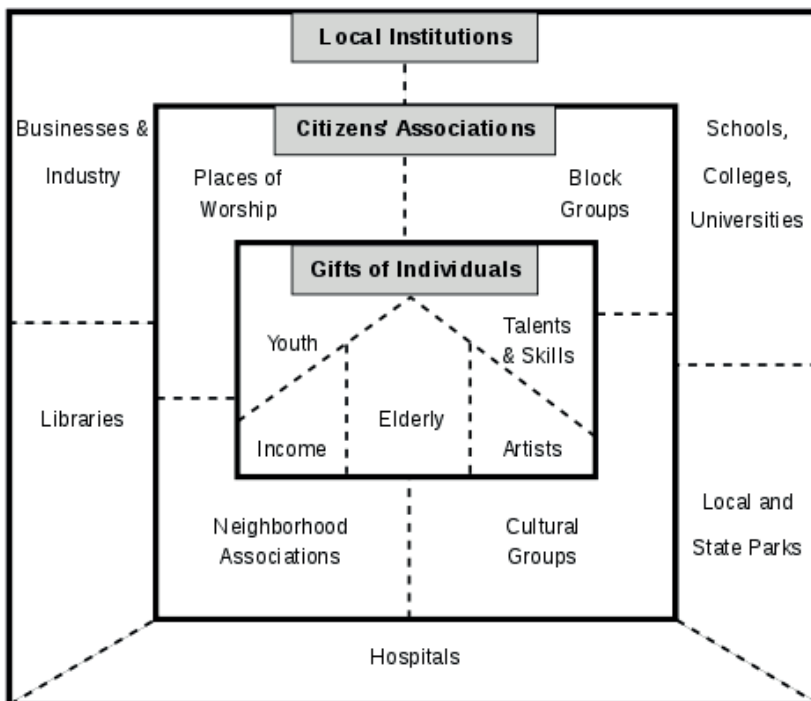
Source: Wikipedia, 2019

PART 1/4
SPATIAL ANALYSIS

4.1 Introduction

All over the world, urban areas are always operating under a pressure of continuous changes. As economic and social fabrics of urban areas constantly change over time, importance and spatial organization of urban functions are also undergoing similar changes. Urbanization is defined as a massive growth of and migration to cities that yield positive and negative consequences. Urbanization is driven by a combination of population growth, migration, and incorporation of rural areas into urban areas. Concern of rapid urbanization extends beyond the challenges faced within urban areas to the impact on its peri-urban and urban hinterlands, as rural and urban economy and social life are becoming increasingly intertwined. Urbanization due to incorporation of rural areas into cities has many positive impacts such as greater income and job opportunities, better access to infrastructure, education, health care and other services. Such impacts are expected to increase, particularly in the hinterland areas of small and medium-sized cities, which form the major characteristics of urban areas within and around Mekelle city.

The spatial expansion trend of Mekelle city in the last decade is relatively very fast. It expands towards the four directions of the city by incorporating new rural settlements. In the newly revised structure plan of the city, the *Debri–Dingur* peri-urban area is proposed as one of the potential growth directions of the city. It was originally restricted around the locality of parts of today's *Debri-Mekayih*, where the initial settlement was, and began to expand into the south. The large swampy open area in front of the settlements offers grazing land for the animals.

This area lies in the major urban agricultural land of the city near the *Kelamino* River, so the redevelopment of the area is very important in terms of the future development of the city. It enhances the living environment of the people that are living in this area. This area is also located in the future center for modern urban agriculture development. But this area is characterized by:

- Lack of basic utilities and social services
- Poor housing conditions populated by relatively low income people with small scale agricultural activity
- Irregular pattern of roads and blocks,
- Ragged topography and swampy areas

This area has been considered as one of the local development plan project areas of the structure plan to improve the basic infrastructure provision and improve the accessibility to enable the area to play its future role as part of the mixed-use residence. When the asphalt construction from Mayweini is completed the vehicles will prefer to travel via this road and it will become an important commercial development area hence the road will be an important infrastructure to attract new development. This part of the city is also exposed to legal and illegal land occupation by the nearby administration and the residents.

Figure 4

Showing the location map of *Dingur*

1 cm = 42 km

TIGRAY

1 cm = 4 km

MEKELLE

DINGUR

1 cm = 0 km
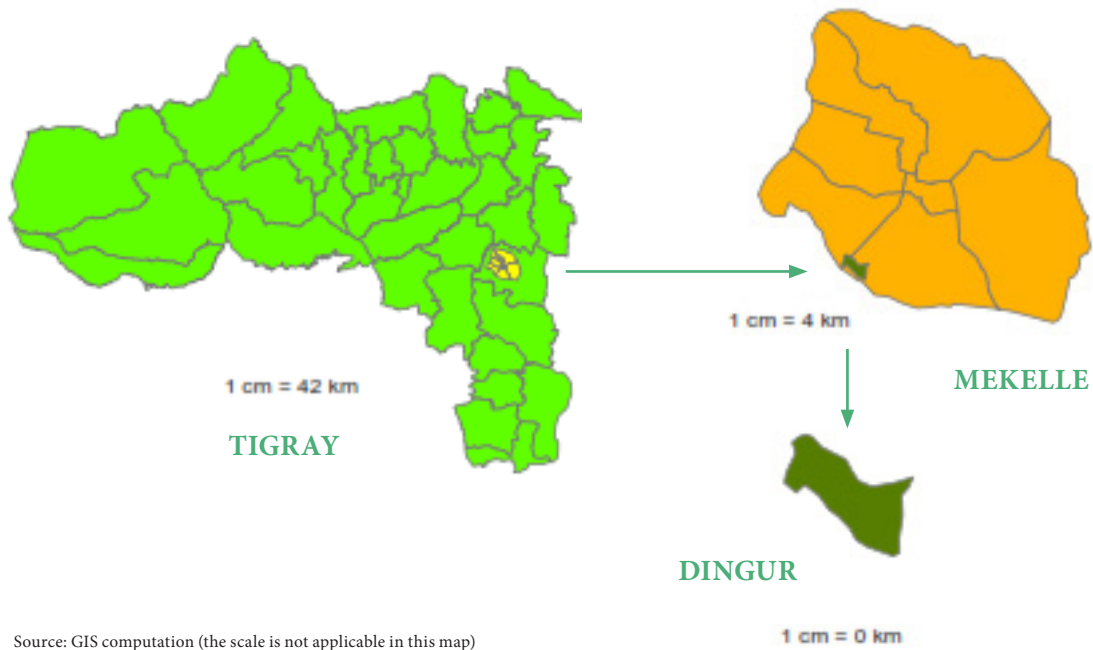
Source: GIS computation (the scale is not applicable in this map)

4.2 Location of the upgrading project

- Located in *Hadnet* sub-city near *Debri tabia* in close proximity to *Kelamino* special high school and Meles Academy.

- Major urban agricultural developments
- near to Mekelle-Samre major highway
- Near to the future artificial lake of the city.

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Figure 5

Showing settlement of the study area

Source: Google earth, Landsat/compernicus [December, 18, 2016] Mekelle, Dingur 13⁰26'32"N39⁰26'05.61"E Eye alt 4.32km CNES/Airbus 2020, www.earth.google.com

4.3 Existing spatial analysis

A census survey conducted in the study area indicates that there are 459 households and the area covers around 137 hectares.

General Housing issues:
• In *Debri-Dingur*, the built up area for living (residence zone) ranges on average from 25-50 square meters and this space is commonly used as living, bed room and kitchen area (this could be separate when there is ample space and financial capacity but with limited space and financial capacity the kitchen may be mixed up with other functions) and most of the houses have an ample area for the allotted function. They have on average a total plot area of 300-600 m^2 which is appropriate for the given function but there are even some plots which have an area of more than 2500 m^2.
• The residents acquired their land by different means: most received it from local administration/municipality (43.2%), the second is by gifts (22.3%) followed by heritage from descendants or families (17.7%). Others are acquired by purchase (12.2%) and the rest are owned by different means including rent and lease.

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Table 10

How they possess the land

	lease	allocation	heritance	gift	purchase	other
No.	2	197	81	102	56	3
In %	0,4	43,2	17,7	22,3	12,2	0,7
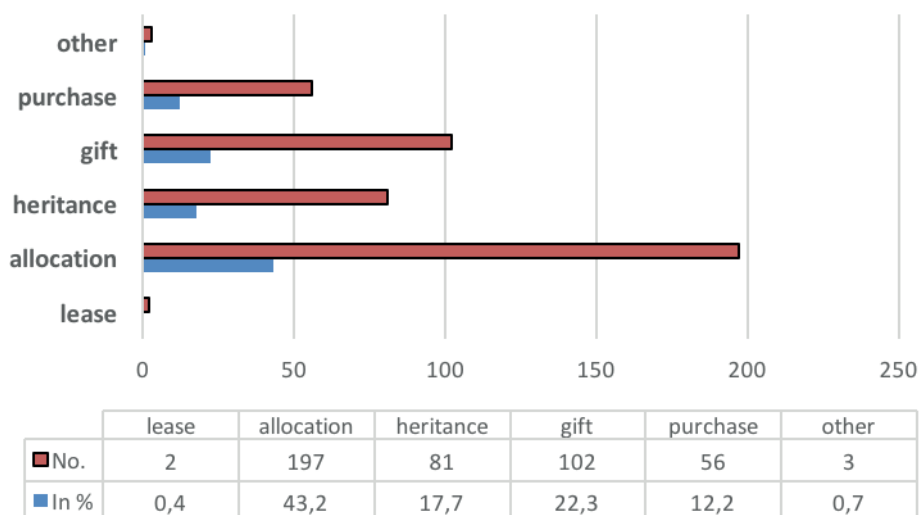
• The houses in the *Dingur* area were constructed many years ago and most of them are as old as the residents. Houses older than 30 years account for 13.3%; the largest percentage of the houses which is 45.7% were constructed 10-20 years ago and the recent one which are houses constructed in the last ten years are 34.8%.

Table 11

Age of the houses

	>30 years	10-20 years	1-10 years	Others
In %	13.3	45.7	34.8	6.1
No.	65	223	170	30
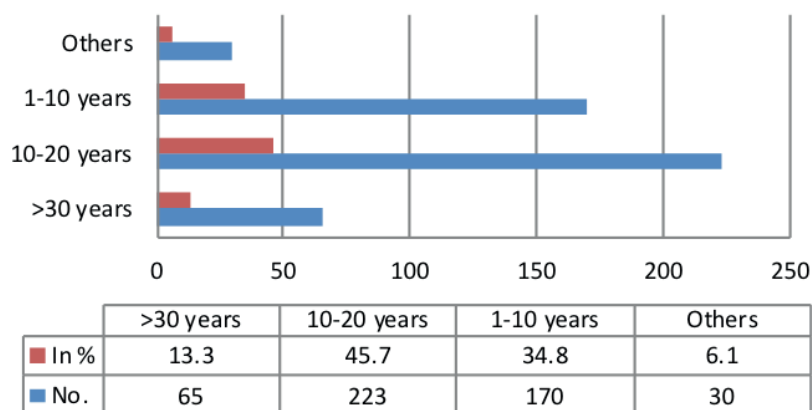
• **Ownership**: In *Dingur* area most of the houses are owned by privately which makes 88% and 1.7% are rental houses which are also owned privately (private rental houses). The housing development and provision were dominated by the private housing development. Unlike the others, *Dingur* area is still undeveloped and there is no urban housing unit like government owned and other schemes.

Source: Household survey, 2017

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Table 12

Houses ownership
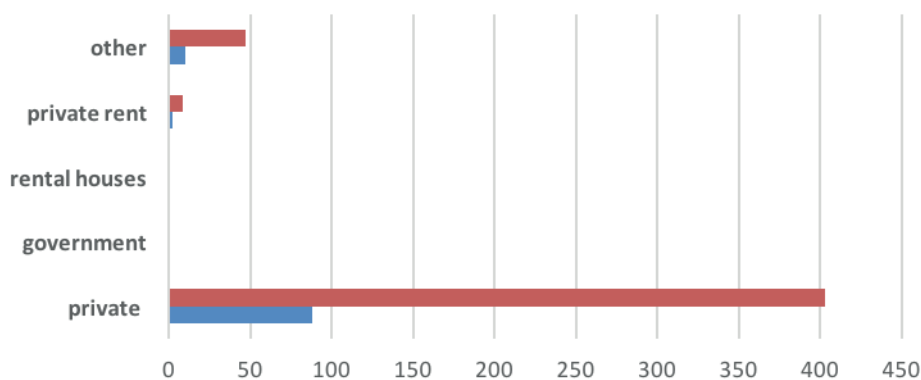
	private	government	rental houses	private rent	other
No.	403	0	0	8	47
In %	88	0	0	1,7	10,3

• **Housing function**: Up to 95.2% of the housings are used for residence, which makes the site a residential area. The rest has a minor share and this includes residence with urban agriculture 1.7%, mixed (residence and commerce) 1.4% and pure commercial 0.2%.

Table 13

Land use
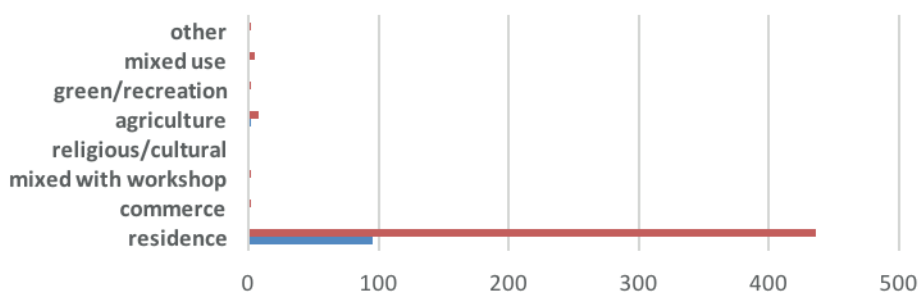
	residence	commerce	mixed with workshop	religious/cultural	agriculture	green/recreation	mixed use	other
No.	436	2	2	1	8	2	5	2
In %	95,2	0,4	0,4	0,2	1,7	0,4	1,1	0,4

Source: Household survey, 2017

• **Existing Land use**: The land use (function) of the houses in the *Dingur* upgrading site is mainly for pure residence with its large share up to 87.6%, which makes the site a pure residential area. The other functions that have a minor share include residence with agriculture with 3.2%, mixed residence with commerce with 3.2% and purely commercial with 5.3%.

Table 14

Type of use of the houses

	residence	commerce	mixed	animal stead	other
No.	410	25	15	15	3
In %	87,6	5,3	3,2	3,2	0,6
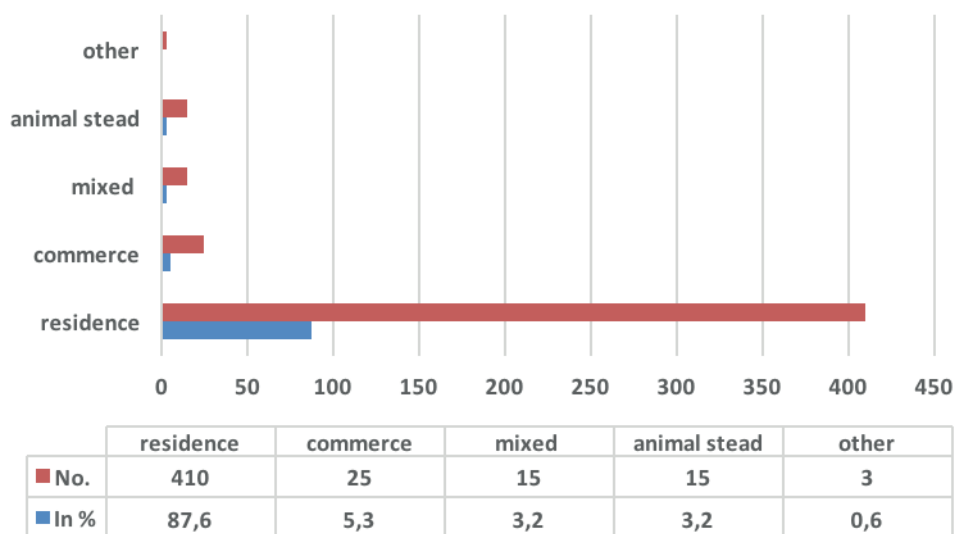
Source: Household survey, 2017

• **Housing Typology**: The housing typology includes villa, semi-detached, detached and row houses. From this housing typology, the row house and villa house are most common. The row house accounts for 46.9%, villa house makes 45.4% and the semi-detached house 6.8%.

Table 15

Type of houses

	villa	row houses	detached	multi-storey	other
No.	208	215	31	0	4
In %	45,5	46,9	6,8	0	0,9

Source: Household survey, 2017

Figure 6

Type of houses

Table 16

Condition of houses
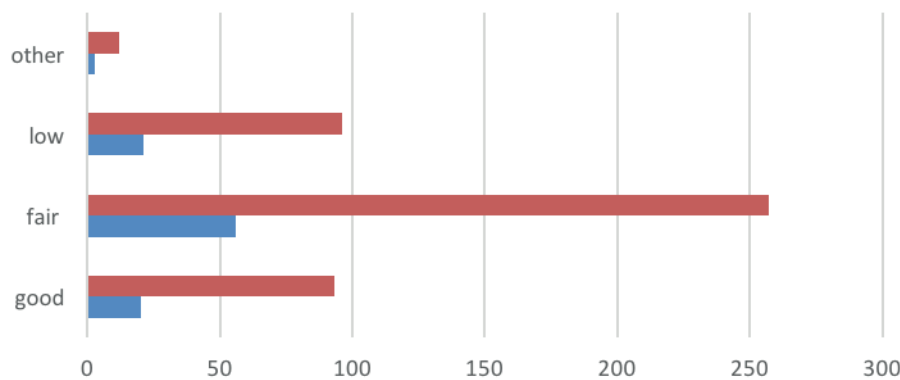
	good	fair	low	other
No.	93	257	96	12
In %	20,3	56,1	21	2,6

Source: Household survey, 2017

Figure 7

Houses condition

Source: Own pictures, 2017

• **Housing conditions**: The housing conditions in *Dingur* as follows: 56.1% of the buildings account for medium housing conditions, 21% are in poor conditions, and 20.3% have good housing conditions. The definition for housing condition is based on the need for maintenance of the house. If no maintenance is required, the condition is good, if it requires moderate maintenance, medium, if it is far beyond maintenance and has to be demolished, it is categorized under poor condition. This is a relative condition with existing circumstances.

Most of the houses in the area are in a fair or good condition. However, houses, which are around the center of the settlements, are deteriorated mainly due to their old age and lack of maintenance. They have no proper foundation, and lack basic facilities like kitchen and latrine. Most of these housing units have no defined plot.

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• Most of the houses do not have separate kitchens and the existing kitchens, which are attached to the living rooms, are in poor conditions. This poor condition of the kitchen accounts for 69.2% 7.9% of the household have a kitchen with a medium physical condition. 22.7% of the households have no kitchen. Most of the houses (98.5%) do not have toilet, shower and the existing toilets are in poor condition and there is neither liquid nor solid waste disposal and no drainage system.

Table 17

Condition of Kitchen
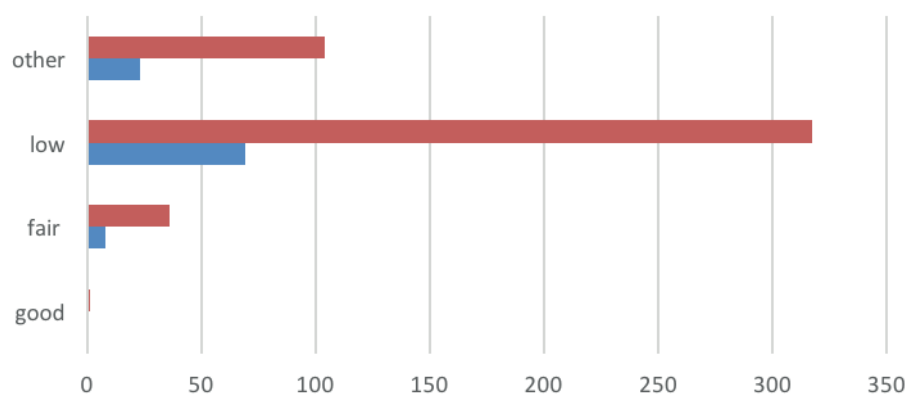
	good	fair	low	other
No.	1	36	317	104
In %	0,2	7,9	69,2	22,7

• The road connectivity is very low, the roads are in a poor state and only some are moderate. According to the respondent's perception, the road condition is very poor (53.1%), medium (25.1%), and good (17.1%). The upgrading site has public transport including taxi and Bajaj (tri-cycle).

Table 18

Condition of roads
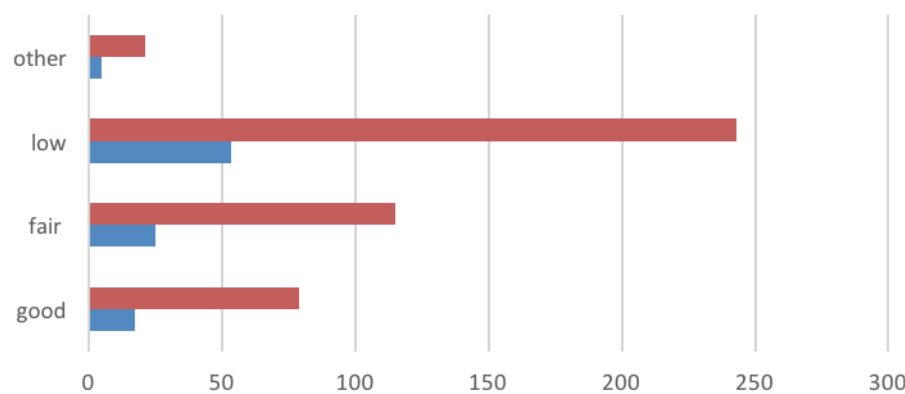
	good	fair	low	other
No.	79	115	243	21
In %	17,2	25,1	53,1	4,6

Source: Household survey, 2017

Figure 8

Road condition

Source: Own picture, 2017

Table 19

Support of the upgrading project by the community

	yes	no	other	
■ No.	449	6	3	
■ In %	98	1,3	0,7	
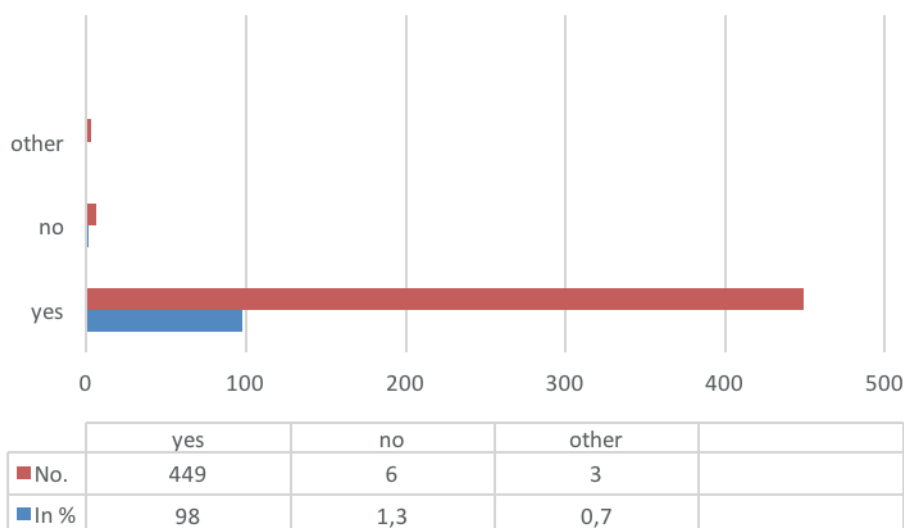
• Almost all of the residents (98%) are happy and support the upgrading at *Dingur* site because the development is according to the demand of the residents. Only 1.3% do not support the upgrading project.

• Most of the residents recommend having a villa housing typology as a housing scheme and this accounts for 45.4% of the total households and the next demand of housing typology is high rise residence building with 32.5% and the remaining are the detached house 13.3%, row house 4.1 % and condo houses 1.5%.

Source: Household survey, 2017

Table 20

Housing Typologies
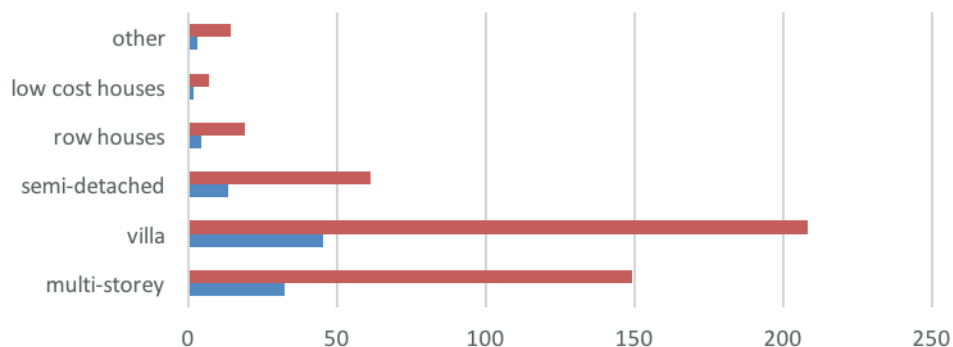
	multi-storey	villa	semi-detached	row houses	low cost houses	other
No.	149	208	61	19	7	14
In %	32,5	45,4	13,3	4,1	1,5	3,1

• Most of the residents would like to accept the upgrading project though there will be some dislocation and demolishing of existing buildings.94.1% support the upgrading project with great enthusiasm. A small number of the residents are not ready and willing for the upcoming upgrading project.

Table 21

Residents' willingness towards the upgrading project
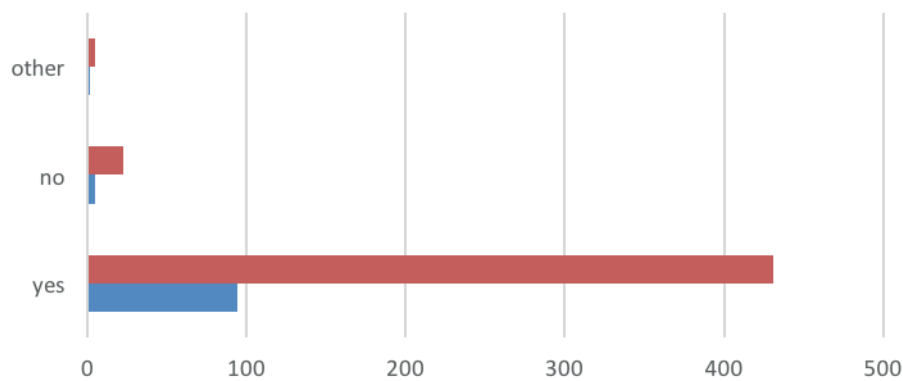
	yes	no	other
No.	431	22	5
In %	94,1	4,8	1,1

Source: Household survey, 2017

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• Physical housing condition: The construction materials for walls are stones in most houses, which are 77.3%, next is mud and wood walling material which makes 14.2%, and some houses are made of HCB blocks, which are 7.6% of the total households.

Table 22

Walling building material
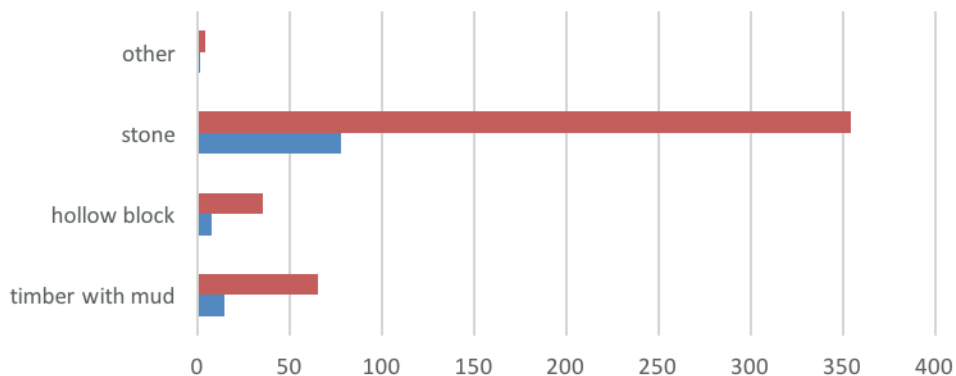
	timber with mud	hollow block	stone	other
■ No.	65	35	354	4
■ In %	14,2	7,6	77,3	0,9

• In the existing houses' floor finishes are made of mud (78.2%) or cement screed (18.6%) and very few (0.9%) are plastic tiles.

Table 23

Floor finish material
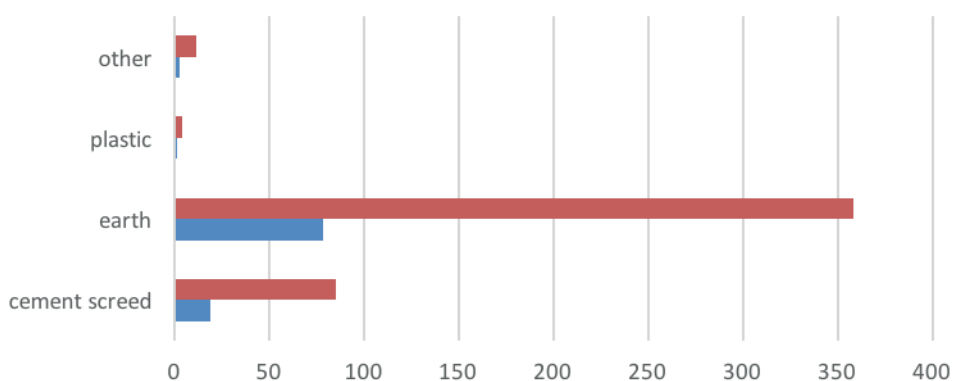
	cement screed	earth	plastic	other
■ No.	85	358	4	11
■ In %	18,6	78,2	0,9	2,4

Source: Household survey, 2017

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• The houses are lacking ceilings in most cases: 92.1% of the houses do not have a normal ceiling and some of the rarely used ceiling materials are chip wood 3.9% and plastic ceiling 3.1%.

Table 24

Ceiling material textile
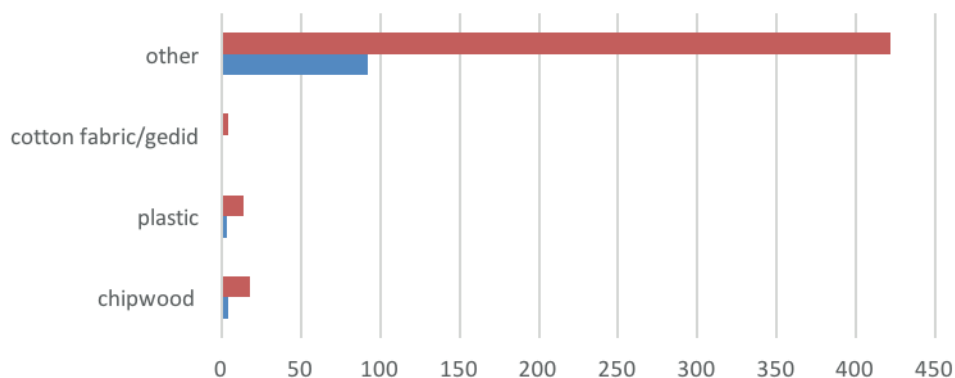
	chipwood	plastic	cotton fabric/gedid	other
■No.	18	14	4	422
■In %	3,9	3,1	0,9	92,1

Source: House hold Census, 2017

• Most of the houses are made of CGIS roofing, which accounts for 85.6%, whereas 5% are slab and the most rarely used roofing material is grass/thatch with 2.6 %.

Table 25

Roofing material
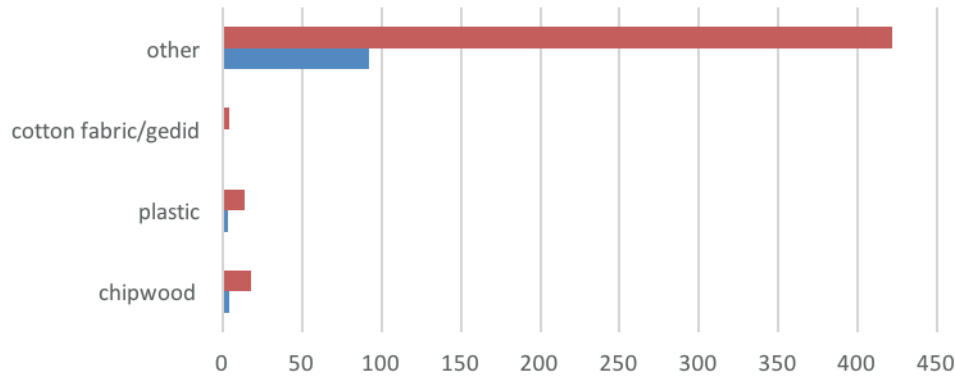
	chipwood	plastic	cotton fabric/gedid	other
■No.	18	14	4	422
■In %	3,9	3,1	0,9	92,1

Source: Household survey, 2017

• Toilets and showers are rarely found in the *Dingur* upgrading area with less than 2% coverage and the existing few are in poor conditions.

Figure 9

Toilet and shower availability

Source: Household survey, 2017

• The most common problems of the upgrading area are housing quality, lack of infrastructure and utility, furthermore high unemployment is visible in the *Dingur* area.

Spatial characteristics of the upgrading area

The *Dingur* upgrading area is characterized with irregular and regular plot and block layouts. The area is also characterized by:

- inaccessibility
- Poor basic infrastructure facilities (water, power and telephone)
- Poor to fair housing condition
- Irregular parcel layout and large plot size
- Irregular block layout arrangement
- Lack of legal land ownerships
- Wetlands
- Social infrastructure problems in terms of quality and scarcity.

Figure 10

The new road to *Dingur* neighborhood

Source: Own picture, 2017

Figure 11

Map showing the spatial characteristics of the area

Source: Mekelle city municipality, ground Survey, 2016

The assessment of the land use shows that the area lacks basic components like

- Kindergarten (There is only one in the neighborhood),
- Playground, and
- Public facilities (toilet, garbage collection)

The upgrading area is dominantly occupied by residential land use, which is dispersed all over the site without following any land use planning. A part of the area is used for urban agricultural activities, notably fattening and dairy farms. This poor block arrangement has resulted in poor road connectivity.

Density

As shown in the figure below, the current built-up area of *Dingur c*overs 137 hectares of land and there are about 459 households in the area**.** The gross population density of the site is 3.35 HHs/ha. When we compare the density of the site with that of other parts of the city it is sparsely scattered.

Figure 12

Built up area
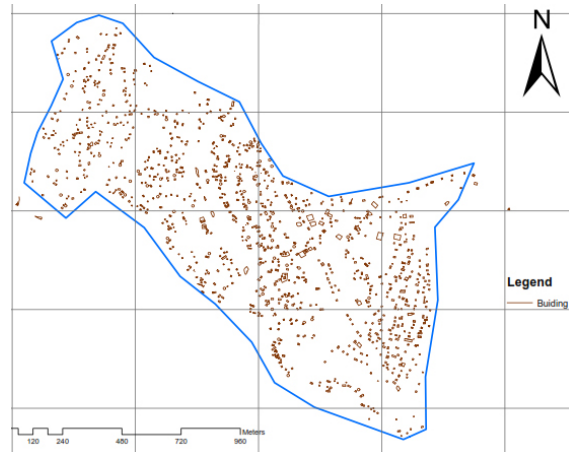
Source: Mekelle municipality, ground Survey, 2016

The structure plan proposal of the area has two major functions. Those are mixed development with commercial and recreational use including parks and an artificial lake.

Figure 13

Structure plan land use of the area

Source: Mekelle City SP, 2016

Figure 14

Existing land use of the study area

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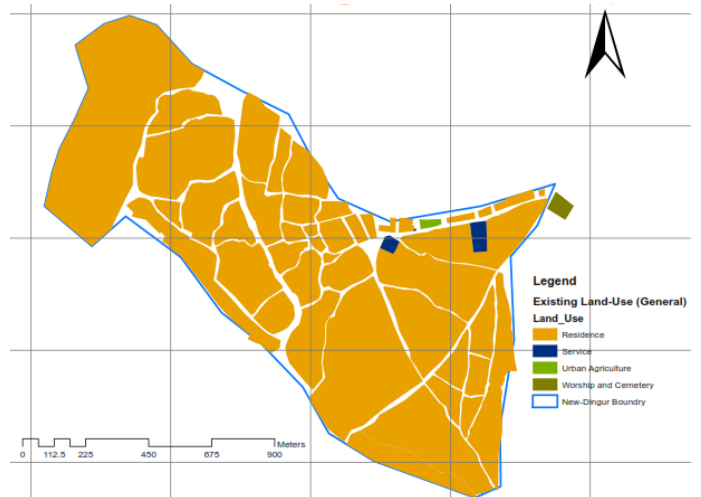
Analysis of existing social services

In the upgrading project area, there is one kindergarten, one health center and one farmers' training center.

Figure 15

Farmers' training center

Figures 16

Health center

Figures 17

Poultry farm

Source: Own picture, 2017

Existing morphology and block arrangement

The upgrading area site has mostly an irregular arrangement of settlementsand this has caused that the site is not linked well with the rest of the city. It has made the local roads narrower and some of them are even dead ends and have bottlenecks.

Figures 18

Existing morphology and block arrangement

Source: Mekelle city SP, 2016

4.4 Topography and Slope Analysis

In *Dingur* area, the slopes are classified into five categories that are from 0-2%, 2-5%, 5-7%, 7-10%, and greater than 10%.

Table 26

Slope classification

NO	SLOPE	PERCENTAGE (%)	AREA (IN HECTARE)
1	0-2%	6	8.22
2	2-5%	14	19.18
3	5-7%	21	28.77
4	7-10%	28	38.36
5	> 10%	31	42.47
	Total	**100**	**137**

Source: Own computation from household survey, 2017

The slope category from 0-2%, which is flat area covers 6% of the total upgrading site and is flood-prone with high costs of construction for drainage lines. The slope categories from 2-10% covers 63%, which is favorable for urban development even though the degree of suitability varies across the slope categories. However, the rest, which makes 31% is above 10% slope and is unsuitable for urban development, which is almost one third of the total 137 hectares.

Figure 19

Showing topography of the area (slopes)
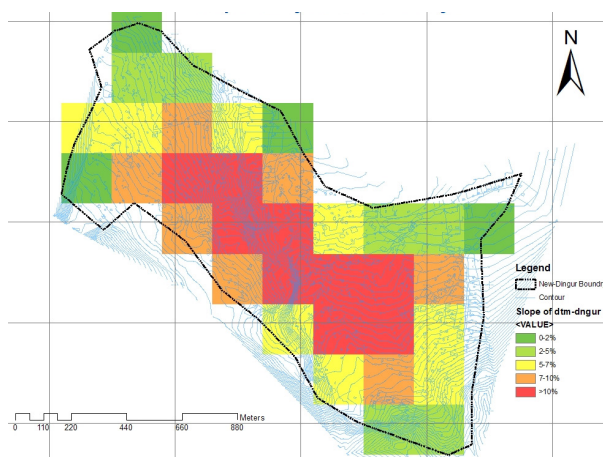
Source: prepared from ground survey, Mekelle municipality, 2016

4.5 Conclusion and Recommendations

4.5.1 Conclusions
Based on the household assessment results, ground surveying and field observation, the following concluding strategic actions have been made for the upgrading project of *Debri* area.

Plot size and BAR: The upgrading area's residents acquired large plot areas compared to other urban areas (140m² and above), however with very small built up areas in proportion to the plot size. This implies that the *Dingur* area is not well developed yet and vacant spaces and underutilized plots are common. Houses within the range of 300-600m² plot sizes are common thus, plots below the minimum standard and excessive plots areas need planning and interventions to regulate the tenure system.

Land acquisition and tenure: Only 43.2% of the households acquired their land from the local administration/municipality. This implies that there is another way of land acquisition and there is a need to establish legal enforcement.

Housing ownership: 88% of the housing units in the *Dingur* area are privately owned and this indicates that private land developers dominate the housing provision and development.

Housing function: 95.2% of the houses are used for residence or living, this makes the area economically inactive.

Housing typology and condition: The most common housing typology is the row house (46.9%) and the rest are detached and other housing typology. The physical housing conditions in the *Dingur* area is that 56.1% are in the medium housing condition. This is related to the age of the houses: 45.7% were constructed 10-20 years ago.

Building materials of housing: The majority of the materials of the houses for wall, ceiling, roof and floor are made of local abundant construction materials. Mud and stone are widely used local materials for floors and walls, with 77.3% and 78.2% respectively and the most common roofing material is CGIS, which accounts for 85.6%. Some *Hidmo* (Typical Tigrain traditional house) house are still available.

Housing facilities and utilities: 69.2% of the kitchens are traditional and most of them are of poor quality. There are also 98.5% of the houses without toilet and shower. There is a lack of access and connectivity of the roads (with 53.1% in poor condition), no drainage system, no water supply system, insufficient access to and supply of electric and telecom networks. The area should be serviced with infrastructures within the time frame. Almost all of the housing units do not have a septic tank and the solid waste is dumped on various open spaces. Therefore, special emphasis should be given to the design, construction of housing, and provision of infrastructure in accordance with planning rules and regulation during the upgrading project.

4.5.2 Recommendations

- The local administration shall provide and regularize the land according to the standards and regulations of the city. The existing land ownership issues should also undergo legalization and standardization.
- The local residents are supporting the upgrading project and continuous awareness creation and participatory approach is very important.
- Before providing land for new comers, it is necessary to empower/secure residents' livelihood & wellbeing (e.g. urban agriculture, business center, indigenous recreation center, etc.)
- Landfill sites and the solid waste collection and disposal be improved and integrated to the services of Mekelle City.
- Use of a rehabilitation rather than a compensation approach during the upgrading implementation process.
- Provision of infrastructures that enable residents to run businesses and access to social services prior to giving land for others.
- All the development activities should consider creating job opportunities for the unemployed youth, such as provision of SMEs. ◆

PART 1/5
ROAD AND TRANSPORT SYSTEM

5.1 Introduction

5.1.1 Background
As discussed, most of the neighborhood residents use non-motorized transport such as walking, horse drawn carts and to some extent bicycles. Motorized tri-cycles and public mini-buses are used as public transport but are very limited in number.

The road condition of the neighborhood is dusty, rugged and unpaved, which makes it very difficult to for pedestrians or the public transport. This was aggravated by the spontaneous development of the neighborhood as a rural settlement annexed to the city administration recently. Thus, the upgrading project of this neighborhood aims to improve the problems related to roads and transport.

5.2 Summary of Findings

The road and transport system in *Debri-Dingur* comprises major organic footpaths, which are created by the natural movements of pedestrians and animals and minor gravel roads, which are used by vehicles. The main challenges include:
- Very poor roads follow the natural topography and are difficult to use by vehicles and completely inaccessible during the rainy season.
- Poor connectivity to other parts of the city through standard transport system,
- Inadequate transport services to all parts of the neighborhood due to the poor roads.

Figure 20

Existing road conditions

Source: Own pictures, 2017

5.2.1 Interview results

Questionnaires were disseminated for 459 households of the site with four assessments related to road, road network and transport issues of the locality. The questions included were the following:

a. Evaluation of the road/road network conditions of the locality with the respondents supposed to rate from very poor to satisfactory level

b. Access to transport services in relation to residence and work places with a possible qualitative description of the distance to get access to transport services from near to very far .

c. Means of transport they use on a regular basis. With the intention to figure out possible transport facilities, the dwellers use regularly from on foot to private vehicles.

d. Possible traffic incidents recorded in the locality to help the study on transportation management regulations.

The results of the household survey are summarized in Table 27 an Figure 21.

Table 27

Summary of road network and transport related interviews

QUESTIONS AND THEIR RATING	CODE	QTY.	% OF RES.
1. Road condition in the locality			
1.1 Satisfactory	1	64	14.0%
1.2 Poor	2	225	49.1%
1.3 Very Poor	3	169	36.9%
2. Transport service in reference to work place			
2.1 Around residence	1	52	11.4%
2.2 At walking distance from residence	2	102	22.3%
2.3 Very Far from residence	3	264	57.6%
2.4 Out of reach	4	40	8.7%
3. Means of transport Used			
3.1 On foot	1	281	61.4%
3.2 By taxi	2	165	36.0%
3.3 By public transport	3	3	0.7%
3.4 Service from employer	4	5	1.1%
3.5 Private transport service	5	4	0.9%
4. Traffic Accident			
4.1 High	1	9	2.0%
4.2 Medium	2	54	11.8%
4.3 Low	3	123	26.9%
4.4 Very Low	4	272	59.4%

Source: Own computation from household survey, 2017

Figure 21

Summary of structured interview results by percentages

Road Condition Survey — Current Means of Transport — Transport Service and Work Place — Traffic Accident Incidents
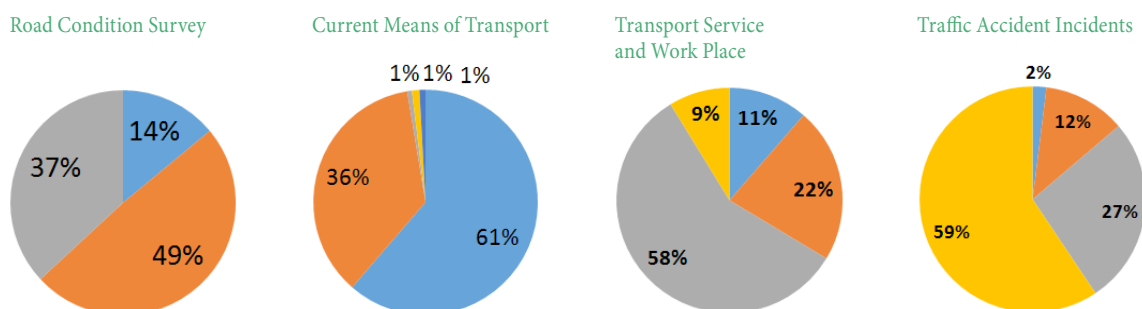
Source: Household survey, 2017

5.2.2 Traffic and Pedestrian Counts
A three-day traffic and pedestrian count was made on the main entry to the upgrading site to understand the type and volume of traffic entering and leaving the project sites and to estimate the volume of pedestrians' movement on the streets.

The results together with inputs from socioeconomic, physical and spatial studies will be used for measuring or evaluating present demands for transport services and for identifying areas where improvements to existing or new transport facilities are required in the future.
The study team prepared formats for traffic counts comprising all types of motorized and non-motorized modes of transport and counts were conducted on Monday, Wednesday and Saturday (2017) considering the movements of the local people and market issues.

Motorized Transport: including private car, Bajaj/tri-cycle, small taxis, minibus taxis, buses, small trucks, large trucks with trolleys, land cruisers, pickups, motorbikes and special trucks like big construction machineries, big defense equipment etc.

Non-Motorized Transport: including horse drawn carts, bicycles, animals, pedestrians and hand pushed trolleys.

a) Summary of the traffic count results
The summary below shows the three day traffic count made on selected two spots at the entry of *Debri-Dingur* from the city center. Spot-1 is along the road 18 *Kebelle*, an asphalted road from *Midregent* to *Dingur* and Spot-2 is *Adi-Hawsi*, also asphalt from *Kelqel Debri* to *Debri*. Spot-1 had a total of 4470 and Spot-2 a total of 6463 counts. This makes a total of 10933 traffic elements (vehicles, pedestrians and animals) in 30 hours for 14 modes of transport. The percentage of each mode of transport shows that pedestrians account for 45.53%, followed by animals (15.08%), private cars (10.08%), minibus taxis (8.35%), Bajaj (5.64%), and Small Freight Cars (5.72%) as shown below.

Figure 22

Total traffic count and percentage by mode of transport -Spot-1

Source: Household survey, 2017

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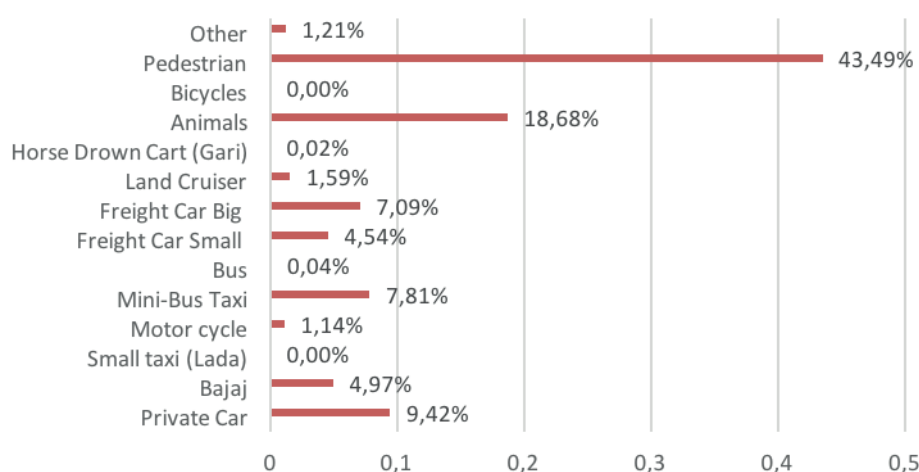
Figure 23

Total traffic count and percentage share by mode of transport -Spot-2
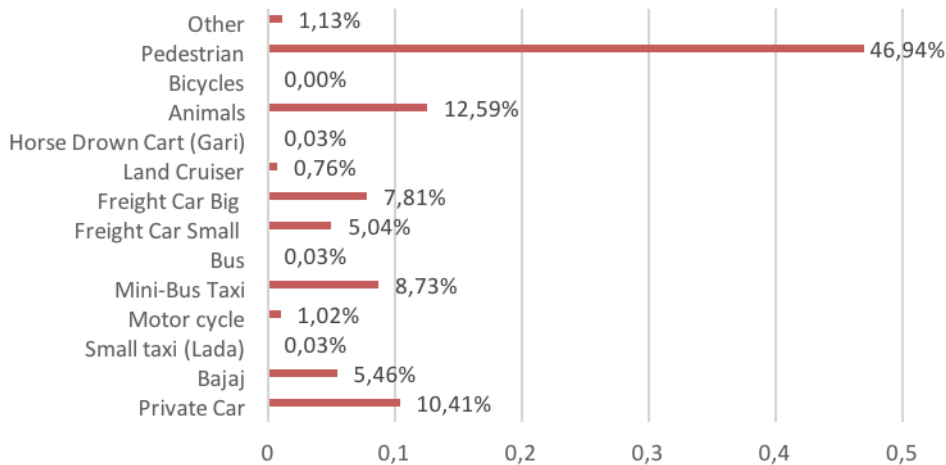
Figure 24

Total traffic count and percentage share by mode of transport-all Spots
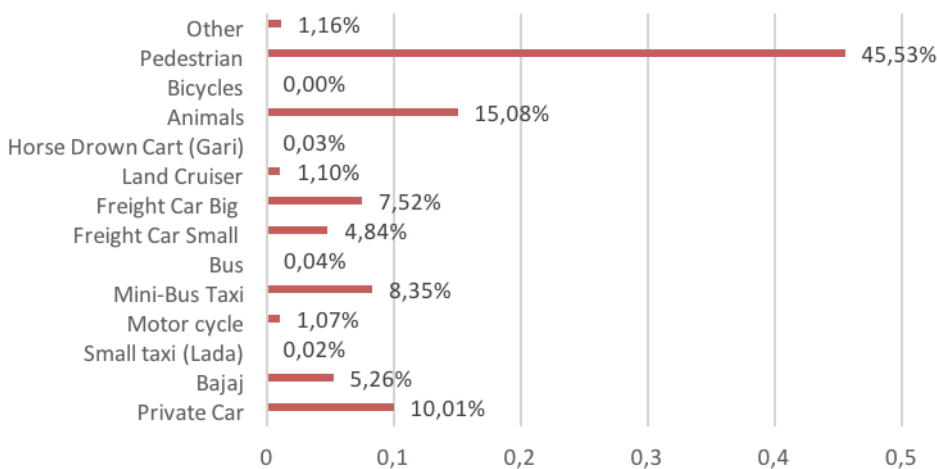
b) Motorized and non-motorized traffic count summaries

The traffic count results show that the proportion of motorized and non-motorized transport for all trips is 73.45% and 26.55%, respectively. Within the non-motorized transport, pedestrians account for 68.60%.

Figure 25

Summaries of findings for motorized and none motorized traffic count-all Spots

Source: Household survey, 2017

Source: Traffic count, 2017

5.3 SWOT Analysis related to the Road and Transport System

SWOT analyses comprise four elements: Strengths, Weaknesses, Opportunities and Threats. The strengths and weaknesses are internal to the organization while the opportunities and threats are external factors influencing the organization. A preliminary SWOT analysis on the upgrading site (*Dingur* and its environs) has been done based on an assessment of the status of various developments and existing situations in the area.

5.4 Summary of Findings

The current study on transport treated all components of transportation planning. The planning team collected secondary and primary data. The road inventory result showed limited, standard road and road networks. Even the existing organic roads are deteriorating before the service time ends. Existing roads are poorly surfaced and not suitable for vehicles. The roads are also inconvenient for most transportation modes.

The survey on terminals showed that there are informal taxi terminals in the upgrading area where people use them rarely during dry seasons. The Traffic count data showed that most of the trips in the study area are made by walking. The study also showed that there is a high demand for modern transportation facilities. Furthermore, the demand for transportation is expected to increase in the future.

Generally, the findings of the study show that with an increase in population and living standard in the locality, the demand for transport will increase constantly. This calls for a revision of the demand for roads and transport system. This can be done through the introduction of land use measures and infrastructure developments. In addition, the existing transportation challenges need to be addressed. ◆

Table 28

SWOT Analysis of Dingur

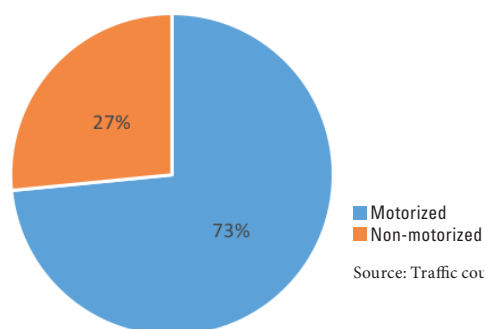| STRENGTHS	WEAKNESSES

• Willingness among the dwellers
• Availability of well-established responsible offices
  - *Mekelle* City Infrastructure Office-Hadinet sub-city office
  - *Mekelle* City Urban Development office
• Availability of the Revised Structure Plan for Mekelle City
	• Road alignment problems
	• Pattern and stretches
	• Transportation facility problems
	  - Lack of transport services (quality and quantity)
	• Poor road connection with the sub cities
	  - Blocked and discontinued roads
	  - Poor road networks
	• Managerial problems
	  - Delayed road constructions
	  - Poor quality control mechanisms
	  - Lack of technical and skill capacities

OPPORTUNITIES	**THREATS**

• **Willingness and investment opportunities**
  - Availability and readiness of governmental, non-governmental and private institutions
  - Dwellers willingness
  - Availability of external funds
• **Ongoing and proposed projects**
  - Proposed Structure Plan of Mekelle
  - Mekelle-Debri Gravel Road Project
  - ERA road projets
  - Serawat-Industrial Park Project
  - Other private construction project
• **Topography of the site**
  - Suitability for alignment
  - Availability of construction materials
	• **Population pressure of the city of Mekelle**

Source: Own analysis with community representatives, 2017

PART 1/6
WATER SUPPLY AND DRAINAGE

6.1 Introduction

Mekelle has been expanding horizontally since its establishment to serve the growing demand of housing and services. Thus, the need for high standard water supply and storm water drainage infrastructure is eminent. However, it lacks because of budget constraints. Due to this, main and local infrastructure and services in the expansion areas such as *Hadinet (Around Debri Dingur, Kelamino), Gefih Gereb, Adi-Hawsi, Lachi, Adishumidihn, Adiha, Illala* and others are below standard. Hence, in the city structure plan, old settlement areas and villages recently incorporated into Mekelle City have been identified as localities with poor infrastructure and utility services. *Debri and Dingur* as recently incorporated villages in the city require provision of modern infrastructure and utility services such as water supply system, storm water drainage and a liquid waste management system. Hence, local development plans for the two localities are expected to consider the provision of modern infrastructure, which is compatible with the city wide structure plan and standard requirements of Ethiopian cities.

Provision of water is the prerequisite for socio-economic development and industrialization of urban areas. The cities of the world in general and that of Ethiopia in particular emerged in areas where there is potable water. History of modern water supply service at Mekelle City goes back to 1949, when a first water supply service delivered to the Emperor Yohannes IV palace and the Mekelle Public Hospital (Mekelle City Structure plan (SP), 2016). In the last 60 Years, only small changes have been made on the water supply service. Although there are still many problems in the city's water supply, progressive expansion works have been done in the last twenty years.

Urban storm water drainage infrastructure are backbones to safely discharge storm waters to natural water ways or rivers. Flooding/Drainage problems, have been identified as a priority in urban-wide plans. Hence, this becomes one of the pressing issues of the local development plan to be dealt in detail.
In this section, situational assessment of water supply and storm-water drainage in Debri Dingur area of Mekelle City is addressed.

6.2 Situation Assessment of Water Supply

6.2.1 Review of Previous Studies on the Water Supply Condition

A study of the local development plan (LDP) for the *Debri* area was done in 2005 by the Urban Plan Development, Monitoring and Evaluation Process of the Mekelle City administration. From the LDP report in the *Debri* local development area, it was noted that the existing infrastructure of the study area is extremely poor. Review of the analysis of the result from the LDP report 2005 is depicted in the following section.

Concerning the water supply, 77.7% of the population in the *Debri* area use below standard and unsafe sources of water: rivers, springs, marsh areas, hand dug wells and ponds. The remaining 22.3% uses public hand-pump water points and public taps. Consequently, the majority of the people in the area suffer from water-borne diseases.

Table 29

Sources of Water Supply in *Debri-Dingur*

	public tap	%	private bore hole	%	public bore hole	%	river	%	stream	%	total
Mekayih	39	19,2	0	0	24	11,8	0	0	140	69	203
Dingur	21	32,3	1	1,5	0	0	5	7,7	38	58,5	65
total sum	60	22,4	1	0,4	24	9	5	1,9	178	66,4	268
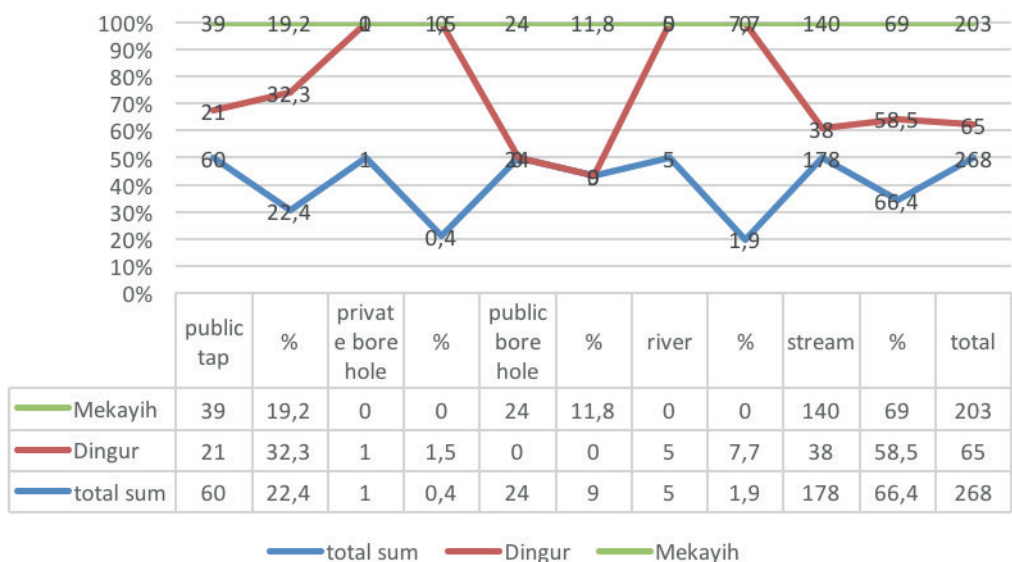
As can be seen in the above table, 54.9% of the *Debri-Dingur* community consumes between one and two Jerry cans[1]. Whereas 36.6% of the community consumes three to four Jerry cans, and the remaining 8.6% use more than four Jerry cans a day.

Table 30

Consumption of Water Supply in *Debri-Dingur* - number of jerrycanes of water consuption per day

	1 to 2	%	3 to 4	%	5 & above	%	total
Dingur	109	53,7	74	36,5	20	9,9	203
Mekayih	38	58,5	24	36,9	3	4,6	65
total sum	147	54,9	98	36,6	23	8,6	268
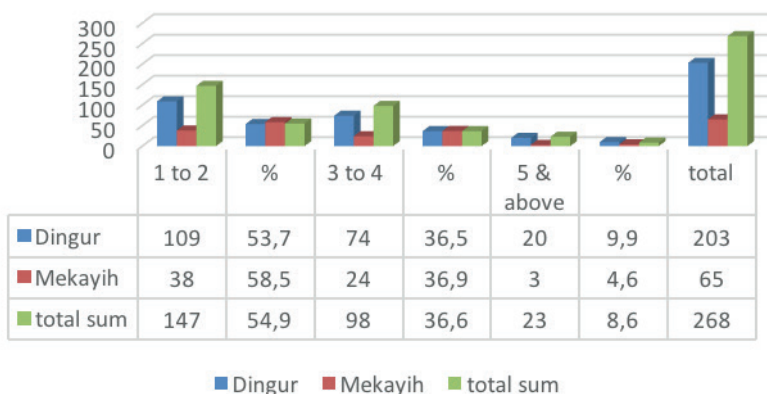
Source: Mekelle City Administration, 2005 EC

1 Each "Jerry can" is with a capacity of 20 liters.

6.2.2 Water Supply House-Hold Survey Analysis

In addition to the literature review, a structured questionnaire based survey was undertaken on a sample size of 459 households. The analysis of the survey is summarized as follow.

Table 31

Source of water supply in *Dingur*

NO.	SOURCE OF WATER SUPPLY	FREQUENCY	PERCENTAGE
1	Public tap	191	42%
2	Communal hand pump water	85	19%
3	River	127	28%
4	Public tap & river	33	7%
5	Others	22	5%
	Total	458	100%

Source: Own Household census, 2017

Figure 26

Community Water Supply Source in *Dingur*

Source: Own picture, 2017

From the table above, we can learn that there is no water supply system, which reaches at household level. Water supply provision is only up to the community level. Furthermore the public water supply sources cover only 61% and about 35% of the community still gets their water from a river and public tap. This shows that *Digur* has a problem of appropriate sources of water and the service is incompatible with the city level water supply system and needs positive intervention.

Table 32

Quantity of Water Supply

SR. NO	WATER QUANTITY	FREQUENCY	PERCENTAGE
1	Good	175	38%
2	Sufficient	35	8%
3	Medium	44	10%
4	Short/Insufficient	50	11%
5	No water	154	34%
	Total	458	100%

Source: Household survey 2017

38% of the respondents believe that there is good quantity of water supply in the area. However 34% of the respondents mentioned that there is no water supply system or water supply network in the study area. This shows that there is not enough water supply in the study area.

Table 33

Water tariff

SR. NO	PRICE OF WATER	FREQUENCY	PERCENTAGE
1	Free of Charge	437	95%
2	< 5 birr per month	14	3%
3	between 5 and 10	6	~1%
4	between 10 and 15	1	~1%
5	exceeding 15	1	~1%
	Total	459	100%

Source: Household survey, 2017

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For the people water consumption does not produce relevant costs. This might be linked to the fact that the community depends on natural rivers, springs and own hand dug wells as water sources.

Table 34

Water quality

SR. NO	WATER QUALITY	FREQUENCY	PERCENTAGE
1	Good/Adequate	251	55%
2	Medium quality	13	3%
3	Poor/without chemical treatment	172	38%
4	Natural without treatment	22	5%
	Total	**458**	**100%**

Source: Household Survey, 2017

Perception of the community on the quality of the water shows that majority of the people (55%) take water sources as adequate in quality. Whereas 43% of the respondents consider the water quality poor. From this, we can conclude that there is poor quality of water in the study area. This is below the WHO recommendation and national water quality standard.

6.3 Assessment of Storm Water Drainage System

6.3.1 Review of Previous Studies on Flooding and Storm Water Drainage

The following section reviews flooding hazards and storm water drainage system analyses of the LDP report 2005. The study area depends on under-standard roads, with no standard storm water drainage system. As a result the community suffers from seasonal floodings.

Table 35

Storm water flooding hazard in *Debri-Dingur* - Flooding problem during rainy season

	yes	%	no	%	total
total sum	219	81,7	49	18,3	268
Dingur	65	100	0	0	65
Mekayih	154	75,9	49	24,1	203
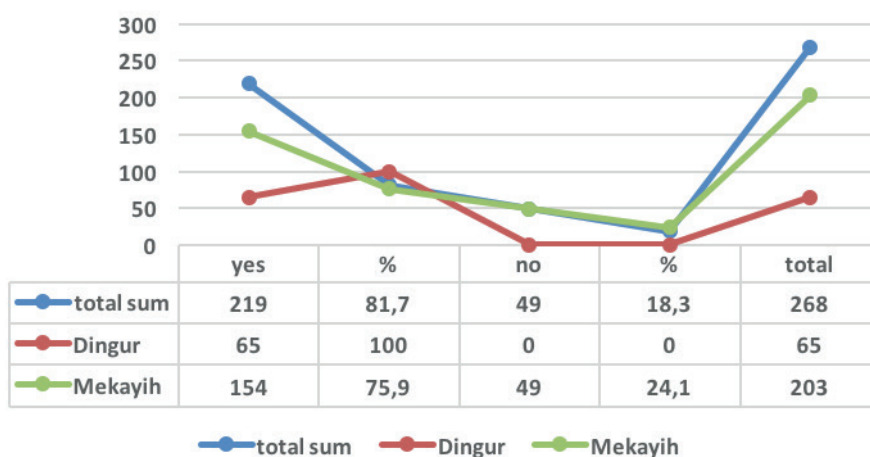
Previous studies revealed that 90.7% of the respondents do not have liquid waste management system at all. Hence, they dispose their liquid wastes in their compound and nearby areas. Only 9.3% of the

community has septic tanks for liquid waste. This shows that liquid waste management should get the appropriate attention in the study area.

Source: Mekelle City Administration, 2005 EC

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Table 36

Liquid waste management in *Debri-Dingur*

	yes	%	no	%	total
■ Mekayih	178	87,7	25	12,3	203
■ Dingur	65	100	0	0	65
■ total sum	243	90,7	25	9,3	268

■ Mekayih ■ Dingur ■ total sum
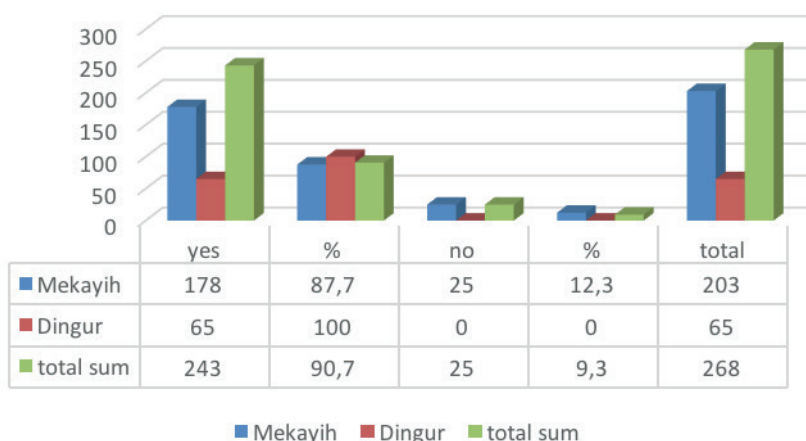
Table 37

Unmanaged liquid waste in *Debri-Dingur*

	compound	%	pit	%	on field	%	river	%	total
Mekayih	91	51,1	11	6,2	54	30,3	22	12,4	178
Dingur	4	6,2	0	0	61	93,8	0	0	65
total sum	95	39,1	11	4,5	115	47,3	22	9,1	243

—total sum —Dingur —Mekayih
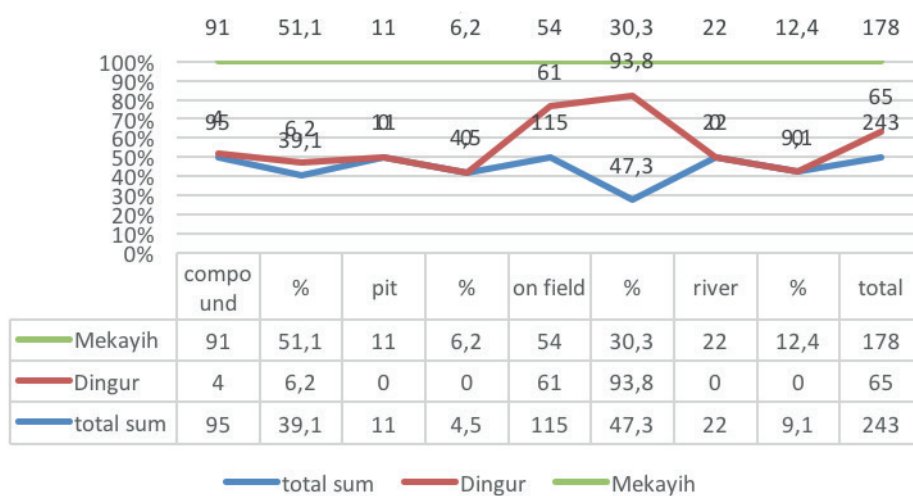
6.3.2 Flooding and Storm Water Drainage Household Survey

The analysis of the household survey on flooding and storm-water drainage system in the *Debri-Dingur* area is discussed in the following section.

Table 38

Flood hazards

SR. NO	FLOOD HAZARDS	FREQUENCY	PERCENTAGE
1	Every Summer	68	15%
2	Sometimes	28	6%
3	Very low	46	10%
4	No	315	69%
	Total	**458**	**100%**

Source: Mekelle City Administration, 2005 EC

Source: Household survey, 2017

According to the table above, most responds mention that there is no flooding threat in the area. Only 31% of the respondents believe that there is flooding hazards ranging from very low to a seasonal flooding. From, it can be concluded that the community in the study area do not believe there is a severe (which might cause community displacement and property destruction) flooding in the vicinity.

Figure 27

Seasonal flood and road mud in *Dingur*

Source: Own picture, 2017

Table 39

Storm water drainage infrastructure

SR. NO	FLOOD DRAINAGE INFRA	FREQUENCY	PERCENTAGE
1	Good	46	10%
2	Medium	27	6%
3	Little	53	12%
4	Poor/Very little	27	6%
5	No infrastructure	305	67%
	Total	**458**	**100%**

Source: Household survey, 2017

The survey investigated the presence of storm water drainage in the study area. A majority (67%) of the respondents believe that there is no storm water drainage at all. Only 10% of the community acknowledged the presence of a good drainage facility in the area. Hence, storm water drainage must also get a due attention.

6.4 Planning for identified problems

Based on the results of the public survey and investigation and observation, the following points have been identified as the main planning issues for *Dingur*:

1. The community is dependent on river, hand-dug wells, pubic taps, communal hand-pumps and marsh areas, as sources of water supply and that does not meet urban water supply standards. There is standard need for standard urban water supply in the area.
2. There is poor liquid waste management in the study area.
3. A seasonal flooding problem and road mud limits free movement of people, animals and goods during the rainy season.
4. Traditional systems oftimber or wood made bridges used by the community and animals to cross small streams and rivers. ◆

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PART 1/7
GEOLOGY AND SOIL CONDITIONS (LANDSCAPE, ECOLOGY AND ENVIRONMENT)

The *Dingur* area is made of Quaternary sediment deposits (alluvial and residual soils) and limestone-marl-shale intercalation geological units. These varieties of formations have different strengths, varying from a weak foundation to a strong one (limestone). The shale unit is considered as a weak geological formation, a rock with low mass strength. The soil deposits are, generally, unconsolidated and composed of silt and clay particles and occupy the low-lying flat area.

Most of *Dingur* area soil is characterized by alluvial soil deposits and weak mass strength of the lithology (see Figure below). The soil is of high plastic nature, likely to shrink and expand during wet and dry cycles. The flat plains of the area are covered by relatively thick 2 meter soil deposits. The sediments comprise gray and black clay soil dominantly in the low-laying area. The soil is characterized by poor geological engineering properties. The engineering properties of such soil vary considerably, laterally and in depth due to differential weathering. The intercalation of shale-limestone units is not well investigated and makes foundations for settlements vulnerable.

In many cases, soil conditions can lead to deep foundations in order to transfer the high loads of buildings into deep soil strata with higher bearing capacities. It is important to note that a good foundation soil provides a better performance during a strong earthquake but the design of the building also plays a crucial role. Therefore, multi-story buildings can be designed in areas where soil strength is low if a robust design (including seismic design) is considered. Good engineering design incorporates corrective measures and management practices. Besides, wide ranges of ground improvement methods are also available (e.g. soil densification and solidification).

Figure 28

Thin soil formation around the area

Source: Own picture, 2017

The groundwater level is relatively shallow in *Dingur* area and a base flow is evident. Both, the alluvial deposits and the presence of shallow aquifers are important features influencing foundation type and the ground shaking during earthquakes. Also, the catchment provides opportunities for aesthetic and recreation activities that integrate an artificial lake/pond in the broad plan. However, a careful analysis of water volume and lake design is important to reduce problems related to the aesthetic amenity.

Building artificial ponds integrated with a park ensures a sustainable function of a park by providing recreation facilities and supporting nature conservation at the same time. The artificial pond will be connected to the recreational facilities of the park. Excavated ponds are the simplest to build in a relatively flat terrain. Because, their capacity is obtained by excavation, their practical size is limited. The pond/lake utilizes the wetland of *Dingu*r along the *Kalamino* River. The physical conditions of the area exhibits normal runoff, moderate slopes, normal soil infiltration and fair to good plant cover. The detailed design of the lake capacity should be based on the runoff generated from the catchment area and should critically consider the following:

- The ability of the catchment to provide sufficient water to maintain an adequate water level in the pond/lake for both, aesthetics and aquatic plant health.
- The depth of the lake should be favorable to macrophyte growth, with high light penetration and less stratification (to protect low oxygen) and subsequent problems
- Preliminary layout should make provision for batters, edge treatments and buffers
- Lake layout must blend into the surrounding environment and enhance the natural features
- Determine the pond/lake level variation; because it may affect the sustainability of the project and water pollution that reduces aesthetic amenity
- The design should integrate a park, a zoo and a water body to maximize a land use. ◆

CHAPTER 2
PROPOSAL

PART 2/1
PROBLEM IDENTIFICATION AND PRIORITIZATION (SOCIAL INCLUSION)

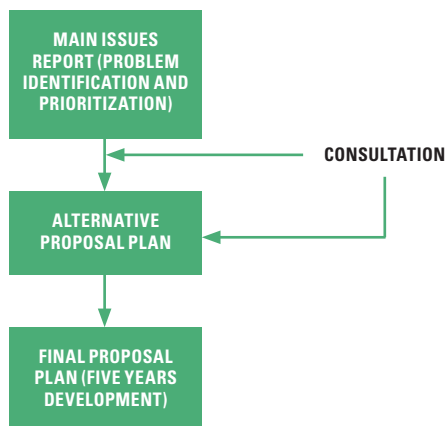### 1.1 Planning approach and methodology

During the first phase of the upgrading project, the study has conducted an in-depth analysis and identification of existing strength, weakness, potentials and constraints of the project area. Moreover, the study has also conducted a community consultation for problem identification and prioritization. The project team, in collaboration with the public representative has identified the planning issues and ranked all according to their urgency, stakeholders interests, multi-dimensionality, extent of the problem, policy friendliness and feasibility of the proposed land use plan and activities. Based on the priority order of the identified issues, the city administration with other stakeholders could mobilize resources and technical assistance to get the upgrading project implemented. The identified and prioritized problems of the community and the in-depth analysis by the project team will be weighed and ranked at the end of this report. The overall process of the project institutions (different committee) were formulated at *Hadinet* sub-city level and opinions of the residents were considered throughout the phases of the project. Lastly, the project team identified main problems of the project area and its hinterlands.

In the strategy phase, the residents of the project area and sub-city officials formulated the particular vision of the project area as a shared vision of the neighborhood. This vision should show the unique characteristics of the site vis-à-vis the city. The vision should be formulated in consultation with the residents of the project area, representatives of the sub-city and the city administration. This helps both, the community and the city administration, to have a shared vision and understanding of the project and to realize their common vision. After formulating a common vision, the residents and the sub-city officials listed objectives based on the strength and potential of the area. The sub-city and the city administration made an active participation in the formulation of objectives for each issue.

For each objective, the project team identified possible strategies, based on the financial, material and technical capacity of the city administration. These strategies have been tested to optimally solve the problem under consideration.

The main stages in the upgrading program are summarized below:

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Figure 29

Stages of the upgrading proposal

Source: Local development plan manual, 2012

1.2 Problem Identification and Prioritization

Problems were identified and prioritized during the discussion and consultation with the community and representatives of the residents of the project area and the in-depth expert analysis made by the project team. ◆

Table 40

Problem prioritization by community (Refer annex 1)

NO.	PROBLEM PRIORITIZATION
1.	Late implementation of LDPs
2.	Housing problems and poor land administration
3.	Insufficient (agricultural) land compensation
4.	Lack of services such as water supplies and electricity
5.	Lack of market place
6.	Lack of public space for public holidays and events
7.	Lack of social services (e.g. school and health centers)
8.	Lack of youth and elders recreational centers
9.	Poor road connectivity and transport services
10.	No designated area for local administration and community policing

Source: Public consultation, 2017

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PART 2/2
STRATEGY PHASE

2.1 Implementation Strategy for *Dingur* Neighbourhood Upgrading

To implement the proposed upgrading project of *Dingur* the following objectives are forwarded:

Objective 1:
Upgrading and constructing infrastructures (roads, water supply, electricity and telecom) and improve the housing conditions and housing facilities of the area.

Objective 2:
Improve the road network by creating new local access roads, using standard surface materials and widths , and upgrading the widths and pavements of the existing ones.

Objective3:
Create employment opportunities through income generation activities by providing working space for MSE's, and enhance commercial and mixed use of space in the area.

Objective 4:
Create open spaces, green areas and playgrounds by improving government owned open spaces and playgrounds on the site.

Objective 5:
Create social services by the participation of the community and NGOs as well as upgrade social and municipal services.

2.2 Vision

"We aspire to see a neighborhood that is environmental friendly, economically and socially viable, and spatially connected with safe and affordable housing available to all of the residents."

2.3 General Objective

The general objective of the project/proposal is to maintain the culture and norm of the existing neighborhood making the area active and vibrant, enhancing the compatibility and accessibility, as well as considering environment friendliness and the linkage with the surrounding areas.

2.4 Specific Objectives

- To create an accessible road network with defined block shape, street hierarchy and pavement,
- To facilitate green areas and open spaces according to the standard,
- To create a strong linkage with the surrounding area,
- To upgrade social and municipal services,
- To enhance a compatible land use distribution,
- To support small and micro enterprises that create job opportunities for the locals.

2.5 Planning principles

- Enhance accessibility and connectivity,
- Provide a balanced residential housing with the surrounding neighborhoods,
- Introduce a mixed use development,
- To have an accessible road network with defined block shape, street hierarchy and standard,
- Enhance the safety and security in the neighborhood
- Provide compatible land use distribution and
- Create a strong linkage with the surrounding area.

2.6 Conception

The conception for the *Dingur* neighborhood future development lays mainly on the prioritized issues, physical impacts of developments, economic potentials, government policy, and achievements of the city's vision.

Furthermore, to achieve the development objectives, the concept focuses on major issues such as efficient land consumption and significant change on the area's morphology and urban structure. The approach used for this study area is mainly of upgrading. The main issues included in the proposed upgrading are: housing conditions, road access, basic infrastructures and utilities, micro and small-scale industry, urban agriculture, social and municipal services, and environmental protection. ◆

PART 2/3
UPGRADING PROJECT PROPOSAL

3.1. Introduction

Urban upgrading is a detailed development plan for a defined locality. A statutory instrument zooms out the general and broader proposals of a citywide Structure Plan of an urban center. It serves as a transition between a Structure Plan and projects in the process of implementation of an urban plan. The upgrading project is a planning instrument that facilitates the implementation of the Structural Plan by focusing on selected strategic intervention areas. This tool is generally approached by various methods such as urban renewal, urban upgrading and urban redevelopment. The upgrading project of the *Dingur* neighborhood is approached as an urban fringe upgrading by regularizing and upgrading the tenure security, which is intended to prescribe functions, design principles and spatial organization of a given locality. It combines urban design with planning proposals and regulations as clearly defined below.

- **Legal component**: consists of hierarchy plans, conformity and consistency of rules and regulations, including land use of the area,
- **Design component**: consists of integration plan, design proposal, perspective plan, 3D and design strategy (image diagram, map),
- **Implementation components**: consist of a strategic action plan, implementation phasing, volume of public investment, mechanism for financing and stakeholder's involvement. Furthermore, a detailed description of the components is stated in the proposal part of this project.

3.2 Basic upgrading Principles

The upgrading project involves mainly the identification of what is achieved vis-a-vis what is envisaged. In other words, it will help to know the degree to which an appropriate upgrading has been prepared and is utilized in promoting the development of the urban center and the implementation of the Structure Plan. This can be achieved if the following key principles are considered:

1. Transparency: The preparation and implementation of the upgrading project proposal should involve stakeholders in a transparent and inclusive manner.

2 Strategic: There should be a focus on measuring how much the upgrading project has addressed the main problems of the community, the area and its surroundings. The focus is on the strategic potential of the area by addressing the problems of the upgrading area in particular and the entire city in general.

3 Integrated Plan: Since the upgrading project is an integral part of a Citywide SP and the urban system, it needs to fit into the overall development vision, goals, strategies and development programs of a city. Thus, an upgrading project is not an isolated task, but rather an integral part of the urban system and continuation of the SP of the city.

4 Harmonization of the upgrading area with the surrounding neighborhoods and the city.

5 Plan for Performance: Upgrading is more than a statutory plan. It is expected to bring the overall development goals and strategies of the structure

plan closer to practical development programs/projects. To this effect, the upgrading project needs to respond firmly to municipal budgets as well as to fit to development programs/projects of the municipal. A well-defined implementation strategy is thus not an option but a critical element of upgrading.

6 Sustainability: Upgrading should fit into national, regional and local contexts. Further, upgrading is supposed to respond both to future and current development needs of the community and find the right balance between current demands and future needs. Moreover, proposals for upgrading urban neighborhoods need to match local capacities (financial, technical, institutional and local economy) for the effectiveness of the implementation.

7 Accommodative Plan: proposals for upgrading should accommodate the needs and interests of the local communities as well as the existing urban functions and characters. Proposals that completely presuppose new urban fabrics in lieu of existing local urban functions could hardly succeed, mainly due to the huge social and economic costs.

3.3 Demographic output–input analysis and integration

The upgrading project is an instrument in qualifying and implementing citywide Structure Plan. Hence, it is important to design proposals in line with the outputs of the Structure Plan. The *Dingur* upgrading area proposal for the socio-demographic sector is therefore proposed in line with the Mekelle citywide main study outputs. Accordingly, the following output-input proposals and recommendations are designed on the bases of *Dingur* upgrading study outputs and in reference to Structure Plan document.

3.3.1 Population

3.3.1.1 Population baseline determination and projection

A study carried out in 2017 by the study team, indicates that *Dingur*, which include *Genha* area, is inhabited with a total number of 459 household heads In addition, the total number of average persons per household was reported to be 5.6. Therefor it is possible to say that *Dingur* settlement area accommodated 2,570 people in 2017. This number can serve as a minimum to project future population dynamism. With 7.1% as a medium and 8.1% as a higher variant, growth rates were proposed to estimate future population size in the Mekelle city Structure Plan revision. The assumption was that everything would continue with similar trends (normal situation). *Dingur* provides basic social services such as grain mill, health service, access road to Mekelle city, etc. It is, then, assumed that at least one third of the *Dingur* population (more than 875 residents) do have access to social services at the upgrading site. A total number of 3,445 people will be used as a baseline data for future population estimation. Though it is expected to design its own social service requirements, Mekelle city administration is preparing to allocate land to construct new cooperative housing units near *Dingur* neighborhood. This will have a positive implication on sharing social services available at *Dingur* site. Hence, it is important to consider additional people as a contingency during social service requirement planning and land allocation. To this end, 7.1% as lower variant, 8.1% as medium variant and 9.1% as a higher variant population growth rates are considered to avoid a backlog of massive population pressure towards the *Dingur* neighborhood.

Therefore, under normal situation, during the next ten years, the population size of *Dingur* neighborhood area will reach **5,891, 6,235** and **6,580** using an average 7.1% (lower), 8.1% (medium) and 9.1% (higher) growth variants, respectively. Besides, there are also nearby village settlement catchment areas that add users to the on social services of the *Dingur* community,. Thus, **8.1%, the medium variant of growth** is used to estimate population size development for basic social services (see table, below).

Table 41

Future population growth trends and dynamism of *Dingur* neighborhood area

YEARS GC	ALTERNATIVE POPULATION GROWTH RATES/VARIANTS		
	INITIAL POPULA-TION	LOWER VARIANT (7.1%)	MEDIUM VARIANT (8.1%)	HIGHER VARIANT (9.1%)
2016	3,445	3,690	3,724	3,759
2017	3,690	3,952	4,026	4,101
2018	3,724	4,233	4,352	4,475
2019	3,759	4,560	4,705	4882
2020	3,952	4,884	5,086	5,326
2021	4,026	5,231	5,500	5,811
2022	4,101	5,602	5,945	6,340
2023	4,233	6,000	6,427	6,917
2024	4,352	6,426	6,948	7,546
2025	4,475	6,882	7.511	8,233
2026	4,560	7,371	8,119	8,982

Source: Household survey, 2017

Doubling time: Population will double itself at 8.6 years interval and the settlement area will require more than double current social services available (2 years faster than the projection of Mekelle city).

3.3.1.2. Basic social services requirements and proposal for Dingur **neighborhood**

Like any other neighborhood standard based plan preparation and implementation activities, *Dingur* settlement area requires a comprehensive social service planning and service integration strategies. Some basic social services requirement as per the community demand and standard requirement is proposed to be integrated in the land use planning to serve current and estimated future population size of **8,119.**

Table 42
....
Required social service

SOCIAL SERVICES REQUIREMENT PER POPULATION					
REQUIRED BASIC SOCIAL SERVICES (KEY ONES)	**SERVICE AGE POPULATION ESTIMATION**	**STANDARD**	**EXISTING**	**ADDITIONAL REQUIREMENT**	**NOTE**
Kindergarten	1,120	1:240	1KG	4	
Elementary School	1,234	1;1600	No (use with Debri)	1	
High School	935	1:800/900	No (use with Debri)	1	
Preparatory School	682	1:8/900/1000	No (use at Debri/ Mekelle)	1	
TVET/College/University			No (use at Mekelle)	1	
Health Post		1:5,000	1	1	
Health Center		1:25,000	1	No need	Upgrade into a & comprehensive services HC as per the standard
Places of Worship requirement		1:2,520 (avg)	3 Ethiopian Orthodox Churches	1 for Muslim and expand the area of existing churches	Will grow from 57 to 115 pop size including people live at Meles Academy/10 yrs.
Cemeteries requirement		1: people living in a range of 4,000-5,000	2 Orthodox cemeteries inclusive within churches	1 for Orthodox and 1 for Muslim which can serve for Dingur and surrounding areas	Including expected people to live at Meles Academy
Small scale elders' recreation & day care center requirement		1:500-1,000	No	2 centers	1 recreational & 1 day care center
Small scale social gathering/ festival places/ sport fields	8,119	1:5,000	No	1	Multipurpose: can service as a playground for children
Small scale market center requirement	8,119	1:5,000	No	1	Small petty trading type of market center
Housing units need	8,119	1:1-1.5	459 HUs	1,270+318 = 1588	318 is contingency for displacement & etc
Entertainment service centers	8,119	1:5,000	no	1	natural greenery areas need to be developed
Establish 1 multipurpose community empowerment center	8,119	1:5-7.000	no	1	Comprehensive community development center

Source: SP manual 2012, and own projection 2017

3.3.1.3 Other recommendations to be integrated with the land use planning proposal

- Design and implementation efforts that ensure the wellbeing of the local people before we use land for expansion and investment purpose (ensure social safeguard of farmers & their children);
- Design and implement effective land use planning to ensure and integrate local needs with investment projects (integrate local resources/skills with Meles Zenawi Academy and Industrial Zone – improve community life and employment) and
- Design proper system to handle the existing land holding legalization, regularization, etc. (e.g. Metesha/ plot allotment, issue of young people, etc.).

3.4 Physical and Environmental Proposals

3.4.1 Summary of planning issues

Most part of the *Dingur* area is characterized by alluvial soil deposit and weak mass strength of lithology unit. The soil is more likely to shrink and expand during wet and dry cycles. So building shall be designed in area considering the specific site's soil strength. Ground improvement methods (e.g. soil densification and solidification) will be good alternatives for multi-story buildings.

Building artificial ponds integrated with park ensures better function of the park by providing recreational activities as the same time supporting conservation works. The artificial pond will be connected to recreational facilities of the park.

Excavated ponds are the simplest to build in relatively flat terrain. Because their capacity is obtained by excavation, their practical size is limited. The detailed design of lake capacity should be based on the runoff generated from the basin. This should critically consider the following issues.

- The ability of the catchment to provide sufficient water to maintain adequate water level in the pond/lake for both aesthetic and aquatic plant health.
- The depth of the lake should consider macrophyte growth, where light penetration is high and less prone to stratification (to protect low oxygen) and subsequent problems.
- Preliminary layouts should make provision for batters, edge treatments and buffers
- Lake layouts must exhibit that the lake blends into the surrounding environment and enhance the natural features in the vicinity.
- Determine the pond/lake level variation because it may affect the sustainability and cause water pollution that reduce aesthetic amenity of the area.
- Design an integrated park, zoo and water body to maximize land use.

3.4.2. Geology and water source proposal

Small-scale quarry sites of dimension stone and aggregate are common in *Debri*. The landscape in the quarry sites is altered. Over a period of time the cumulative soil deposit may result in a loss it fertility and its natural landscape. Some of the quarries have been dug deep forming a man-made cliffs and ponds which distort the natural water flow. Thus, quarry activities for dimension stone should be prohibited as it affects the landscape.

The area is potentially an important source of groundwater. It is part of the *Aynalem* catchment, which forms a significant source of groundwater resource. So.the *Aynalem* ground water is highly hydraulically connected to the area (wetland of *Debri*). The upper catchment area of *Aynalem* will be preserved to its natural condition, and no major developmental activities will take place in the area. The proposed pond/lake will be planned in the Wetland of *Debri-Dingur,* along the *Kalamino* River. In a pri-urbanized *Aynalem* catchment, natural drainage systems and hydrological processes prevail

that leads to the effects of infiltration, vegetation, wetting, and interception and depression storage. The area is designated as a green space and the water body can be developed together as the catchment can provide a continuous water supply from the upper catchment area. The detailed design and capacity of the lake should be based on the discharge capacity of the catchment. Depending on the capacity of the catchment to provide sufficient water, the artificial pond can be designed in a series of small ponds in 40 hectares or one big pond.

3.4.3 Urban greenery and recreation areas proposal

Debri-Dingur has preserved natural and manmade greenery and environmental sensitive areas but no playgrounds and sport fields. Most of the reserved area in the upper catchment is created for the protection of the ground water and wetland and for urban agriculture. Based on the standard for parks, neighborhood parks with 0.05-1.2 ha, local Park 1-4 ha, district parks 4-8 ha, and city wide parks greater than 8 ha have been identified.

The neighborhood parks are open green spaces for children, elders' recreation areas and other social services. For the sake of efficiency, such small patches of green spaces in the neighborhoods shall be planned together with play lots and Area should be 0.05-1.2 ha, and the catchment area is 500 - 7000 m. The entire park should be covered by vegetation in which 20-30% by trees and the rest ground cover. If there is a district or city park within the vicinity, a park should not be provided.

Local parks are found within the boundary of the *kebelle/tabia* and will have 1.5 km, of catchment area. This can have an area of 1-4 ha. These parks will be proposed along the riparian corridor. The parks will be connected to the city's green network. In addition, the parks will be proposed together with the district and citywide park. The park's 70-80% of the total area must be covered by vegetation out

of which 20-30% will be covered by trees for shed. Such area shall be planned together with *kebelle/tabia* playfields.

The big city park with 169 hectare is located in *Debri* and it is expected to serve as City Park. This area is suitable for eco-resort. *Debri-Chelanqua* waterfalls will be a potential location for an eco-lodge. The green area of the park should comprise 80% including a green house, a rock garden, with sculpture, a water body and an aquatic life and a fountain.

3.4.4. Solid waste management proposal

The waste management problems have been recognized through studies (Mekelle city administration, 2005 EC). *Debri* is one of the areas in the city with limited solid waste management system. This study recognizes basic waste management problem in the area and encourage the introduction of solid waste collection system in the area. This can be done first by re-organizing the waste management office down to *tabia* level. This can be done in collaboration with the community in areas of awareness creation and the like. Major activities may include recycling, compost preparation techniques and environment conservation practices as an integral part of water resources management.

3.5. Micro and Small Scale Enterprises Proposals on *Dingur* upgrading area

Key findings of the situation analysis of the micro and small-scale industry and allocated space are listed below.

Table 43

Proposal for land or space requirement

SN	TYPE OF MSE	NUMBER REQUIRED	LAND REQUIRED	SUB TOTAL
Urban Agriculture	Vegetable production	10 groups (five households in each group	½ hectare per group = 5 hectares of land	5 hectares
	Poultry development	4 groups (five households in each group)	2 shades each, 300 m² per shade = a total of 2,400 m²	2,400 m²
	Livestock development	5 groups (five households in each group)	2 shades each, 250 m² area per shade = a total of 2,500 m²	2,500 m²
Manufacturing	Metal works	7 groups (five households in each group)	1 shade each, 250 m² area per shade = a total of 1,750 m²	1,750 m²
	Wood works	4 groups (five households in each group)	1 shade each, 250 m² area per shade = a total of 1,000 m²	1,000 m²
	Grain mills	2 groups (five households in each group)	1 shade each, 300 m² area per shade = a total of 600 m²	600 m²
	Bricks production centers	4 groups (five households in each group)	1 shade each, 400 m² area per shade = a total of 1,600 m²	1,600 m²
	Food processing	2 groups (five households in each group)	1 shade each, 300 m² area per shade = a total of 600 m²	600 m²
	Textile (weaving and sewing) centers	3 groups (five households in each group)	1 shade each, 200 m² area per shade = a total of 600 m²	600 m²
Service	Retail goods distribution shops	2 groups (five households in each group)	1 shade each, 250 m² area per shade = a total of 500 m²	500 m²
	Garage	3 groups (five households in each group)	1 shade each, 350 m² area per shade = a total of 1,400 m²	1,050 m²
	Car wash	4 groups (five households in each group)	1 shade each, 250 m² area per shade = a total of 1,000 m²	1,000 m²

Source: Own projection, 2017

3.6 Proposal for utilities (electric and telephone)

3.6.1 Introduction

The *Dingur* upgrading project considers an assembly of utilities' equipment in an electric power and fixed or mobile system through which is passed for transmission, distribution, interconnection, conversion or switching from electric power substation and BTS or MSAG respectively.

Therefore, the main target of upgrading for electric and telephone in *Dingur* is to implement sufficient,

reliable and flexible service. The huge problem here in Mekelle city is power interruptions and limited transformer capacity as well as the load balance system. This directly affects the performance of other infrastructures. This calls for balanced power distribution system of the city and load sharing of each transformer need to be standardized.

3.6.2 Proposed energy meter (KWHM) for 5 years

To propose the estimation of *Dingur* energy meter demand in the coming 5 years, population projection, households projection, commerce projection, small and

large industry projection are needed. The above factors are inputs to calculate the number of energy meters and maximum electric power demand for the area.

Using the projection, we can calculate the maximum kilowatt-hour meter (KWHM) and power demand using rolling or fixed (block) demand methods.

Table 44

Proposed average KWH-M for 5 years

CUSTOMER CATEGORY	TOTAL NUMBER OF HOUSEHOLDS UNIT	TOTAL NUMBER OF KWH-M	REMARK
Residential	1,250	1,250	Single phase (10/30A)
Commerce	800	1,850	Single and three phase (110/30A, 120/60A, 315/30A, 3 and AR)
Small industries, LV	125	138	Single and three phase (120/60A, 315/30A, 3 and AR)
Medium industries, MV	10	20	three phase (3)
Street light		03	three phase (315/30A, 3 and AR)
Grand total		**3,171**	

Source: Household census and own projection, 2017

3.6.3 Proposed transformer for 5 years

The expansion and existing *Dingur area* needs a sufficient and reliable utilities service such as an electric transformers devices used to distribute power to customers, which covers about 500 m radius.
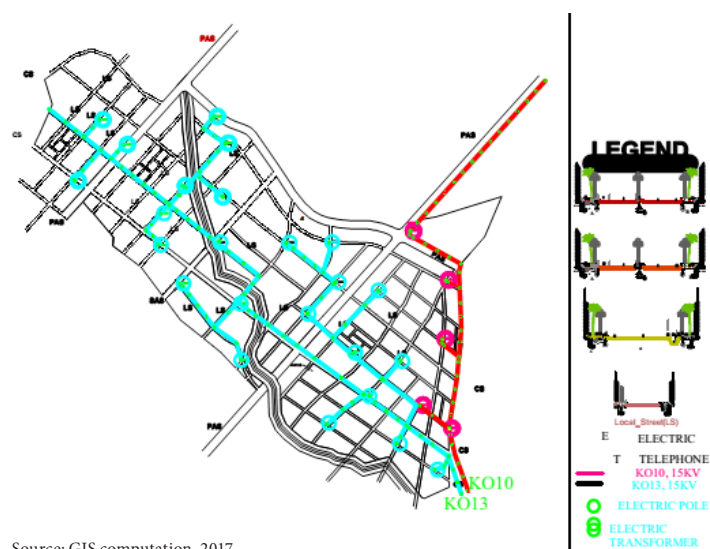
Table 45

Proposed electric transformers for 5 years

TRANSFORMER TYPE (KVA)	QTY	TOTAL KVA	REMARK
100	8	800	Outdoor transformers: Are < 250kw
200	15	3,000	
315	07	2,205	
630	03	1,890	Indoor transformers: Are > 250kw and NTS system (VT and CT)
800	01	800	
1,250	01	1,250	
Grand total		**16,110**	**12.89MW**

Source: Own projection, 2017

Figure 30

Proposed utilities network and location of transformers

Source: GIS computation, 2017

3.6.3 Proposed electric poles

To transmit the feeder line of 15KV into transformer step down (to 220/380V), electric poles are important for the installation.

Table 46

Proposed electric poles

POLE TYPE	UNIT	QUANTITY	REMARK
Wooden pole 11 m	Pcs	350	High and low tension poles, supporting poles and 8-20 m street light poles
Wooden pole 10 m	Pcs	800	
Wooden pole 8 or 9 m	Pcs	1580	
Concrete pole 10 or 11 m	Pcs	155	Used for 30 m wide roads for street light poles
Steel pole 10m	Pcs	175	

Source: own computation, 2017

3.6.4 Standard clearances

The standards clearance between utilities is very important to have integrated plan. Electric power lines should meet to the standard clearance to the other utilities like water, telephone, fuel, gas line and sewer. So, the minimum standard clearances of vertical and horizontal is indicated in the table below.

Table 47

Standard clearance of overhead conductors

LEVEL OF CURRENT CON-DUCTOR	FROM GROUND SURFACE		FROM TREES			FROM BUILDINGS
	VERTICAL DISTANCE (CM)		HORIZONTAL (CM)			HORIZONT. (CM)
	WOODEN POLE	CON-CRETE POLE	4 M	8 M	≥ 25 M	
380/400V	900	800	250	250	250	75
15KV	1,100	1,000	250	250	250	200

Source: EEPC, 2017

3.6.5 Proposed Street Light for 5 Years

- Proposes street light easy system by using PV solar system.
- All 40m ring roads will be rectified using PV solar street light.

Table 48

Street light proposal for 10 years

POLE	DISTANCE	POWER SOURCE	REMARK
	KM		
Wooden	12	Grid	8-20 m roads
concrete	2.75	PV solar (on system)	recommended for 30 m roads
Steel	3.15	PV solar (on system)	recommended for 40 m and 30 m roads

Source: Own computation
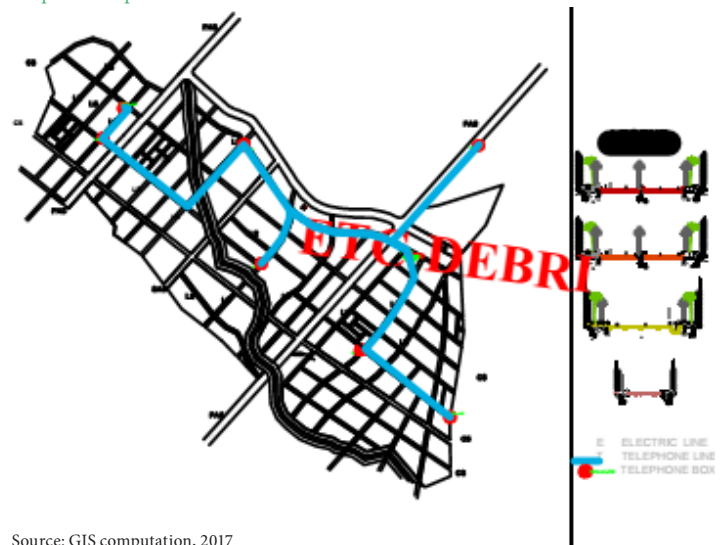
3.6.6 Proposed Telephone MAGS and BTS for 5 Years

Table 49

Proposed Telephone for expansion areas

TYPE OF SYSTEM	QTY	POWER SOURCE	REMARK
MSAG/M	6	Grid	
BTS	2	PV solar and Grid	
Wireless cell	4	PV solar	Set on the longest buildings

Source: Own computation, year

Figure 31

Proposed telephone network

Source: GIS computation, 2017

3.7 Road network and Transportation proposal

3.7.1 Summary of Findings

The road and transport system in Debri-Dingur comprises major organic footpaths, which are created by the natural movements of pedestrians and animals. Minor gravel roads that are used by vehicles are also present. The main challenges include:

- Very poor roads that follow natural topography and are difficult for drivers. The roads are completely inaccessible during the rainy season.
- Poor connectivity,
- Inadequate transport services.

Figure 32
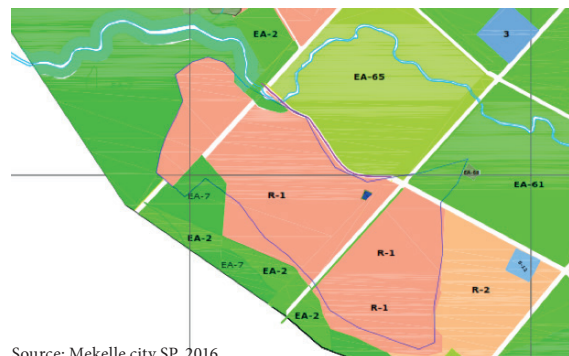
Existing organic roads

Source: Own picture, 2017

3.7.2. Proposal in Structure Plan around the LDP area

The LDP area includes major connector roads that connect to the city center as shown below.

Figure 33

Road network in the upgrading area

Source: Mekelle city SP, 2016

3.7.3 Summary of Traffic Count Results

The summary below shows a three-day traffic count made on selected two spots to *Debri-Dingur* from the city. Spot-1 is from the direction of Kebelle 18 Asphalt Road pass *Midregent* and Spot-2 is *Adi-Hawsi* Asphalt through *Kelqel-Debri* to *Debri*. 4470 and, 6463 traffics and pedestrians were counted In Spot-1 and in Spot-2 respectively. 10933 traffic elements (vehicles, pedestrians and animals) were counted in 30 hours for 14 modes of transport. The percentage share of each mode of transport shows that pedestrians account for 45.53%, followed by animals (15.08%), private cars (10.08%), minibus taxis (8.35%), Bajaj (5.64%), and Small Freight Cars (5.72%) The detail is documented in the following table.

Generally, the current study in the upgrading area on the road network and transport is limited. Even the existing organic roads are deteriorating before the service time ends. Existing roads are poorly surfaced. They are also found to be inconvenient for most of the transportation modes.

The survey on terminals showed that there are informal taxi terminals in the LDP area where people use them occasionally during dry seasons.

The Traffic count data showed that most of the trips in the study area are made by walking. The study also showed that there is and will be high demand for modern transportation facilities in the near future.Generally, findings of the study show that with an increase in population, and the high economic growth in the area, the demand for modern transport will increase. This calls for intervention on transport system and upgrading existing facilities through land use management and infrastructure development.

3.7.4. Road network and transport proposal

Table 50

Proposal of road network and transport

NO.	LAND USE COMPONENTS	STANDARD	EXISTING	PROPOSED
1	Utilities and infrastructures	15-25%	10.4ha (7.6%)	13%

Source: Own computation, 2017

Figure 34

Dingur land use proposal

Source: GIS computation, 2017
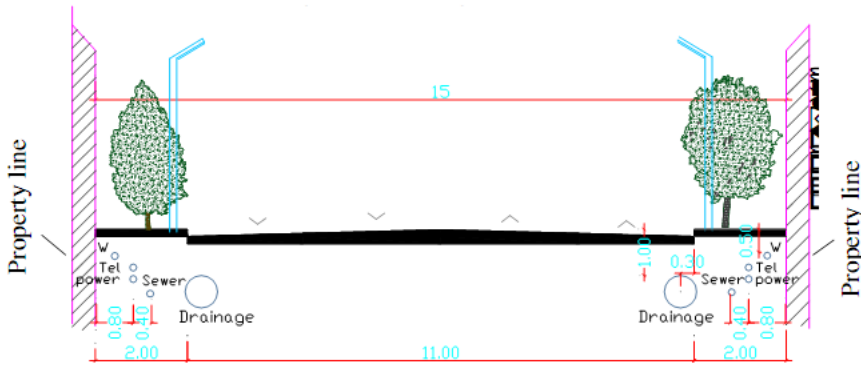
3.7.5 Standard road sections
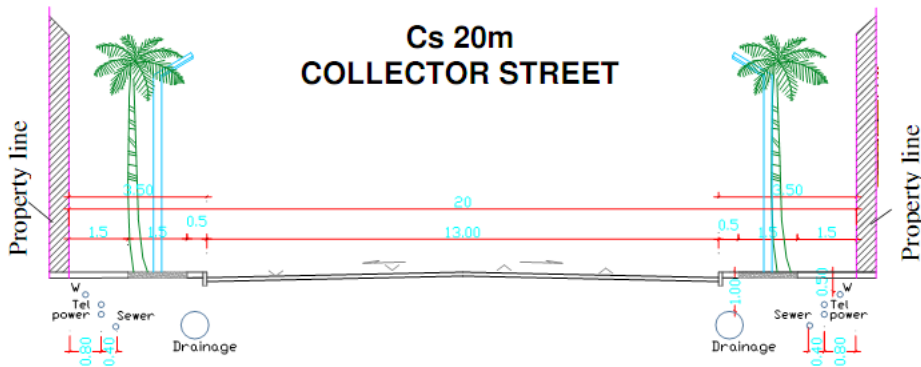
Figure 35

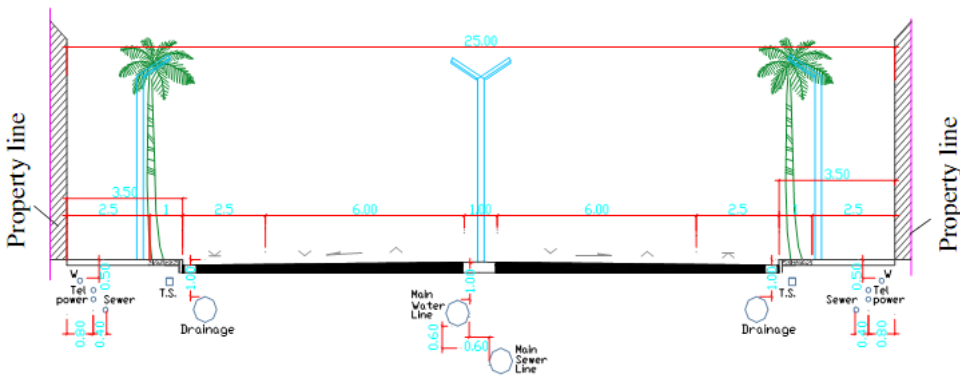Standard road section
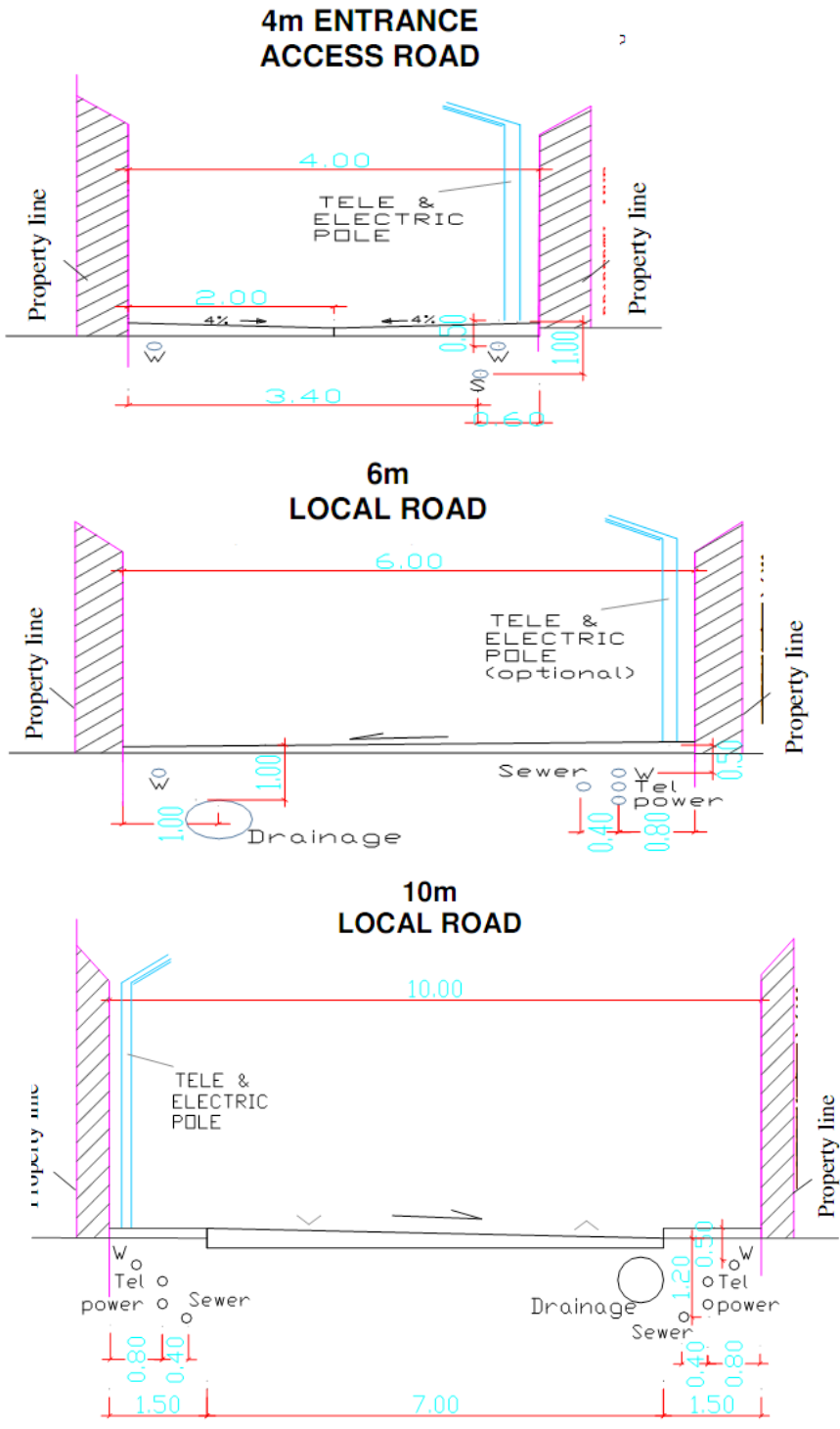
Source: SP manual, 2012
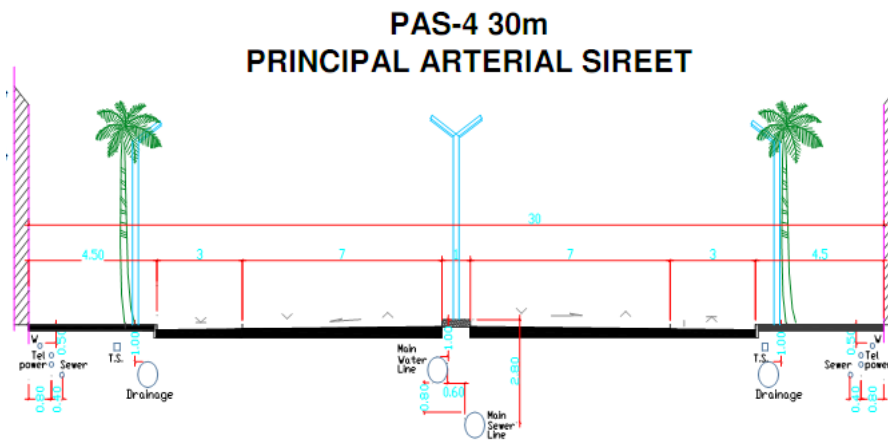
Cs-1 15m
COLLECTOR STREET

Cs 20m
COLLECTOR STREET

SAS-25m
SUB ARTERIAL STREET

3.8 Proposed land use

The *Dingur* upgrading is a prime model for the implementation of the revised structure plan of the city and it can be taken as an example for peri-urban areas of the city.

3.8.1 General framework of the concept plan development

- Upgrading the old neighborhood by providing suitable access and efficient road linkage,
- Providing basic infrastructures and utilities,
- Improve the security of the tenure,
- Provide a sufficient social and municipal services,
- Improve the residential area with dwelling densities and types of housing,
- Ensure efficient land use for different purposes and
- Provide enough public spaces and enhance the quality of the environment.

Figure 36

Concept map

Source GIS computation, 2017

Planning Area

- Proposed potential area for park
- Potential river for urban agriculture
- Connectivity
- Social services
- Churches
- Ongoing good quality residential neighborhoods

Action Area

- Health center
- Micro and small industries
- Lack of open spaces and greenery
- Poor quality infrastructures and residences

The action area covers an area of 137 hectare

Selection criteria

- The need for implementation of the structure plan and it is the prime model of the new revised plan.
- Substandard housing condition and inefficient land use.
- Problems related to road connectivity and accessibility
- The need to enhance and strengthen link between the peri-urban and the main urban center
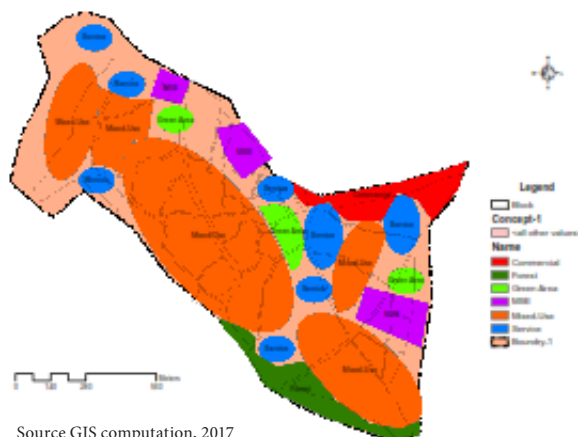
3.8.2 Existing Land use, Gap Analysis & Proposed LDP

Table 51

Existing land use, gap analysis and proposal

NO.	LAND USE COMPONENTS	STANDARD	EXISTING (HA)	GAP	PROPOSED	AREA
1	Housing	40-50%	121ha (88%)	38%	58%	
2	Business and commerce	7-20%		8%	8%	
3	Services (spatial functions)	10-20%	0.96ha (0.7%)	10%	6%	
4	Green, recreation, sports and environmental sensitive area	15-20%	4.1ha (3%)	11%	11%	
5	Administration	3-7%	0.023ha(0.02)	1.5%	1.5%	
6.	Manufacturing and storage	10-15%	0.5ha (0.37%)	2.5%	2.5 %	
7.	Utilities and infrastructures	15-25%	10.4ha (7.6%)	13%	13%	
	Total	**100%**	**100%**		**100%**	**137**

Source: Own computation, 2017

The upgrading area in the structure plan as shown below is proposed for housing development.

Figure 37

Housing land use proposal in the upgrading area as shown on the SP

Source: Mekelle city SP, 2016

3.8.3 Land Use Allocation

In order to propose the land use zoning the following land allocation is stated below.

Table 52

Existing land use, gap analysis and proposed use allocation

NO.	SERVICES	QUANT/NO (PROPOSED)	AREA(M2)	TOTAL AREA(M2)	REMARK	EXISTING
1.	Nursery	3	175	525		0
2.	Kindergarten	2	1500	3000		1
3.	Primary School	1	18,000	18,000	Max. 25000	0
4.	Heal Center	1	2000	2054	2054	1
5.	Model Cemetery	1	50000	50,000	Out of the LDP area	0
6.	Elders' recreation area	1	500	500		0
7.	Social gathering /festival places	1	25000	25000	18,175.5	0
8.	Market Center	1	2500	2500	2550 Small scale	0
9.	Community empowerment center	1	500	500	635	0
10.	Housing	1080 (HU)	140	151,200		
	Urban agriculture, Poultry and livestock production			10,657		1
11.	Manufacturing			8117	Garage too	0
12.	Carwash		1500		1000	0
13.	Garage and parking			manufacturing		0
14.	Retail				CBA	0
15.	Play lot	5	1066	2000	1000-2000 standard	0
16.	Play ground	1	3456	3000	3000-4200	0
		1	3021			0
17.	Kebele Level Football field	1	7676	7676	8064	0
18.	Administration					0
19.	Community police	5	175	875		1
20.	Public Water Tap	5	25	125		-
21.	Mobile Toilet with well-designed Landscape	1	300			

Source: Own computation, 2017

Figure 38

Upgrading land use proposal
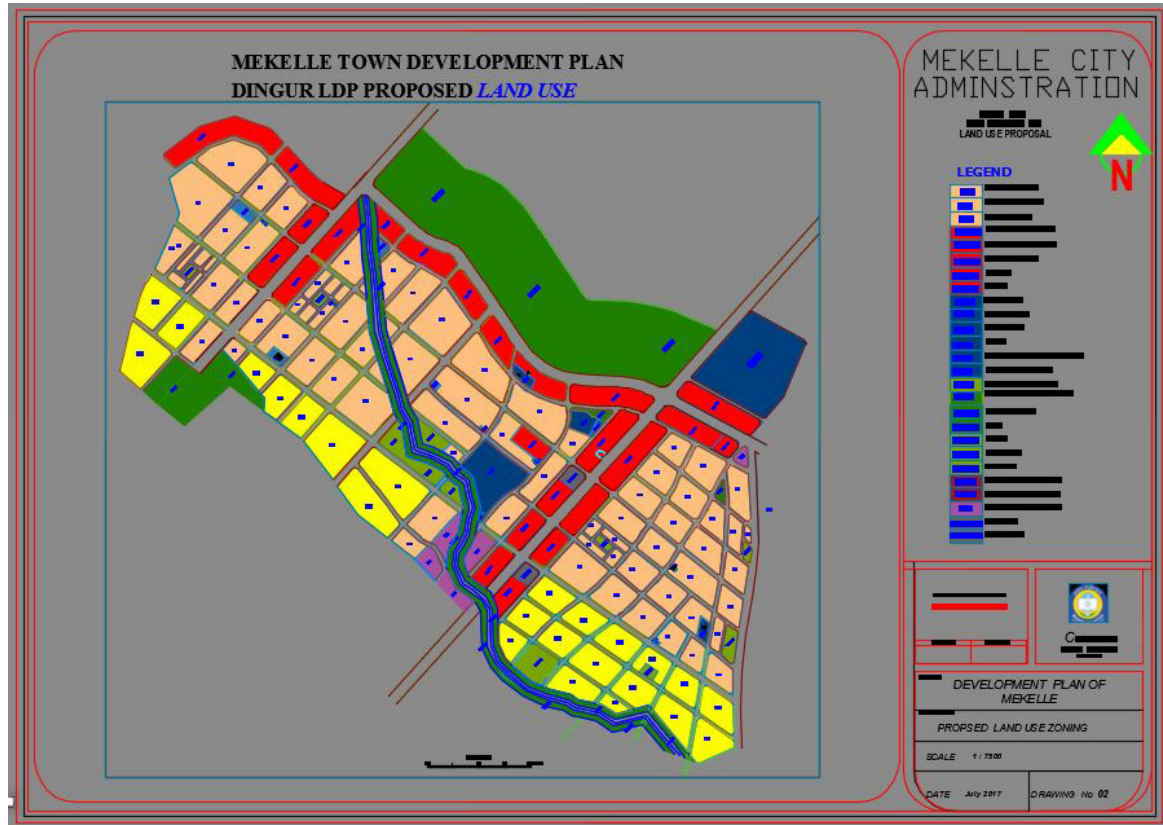
Source: GIS computation, 2017

3.8.4 Plots and houses affected by the proposal

Table 53

Plots and houses affected by land use proposal

| NO	AFFECTED BY	FULLY AFFECTED		PARTIALLY AFFECTED	
		Plot	Houses	Plot	Houses
1	Structure Plan Road	9	21	11	16
2	Upgrading Road	12	19	24	13
3	Social Services	6	8	2	-
4	River Buffer	3	7	14	7
Total		**30**	**56**	**51**	**36**

Source: Own computation, 2017

3.8.5 Proposed Building Height Regulation

The *Dingur* upgrading project building height regulation is proposed by taking in to account various factors that have remarkable contribution for the height restrictions; therefore, the regulation is proposed to bring balanced, active and human scaled developments. The regulations that need to be considered during construction:

- Width of the street (Height to width ratio),
- Proximity to main streets and major activities in the area,
- The current price of land, and the availability of infrastructure,
- Aesthetic and visual considerations and
- Soil and geological conditions.

Figure 39

Upgrading proposed building height regulation
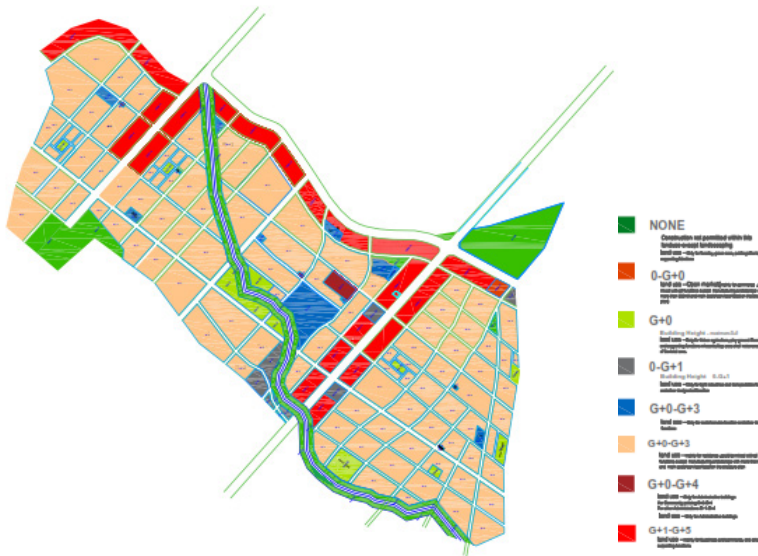
Source: GIS computation, 2017

3.9 Upgrading project and the need for good governance

Urban planning is one of the most important tools of urban management. It guides the socioeconomic and physical development of a given urban center, sub center and neighborhood. Mekelle is a vibrant city undergoing rapid urban development and horizontal expansion. A naked eye observation on current urban morphology of the city suffices to witness the existence of neighborhoods having neither urban nor rural structure. The city also hosts poorly planned centers, sub centers and neighborhoods with inadequate infrastructure and service supply. The predominance of such unplanned development and the rapid horizontal expansion and annexation of rural hinterlands has necessitated upgrading project preparation.

Upgrading project involves an extensive land-use readjustment, fundamental reorganization of infrastructure networks as well as revitalizing rural hinterlands within the city administration. The proposed upgrading project will be lower level urban plan, which is prepared within the framework of the Mekelle city structure plan approved by the Mekelle city cabinet in 2015/16 (2008 E.C).

The proposed LDP should form an integral part of the urban system of the city administration as prescribed in the Mekelle Structure Plan. Therefore, it has to fit into the overall development vision, strategies and development plans of the city administration as stipulate in the structure plan. This upgrading project implementation process shall be participatory. In the process, sector departments, local communities, civic society, private developers, professionals etc. have to take part.

The upgrading project should be guided by a well-defined implementation strategy to bring the overall development goals and strategies of the Structure Plan closer to practical development programs/projects. Thus, implementation of the upgrading needs to be linked firmly with the city administration/sub city budget as well as with the development programs/projects of the city administration. Furthermore, its

implementation should be visible within the continuously enhanced local capacity (financial, technical, institutional and local economy) for the effectiveness of the results. Finally, the implementation of the proposed upgrading project should accommodate the needs and interests of the local communities as well as existing local urban functions and characters.

The upgrading project is an important tool for implementation of boarder Structure Plan Proposals. The upgrading implementing bodies, i.e., the city and sub-city Urban Planning and Land Administration Departments shall follow an integrated and holistic implementation approach. One aspect of upgrading project execution is that employees with relevant knowledge and techniques shall guide its implementation. In addition, public participation must be insured and transparency and accountability of the process must be maintained.

3.9.1 Public Opinion on State of Governance: Survey Results

Responsive governments design projects and development interventions based on information they receive from stakeholders. Information about governance indicates how government structures and public administration within the local administration are providing public services and infrastructure. Public opinion survey is a powerful tool to gather information, understand the state of governance, and design appropriate institutional set-ups. This helps in bringing an effective service delivery by the relevant governmental institution.

Upgrading project intervention touches all inhabitants of the upgrading project intervention area and many of the proposed changes will have multiple effects on socio-economic and environmental conditions of the area.

Therefore, prior feedback from inhabitants about the state of governance is very important. The feedback supports in designing administrative structures and placing adequate resources for effective implementation of the project. When designing and implementing substantive upgrading projects, public participation at different levels of administration can benefit from feedbacks of residents.

Few a key questions were included in the household survey conducted in *Dingur neighborhood* of Mekelle city administration. The aim was to investigate the state of governance at sub-city level and included the results in the upgrading project report. Questionnaire was distributed to all households on governance related questions. The questions addressed specific issues on participation, service delivery and responsiveness of sub-city admnistration. In addition, the questions, help to assess whether key public goods and services are adequatley and effectively provided. Morover, the survey looked at whether views of minorities in the society are taken into account during decision-making. The survey instrument also assessed whether there are problems rellated to security and lack of peace due to a spontanous crime and illegal activities in the *tabia*. The survey result is summarized as follows:

Q1: How do you see the state of governance in the *tabia* administration?
Out of the 37 households who responded to the question 5 (13%) indicated that it is bad and 6 (15%) reported that it is deteriorating compared to the previous years. However, about 16 (43%) of the respondents confirmed that the situation improved compared to previous years. Finally, 10 (27%) of the households mentioned that they know nothing about the issue.

Q2: How do you evaluate the state of corruption and rent-seeking practices and unjust bureaucracy in the *tabia* administration?
Out of the 37 households who responded to the question, 15 (40%) expressed that corruption and rent seeking is becoming a serious problem and the *tabia* bureaucracy is bad compared to 11 (22.5%)

who indicated that the situation is at a moderate stage. However, they mentioned that the situation might get worst in the future. The remaining 11, (30%) mentioned that they are not able to comment on the state of corruption and rent-seeking behavior in the *tabia* administration.

Q3: Does the *tabia* administrations deliver their services at a reasonable time?
About 27, (close to 73 percent) respondents expressed that service delivery at sub-city level is very poor. In contrast, about 9 (close to 25 percent) responded that there is timely service delivery at the sub-city level and service delivery has improved.

Q4: What do you thinking about women empowerment in *tabia* council?
From the 37 respondents, about 17, (close to 46 percent) confirmed that women participation and empowerment at council level of the city structure is low while 4 respondents (close to 11 percent) responded women are fairly represented and empowered. Lastly, about 15, (close to 41 percent) responded that women are adequately represented at council level of the *tabia* administration.

About 15 (41 percent) indicated that that there is favorable condition for women participation at council level; and 12 replied the political environment for women participation is unpredictable. In summary, the political environment is not conducive at *tabia* level for women in socio-economic development and political decision-making compared to the number of women and need.

Q5: Have you come across or have heard about people complaining about lack of peace and insecurity such as obstruction and physical violence in your taia?
Tweentythree respondents (close to 62 percent) indicated that such insecurity is not common and there are occassional inccidents of such kinds in the *tabia*. This shouws that the neighbourhoods are free from

serious security problmes. However, 14 respondets, (38 percent) mentioned that insecurity and crime incidents are becoming frequent in recent years.

Q6: How frequent is theft and burglary in your tabia?
About 16 respondents (43 percent) responded that occasionally theft and burglary do happen in the *tabia* compared to 21 (close to 57 percent) who reported that such crimes do not take place in the *tabia* at all.

Q7: To what extent are security and community police helpful in responding to criminal activities in time?
Thirty-three respondents (90 percent) replied that the response of the security and community police in preventing crime and solving criminal cases is high; while 4 respondents (10 percent) agreed that there is an improvement in policing and police response to criminal behavior and actions. ◆

PART 2/4
MONITORING AND EVALUATION

4.1 Monitoring and Evaluation

Monitoring and evaluation is an integral component of planning. Special attention must be givento socio-economic and environmental impacts of urban plan implementation.

Monitoring and evaluation activities in urban planning and implementation shall be based on the participation of stakeholders. In additional the process must be transparency and accountability needs to be insured. The following shall be assessed continuously and periodically during monitoring and evaluation activities:

- Appropriate allocation of resources, efficient and effective utilization of resources during planning and implementation periods,
- Targets must be addressed;
- Outputs must be produced;
- Unforeseen activities and events   affecting implementation must be checked out and
- Outcomes and   impacts of the project or/ and lack of evaluation criteria against desired outcomes

4.2 Responsible body for Evaluation and Monitoring

- The *Hadinet* sub-city administration is responsible for conducting monitoring and evaluation as long as it has the required professional capacity.
- The city administration is responsible for conducting and implementation of the upgrading project;
- The *Dingur* residents and stakeholders participation and follow-up in the upgrading implementation

4.3 Evaluation and Monitoring Period

- Monitoring of plan implementation for *Dingur* area shall be conducted at least quarterly (every three months);
- Evaluation of plan implementation in *Dingur* shall be carried out annually and
- Reporting to the relevant body shall be carried out quarterly.

4.3.1. Verification

- Reporting (quarterly, biannually and annually) of activities to relevant body should be strictly adhered to.
- On site, observation of implementation of particularly physical plans should be done at least once a year.
- The city administration should provide technical assistance during evaluation and implementation period.

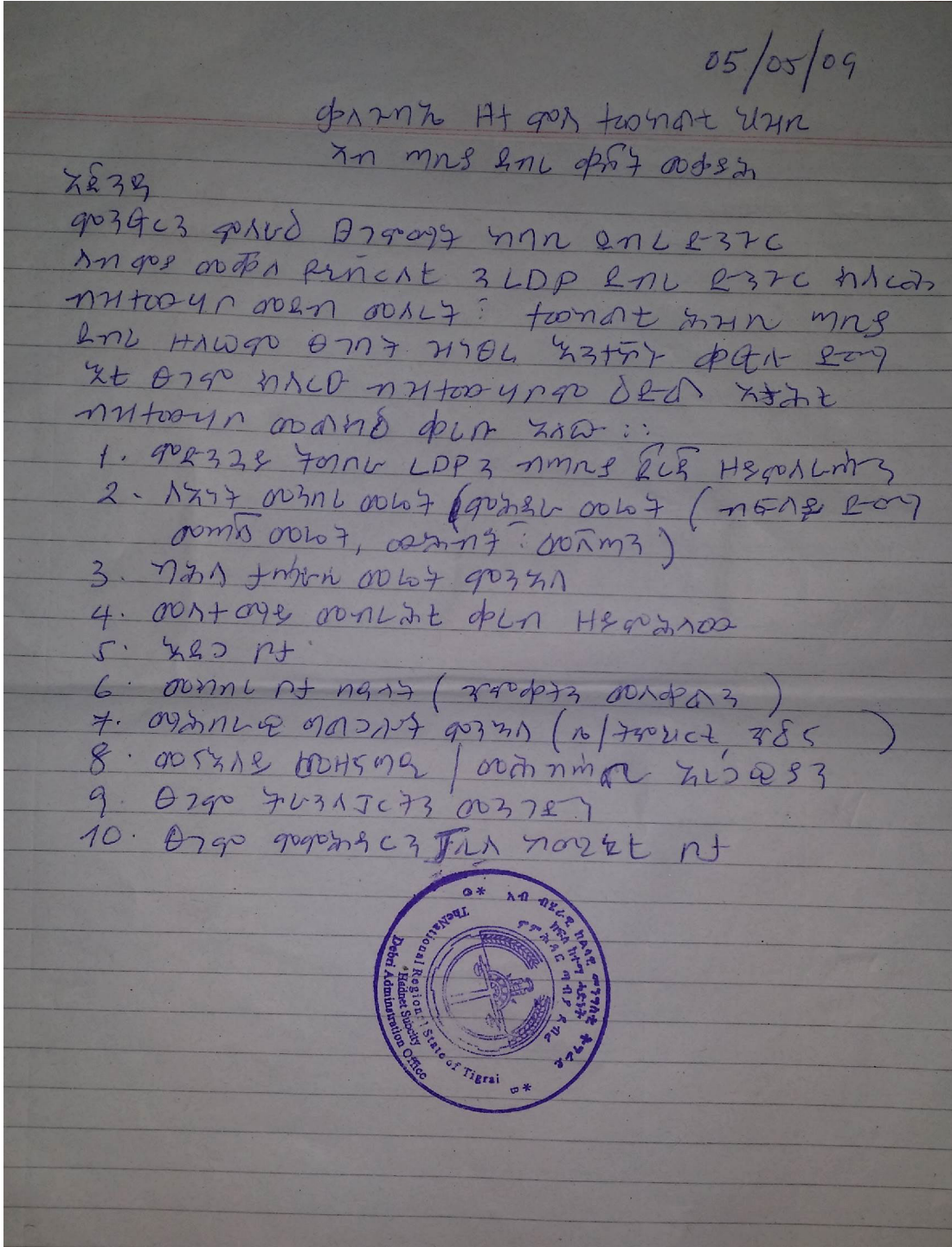## 4.4 Responsibility for Modification of Plans

- *Hadinet* sub-city administration-through its respective office is responsible for modification of the upgrading project as long as the administration has the required capacity to modify the plan.
- The sub-city administration shall have the responsibility for approving the modified plans submitted to the city administration. ◆

REFERENCE

1. Debri LDP report, Mekelle City Administration, 2005
2. Structure Plan Preparation Manual, Ministry of Housing and construction, 2012
3. Mekelle City Structure Plan, MU, 2016
4. LDP preparation Manual, Ministry of Housing and construction, 2012
5. Revised Standards for Structure Plan Preparation and Implementation, Ministry of housing and construction, 2012
6. UI, Kebele Houses, Market and Neighborhood Upgrading, 2015

ANNEXES

Annex 1:
(Minutes of public hearing on the problem identification and prioritization)

Total 3-Days traffic and pedestrian count by day and mode of transport

Annex 2: 18 Kebele Asphalt:
Midregenet-Debri Dingur (Spot-1)

TIME	PRIVATE CAR	BAJAJ	SMALL TAXI (LADA)	MOTOR CYCLE	MINI-BUS TAXI	BUS	FREIGHT CAR SMALL	FREIGHT CAR BIG	LAND CRUISER	HORSE DROWN CART (GARI)	ANI-MALS	BICYC-LES	PEDES-TRIAN	OTHER
Monday	148	83	0	19	123	2	89	101	31	1	234	0	803	19
Wednesday	99	67	0	11	79	0	61	99	17	0	307	0	533	23
Saturday	174	72	0	21	147	0	53	117	23	0	294	0	608	12
sum	421	222	0	51	349	2	203	317	71	1	835	0	1944	54
Percentage Share	**9.42%**	**4.97%**	**0.00%**	**1.14%**	**7.81%**	**0.04%**	**4.54%**	**7.09%**	**1.59%**	**0.02%**	**18.68%**	**0.00%**	**43.49%**	**1.21%**

Annex 3: Adi-Hawsi Asphalt:
Kelqel Debri-Debri Dingur (Spot-2)

TIME	PRIVATE CAR	BAJAJ	SMALL TAXI (LADA)	MOTOR CYCLE	MINI-BUS TAXI	BUS	FREIGHT CAR SMALL	FREIGHT CAR BIG	LAND CRUISER	HORSE DROWN CART (GARI)	ANI-MALS	BICYC-LES	PEDES-TRIAN	OTHER
Monday	237	132	1	23	203	1	145	163	23	0	279	0	1023	23
Wednesday	158	108	0	16	127	0	98	159	12	2	233	0	988	31
Saturday	278	113	1	27	234	1	83	183	14	0	302	0	1023	19
sum	673	353	2	66	564	2	326	505	49	2	814	0	3034	73
Percentage Share	**10.41%**	**5.46%**	**0.03%**	**1.02%**	**8.73%**	**0.03%**	**5.04%**	**7.81%**	**0.76%**	**0.03%**	**12.59%**	**0.00%**	**46.94%**	**1.13%**

Annex 4: All Spots

TIME	PRIVATE CAR	BAJAJ	SMALL TAXI (LADA)	MOTOR CYCLE	MINI-BUS TAXI	BUS	FREIGHT CAR SMALL	FREIGHT CAR BIG	LAND CRUISER	HORSE DROWN CART (GARI)	ANI-MALS	BICYC-LES	PEDES-TRIAN	OTHER
Monday	237	132	1	23	203	1	145	163	23	0	279	0	1023	23
Wednesday	158	108	0	16	127	0	98	159	12	2	233	0	988	31
Saturday	278	113	1	27	234	1	83	183	14	0	302	0	1023	19
sum	673	353	2	66	564	2	326	505	49	2	814	0	3034	73
Percentage Share	**10.41%**	**5.46%**	**0.03%**	**1.02%**	**8.73%**	**0.03%**	**5.04%**	**7.81%**	**0.76%**	**0.03%**	**12.59%**	**0.00%**	**46.94%**	**1.13%**