Melamchi Municipality

Office of the Municipal Executive

Melamchi, Sindhupalchowk

Land pooling Feasibility Study
of
Bahunepati Area

Submitted by:-

A-NOT Architecture and architects /

Architects And Allied (J/V)

Patan Dhoka, Lalitpur

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1. Chapter 1: Introduction

1.1 Background

Urbanization in Nepal is growing rapidly and is also one of the top ten fastest urbanizing countries. In 2014, the level of urbanization was 18.2 per cent, with an urban population of 5,130,000, and a rate of urbanization of 3 per cent (UN DESA, 2014). Nepal recorded an average annual urban growth rate of 3.38 percent between 2001 and 2011 (CBS, 2014) and as of 2011 had 58 municipal governments (metropolitan cities, sub-metropolitan cities and municipalities), which covered 17.1 percent of the population. In recent years the number of municipal governments has increased five-fold with the number standing at 293 in May 2018 including 6 metropolitan cities, 11 sub-metropolitan cities and 276 municipalities (nagarpalikas). These areas now cover about 42% of Nepal's population (MoUD, 2016). With the rapid urbanization in Nepal, there is the urgent need of shelter with comfortable urban infrastructures to all citizens, conservation of prime agricultural land and environment, land consolidation, and planned urban growth. To attain these desired state of planned city, there must be the investment form the local government authority and utilization of the available resources with proper land development techniques to be implemented.

Melamchi Municipality is newly formed municipality as a part of state restructuring under the new federal constitution (2015). Melamchi Municipality acts as the service area for the two neighboring rural municipalities namely Helambhu and Panch pokhari. According to the CBS Datas of 2058,2068 and 2074, the population has grown up. The CBS data of 2074 shows that the Melamchi Municipality has grown up by 13471 people. A 2016 survey indicated a dramatic increase in the population at an annual growth rate of 5.2% since 2011 (Melamchi Municipality 2016). Melamchi Municipality as newly formed municipality has challenges and opportunities and one of them the opportunities is to guide the cities in along the path of sustainable development. Bahunepati area is one of the market center in the Melamchi Municipality and it is important land area as it is highly urbanizing.

Land pooling is one of land management methods used in urban development or redevelopment processes. Increasing pace of urbanization has led to situation that to develop the urban fringes properly so, land pooling has emerged as the tool to promote efficient, sustainable and equitable land development. Land pooling/readjustment (LP/R) is a technique for managing the planned development of urban-fringe lands, whereby a government agency consolidates a selected group of land parcels and then designs, services and subdivides them into a layout of streets, open spaces and serviced building plots, with the sale of some of the plots for cost recovery and the distribution of the remaining plots back to the landowners to develop or to sell for development (Archer RW ,1992). This process helps in coordinating a largescale development on contiguous land parcels that were initially fragmented by ownership, use, and size. Pooling also helps in carving out space (land) for common public facilities such as roads and lots to accommodate public amenities while planning for a coherent larger-scale future development without worrying about the individual landowners. The land-pooling scheme is regarded as one of the best readjustment technique for planned provision of urban environmental infrastructures and supply of urban land without external investment. It is a proven and successful land development scheme in the country with a history of more than a dozen successfully implemented projects within the Kathmandu Valley only (Oli P.P ,2003).

1.2 Need and rationale of the study

Melamchi municipality is growing according to the latest CBS data. People are increasing in the market areas and urbanisation is being in rapid manner since Melamchi municipality acts as service centre of the neighbouring rural municipalities. This is causing rapid sprawl and conversion of farmland into housing plots.

Among various area in the Melamchi Municipality, Bahunepati area is one of the market centre which is fastest growing and sprawling. Thus, this study intends to identify feasibility for the development probable

land in Bahunepati area. This will help to control the unmanaged land parcelling and reduce deficit of urban services.

1.3 Objective of the Study

Following are the objectives of the study:

- Tracing Satellite image of the land pooling site
- Preparation of Block Plan of the study area
- Prepare financial feasibility projections of the land pooling program proposed
- Finding out the contribution percentages

1.4 Scope of the Work

The scope of the work is to carry out conceptual land development work at Bahunepati area of Melamchi Municipality along with, feasibility study of the at proposed project. The work has been carried out in high resolution satellite image acquired from latest Google Earth platform.
The study has not covered the details of land ownership and legal aspects of feasibility. However, the study team were fully aware of retaining permanently built structures. The study has not considered cadastral verification of the satellite image due to several constraints. However, this should be taken into account while preparing the Detail Project Report. Further, detail plot division of the blocks as defined by the project has not been dealt.

2. Chapter 2: Literature Review

2.1 Land development Techniques

The land management is defined as an activity on the ground, using appropriate technologies in the respective land use systems. It is required to create healthy growth of towns and cities. The land development techniques that are being practiced here in Nepal are site and services, guided land development and land pooling.

i. Site and Services

Site-and-services schemes provide the target group with a plot and basic infrastructure, such as water, roads and sanitation facilities. The beneficiaries either lease or buy the allocated land. Often, they are provided access to a loan with reasonable terms as well as an additional loan for the construction of a house.

ii. Guided Land Development

Guided land development (GLD) uses the provision of infrastructure as a mechanism to guide urban development. It is a land management technique for guiding the conversion of privately owned land in the urban periphery from rural to urban uses. Governments can use infrastructure investment policies to guide the direction of land development, as well as, to ensure that land development is efficient, environmentally sound and equitable. This encourages private land developers to develop land in that area. It is done in partnership with landowners who pay for the cost of servicing their land through donation of land for public infrastructure and payment of betterment levy. It uses a combination of traditional government role of providing infrastructure and the enforcement of land subdivision regulations. The key advantage of the approach is that it is less costly than outright land acquisition and more equitable than land banking.

iii. Land Pooling

The land pooling scheme of land development is regarded as one of the best readjustment technique for planned provision of urban environmental infrastructures and supply of urban land without external investment. The objective of the land pooling is to prepare a master plan, providing basic infrastructure such as road, electricity, telephone, drainage, potable water supply, opens spaces making it suitable for an ideal urban residential, commercial and other mixed blocks and redistribute the planned plots to the land owners who agree to share the cost of development by contributing a part of their land parcel. this is a widely used technique for promoting efficient, sustainable and equitable land development in the urban fringes.
The main objectives of urban planning by land pooling are:

- To provide maximum number of developed plots and to conserve agricultural land, cultural heritage and environment.
- Maximum participation of local people in the process of urban planning making them aware of the importance of planned urban development.
- To control the rapid unplanned urban growth and its impact on environment and emphasize the importance of the concept of planning in modern urbanization.
- To provide employment opportunity to local people.
- To set an example that unified development efforts are successful only through active participation of the people.

- To set an example of a planned urban residential area with all necessary infrastructure and clean environment.

2.2 Land Pooling Process

The land pooling process consists of acquiring large number of small land parcels belonging to many land owners; consolidating the parcels into a single large plot; planning and providing all necessary infrastructure (such as road, water supply, drainage, electricity and telephone, open spaces, community service area); re-plotting the parcels; and giving back to the owners as per agreed terms of land contribution. The cost of planning and providing infrastructure is covered from the land itself, which is partly contributed by each landowner. The owners get back about 12-30% smaller piece of land but with all necessary infrastructure including parks and open spaces. Moreover, the original irregular shapes of plots are converted into regular geometric shapes. Thus, land-pooling can be defined as a land management technique for carrying out unified design, servicing and sub-division of a group of separate land parcels for planned urban development with the sharing of the project costs and benefits between the land owners and recovery of the project costs by the sale of some of the developed plots. A typical flow-chart of the land pooling process is given in flowchart.

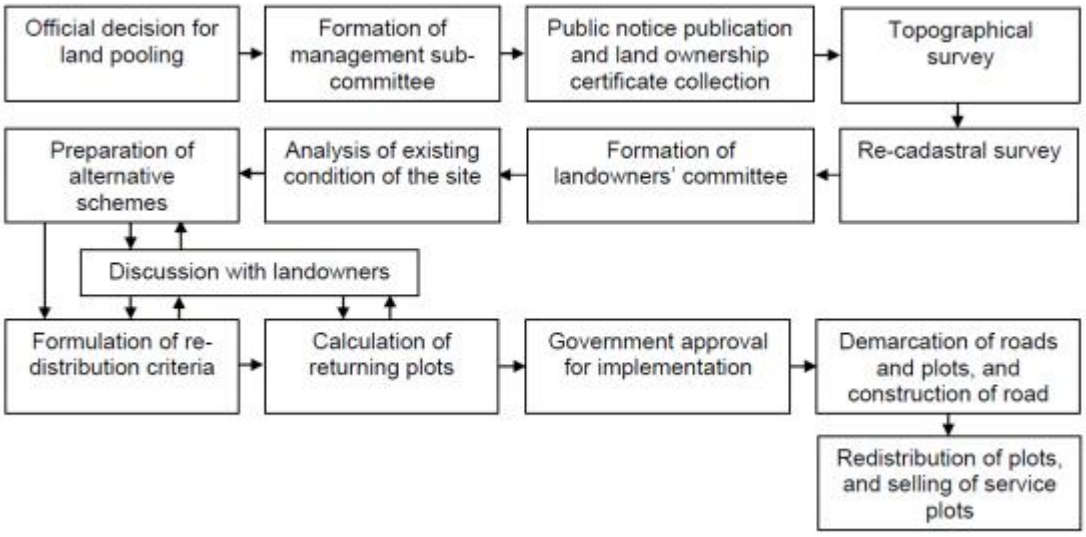

Figure 1: Flow chart for land pooling procedure
Source: 1 Joshi J., 1997

2.3 Land Pooling Practices in Nepal

Planned development was initiated in Nepal after the enactment of Town Development Committee Act (TDCA) 1962 and Town Development Plan Implementation Act (TDPIA) 1972. In 1977 government implemented two sites and services program. However, these projects became a failure as there was the high degree of resistance by the owners due to low compensation, displacement of the original inhabitants and delay in project completion. Also there were administration problems and the actual beneficiaries were not the low income group people but the middle and high income groups (UN-HABITAT, 2010).
Enactment of Town Development Act (TDA) 1988 after the abandonment of TDCA and TDPIA came up for the control of land use and enable land development in participatory approach. Thereafter Kathmandu Valley Development Authority (KVDA) came up with the two models of land development: Guided Land Development (GLD) and Land pooling (Shrestha, 2010). GLD came up with the idea of providing access road either new or only improvements of the existing plots which came up with the problem of rapid

construction of houses on the agricultural land. Nonetheless these programs have some serious drawback of lacking the updated cadastral and constructing expensive access road as per existing site topography (UN-HABITAT, 2010). Under GLD government opened 324 km of access road (Shrestha, 2010). Nevertheless, there are not new plans for GLD and it is limited only to the projects which are already in the plan.

The land pooling technique has been in use in Kathmandu Valley since 1988. The initial phase included Gongabu LPP in Kathmandu, Lubhu LPP in Lalitpur and Kamal Binayak LPP in Bhaktapur and in outside Kathmandu, it was done in Chipledhunga, Pokhara.

Table 1: Land Pooling Projects

S.N	STATUS	DISTRICT	PROJECT NAME	S. N	STATUS	DISTRICT	PROJECT NAME
1	**Completed**	Kathmandu	Dallu	26	**NA**	Lalitpur	Bhelpa- Hattiban
2	**Completed**	Kathmandu	Gongabu	27	**NA**	Kavre	Tulti Phant
3	**Completed**	Kathmandu	Nayabazar	28	**NA**	Kavre	Dhulikhel
4	**Completed**	Kathmandu	Gopikrishna	29	**NA**	Sindhuli	Kamalamai
5	**Ongoing**	Kathmandu	Sinamangal	30	**NA**	Chitwan	Bharatpur
6	**Completed**	Lalitpur	Sinamangal	31	**NA**	Banke	Water Park
7	**Completed**	Lalitpur	Lubhu	32	**NA**	Morang	Biratnagar Ringroad
8	**Completed**	Lalitpur	Bagmati Corridor	33	**NA**	Taplejung	Fungling Bazaar
9	**Completed**	Bhaktapur	Kamal Vinayak	34	**NA**	Dang	Dodhare
10	**Completed**	Bhaktapur	Kamal Vinayak-2	35	**NA**	Chitwan	Krishnapur
11	**Completed**	Bhaktapur	Liwali	36	**NA**	Dang	Ambapur
12	**Completed**	Bhaktapur	Sintitar	37	**Pending approval**	Parsa	Pokhariya Landpooling Project
13	**Completed**	Kaski	Naya Sadak	38	**Pending approval**	Banke	Rajhena Landpooling Project
14	**Completed**	Baglung	Baglung Bus Park	39	**Feasibility Study**	Kathmandu	Dhumbarahi South (Ward No. 4, 5, 7)
15	**Completed**	Banke	Sadarline Bazaar Extension	40	**Feasibility Study**	Lalitpur	Harisiddhi Upanagar
16	**Completed**	Lalitpur	Bagmati Phant Jwagal	41	**Feasibility Study**	Kathmandu	Gothatar
17	**Completed**	Kathmandu	Kirtipur	42	**Feasibility Study**	Kathmandu	Nayapati
18	**Completed**	Kathmandu	Bagmati Nagar	43	**Feasibility Study**	Kathmandu	Nepaltar
19	**Ongoing**	Bhaktapur	Kamerotar	44	**Feasibility Study**	Kathmandu	Kapantar
20	**Ongoing**	Kathmandu	Chamati	45	**Feasibility Study**	Kathmandu	Tusal
21	**Ongoing**	Kathmandu	Manohara Phant	46	**Feasibility Study**	Kathmandu	Taudaha, Chovar
22	**Ongoing**		Tumucho Dugure Chokha	47	**Detail Project Report**	Rupandehi	Hattibangain
23	**NA**	Kathmandu	Dibyeswari	48	**Detail Project Report**	Kaski	Lekhnath

24	**Completed**	Bhaktapur	Ichangu Narayan (Raniban) II	49	**Detail Project Report**	Rupandehi	Kandeldanda
25	**Completed**	Lalitpur	Sainbu Nakkhu dol	50	**Detail Project Report**	Kathmandu	Mulpani

2.4 Land pooling Potential in Bahunepati

- Bahunepati is one of the up-growing market center of Melamchi municipality and bears all the potential to develop as urban center.
- The status of the land of Bahunepati seems to be lagging sufficient infrastructure and public amenities to cater the up-rising trend of urbanization.
- The area has been showing the trend of informal land division and unmanaged way of building construction.
- The location of site itself within the context and the expectation of positive message of formal land development to the surrounding areas

3. Chapter 3: Overview of Melamchi Municipality

3.1 Introduction

Melamchi Municipality is located in the southwest of Sindhupalchowk District in Province 3. It covers an area of 160.63 km^2 plus 2.44 km^2 in Shivapuri Nagarjun National Park. The municipality is bounded to the:
- North by Helambu Gaunpalika and Panchpokhari Thangpal Gaunpalika
- East by Indrawati Gaunpalika and Panchpokhari Thangpal Gaunpalika
- South by Kathmandu and Kavrepalanchok Districts
- West by Kathmandu and Nuwakot Districts.

The municipality was formed on 2 December 2014 by merging the seven village development committees (VDCs) of Jyamire, Talamarang, Melamchi, Sikharpur, Sindhukot, Bansbari and Fatakshila. As a part of state restructuring under the new federal constitution (2015), on 9 March 2017 Melamchi Municipality was expanded to its present form by merging the four neighboring VDCs of Bhotechaur, Haibung, Thakani, Dubachaur and a part of Shivapuri National park.

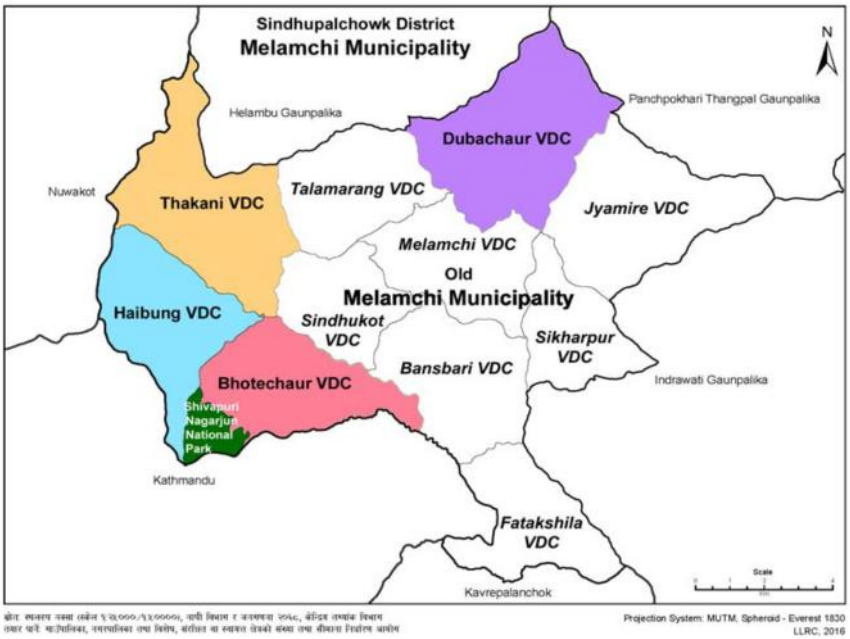

Figure 2: Map of Melamchi Municipality

3.2 Administrative Sub-Divisions

Melamchi Municipality has 13 wards. Bhotechaur VDC and Dubachaur VDC were divided into two wards each while all the other VDCs now represent single municipal wards. Wards 4 and 9 (erstwhile Thakani and Jyamire VDCs) are the largest wards being while Ward 2 in erstwhile Bhotechaur VDC is the smallest.

Ward 11, corresponding to the Melamchi VDC, has the highest population density (410 persons/km2 in 2011). The largest market, Melamchi Bazaar (also known as Melamchi Pul), is situated in Ward 11. (GGGI., 2018)

3.3 Demography

3.3.1 Population and household

Melamchi Municipality has total 11,832 houses and 52,814 populations which is 20.43% of total district's population. The population density of this municipality is 366 people per km. Ward number 11 has highest numbers of household and ward number 2 has the lowest number of household i.e. 6417 and 1791.

3.3.2 Comparison between CBS data of 2058, 2068 and 2074

Comparing the 2058, 2068 and 2074's CBS data, population, household, population density data, household are seen to be increased in these years. Population was decreased in 2068 by 1,947 persons than that of 2058 but was again increased in 2074. The household has also rise in numbers in 2074 giving rise to 366.15 people per km.

Table 2: Population Data of Year 2058,2068 and 2074

Year	Household	Population			Population density
		Male	Female	Total	
2058	8989	23282	24008	47290	298.98
2068	10097	21729	23614	45343	286.67
2074	11832	29118	29696	58814	366.15

3.4 Main market centres

Melamchi bazaar is the main market centre where people from the surrounding areas come to sell their agricultural produce and buy food and household goods. Many shops, hotels, and restaurants operate in Melamchi bazaar. Bahunepati in Bansbari VDC is another emerging market.

Table 3: Wards of Melamchi Municipality

S.N	Ward Num	Market Centre	Major Settlement Area
1	1	Bhotechaur	Bhotechaur, Bhanjhang, Dadagaun, Chapabot, Chisapani, Manedada, Khalde
2	2	Nivgaun, Mathillo Jaisi Gaun, Bhotechaur	Nivgaun, Suyalchap, Mathillo Gairigaun, Tallo Gairigaun
3	3	Dadathok, Bhotechaur	Bindutole, Majuwa, Dadathok, Babrang, Gurunggaun
4	4	Pati Bhanjhang, Thakune, Pipale, Bhotechaur, Melamchi	Thalakharka, Chipling, Thakune Bhanjhang, Dihi, Urleni, Thulo Bharyang, Pati Bhangjhang, Besari, Chilaune, Palche, Kapre, Salmi, Dadakateri, Chapeli, Amale, Sanomusure, Thakani

5	5	Pipale, Bahunepati, Melamchi, Bhotechaur	Musure, Bhadauri, Derali, Dhungechap, Kathar Bagar, Gairigaun, Sindukot, Tharigaun, Tarebhir, Bhimaldada, Kartikechap
6	6	Talamarang Market, Melamchi	Talamarang Market, Mane Bhanjhang, Upallo Gaun, Batase, Panchkanya, Nepane, Kaulechaur, Dhunganabesi
7	7	Pokharetole, Melamchi	Gairathok, Chaap, Sungurephant, Pokartole, Sunkhane, Salle, Kafalgairi, Baluwa, Bahuntole
8	8	Melamchi, Lavagaun, Gorakhnath Tole	Kwaurani, Lavagaun, Khaire, Ghattekhola
9	9	Jyamire, Melamchi, Golmasthan, Khadkatole, Sunkhani, Ratamata	Piplatar, Ratamata, Baluwa, Sunkhani, Dablyang, Dhulegauri, Gufa, Jyamire, Golmasthan, Khadkathok
10	10	Melamchi, Rotepingdada	Phalame, Rampur, Pairawari, Rotepingdada, Kautachaur, Aryaltole, Ambote, Bangaun, Badare
11	11	Melamchi	Kartike, Dhuseni, Katunje, Bahuntole, Damaitole, Dadhuwa, Sirikot, Gairidada
12	12	Bahunepati	Giranchaur, Dhakalkhaharegaun, Dhakalthok, Chyandada, Thakle, Pipalchaur, Bansbari, Nepalthok, Aapchaur, Bahunepati
13	13	Fadkeshor, Dhadbesi Market	Thati, Nepalthok, Dumrechaur, Dhakalthok, Beratar, Simle

4. Chapter 4: Site Description: Bahunepati

4.1 Location and Area

Figure 3: Location of Site

The proposed site for land development is located at Bahunepati area, Ward Number 12, which occupies around 469 Ropani of land, in Melamchi Municipality. The elevation of the area varies from 2484 m. to 2490 m., with average slope less than 10 degrees. The Site is South of Melamchi old settlement and mostly covers agriculture lands and is one of the market centre. The site is bounded by roads on Southern, western and northern side and by Indrawati river in eastern side. The area is Approximately 6.4 km from Melamchi market.

4.2 Population and Houses

This study has not performed detail site survey of the study area, however the study of satellite image shows that, there are over 43 houses in project boundary. There are lots of farms in the project area. Basically, it is growing into new settlement and houses are sparsely distributed. Most of the houses are newly built in RCC framed structures/ permanent structure. The road side area is comparatively dense whereas the inner area is still farmland.

4.3 Site and Surroundings

The surrounding area of the proposed site is gradually urbanizing. The farmland is getting converted into housing plots and sprawl is notable. There is river basin in the eastern side and the houses are growing in the line of the road. The proposed site is 6.4 km far from Melamchi Bazar.

Figure 4: Site and Surroundings

4.4 Physical and Social Infrastructures

4.4.1 Built Environment

Farmland occupies highest proportion in proposed land development area. Built space inside the study area includes, agriculture farm, schools, houses, petrol pump, health centre, police station, etc.

Figure 5: Farmland turning into plots nearby Indrawati River in eastern side

4.4.2 Road and Transportation

No local public transportation area accessible in the area. Long distance buses running from Kathmandu are providing regular services to the area and vicinity. The main road of the proposed area is Melamchi - Helambu Road, which is blacktopped. Similarly, Bhotechaur – Kauledobhan- Bahunepati road is gravelled, and all other road inside the study area is either graveled or earthen. All area doesn't have motorable road and foot trail is only means of access. Melamchi- Helambu Road is approximately 9 m in width, ROW according to the byelaws is 30 m.

Figure 6: Petrol Pump

4.4.3 Drainage & Sewerage:

Every house has the provision of septic tank and soak pit. The main roads have provision for covered drains.

4.4.4 Water Supply: Community Water Tap

Community consumer committee has installed community taps for every 4 to 5 houses and these taps provides the drinking water for the community. Every houses pays certain amount of fee to the committee for regular maintenance of the tap. For land pooling site, alternate source of drinking water need to be identified to provide the continues drinking water to every houses.

4.4.5 Electricity

The area has proper electricity supply through National Grid, managed and operated through Nepal Electricity Authority. The High tension line is going through the site. The Authority is planning to establish sub- station in Bahunepati.

4.4.6 Communication

Area has good connectivity in terms of mobile communication but lack in telephonic communication. Further, there is good facility of cable and satellite television. Being an urban fringe, the area has well connectivity in terms of communication and entertainment.

4.4.7 Health and Education

There are several schools in the study area. Shree Jalpa Devi Uccha Ma Vi School and Shree Siddhi Ganesh Pra Vi are school adjacent to proposed land pooling site. Further, there is Bahunepati Health Centre present inside study area. The area is well suited in terms of health and education facilities.

4.4.8 Forest, Environment & Agriculture

There is no forest in the study area. The area is almost the flat area and has many farming zones. This shows the area has agriculture potential.

Figure 7: Farmlands

5. Chapter 5: Land pooling proposal

5.1 General Considerations

While preparing the Block plan of the study area, various considerations were made. The outcome of the proposed plan is a derivative of these considerations. Following documents were reviewed before preparation of land development scheme,

- Land Pooling Guideline, DUDBC
- Bye-Laws of Melamchi Municipality
- Case Study of Various Land Pooling Sites

Following considerations were made before preparation of the block plan:

S.N	Consideration	Elaboration	Extraction
a	Minimum Road width: 4.5 Mtr/ 15 Ft	The roads are residential, where no heavy vehicles are permitted and traffic is comparatively less	Bye-Laws of Melamchi Municipality
b.	Collector Road Width: 8 Mtr.	This road collects traffic from residential road and contains two side footpath and intermediate single lane (5.5m)	As per Bye-Laws of Melamchi Municipality
c	Main Road Width/ Highway: 30 Mtr. ROW	This road collects traffic from collector road and have relatively large traffic volume. It has	As per Bye-Laws of Melamchi Municipality for Road Category
d.	Minimum Lot Size: 3. Aana (95 SqM)	Considering people with less land ownership and preventing them from displacement.	The smallest size for the building construction.
e.	Average Plot Size:5 Aana 2 Paisa (175 Sq M)	Considering the adequate land area for comfortable individual houses in reference to affordability.	The highest number of plots will be of 4 Aana and largest plot size will be nearly 1 Ropani. The average will be 5.5 Aana (assumption).

f.	Open Space: not less than 5% of total planning area	Open spaces have been considered in neighborhood level.	As per the standard Land Pooling Guideline by DUDBC
g.	Setback from River: 50m	Setback from the Indrawati River has been considered.	As per Bye-Laws of Melamchi Municipality

5.2 Other Considerations

Grid pattern has been considered at the vacant area with rectangular residential/ commercial plots, whereas the existing roads and building has been untouched in the old settlement, which results into organic planning.

- Block depth varying from 30m-50m for small and medium plots and around 50m for larger plots.
- Block length varying from 50m (in an area with buildings) to 120m and some adjustment at nodal points. However, average block length is 100-150 m.
- The block width and length are provisioned as per Land Pooling Reference Manual, 2072, DUDBC.
- Open spaces/ recreational area not less than 5 %
- Provision of street lighting as per the standard shall be maintained during implementation phase of the land pooling.
- Provision of sewer line and surface drain as required and as per standard.
- Provision of water supply and telecommunication as per requirement.

Based on these considerations, land use/ Zoning and block planning has been done.

5.3 Block Design

The existing highways and roads are widened according to the Melamchi Byelaws 2075. The buffer of 3.5 m on each side of high tension line has been considered. Collector road (8 m) separates one block from another and each block contains 80- 100 housing plots, which is considered as one neighborhood. The main highways are widened to 15 m from center line of existing roads having ROW of 30m. The proposed residential road is 4.5 m which are connected to collector roads of 8m. Grid iron pattern has been utilized with new alignment of roads. The maximum number of plot will be of 4 Annas and the average area of a plot is 5 Aana 2 paisa (175 Sq m). The minimum lot size is 3 Aana and maximum is 8 Anna or even larger. Open spaces are provided centrally.

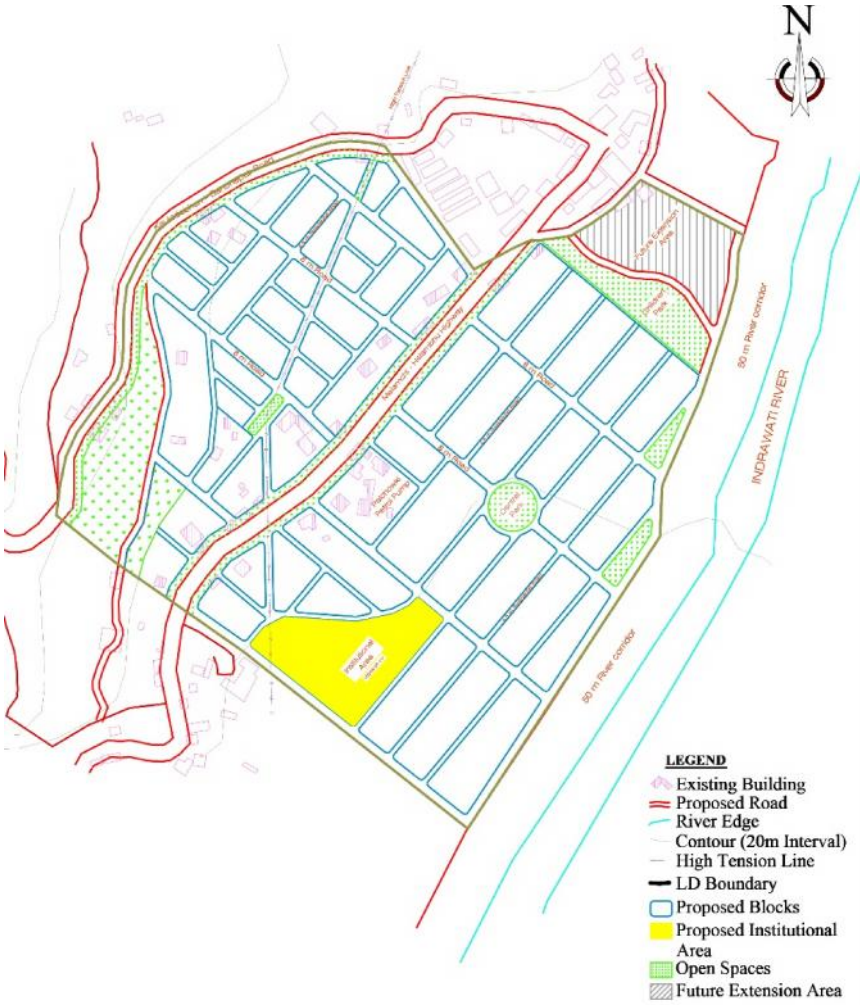

Figure 8: Proposed Block Plan

5.4 Contribution Percentage (Net contribution calculation)

Each land pooling project needs considerable amount of investment for site development. The proposed site in Bahunepati has different categories of lands and each of them are unique. Some of them have road access, some doesn't and those who have road access, the width and surface type is different. The site doesn't have dedicated open space and recreational parks and parking areas. Thus, to meet all the necessity and requirements of a planned settlement, certain portion of the land has to be contributed. The road, open spaces and sales plot for land development has to be acquired from existing lands. Although the land owners fell unwilling to contribute the land, this will ultimately increase the land value and quality of services. Following considerations has to be made for calculating the contribution percentage.

5.4.1. Change in Land Use

There will be considerable change in land use of road, open spaces, parks etc. after land adjustment. The change in land use of such facilities has to be deducted from the existing land from the land owners. The more we allocate such land-use, the more contribution has to be made by the land owners. Thus, it is

necessary to make detail consultation with land owners and municipal government regarding the allocation of roads, open spaces etc.
The land use change as per the current situation and proposed scheme prepared for this feasibility study has been shown in the table below,

Table 4: Land Use change Calculation

Land uses	At present			Proposed		
	Area (m^2)	Ropani	Percentage	Area (m^2)	Ropani	Percentage
Residential / Built up	5611.48	11	2.35	160033.9401	314.63	67.18
Agriculture	219023.80	430.60	91.9463406	0	0	0
Road	9999.88	19.66	4.1979	63565.44	124.97	26.68
Open Space/ Recreation	0	0	0	11035.78565	21.7	4.63
Public Land (Assumption 1.5%)	3573.12435	7.025	1.5	3573.12435	7.025	1.5
Total	238208.29	469	100	238208.29	469	100

According to the above table, the land contribution percentage that the land owner has to make is 28.73%, just for the land use change, excluding land development costs. However, the contribution ratio varies according to the nature of existing land/ plots.

5.4.2 Cost of Infrastructure Development

Besides the change in land use at the project area, it is necessary to develop the land to desirable sellable plots. Proper land development, road construction, layout of services and infrastructures and project management requires huge amount of investment. It is necessary to have substantial financing to the project development. Most of the land pooling projects are self-sustaining and generated financial measures through Sales Plots. Sales plots are the only means to acquire financial support. The quality of physical infrastructure construction and site development depends on the financial value of sales plot, guided by market value. Thus, it is recommended to develop necessary and important infrastructures at the project site.
The project will have a detail cost estimation and financial calculations at the DPR phase. Thus, the area of sales plot has to be demarcated after finalization of actual project cost and land value of the sales plot. The higher the cost estimation, the higher percentage of the sales plot has to be allocated. With reference to the past land pooling projects in Kathmandu valley, for this project, 7 % of the total residential area has been allocated as the sales plot and institutional area.

5.4.3 Average Contribution

The contribution percentage is not same for all the land owners. However, the contribution for road, open space & recreational space, which is 28.73% and contribution for sales plot, which is 6.10% (consider average) of total residential land has to be made by land owners. Thus, the average contribution for land owners is 34.83 %, however the percentage could be more than this for under-serviced plots (may reach up to 40 %) and could be less for serviced plot (may be below 10%).
Detail contribution percentage as per the land condition, will be calculated in the detailed project phase.

5.4.4 Contribution as per Land Categorization

Land contribution is not same for all land types. There are different types of land in the proposed land development area. Government has classified the land according to the cultivation value, viz. Aabal, Doyam, Sim, Chaahar. Similarly, some site is valuable in terms of the services they already have and some are valued less due to lack of road and other infrastructures. As we know, agricultural lands are classified as per their productivity whereas residential plots are classified as per available infrastructure and services. Also while registering the plot of land, it is better seen that what kind of infrastructural services are attached to the land, for example the adjoining road. Thus, following has to be considered for land categorizations.

A. According to road access

The width of the road and the type of road finish largely determine the value of the land. Larger the width of the road and better the surface finish, the contribution percentage of the existing land will be lesser.

B. According to the status of infrastructure

More services and facilities the exiting plots have, more will be the land value. Thus, for such lands, contribution percentage will be less. Similarly, land without road, electricity and other infrastructures, the contribution percentage will be higher as the current market value of such land us less.

C. According to the Shape of the Plot

The more regular is the plot, the more will be its value. The size of the plot is guided by width: length ratio. Elongated and irregular sites have less market value than regular plots. Thus, this has to be considered while detail planning. Similarly, the plot having high frontage is regarded as more valuable than with less frontage, as it has higher proportion of road connectivity. Thus, the plots with high frontage will have less contribution percentage than plots with less frontage even they are adjoining to each other in same loci.

D. Location of the plot

The land located near to the vital facilities like, near to the highway, market centre, health & education facilities, commercial areas etc. have more value than distant plots. Thus, this will largely affect the current market value and ultimately affect the contribution percentage. The accessibility to the plot also determines the value of the plots. Thus, plots with easy access will have less contribution percentage than plots with difficult accessibility.

5.4.5 Questions regarding Contribution Percentage

Most of the case, land owners are found raising two basic questions regarding to land development projects,
- Why do we need to contribute this high amount of land?
- Why government doesn't invest in such projects directly?

To answer the first question, we should understand the condition of existing land. The under serviced plots will be developed into "Ready to Construct" stage. Further, it will have all the infrastructures and facilities. Basically, land owners need to contribute for the change in land use, like road, open spaces and recreational spaces. This is ultimately for their own use and benefits.

Similarly, to answer second question, land in Nepal are owned by individual citizens, thus it is citizen's duty to invest on their land too. Further, Government is also responsible to provide basic facilities and services to their citizen. This responsibility is not limited to certain area, and requires to invest nationwide. Realizing the fact that, the capacity of government is very limited and narrow, it is necessary for to take initiative at individual level. Hence, there need to have some partnership among public and private sector.

This partnership will ultimately build better settlement area with all the services and infrastructures. For example, water supply services, electricity services etc. will be supported by respective line agencies.

5.5 Sales Plots

After completion of Land Pooling Project, the area will have abundant sales plots. Initially there was 2.35 % of built-up area, essentially residential buildings. After completion of the project, built plot will be nearly 67.18% including sales plot, which is around 315 Ropani of the total land. Allocating the 6.10 % (26.96 Ropani of the viable land) of the land for sales plot, total developed plot area will be around 315 Ropani. Assuming, half of the area of sales plot will be developed into housing lots and half will be sold to institutions, total land for housing plots will be 301 Ropani and considering 5.5 Anna average plot size, total number of housing plot will 875. This housing plots will be fully serviced and are ready to construct new house.

6. Chapter 6: Financial Aspects of the Proposed Project

6.1 Initial Cost Estimation

The cost estimation of the project includes the project total costs. This is the sum of administrative as well as construction cost. For this project total 43 Crore has been initially estimated. The initial cost involved in the project has been shown in the table below.

Table 5: Cost Calculation for the Land Pooling Project

S.N	Description	Unit	Quantity	Rate	Amount	Remarks
1	Road construction	m^2	63565.44	2366.94	150455582.6	
2	Site Drainage	RM	15891.36	5000	79456800	
3	Open Spaces (Parks etc.)	m^2	11035.78	6000	66214680	
A	SUBTOTAL				296127062.6	
4	Other facilities (electricity, water supply, telephone, green belt etc.)	m^2			59225412.51	20% of Subtotal A
5	Service plot development	m^2			29612706.26	10% of Subtotal A
B	SUBTOTAL				88838118.77	
C	TOTAL				384965181.3	A+B
D	MANAGEMENT COST (10%)				38496518.13	
	GRAND TOTAL				423461699.5	C+D

Total Project Cost = Rs. 423461699.5

Total estimated cost: Nrs. Forty-Two Crore Thirty-Four Lakh Sixty-One Thousand Six Hundred Ninety-Nine Rupees including all management costs.

6.2 Land Valuation

The success of the project depends on the value of the land after land development. In most of the cases, land price increases after implementation of land development scheme, but such increment should be considerably high for project accomplishment. Thus, brief study on the current land price has been assessed through consultation with public and municipal authorities. This helps us to understand the current market scenario and forecast future possibilities.

6.3 Existing Land Price

The land price of the study area varies according to the location and services they have. Further, there is no any certainty of land price and it depends on the mood of buyers /seller and supply/ demand factor. Thus, referring to current market trend and discussion with local people, following ideas were collected regarding the land price.

Table 6: Land Price Table

Land without accessibility	Approximately Rs. 50000/ Aana (which is nearly 75% of the total land)
Land with pedestrian access	Approximately 2 Lakhs per Aana. (which is nearly 20% of the total area)
Land having road access	Approximately 10 Lakhs per Aana, depending upon the location. The price varies according to road type as well. (Nearly 5% of the total area)

The average land price of the area as per the above calculation is 1.3 Lakhs i.e. {(0.5*75) +(2*20) +(10*5))/100] lakhs. For this project the average land value of the area has been considered to be 2 lakhs/ aana.

6.4 Land Price after Land-readjustment

Existing average land price is assumed to be 2 to 5 lakhs per anna with or without all the required facilities. This project will have road access more than 14 feet everywhere (min. road width proposed is 14') and with all basic facilities and services. Thus, the average land price of the project area will not go below 8 lakhs/ Aana in any situation.

6.5 Project Feasibility Parameters

Project feasibility parameters have been calculated and attached in annex. In this section, the parameters have been briefly explained.

6.5.1 Site Potential Ratio (Y_o)

Site Potential Ratio is a primary tool that tell the initial feasibility of the project. This is the ratio of average land price before land development and average land price after land development project. This project has 5 numeric value as site potential ratio. This resembles that the average site value increases 5 times after the land development scheme. However, this doesn't fully indicate the feasibility of the project, and requires further development considerations.

6.5.2 Site Feasibility Index Value (α)

Site potential ratio alone cannot specify feasibility of the project. Thus, it is necessary to calculate the site feasibility index value. This will show the average increment in site value after the implementation of land development project. For this, the average site value of the area after and development project is divided by the average land value of the area before land development. In this principle, there are 3 possibilities, in which

- $\alpha < 1$- This means that for the project operation, the profit is negative and the chances of project failure is maximum, Thus, this sort of project shall not be executed. Many factors have to be considered before project initiation. Direct government investment or support is required.
- $1 < \alpha < 1.5$- In this case, there is very less chance of project success, as the investment is slightly less than the development benefit. If the project goes longer or market price increases, the project is likely to fail. Thus, the project need subsidy and support from government or else, the project cost should be minimized by compromising through physical measures.

- $\alpha > 1.5$ - In this case, the project is feasible and can be executed. The chances of project failure through financial cause is very less.

The Site feasibility index value for this project is 3.56, thus the project is feasible and recommended for execution.

6.5.3 Total Development Benefit (ΔV)

Total development benefit is calculated based on the total site value before and after land development. In General, the site value after land development increases with reference to pervious site value. For this project, the increment in site value is 3625.6 Million NPR. Thus the total development benefit for this project is 3625.6 Million NPR.

6.5.4 Maximum Area for Financial Land (R_{max})

This is associated with the total virtual increment in land area after land development program, based on the total site value before land development. It is calculated by dividing total development benefit by average land price after land development. If we return the developed land equivalent to the land price before land development, then the R_{max} for this project is 226.6 Ropani. However, the development benefit is shared among land owners to have a positive impact on the project. Cost for infrastructure development and administration work will be recovered from financial land and remaining land will be returned to respective land owners in proportional basis.

6.5.5 Index (K)

Index K gives us the actual value of benefits to the land owners. This is calculated after deducting the total site development/ construction cost from total development benefit. The value is divided by the total site value of the area before land development project. For this project, total index K is 0.57, which signifies that the land owners will be benefitted. This will be due to the increment in land price after the land development scheme.

6.5.6 Contribution Ratio

Total contribution ratio (d) for this project has been calculated based on the non-viable land contribution ratio (dp) and Financial land contribution ratio (dr). For this project, non-viable land contribution is 28.73%, which is the contribution for road, open space and parks. This is basically for the own benefits of the residents. The financial land contribution is for the project development and construction of physical infrastructures. For this project, financial land contribution is 6.10 % and total contribution for this project is 34.83. %. However, this is the average contribution ratio and changes as per the existing land value of the land owners.

6.5.7 Project Requirements

The financial viability of any land development project depends on the following factors

- The rate of land price increment after land development project
- The total construction/ physical infrastructure development cost of the project.
- Total cost which can be managed for physical infrastructure development.

The project feasibility largely depends on the land market. The total cost of land development should be equal or slightly less than the total financial value of the land allocated for sale (sales plot). If the cost of project construction is high, then area of sales plot increases. This is likely to affect project and there may be chances of project failure. Various facts of this project have been presented briefly in below section.

Table 7: Project Facts

Total Cost of the Project	**= Rs 4,23,461,699**
Financial Land	= 27 Ropani
Financial Land Contribution Ratio (d_r)	= 6.10 %
Land Use Contribution (d_p)	= 28.73 %
Total Contribution Ratio(d)	= 34.83 %
Gross Benefit to the Land owners	= Total site value of after land development – Total site value before land development = 5040- 1414.4 = 3625.6 Million NPR
Net Benefit to the land Owners	= Gross Benefit – Total Project Cost (Site value of Financial Land) = 3625.6 – 423.36 = 3202.24 Million Npr
Per Ropani Benefit	7.24 Million
Benefit Times (Net)	0.57
Maximum Feasible Project Cost	424 Million Npr

The above figures indicate that that the project is financially feasible, however, socio-economic feasibility has to be considered during DPR phase.

7. Chapter 7: Conclusion and Recommendations

7.1 Conclusion

The impact of urbanization is comparatively less in Bahunepati area, however the rate of land transaction and private sector involvement in real estate development is increasing day to day. Being near to Melamchi Bazaar, the proposed site is potential for development. The site is covered with agriculture land and nearly 80% of the total land is open/unbuilt. However, the trend of land transaction has increased land subdivision and sprawl. The current trend indicates that the future of Bahunepati area is not indifferent than other unplanned and haphazard settlements. Thus, to protect haphazard urbanization, which is unavoidable in future, it is necessary to undertake direct intervention from concerned authorities to establish proper and managed township.

Through the observation of financial feasibility and spatial trend, it is obvious that, Bahunepati area is feasible for land pooling. The one and only challenge for the area is, existing built structure along the Melamchi – Helambhu Highway, which impends to maintain ROW of the road. Further, maintaining road alignment by keeping the existing building intact is yet another challenge. The project area is considerably big and rate of building construction is comparatively high. Thus, the project needs immediate endorsement and initiation to control unplanned growth and manage possible future constraints. Further, it is recommended to carry out detail feasibility study to cover social and legal aspects of the area.

7.2 Recommendation

The area allocated for the land development project is considerably high, thus, there must be considerable amount of public land. This study has made general assumption and considered that there could be less than 1.5% of public land in total. Thus, during DPR phase, public land/ or land without ownership has to identified.

The number of housing plots assumed to be developed after completion of LP is expected to be 875. This will account 5250 populations, assuming average building occupancy of 6 people (see annex for detail). Huge investment is necessary to cater the need of urban services for this large number of population. Thus, it is recommended to carry phase wise implementation of LP program based on the housing demand. Further, based on the site condition, it is recommended to develop sales plot at the first phase, which aids in project financing and provides optimum benefits to existing land owners.

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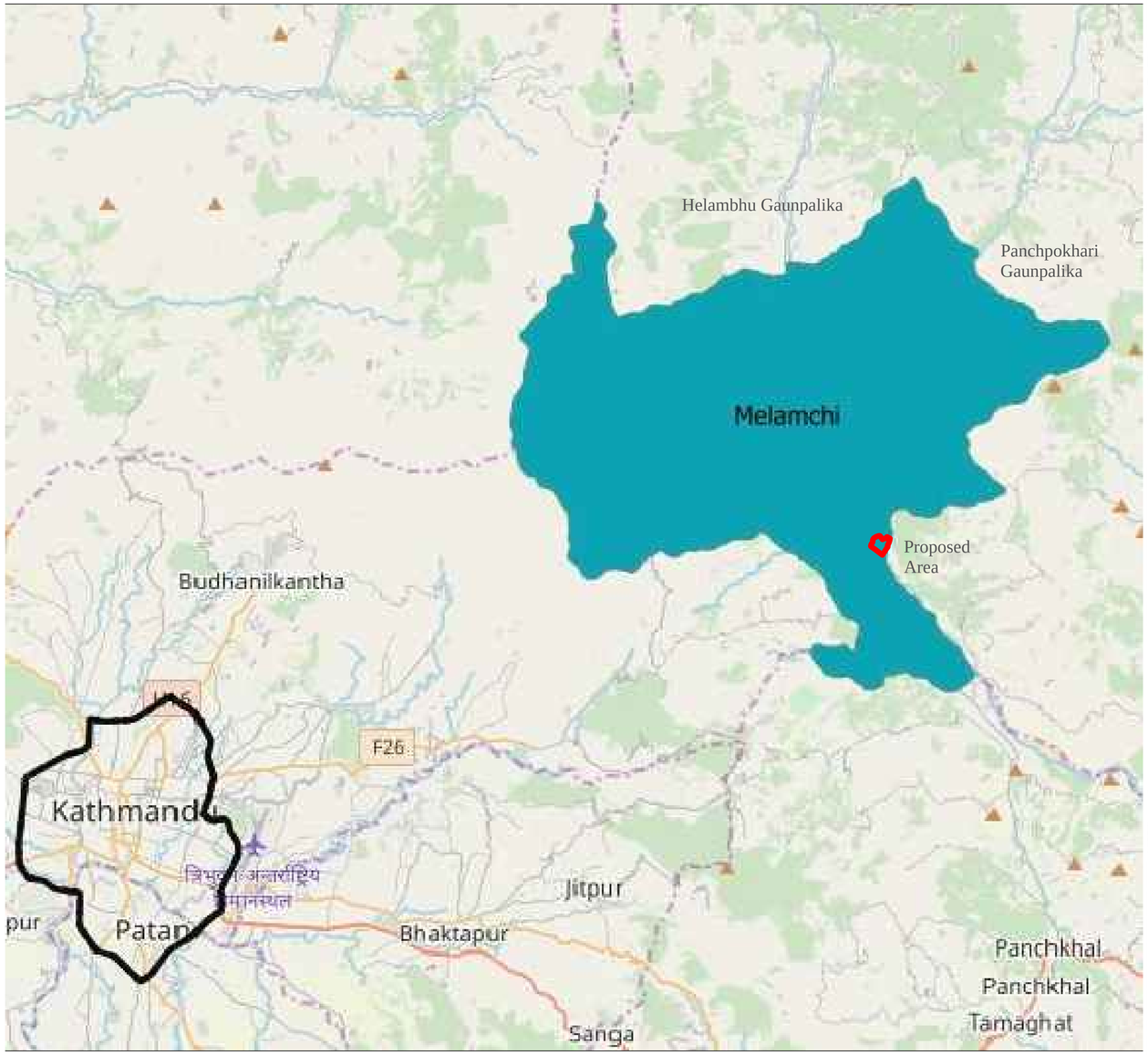
Annex

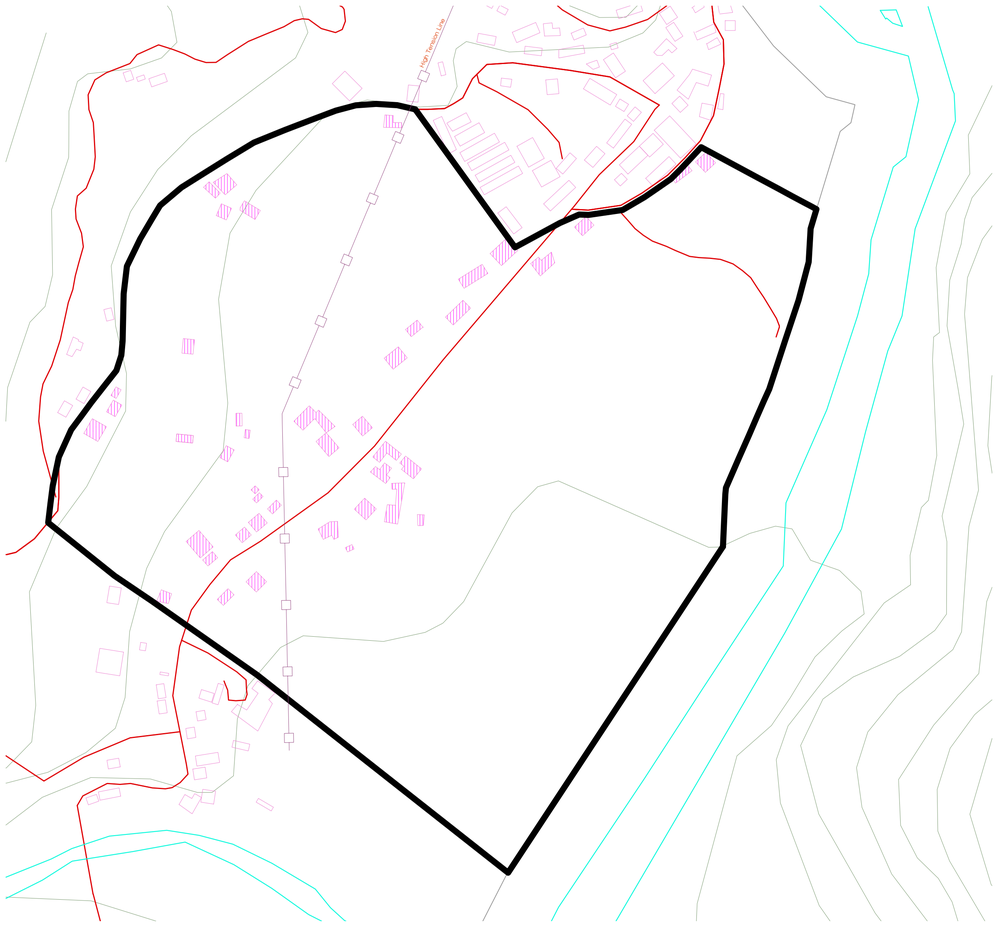
Annex 1: Maps
Annex 2: Project Density Calculation
Annex 3: Project Feasibility parameters



Surrounding of Melamchi Municipality

Satellite Image of Proposed Area

Consultant:- A-NOT ARCHITECTURE / ARCHITECTS AND ALLIED (J/V)	Project Title:- Land Pooling Feasibility Study at Bahunepati, Melamchi	Sheet Title:-Location Map	Scale: Not In scale	1
		Prepared By:- Ar. Krishma Basnet / Checked By:-	Date:- 2075/11/26	

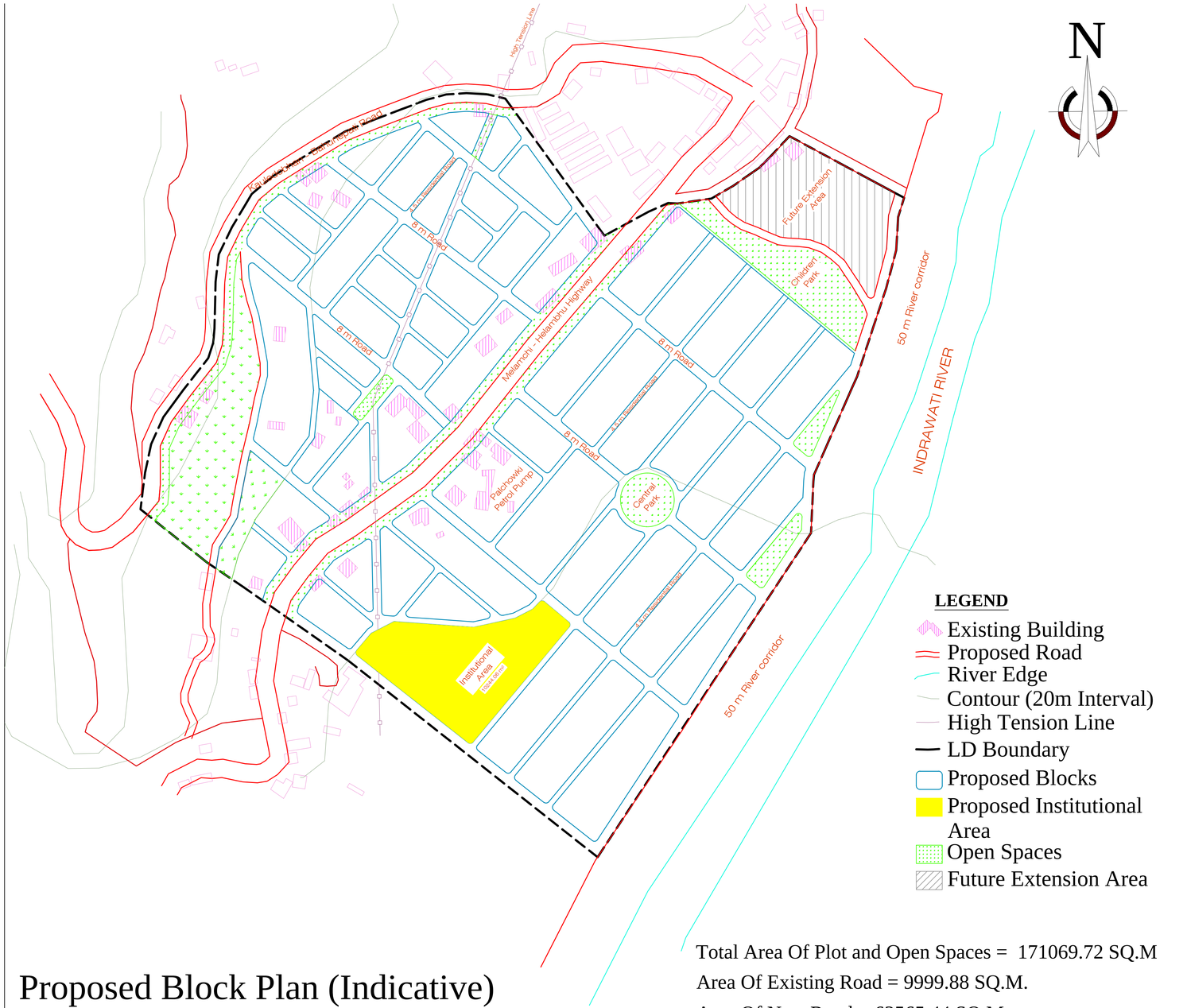


Existing Land Development Area at Bahunepati, Melamchi

LEGEND

- Existing Building
- Existing Road
- River Edge
- Contour (20m Interval)
- High Tension Line
- LD Boundary

0 M 20 M 50 M 100 M 200 M



Proposed Block Plan (Indicative)

Total Area Of Plot and Open Spaces = 171069.72 SQ.M

Area Of Existing Road = 9999.88 SQ.M.

Area Of New Road = 63565.44 SQ.M.

Total Nos. of Existing Building = 43

Size of the Plots = 4-8 Anna

0 M 20 M 50 M 100 M 200 M

Consultant:- A-NOT ARCHITECTURE / ARCHITECTS AND ALLIED (J/V)	Project Title:- Land Pooling Feasibility Study at Bahunepati, Melamchi	Sheet Title:- Land Development Area at Bahunepati	Scale: As per given	2
		Prepared By:- Ar. Krishma Basnet / Checked By:-	Date:- 2075/11/26	

Annex 2
Density Calculation

1. Average Lot Size: 5.5 Aana
2. Average size of the Household: 4.9 (National Average)
3. Total Area of Project: 469 Ropani
4. Total non-viable land contribution: 28.73 % (Excluding Sales Plot)
5. Total Sales Plot (6.10%): 26.962 Ropani of total Viable Land before LP
6. Considering 50% of sales plot will be sold to Institutional use, total residential plots from sales plot: 13.481 Ropani
7. Total Residential Plots: 287.668+13.48 = 301.148 Ropani ~ 301 Ropani
8. Total numbers of housing units: (301*16)/5.5 = 875
9. Total inhabitant in a house (1.2 Times the average housing hold size, including people in rent but not every house will have rented population) = 1.2*4.9 = 6 (Avg)
10. Total Population in the planning area/ excluding institutional and day time floating population: 6*875= 5250
11. Gross Density of the area: 5250/24= 219 Persons/ Hect
12. Net Urban Density of the area: 5250/16 = 328 Persons/ Hect

Annex 3
Project Feasibility parameters

VIABLE AND NON-VIABLE LAND
Land Type

Land Type	**Before**		**After**	
	Ropani	**Percent**	**Ropani**	**Percent**
Non-Viable Land	27	5.75	154	32.84
Viable Land	442	94.25	315	67.16
Total Land	**469**	**100%**	**469**	**100%**

1. Site Potential Ratio, Y_o = $\frac{\text{Avg. Land Price after LP}}{\text{Avg. Land Price before LP}}$

The current trend and market rate of the Bahunepati area showed that the maximum land price in the area is nearly 10 Lakhs/ anna, near Melamchi- Helambhu Highway, with very high commercial value. Similarly, the lowest land price was around Rs 50,000/ aana, where there is no road access. In an average, the land value per Anna is 2 lakhs.
Similarly, the average residential land with basic facilities and over 15 ft. road has 8 lakhs/ anna at present and at large road area, the price is nearly 15 Lakhs/ Anna. Thus the average price of the land after land development could be around 10 Lakhs/ Anna.

Thus, site potential ratio Y_o = $\frac{10,00,000 \text{ / Anna}}{2,00,000 \text{ / Anna}}$ = 5

2. Site Feasibility Index Value, α= $\frac{\text{Total site value after LP}}{\text{Total site value Before LP}}$

At present, total land excluding the road area and public open space is approximately 442 Ropani. The value of this land at current average price is 1414.4 Million NPR. The total sellable land after land development will be 315 Ropani. The site value after land development at an average cost of the land @ 10,00,000/ Anna will be 5040 Million NPR.

Thus, Site Feasibility Index Value, α = $\frac{5040}{1414.4}$ = 3.56

3. Total development benefit, ΔV= Site Value after LP-Site Value before LP
From the calculation number 2, it is found that the total site value before land development scheme is 1414.4 Million NPR and after land development scheme is 5040 Million NPR. This is gross development benefits.
Thus, total development benefit, ΔV = 5040- 1414.4 = 3625.6 Million NPR

4. Maximum Area for Financial Benefit, R_{max} = $\frac{\text{Total Development Benefit}}{\text{Average Site Value after LP}}$

The total development benefit of the scheme is 3625.6 million NPR and average site value for the area after land development is 10,00,000 NPR/ Anna.

Thus, Maximum Area for Financial Benefit, R_{max}= $\frac{3625.6 \text{ x } 10,00,000}{10,00,000*16}$ = 226.6 Ropani

5. Financial land= $\frac{\text{Total cost of the project}}{\text{Average land price After LP}}$

   The total cost of the project at current rate is approximately 423.46 Million. This shows that per ropani development cost is approximately 0.93 lakhs. For the completion of this project, financial land should be,

   $$= \frac{423461699.5}{10,00,000*16} = 26.46 \text{ Ropani}$$

6. Site Value of Financial Land= Financial land x Land price after LP
   = 26.46 *16*10,00,000 = 423,360,000

7. Index, K= $\frac{\text{Total site value after LP - Site value of financial land}}{\text{Total site value before LP}}$

   This is the total project feasibility index which gives the viability of the project. In this project, the total site value after LP project is 5040 Million NPR and Site value of financial land is 4233 Million NPR. The total site value before land development is 1414.4 Million NPR.

   Thus, Index, K = $\frac{5040 - 4233}{1414.4} = 0.57$

8. Non-Viable Land Contribution Ratio, dp= $\frac{\text{Increase area of non-viable land}}{\text{Viable land before Readjustment}} = \frac{127}{442}$

   = 28.73 %

9. Financial land contribution Ratio, dr = $\frac{\text{Financial land}}{\text{Viable land before Readjustment}}$

   $= \frac{27}{442} = 6.10\ \%$

10. Total contribution ratio, d= dp+dr = 28.73+6.10 = 34.83 %

Project Requirement

Total Cost of the Project	= Rs 4,23,461,699
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d