Annexure 1
Panbang Local Area Plan

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1 Introduction

The Local Area Plan of Panbang basically entails the detailing of the visions and the principles laid out in the Structure Plan. Panbang serves as a commercial hub to Ngangla Gewog and three adjoining gewogs namely Bjoka, Phangkhar and Goshing. Currently, the area embodies orange orchards, scattered residential structures, vast vacant plots, agricultural fields and a clustered town arrangement in the Panbang area. The existing population are mainly settled in the existing Panbang town.

The Local Area Plan generally encompasses five units including the existing Panbang town, Gallabi, Tungkudempa, Brahmang and Annala.

2 Mode of Land Mobilization

Over the years, Bhutan's urban population witnessed a growth rate of 5.7 % annually. Faced with an alarming rate of urbanization and the scarcity of the land for development, the difficulty in dealing with the stress that urban populations put on infrastructures, basic amnesties, housing and the environment lie at the heart of relative lack of livability of the region's cities. In order to combat rapid urbanization, the scheme of land pooling, succeeding the land acquisition scheme, has been highly encouraged over the years given its egalitarian ground. Land pooling is basically a technique wherein a group of contiguous land parcels are voluntarily brought together for unified planning in order to provide for public facilities (roads, open spaces, etc) or to improve the existing amenities.

According to the Land Pooling Rules 2009, there are a certain number of crucial conditions that needs to be considered before the initiation of the scheme such as:

- Not more than 25 % of the land should be developed
- 2/3 consensual agreement from the public
- Suitability and feasibility studies
- Land pooling contribution ratio should not exceed 30 %

Table 1: Calculations of land pooling contribution ratio.

Land Pooling Contribution			
Precincts	**Area** (Sq.m)	**Area** (Acres)	(%)
Total Area	**2623510.630**	**648.284**	**100**
Land Excluded from Contribution			
E1	359570.865	88.852	13.71
E2	996329.849	246.198	37.98
E3	100665.639	24.875	3.84
HT Buffer	43571.580	10.767	1.66
River	152570.024	37.701	5.82
Total	**1652707.957**	**408.393**	**55.75**
Area to be pooled	**1160781.306**	**239.891**	**37.00**
Proposed Public facilities			
Road	136932.868	33.837	14.11
Foot path	11518.083	2.846	1.19
Bicycle track	10151.580	2.509	1.05
POS	42103.333	10.404	4.34
Services	10625.301	2.626	1.09
Vegetable market	1130.117	0.279	0.12
Bus Stop	1362.400	0.337	0.91
Sports Complex	37291.250	9.215	3.84
Parking	666.862	0.165	0.07
Craft bazaar	783.477	0.194	0.08
Total Area	**252565.269**	**62.410**	**26.02**
		Average Contribution Rate	**26.02**

Since Panbang region fulfills all the necessary requirements for the scheme, we have settled on a differential land pooling contribution ratio to ensure a more equitable and participatory planning process. Different rate of land contribution ratio is applied on each of the land owners corresponding to the level of benefits they acquire from the scheme. The land-pooling scheme generally involves the consolidation of the privately-owned land parcels into one singular block. Consequently, after the deduction of land (in accordance to the differential land pooling contribution), the remaining land is then re-allotted back to the landowners. This pooled land is used for providing public facilities including roads, utility services, open space and recreational area to the whole community. Differential land pooling scheme in Panbang is predominantly based on precincts. Precincts are identified through urban design surveys that classify the region into different precincts based on typical characteristics of each area. Precincts planning provide more detail on the land uses. It also depicts housing yields, open and public space, transport networks, employment land provisions, activity and community centres. With the differential land-pooling scheme, different precinct schedules have different land contribution ratio and the grounds on developing this differential land pooling percentage are:

- Road classification
- Land uses
- Plot coverage
- Allowed floor of commercial use.

Table 2: Precincts and their corresponding land pooling contribution ratio.

Precinct	Land Pooling Rate	Benefits
Urban Core -1	**29%**	-3 Floors (2 floor of commercial use) -50% plot coverage -2m setback on 3 sides -on-street parking
Urban Core -2	**27%**	-2 floors (1 floor of commercial use) -50% plot coverage -2m setback on 3 sides
Urban Village -1	**26%**	-2 floors (Half floor of commercial use) -45% plot coverage -3 m setback on 3 sides
Urban Village-2	**25%**	-2 floors (Residential use) -40% plot coverage -3m setback
Urban Village -3	**23%**	-2 floors (Residential use) -30% plot coverage -3m setback
Agri-based environment (E-4)	**15%**	-1 floor (Agri-based use) -20% plot coverage -3m setback on 3 sides -Min. plot size of1000 sq.m

As depicted in the table, Urban Core-1(UC- 1) reaps more benefit comparatively to Urban Village- 2 (UV-2) as UC-1 has one extra floor and another 10% more plot coverage along with the commercial use of the plot. Similarly, Urban Village 2 has an extra floor and 20 % more coverage than Agri-based environment (E-4) precinct, depicting the huge difference in the use of the plots in different precincts. Therefore, given the different level of benefits obtained by the land owners in different precincts, we have prescribed differential land pooling contribution ratio accordingly, to make this land pooling scheme as fair and just as possible.

3 Road Classifications

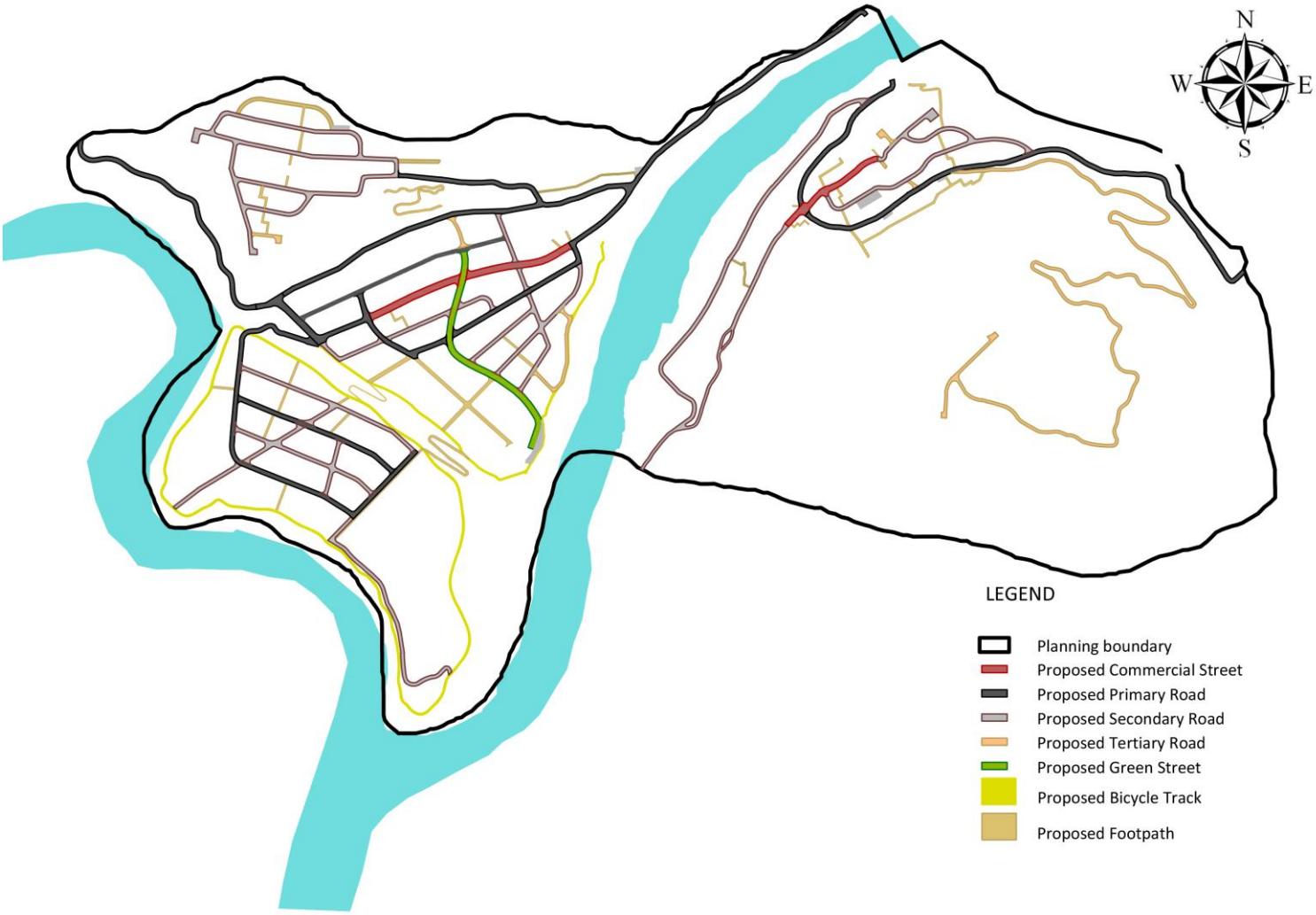

Figure 1: Road connectivity in Panbang.

The proposed road circulation comprises of different hierarchy of roads connecting to each and every plots. The main purpose of road circulation is:

- To provide access for all plots.
- To provide proper pedestrian facilities to promote walkable community.
- To prevent vehicular-pedestrian conflict
- To provide fuel efficient transport networking.
- Overall to promote green transportation in the community.

The proposed road circulation is aimed to encourage green transportation in the community with the proper non-motorized transportation facilities such as cycling and walking trails.

The proposed road has a following hierarchy:

1. Commercial Road (15m)
2. Primary Road (10m)
3. Secondary Road (8m)
4. Tertiary Road/Access road (6m)
5. Green Street (14m)

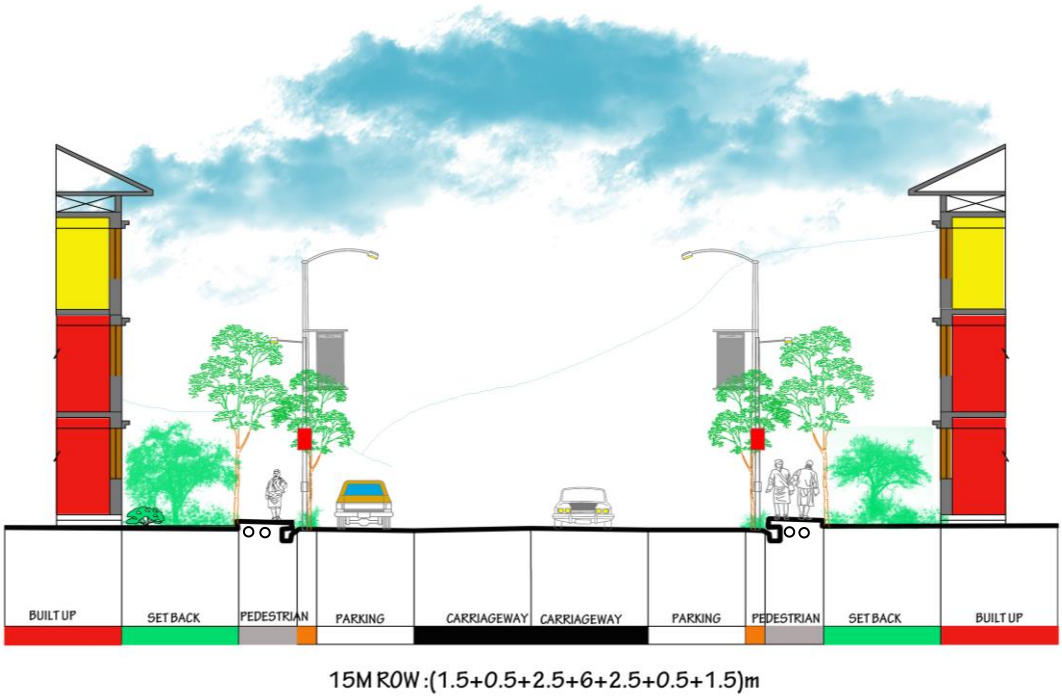

Figure 2: Cross section of Commercial Street.

The commercial road is 15 metres wide and basically abuts the main stretch of the town centre (Urban core – UC) in Tungkudempa, serving as a commercial street for Panbang town. It has a ROW of 15m with carriage way of 6m. Furthermore, it also has provisions for on-street parking on both sides of the road.

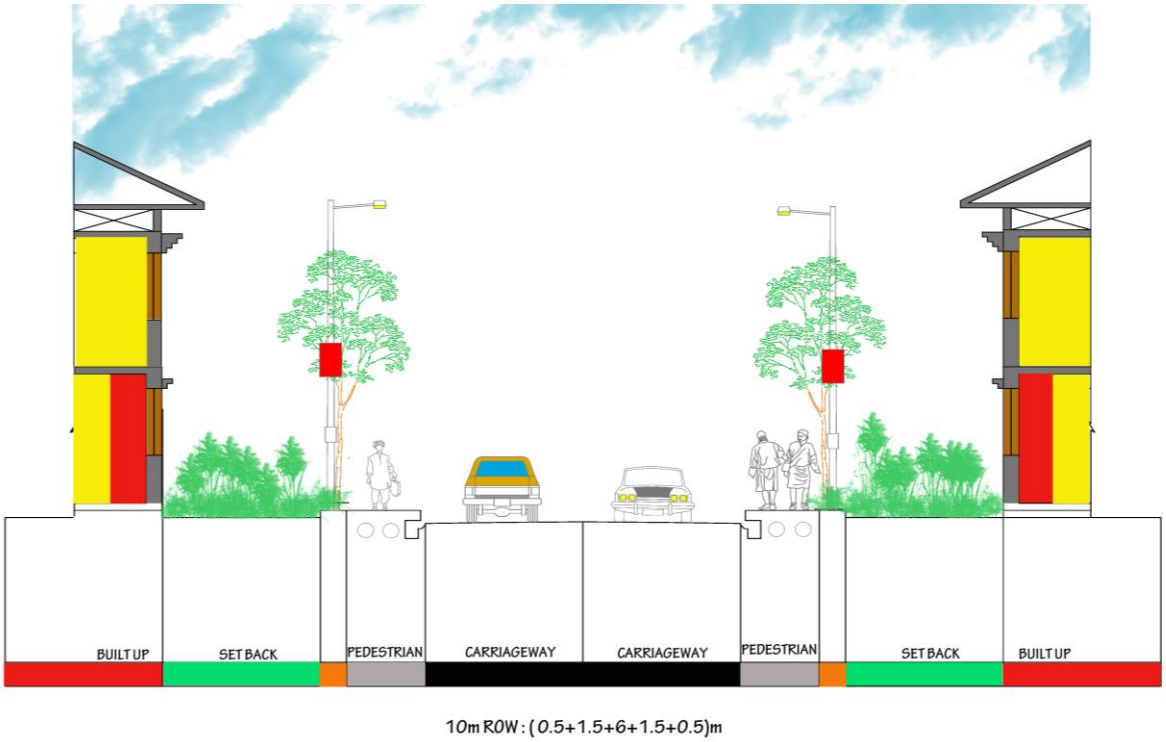

Figure 3: Cross section of Primary road.

The proposed primary road will have a ROW of 10m with the carriage way of 6m. The primary roads are the major roads connecting core area to other places. The primary road in the core area is in the loop form which will benefit from serving as an alternative route in case of traffic congestion in the main commercial street.

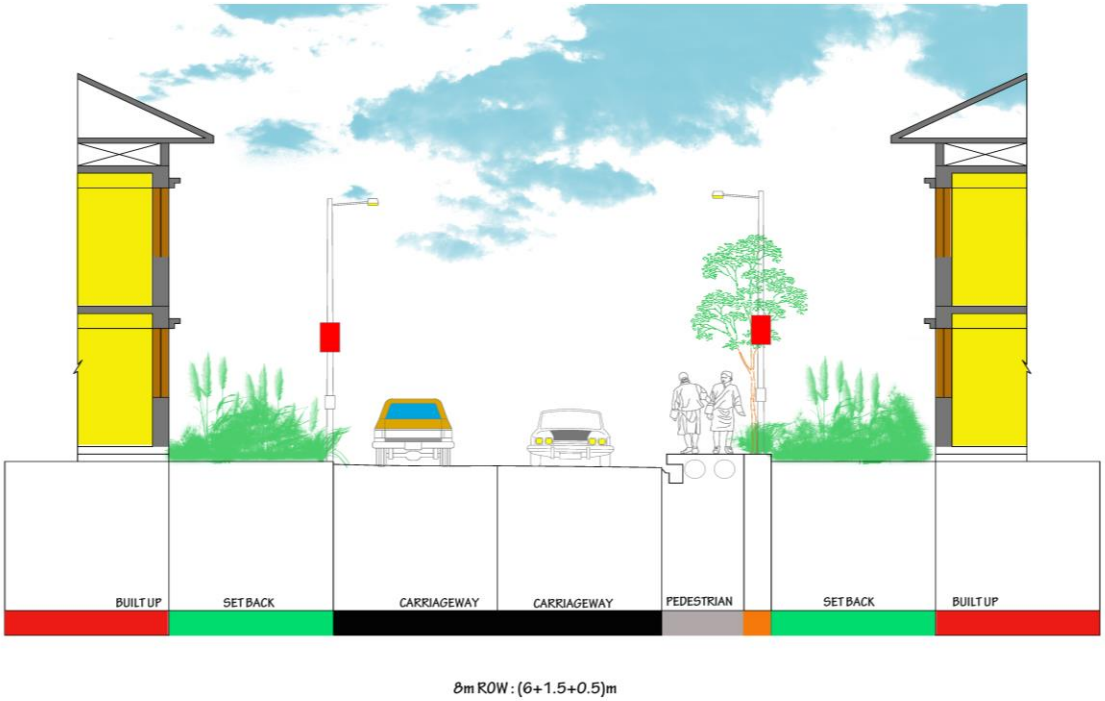

Figure 4: Cross section of Secondary road.

Secondary roads are the minor roads, connecting tertiary roads to primary roads. It will have a ROW of 8m and a carriage way of 6m. It connects most of the plots to the primary roads.

Figure 5: Cross section of tertiary road.

Lastly, we have the tertiary roads that basically provides access for the plots, which are not connected by the secondary roads. They also provide access to the parks and playgrounds. It has a carriage way of 6m with the provision of pedestrian on both sides of the road.

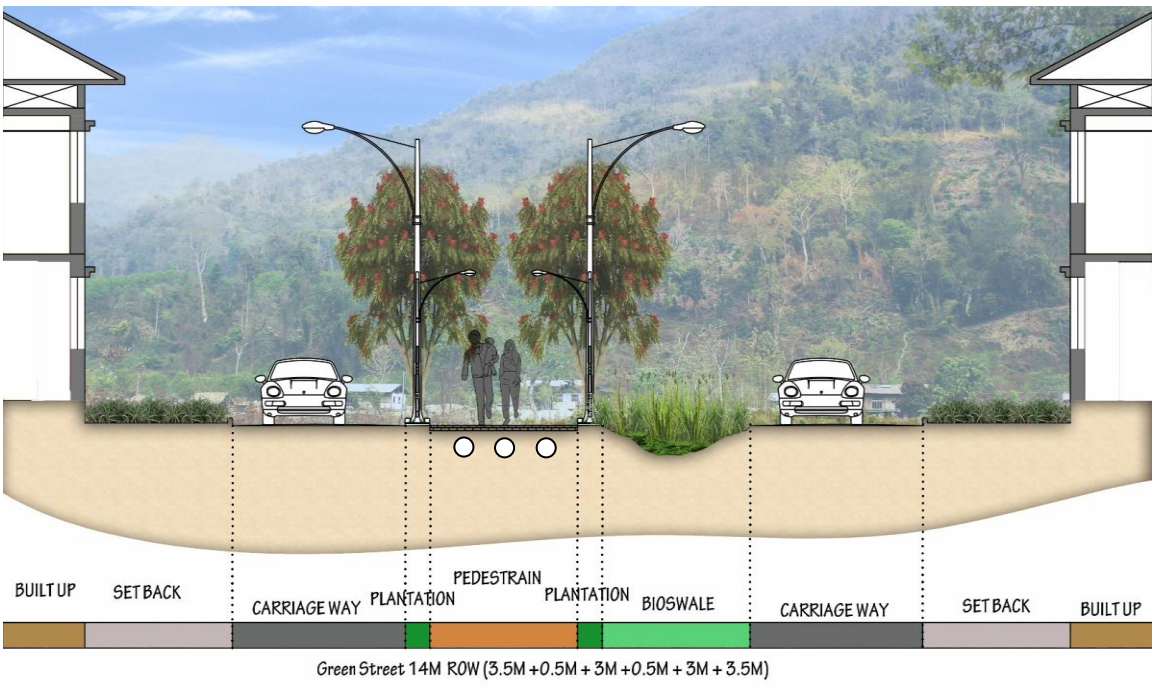

Figure 6: Cross section of Green Street.

Green streets are streets where plants and soils are a visible part of the storm water and gutter system. Integrated into the existing street and storm drain system, these green streets retain and filter storm water while they also add to the aesthetic appeal of the street. Concurrently, the plan proposes for a green street in the middle of the Tungkudempa area, which starts from the centre and curves down from the north to south. It is 14 meters in width and incorporates a bio swale of 3.5m that runs down the whole street.

4 Open space classification

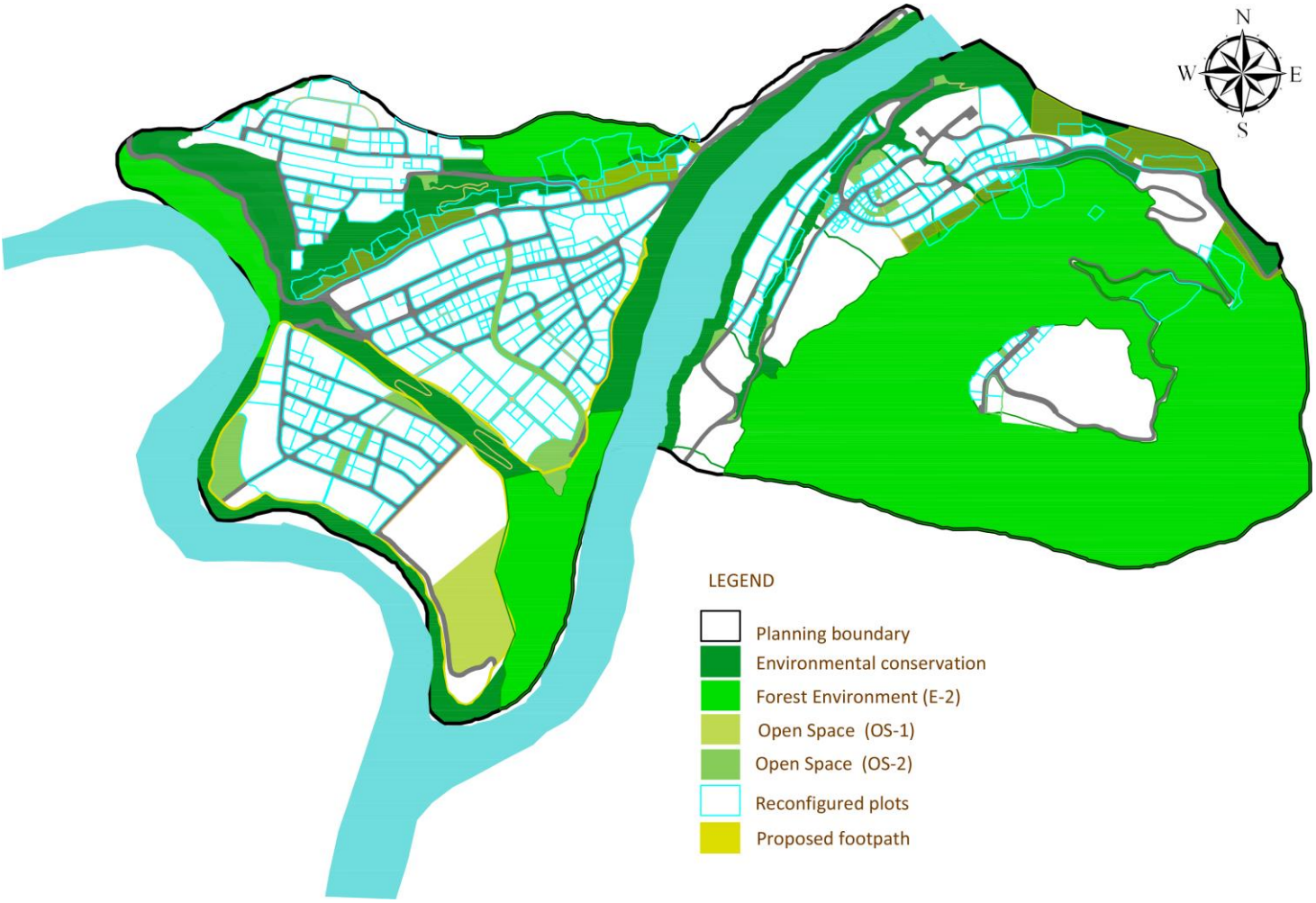

Figure 7: Map illustrating the distribution of open spaces in Panbang.

Open space systems are a key consideration in urban planning as it directly determines the health of the city and its people. Open spaces render an escape from the din of urban life and can help to restore people physically and psychologically by reducing stress and improving mood. It can also improve the urban climate, abate the urban heat effect by their ecological- balancer function and minimize environmental damages. Through their social importance, open spaces can serve a vital function in

bringing people together and in building personal relations and bonds that encourage community identity and stability.

Figure 8: Conceptual Visualization of proposed open space precincts.

It can also help the residents in adjusting to the healthy lifestyle. By their aesthetic importance, they determine the characteristics of the settlements, ameliorating the built- up character of the cities. Moreover, provision of an adequate open space in a city also manifests the goals of a sustainable city development.

Most of the proposed parks and open spaces in the region will be properly linked in order to better integrate the network of parks, open space, bicycle tracks and trails. Particular emphasis will be given to completing and maintaining the connectivity of linear open space networks such as the bicycle tracks and waterfront recreational trails, since continuous access for the public (and for wildlife) is an important aspect of the open space networks. The plan proposes for two types of open spaces (seen in figure 8) with open spaces for the community (OS-2) and a regional level sports complex in Annala (OS-1) wherein people could gather for a regional sports meet given the favourable climate, especially in winter months.

5 Pangbang Plot reconfiguration

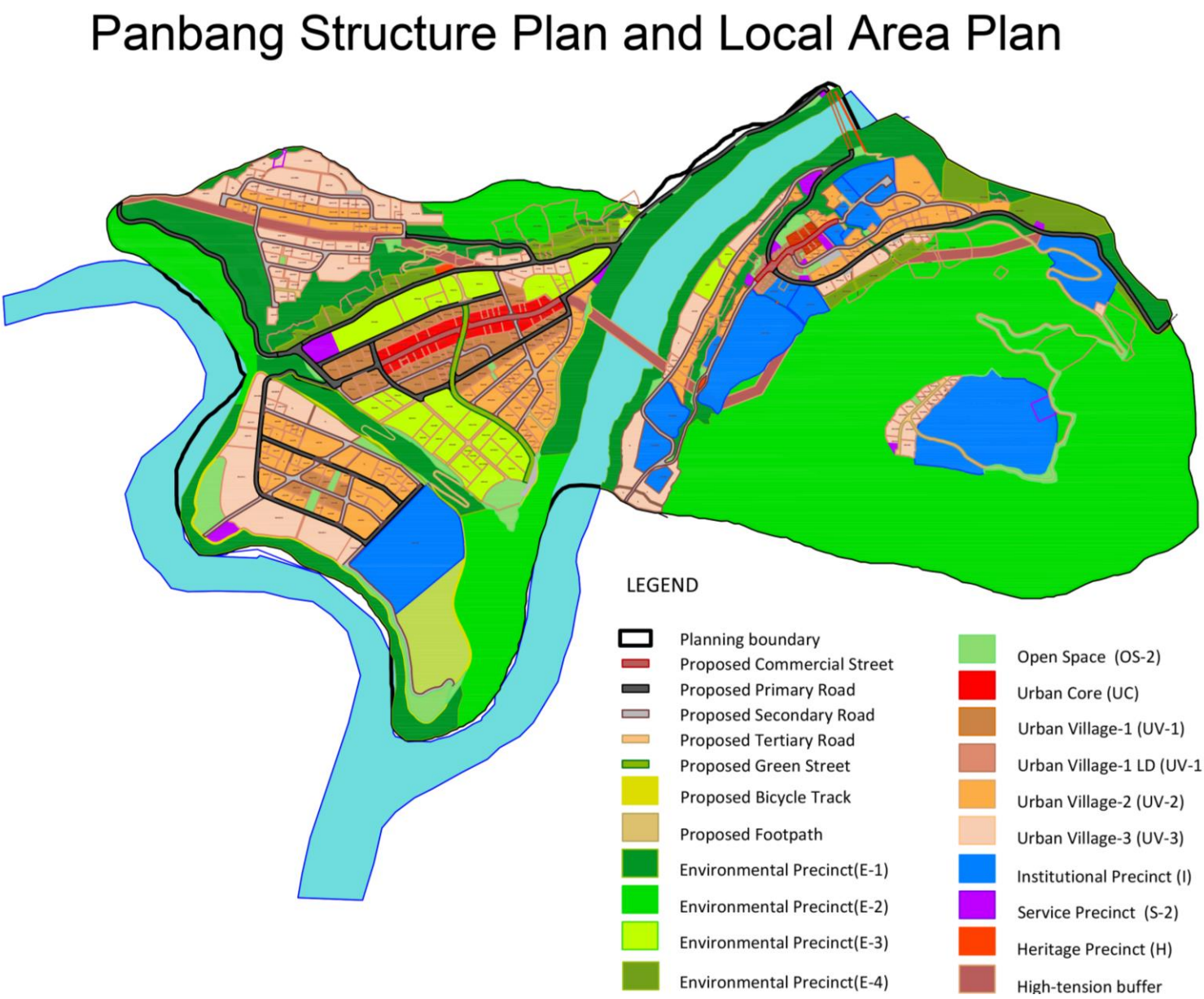

Figure 9: Structure plan of Panbang with reconfiguration of the plots.

1. Panbang

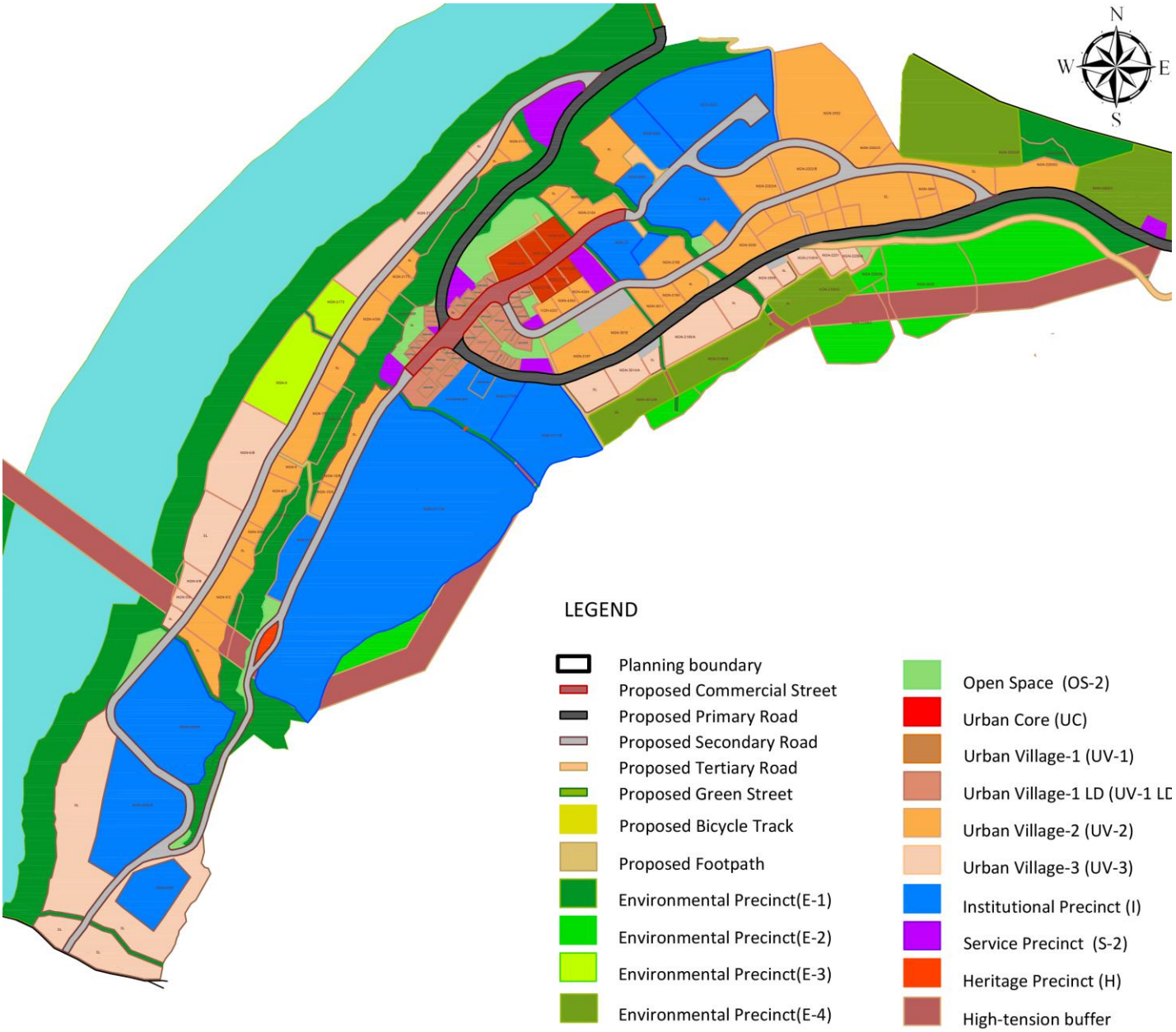

Figure 10: Plot reconfiguration for Panbang.

Panbang harbours a majority of institutional landholdings as observed in the map. The Grade-1 Basic Health Unit is located to the north of the Panbang town with the Panbang Central School located at the southern exit of the town before entering the PWD colony. UC-2 precinct has been designated in the centre, which will cater to the commercial needs of the Panbang and the Gallabi residents. Lying next to the urban core is the Urban Village-1 LD, mainly encompassing the kidu plots granted by His Majesty the King. This precinct will allow for mixed use, in order to retain the commercial uses that was previously allowed before the formulation of the plan. Moving further away from the urban core lies the UV-2 precinct, which is predominantly residential. In the near propinquity of the core is a

neighbourhood park that provides intrinsic recreational and aesthetics benefits to the town. Similar parks have been allocated in close vicinity to residential neighborhoods.

On the periphery of the Panbang town lies the UV-3 precinct, which is a low-density residential area. This precinct has access to the spectacular views of the river and the plains of Tungkudempa. A vegetable market is designated in the core, serving as the buying and selling point for freshly produced farm products. All of the private plots within Panbang has been provided with road access to achieve improved connectivity within the region. The two Chhuzhing plots in the Panbang region has been retained to its original land use to conserve agricultural land. At the eastern end of Panbang lies E-4 precincts characterised by slope gradient of 30 -57 %. In Panbang, the pattern of land ownership is as given below in the table.

Land ownership	Number
Private landowners	57
Institutional	12
State	26

2. Gallabi

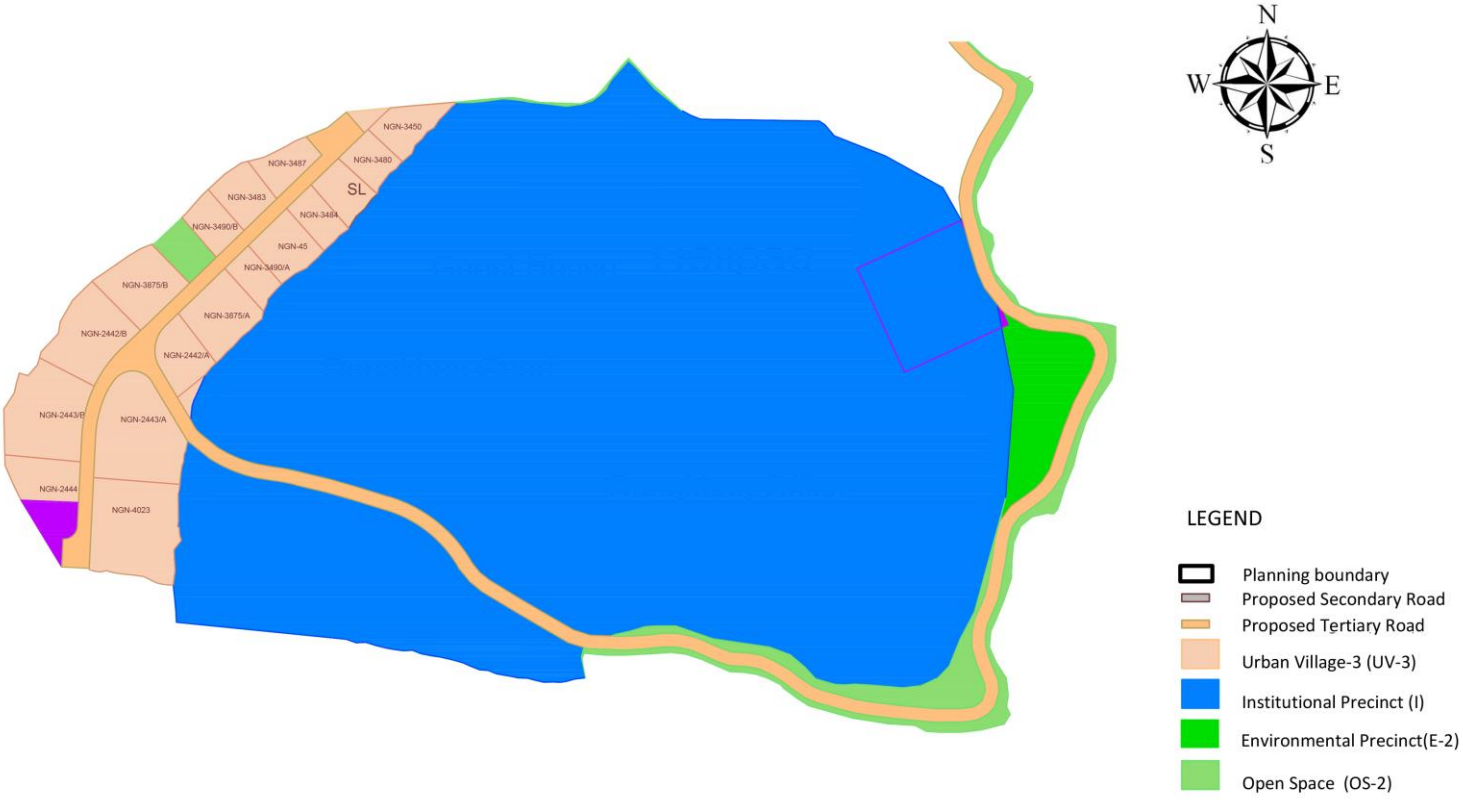

Figure 11: Plot reconfiguration for Gallabi.

Gallabi can relatively be defined as an institutional enclave. Both the Dungkhag office and the Dungkhag court is located in Gallabi. It also contains the UV-3 precinct next to the institutional establishments. The Gallabi area is enclosed on all sides by E-2 precinct (precincts devoted to the natural forest preserves). The newly reconfigured plots in the UV-3 precincts have been rendered with tertiary roads with a ROW of 6 meters. The Helipad and the Dungkhag Guest house is also located in close vicinity to the Dungkhag office. Furthermore, in Gallabi, the pattern of land ownership is as given below in the table.

Land ownership	Number
Private landowners	12
Institutional	2
State	1

3. Tungkudempa

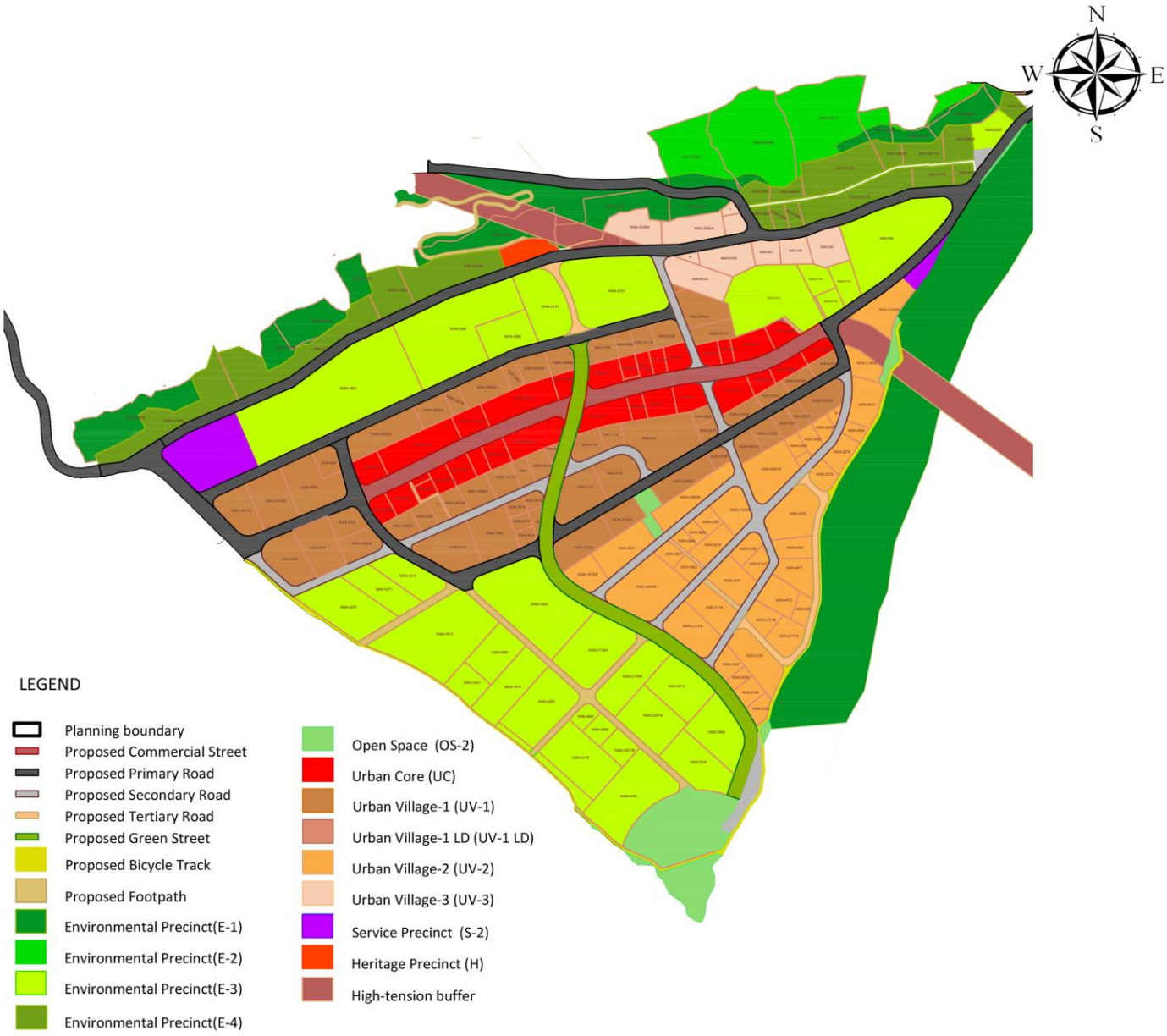

Figure 12: Plot reconfiguration for Tungkudempa.

Owing to the favourable site conditions of Tungkudempa, it will serve as the heart of Panbang Dungkhag. The UC- 1 precinct is the main commercial core of the region with the highest building height of 3 storeys. This precinct is abutted by the Commercial Street of 15 m ROW with provisions of car parking on both sides of the road.

The LAP defines a series of precinct that transitions from a highly dense core (UC-1 & UV-1) to lesser dense precincts as we move further away from the centre (UV-2, UV-3 & E-4 precincts). In the case of UV-1 precinct; although primarily residential, they are more urban

in character (higher density with a mix of housing types and a slightly greater mix of uses allowed). All of the Chhuzhings that were scattered all over Tungkudempa has now been merged into one precinct, divided into three larger parcels. This consolidation allows for efficient provision of infrastructures such as irrigation channels and farm roads. Located to the north is the E-4 precincts, characterized by a slope gradient of 30% to 57 %. Right at the entrance to the town lies the service precinct (earmarked in purple) that will contain the fuel station and the taxi/ truck parking. The fuel station will be situated at the upper left corner of the lot with an area of 1000 sqm and the other half will be designated as truck parking. Meanwhile, the lower half of the precinct is to be used as a bus/ taxi parking lot. In Tungkudempa, the pattern of land ownership is as given below in the table.

Land ownership	Number
Private landowners	135
Institutional	-
State	8

4. Brahmang

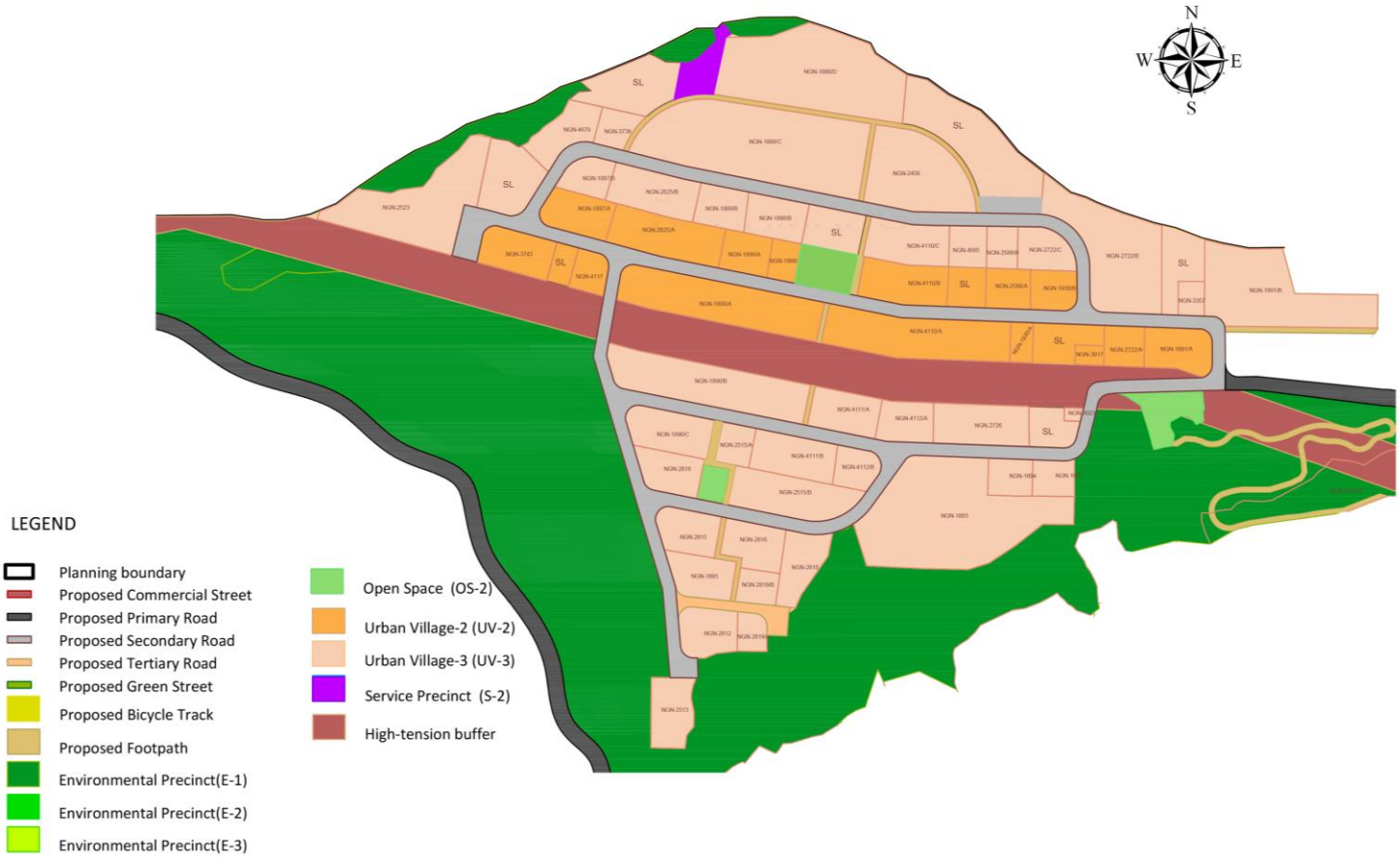

Figure 13: Plot reconfiguration for Brahmang.

Coming to the northern spectrum of the LAP, we have Brahmang that is mainly residential (UV-2 and UV-3 Precincts). A plot, currently earmarked as state land will be designated as UV-1 precinct in order to allow for mixed use within Brahmang. A High-Tension Buffer of 27 m runs through the center of Brahmang, wherein no developments shall be allowed within the buffer zone due to concerns of safety from the high-tension electric poles. In Brahmang, the pattern of land ownership is as given below in the table:

Land ownership	Number
Private landowners	35
Institutional	-
State	9

5. Annala

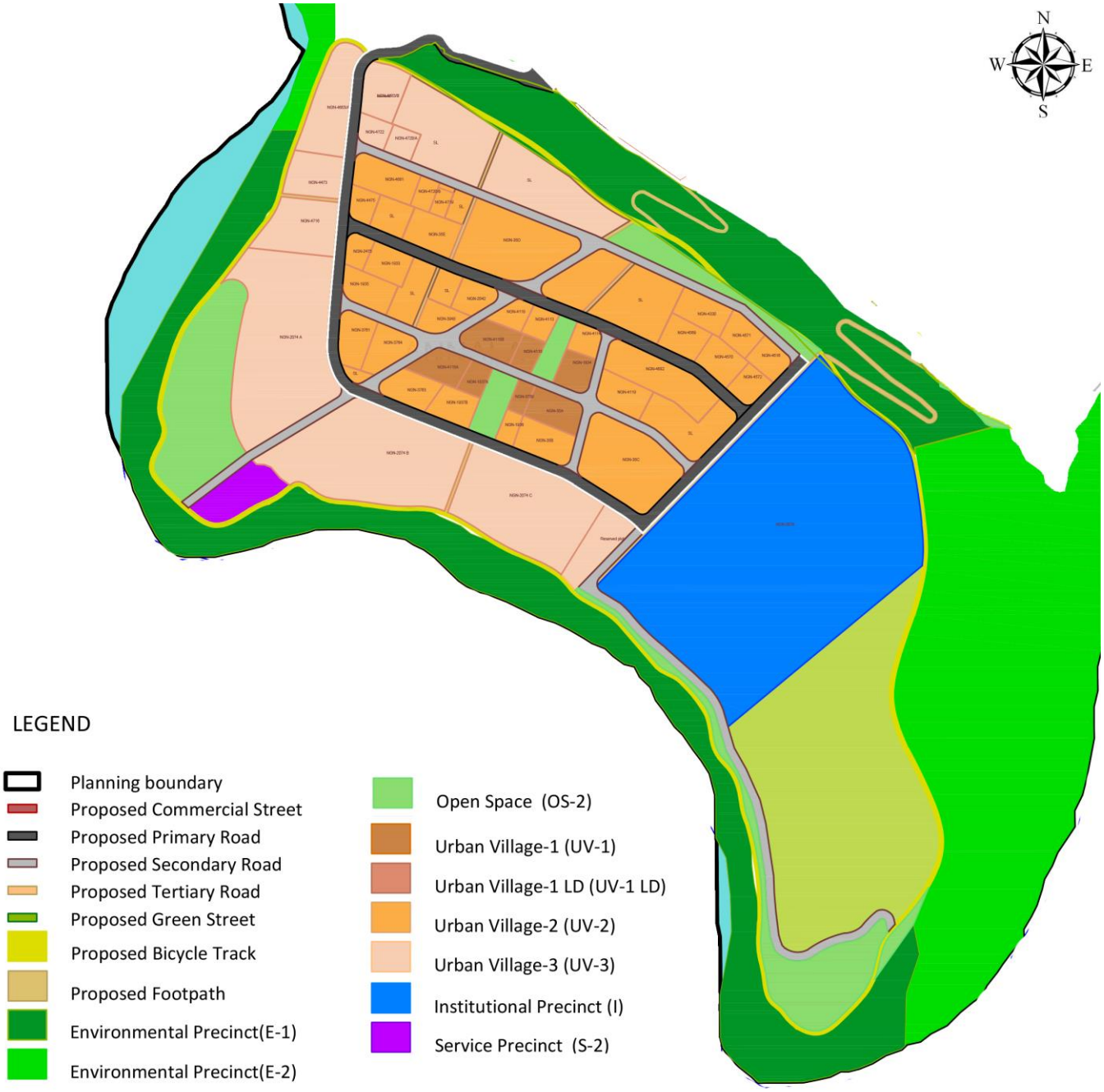

Figure 14: Plot reconfiguration for Annala.

Annala, the lowest point in the Panbang Dungkhag is primarily a residential neighborhood with a larger proportion of UV-2 and UV-3 precincts. A small UV-1 precinct has been designated in the core of Annala. Well-designed open spaces have been distributed throughout Annala to encourage outdoor activity and social communication.

Annala also encompasses a school and a sports complex. The school will also comprise of an "Early Childhood Care and Development" whereas the sports complex will serve as a place for major sports meet with incoming students from the nearby regions. Since Annala is enclosed by Drangme Chhu on the east and the Mangde Chhu on the west, a river buffer of 30 meters have been kept on the periphery of Annala abutting the rivers.

Figure 15: Conceptual visualization of proposed sports complex in Annala.

With chances of flooding in Annala, we have allocated a heritage precinct at the confluence of the two rivers. By doing so, the damage to property and human lives is reduced given that it will most likely be used only during daytime. In Annala, the pattern of land ownership is as given below in the table.

Land ownership	Number
Private landowners	38
Institutional	1
State	9

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