



# ANALYSIS OF GREEN OPEN SPACE DEVELOPMENT, TEBING TINGGI KOTA SUB-DISTRICT, TEBING TINGGI CITY

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## ABSTRACT

*The study aims to analyze and determine the suitability of the location for the development of green open spaces (GOS) in responding to the demands of Law no. 26 of 2007 using the ArcGis application with the Union / Overlay method. Based on the research results, it is known that the public GOS in Tebing Tinggi Kota District covers an area of 2.287 hectares or 0.88% of the total usage area of Tebing Tinggi Kota District. The need for public GOS in Tebing Tinggi Kota District is 1.81% or 6.28 Ha, while the provision of public GOS for Tebing Tinggi Kota Subdistrict by the direction of Law Number 26 Year 2007 is 20% of the total area.*

**KEYWORDS:** *Green Open Space, Tebing Tinggi Kota Sub-district, Union/Overlay method*

## 1. INTRODUCTION

Cities are a network system of human life characterized by a high population density and characterized by heterogeneous socio-economic strata and materialistic features (Zahnd, 2008). One of the physical needs of urban communities is the availability of public spaces, which are part of green open spaces. Each city is expected to make arrangements for public space areas, and compiled in the City Spatial Planning (RTRW). The rise in population density would affect the conversion of land into built and undeveloped areas, thus reducing the proportion of green open space and making it hard to function optimally. This would also have an effect on the sustainability of the climate, which, due to the decrease of green open space, appears to be less than ideal.

The need for GOS provision has been stipulated in the Law of the Republic of Indonesia

No.26 of 2007 Article 29 paragraph 1-3 concerning Spatial Planning where it is determined that the area of urban GOS is at least 30% of the total city area. The 30% amount consists of 20% for public GOS and 10% for private GOS. The distribution of Public GOS, covering 6% green lines, 12.5% garden GOS and 1.5% GOS for certain functions (Utami, 2011).

Kota Tebing Tinggi is a municipality formed under the Law of the Republic of Indonesia No. 9 of 1956 concerning the creation of Kota Tebing Tinggi. The direction of the spatial structure plan for the City of Tebing Tinggi Regional Spatial Plan, that Tebing Tinggi City is designated as a Regional Activity Center (PKW) which functions to serve provincial or several regency/city scale activities.

Tebing Tinggi Kota Subdistrict is one of the two new sub-districts resulting from the expansion based on the Regional Regulation on the City of



Tebing Tinggi number 15 of 2006 concerning the Establishment of Sub-Districts and Villages in Tebing Tinggi City. The pattern of spatial use in Tebing Tinggi Kota Sub-district has  $\pm$  70% of the built land of the entire Tebing Tinggi Kota Sub-district. It is because of Tebing Tinggi Kota Subdistrict in the city center in Tebing Tinggi City, which has an area of 3.4732 km<sup>2</sup> with a population of 25,107 people. Tebing Tinggi Kota sub-district has several functions, including as a residential center, government center, education center, trade and service center, health center.

In Tebing Tinggi Kota Subdistrict, it describes quantitatively the need for GOS both ecologically, aesthetically, and socially, so there is a need for GOS Development Analysis in Tebing Tinggi Kota District, Tebing Tinggi City

## 2. RESEARCH METHODOLOGY

In principle, data collection activities are used to describe the existing conditions of public GOS in the Tebing Tinggi Kota District. Primary data collection obtained in this research is carried out by field observations made using tools, such as GPS (Global Position System), cameras, Geo-Eye 1 Satellite Imagery (recording year February 2016), modes of transportation, drones, measuring instruments. Others.

Secondary data collection is carried out by institutional surveys, in particular by secondary surveys of relevant organizations, including the National Statistical Agency (BPS), the Regional Planning Agency for Development (Bappeda), the Public Works Office, the Business Service, the Hygiene and Gardening Service, and other entities related to this study.

**Table 1**  
**Data Requirements**

No	Data description	Type of data	Form	Year	Source
1	An overview General territory studies (Tebing Tinggi Kota sub-district)	Secondary	Data and Map	Latest	- Bappeda - Public works office
2	Population	Secondary	Data	Time Series (5 Year last)	- BPS
3	Availability GOS	Primary/Secondary	Data dan Peta	Latest	- DKP office Observation Data field
4	Management GOS	Secondary	Data		- DKP office

Source: Analysis, 2016

The analysis used in this research is descriptive-evaluative analysis. To find out the need for the area of public GOS in Tebing Tinggi Kota Subdistrict, namely the source of the RTRW and the results of the dissertation in the field in response to the demands of Law Number 26 of 2007 using the standard needs as outlined in the Minister of Public Works Regulation No. 5 / PRT / M / 2008 concerning Guidelines for the Provision and Utilization of Green Open Space in Urban Areas.

The study used in the identification of public GOS in the sub-district of Tebing Tinggi Kota is to define the area of GOS in the sub-district of Tebing Tinggi Kota that comes from the Regional Spatial Plan (RTRW) and to identify land uses in the sub-district of Tebing Tinggi Kota.

Using ArcMap 10 software with geoprocessing tools (Overlay - Union), the spatial analysis was carried out to assess land-use changes from mangroves to residential land use and to determine the typology of land use in the Tebing Tinggi City Spatial Plan. A scoring tool or an assessment of various parameters where the parameters used are relevant to the research objectives is required to identify locations and areas that can be developed into GOS. The existing land use map and the developed and unbuilt land map are the parameters that will be used.

## 3. LITERATURE REVIEW

There are elements of Open Space, including hard elements and soft elements. Hard elements, such as road and building paving, while soft elements are



different varieties of plants. An open space, which consists mainly of soft elements, is known as GOS (Hakim, 2000). In the Director-General of Spatial Planning (2006), according to Rustam (2004), GOS is an area that is overgrown with numerous plants in different strata, ranging from ground cover, shrubs and trees (tall, woody plants).

In general, GOS has or has a main (intrinsic) function, namely ecological functions and additional (extrinsic) functions. Within an area, these main functions can be combined according to the needs, interests, and sustainability of the city, such as protection of water systems, ecological balance, and biological conservation.

The provision of GOS in urban areas is divided into 2 (two), namely:

1) Provision of GOS based on area.

The provision of GOS based on the urban area is as follows:

1. Green open space in urban areas consists of public GOS and private GOS,
2. The proportion of GOS in urban areas is at least 30% consisting of 20% public GOS and 10% consisting of private GOS,
3. If the area of GOS, both public and private in the city concerned, has a total area greater than the prevailing regulations or laws, then this proportion must be maintained.
4. The proportion of 30% is the minimum measure to ensure the balance of the city's ecosystem, both the balance of the hydrological system and the balance of the microclimate, as well as other ecological systems that can increase the availability of clean air needed by the community, and at the same time can increase the aesthetic value of the city.

2) Provision of GOS Based on Total Population.

It is achieved by calculating the number of people served by the GOS region standard according to the relevant regulations to decide the area of GOS based on the population number.

Provision of GOS based on the need for certain functions has a function as protection or security, facilities, and infrastructure, for example protecting the preservation of natural resources,

protecting pedestrians, or limiting the development of land use so that its main function is not disturbed. GOS this category includes: green line

The development of GOS in big cities, such as Singapore, with an area of 625 km<sup>2</sup> and a population of 3.6 million in 2000 and a density of 5,200 people / km<sup>2</sup>, is projected to have built-up space reaching 69% of the total city area. In the plan, 24% or 177 km<sup>2</sup> is outlined as open space, so that the standard of open space reaches 0.9 ha per 1,000 people. Tokyo carried out GOS repairs on green roads, industrial estates, hotels, and the closure of several roads. Even though the city of Tokyo is very limited, the city government is still working on these parks, which have a standard of 0.21 ha per 1,000 people.

Provision of Green Open Space in Urban Areas:

In Buildings / Housing: GOS in buildings/housing both in yards and office yards, shops, and business premises functions as a producer of O<sub>2</sub>, a noise damper, and enhances the aesthetics of a building so that it looks beautiful, and provides balance and harmony between the building and the environment.

Utilization of PRH in the Environment / Settlements:

The function of GOS in the Environment / Settlements can be optimized according to the following types of GOS: (a) GOS for Rukun Tetangga Park, (b) GOS for Rukun Warga, (c) GOS for the urban village, (d) GOS for Sub-districts, (e) GOS for Pedestrian Paths, (f) GOS flyover

Utilization of GOS in Cities

GOS Certain Functions, such as (a) Green Line of Railroad Border, (b) Green Line of High Voltage Electricity Network, (c) GOS of River Border, (d) GOS of Coastal Border, (e) GOS of Raw Water Source / Springs, (f) GOS cemetery.

#### 4. RESULT



**Figure 1. Tebing Tinggi City Orientation Map**

Tebing Tinggi city is one of seven cities in North Sumatra Province, which is about 78 km from the city of Medan. Tebing Tinggi City is located at  $30^{\circ} 19'00'' - 3^{\circ} 21'00''$  North Latitude and  $98^{\circ} 11' - 98^{\circ} 21'$  East Longitude. Tebing Tinggi City is in the middle of Tebing Tinggi sub-district, Serdang Bedagai Regency. Tebing Tinggi City consists of 5 (five) sub-districts and 35 urban villages with an area of 38,438 km<sup>2</sup>. Padang Hilir Subdistrict is the largest sub-district with an area of 11,441 km<sup>2</sup> or 29.76 percent of the area of Tebing Tinggi city. Most of the land (50.89 percent) in Tebing Tinggi city is used as

agricultural land. The administrative boundary of Tebing Tinggi city is to the north, bordering PTPN - III Kebun Rambutan, Serdang Bedagai Regency. In the south, bordering PTPN - IV Kebun Pabatu and Paya Pinang Plantation, Serdang Bedagai Regency. East side, adjacent to PT. Soefindo Tanah Besi and PTPN - III Rambutan Plantation, Serdang Bedagai Regency. In the west, bordering PTPN - III, Bandar Bejambu Plantation, Serdang Bedagai Regency. Administratively, the area of Tebing Tinggi city is 38.44 km<sup>2</sup>. The administrative area of Tebing Tinggi city covers 5 sub-districts and 35 villages.



**Figure 2. Tebing Tinggi City Administrative Map**

Tebing Tinggi Kota sub-district is located at coordinates  $03^{\circ} 18'30'' - 03^{\circ} 21'30''$  North Latitude and  $99^{\circ} 9'30'' - 99^{\circ} 11'30''$  East Longitude with an area of 3.4732 km<sup>2</sup> with an altitude 18 m above sea level. Geographically, the Tebing Tinggi Kota sub-district is located in the middle of the Tebing Tinggi City area. As the name implies, urban centers and economic centers such as shops and others are widely

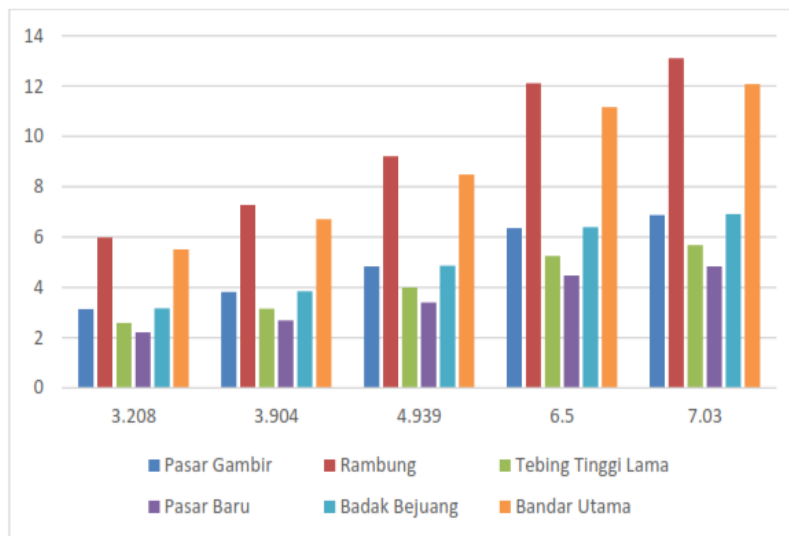
available in this sub-district. The topographic condition of Tebing Tinggi Kota subdistrict is slightly lower than that of several other sub-districts in Tebing Tinggi City. The boundaries of Tebing Tinggi Kota sub-district are to the north by Rambutan sub-district, to the south by Padang Hulu sub-district, to the west by Bajenis sub-district, to the east by Padang Hilir sub-district.



**Table 2**  
**Projections of Population in Tebing Tinggi City Sub-District 2016-2036**

No	Urban village	Population	Projections				
			2016	2021	2021	2031	2036
1	Mandailing	3.085	3.208	3.904	4.939	6.5	7.03
2	Pasar Gambir	3.015	3.136	3.815	4.827	6.352	6.87
3	Rambung	5.749	5.979	7.274	9.204	12.112	13.101
4	Tebing Tinggi Lama	2.487	2.586	3.147	3.982	5.24	5.667
5	Pasar Baru	2.119	2.204	2.681	3.393	4.464	4.829
6	Badak Bejuang	3.031	3.152	3.835	4.853	6.386	6.907
7	Bandar Utama	5.299	5.511	6.705	8.484	11.164	12.075
<b>Total</b>		<b>24.785</b>	<b>27.792</b>	<b>33.382</b>	<b>41.709</b>	<b>54.249</b>	<b>58.515</b>

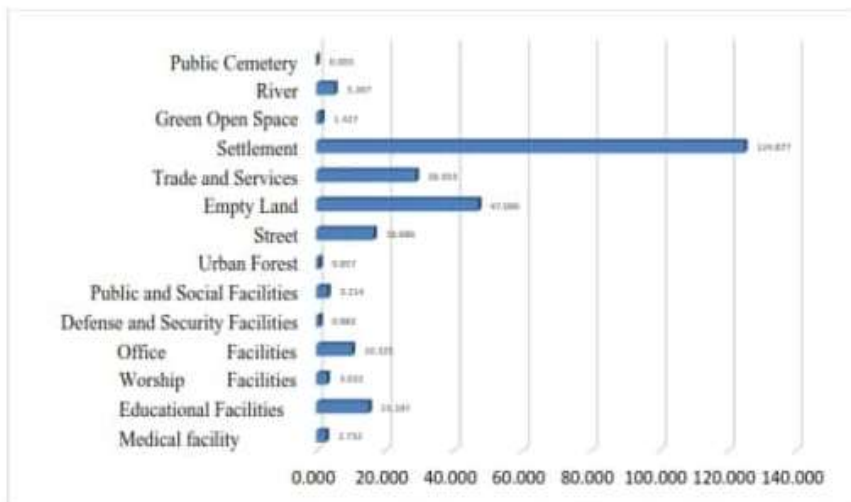
Source: Analysis, 2016



**Figure 3. Population Growth of Tebing Tinggi Kota Subdistrict, 2016 – 2036**

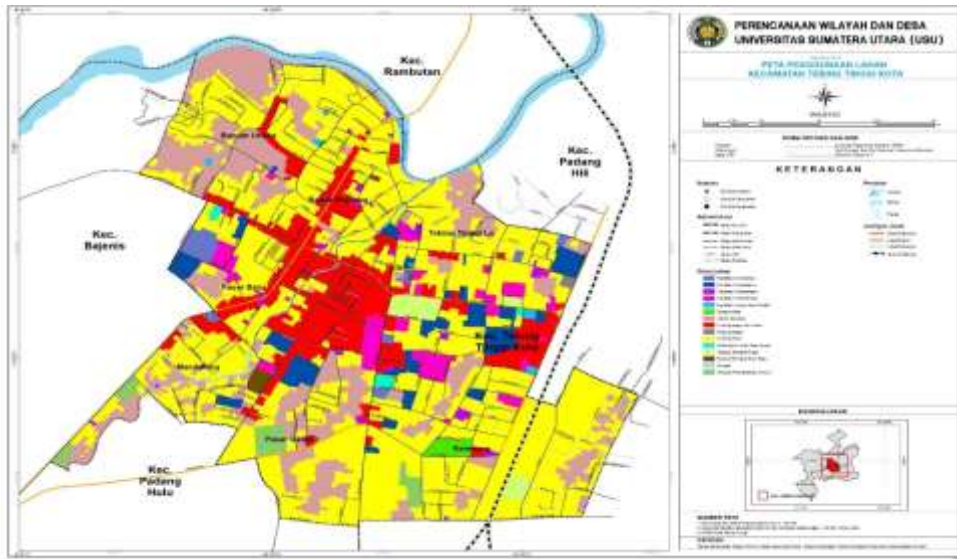
The graph above shows that population growth for the next 20 (twenty) years shows a significant difference every 5 (five) years. With the increase in population, it can indirectly affect patterns

and changes in land use and in particular vacant lands that are still likely to be converted as settlements due to the need for shelter or other activities.



**Figure 4. Land Use in Tebing Tinggi City Subdistrict in 2016**





**Figure 5. Land Use of Tebing Tinggi City Sub-district 2016**

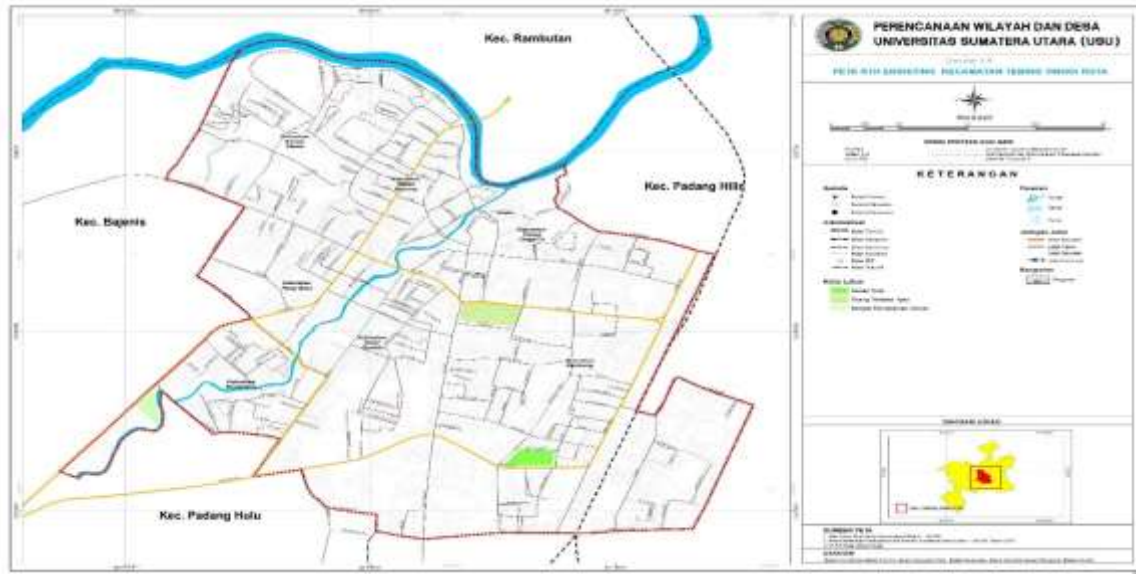
**Table 3  
Land Use of Tebing Tinggi City Sub-district 2016**

No	Land Use	Area in Hectare	Percentage %
1	Medical facility	2.732	1.048652
2	Educational Facilities	15.197	5.832725
3	Worship Facilities	3.022	1.159771
4	Office Facilities	10.325	3.962846
5	Defense and Security Facilities	0.882	0.338422
6	Public and Social Facilities	3.214	1.233697
7	City Park	0.857	0.328796
8	Street	16.686	6.404485
9	Empty land	47.099	18.07745
10	Trade and Services	28.953	11.11276
11	Settlement	124.877	47.9298
12	Merdeka Square (Green Open Space)	1.427	0.547693
13	River	5.267	2.021732
14	Public Cemeteries	0.003	0.001169
<b>Total</b>		<b>260.541</b>	<b>100</b>

Source: 2016 Analysis

The existing GOS in Tebing Tinggi Kota sub-district covers an area of 2.28 hectares or 0.87% of the total use area of Tebing Tinggi Kota District, where the amount is a combination of land use for the

Public Cemetery (TPU), City Park, and Merdeka GOS Field. The existing GOS in Tebing Tinggi Kota District can be seen in (Figure 3)



**Figure 6. GOS Existing of Tebing Tinggi City Sub-district, 2016**

**Table 4**  
**Area and Percentage of Public Green Open Space in Tebing Tinggi City Sub-district in 2016**

No	Public Green Open Space	Area in Hectare	Percentage (%)
1	City Park	0,857	0,33
2	Merdeka Square	1,427	0,55
3	Public Cemeteries	0,003	0,00
<b>Total</b>		<b>2,287</b>	<b>0,88</b>

Source: 2016 Analysis

The percentage of GOS in Tebing Tinggi Kota Subdistrict by the existing conditions is not sufficient or it can be said that it is not by the GOS needs to be mandated by the Tebing Tinggi City Spatial Planning (RTRW). The GOS for the public in the sub-district is still 0.87% of the total land area. Currently, Tebing Tinggi Kota District has public GOS such as City

Park with an area of 0.85 Ha, Merdeka GOS Field with an area of 1.42 Ha, and also a Public Cemetery with an area of 0.003 Ha. The existence of public GOS is not sufficient to meet the needs of public GOS in Tebing Tinggi City, where the mandated percentage of GOS is 30% with a share of 20% for public and 10% for private.

**Table 5**  
**Directions for Green Open Space Development based on Law Number 26 of 2007**

No	Regulation	Directions for GOS	
		Public	Private
1	Land area based on the direction of Law Number 26 of 2007	20% 6,28 Ha	10% 3,14 Ha

Source: 2016 Analysis

Law Number 26 of 2007 concerning Spatial Planning provides a basis for regulating green open spaces in the context of realizing safe, comfortable, productive, and sustainable urban space. Law Number 26 of 2007 states that GOS is an area that extends in the form of a lane and/or grouped area, whose use is more open, a place to grow plants, both those that grow naturally or intentionally planted.

Law No. 26 of 2007 concerning spatial planning states that 30% of the city area must be a

GOS consisting of 20% public and 10% private. Public GOS is a GOS that is owned and managed by the city/district government which is used for the benefit of the general public. Examples of public GOS are city parks, green belts, river GOS, cemeteries, and railroads. Meanwhile, private GOS is GOS owned by certain institutions or individuals whose use is for a limited group, among others, in the form of gardens or house yards/buildings owned by the community/private that are planted with plants.



So that the provision of GOS for cities by the direction of Law Number 26 of 2007 emphasizes that GOS for the public must be 20% of the total area.

## 5. CONCLUSION

1. Public GOS in Tebing Tinggi Kota sub-district covers an area of 2.287 Ha or 0.88% of the total utilization area of Tebing Tinggi Kota sub-district.
2. The need for public GOS that must be met by Tebing Tinggi Kota Subdistrict is 4 Ha to fulfill 6.28 Ha of the total area.
3. Provision of GOS for Tebing Tinggi Kota Subdistrict by the direction of Law Number 26 the Year 2007 emphasizes that GOS for the public must be 20% of the total area of 6.28 Ha.

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