

Mapping Area Analysis Using ArcGIS and AutoCad: Cast in Border Area

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Abstract: The purpose of this study is to analyze land changes within the PT Inhutani Nunukan area. Direct measurement is using Garmin 76 CSx and 62 CS type GPS devices with data processing using AutoCAD and ArcGIS applications. The results of the measuring and mapping showed that the area of the settlement area is 19.393 Ha, the area of green open space is 0.540 Ha or equal 5394.313 m². It is measured that hotel area is 0.145 Ha or equal 454.431 m², and the office area is 1.435 Ha or equal 14358,398 m². It is also mapped that the area of public and social facilities is 1,375 Ha or equal 13738,705 m², mess area 1,830 Ha or equal 18292,675 m², and education facilities area 0.465 Ha or equal 4653.861 m². It is identified that market area 0.832 Ha or equal 8321.291 m², terminal area 0.499 Ha or equal 4990, 441 m², while vacant land area 0.214 Ha or equal 2142.659 m². Lastly it is also identified that BNI housing area 0.190 Ha or equal 1896,766 m². Then the total area = 26,929 Ha or equal 269259,159 m².

1 INTRODUCTION

Nunukan Regency is a district in the North Kalimantan Province which is located on the border of Indonesia-Malaysia. Based on the Regional Spatial Planning, Nunukan Regency is designated as a green open space area, residential area, as well as a trade and service area (Peraturan Daerah Nomor 19, 2013). However, in reality there is a building permit area in the urban center which is the property of one of the State-Owned Enterprises, namely PT. Inhutani Persero I (Vini Indriasari, 2021).

PT. Inhutani Persero I Nunukan is a state-owned company engaged in the forestry sector with a land area of 271,000m². After a long time running the business on the land, the activities of PT. Inhutani began to decrease so that problems arise related to land use where the land is used by the community for housing. As a result of this land use, the community and PT. Inhutani conflict occurs because residents want legal certainty of the land they use. Besides being used by residents, the land of PT. Inhutani is also used for public facilities, government offices, private, markets, green open spaces (Basuki, 2020).

The following areas use the land of PT. Inhutani

- Settlements.
- Public Facilities.

- Office.
- Mess
- Market.
- Educational Facilities.
- Green Open Space.
- Vacant Land.
- eta Hotel Area.
- Terminals.
- BNI Housing.
- Buildings within the PT. Inhutani.

To find out clearly what are the uses and land area of PT. Inhutani used by residents and other purposes, it is necessary to measure and map to find out the boundaries, area and percentage of land use.

2 RESEARCH METHODOLOGY

2.1 Preparing Data

2.1.1 Primary Data

- Coordinates of land area boundaries
- Land boundary location tracking
- Base mark coordinates

2.1.2 Secondary Data

- Satellite Image Map
- Spatial Map
- Situation Map of PT. Inhutani
- Map of HGB PT. Inhutani

2.2 Preliminary Survey

Preliminary survey is a survey to find out the condition of the area, the environment, where the coordinate points are taken and the area tracking path.

2.3 Traking

Tracing is done using GPS by circling the entire land used to form a closed polygon. The survey results will be processed using Autocad and then analyzed for the suitability of the measurement results using Google Earth and Satellite Imagery. After the field data is in accordance with the satellite image, the land will be mapped using ArcGIS (Sudarsono, 2020); (Omura, 2017); (Wahana, 2015).

2.4 Research Diagram

This study aims to map the land of PT. Inhutani. The stages in mapping can be seen in the image below.

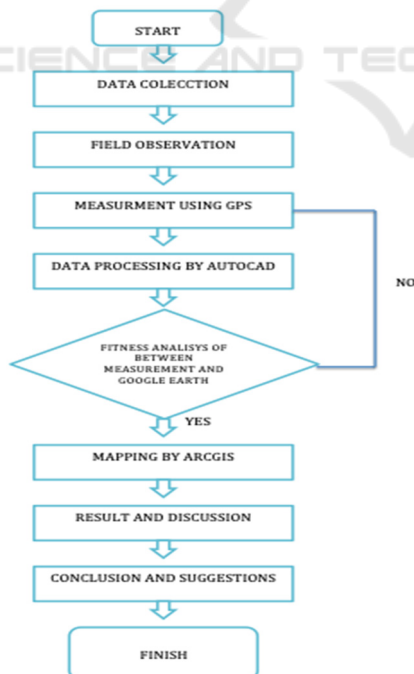


Figure 1: Research Diagram.

3 RESULTS AND DISCUSSION

3.1 Map of PT. Inhutani

Total area of PT. After conducting survey analysis and field measurements, Inhutani has an area of 29,784 ha, which consists of residential areas, green open space areas, hotel areas, public and social facilities areas, BNI housing areas, market areas, residential areas, educational facilities areas, land areas. empty, office areas, terminal areas, as well as road facilities and infrastructure.

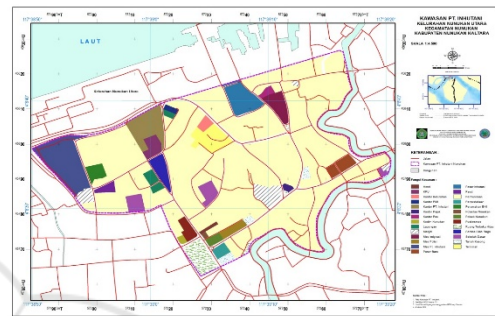


Figure 2: Map of PT. Inhutani.

3.2 Map of Quickbird Image

From the Quickbird image map above, we can see that the area of PT. Inhutani is already crowded with buildings and other infrastructure facilities.

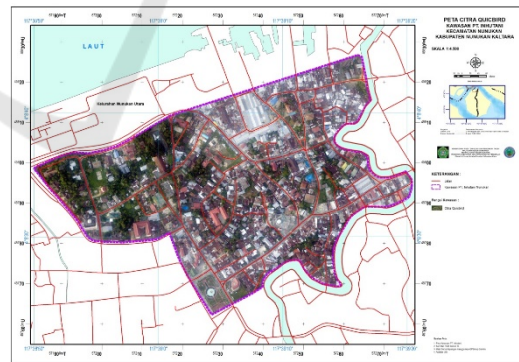


Figure 3: Map of Quickbird Image.

3.3 Map of Residential

The residential area included in the PT. Inhutani has an area of 19.393 Ha/193901,218 m², with a percentage of 72.02%.

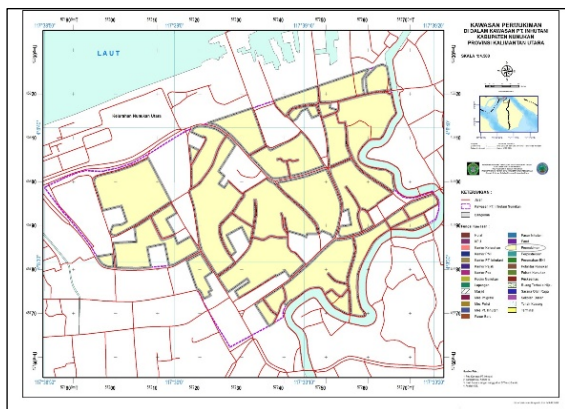


Figure 4: Map of Residential.

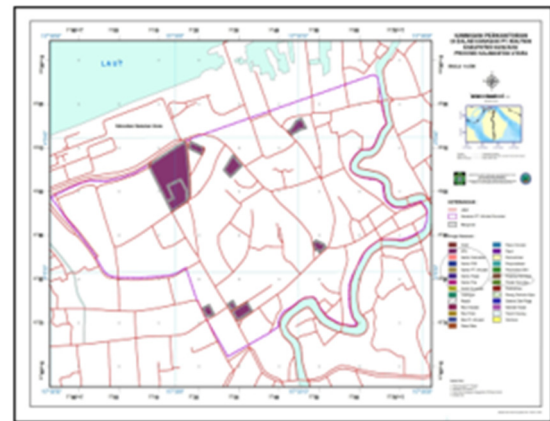


Figure 6: Map of Office.

3.4 Map of Public Facilities

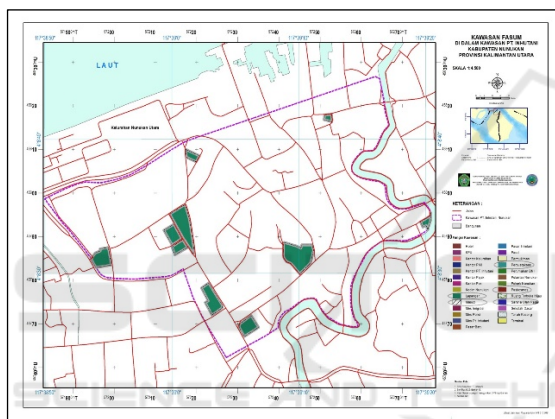


Figure 5: Map of Public Facilities.

The area of public facilities consists of libraries, health centers, mosques, sports facilities, and fields which have a total area of 1,375 ha/ 13738,655 m², with a percentage of 5.11%.

3.5 Map of Office

The office area consists of the Tax office, PT. Inhutani, North Nunukan sub-district office, Post office, PMI office, KPU office, Kodim office, Nunukan Polsek office and Nunukan Polantas office with a total area of 1,435 Ha / 14358,398 m², with a percentage of 5.33%.

3.6 Map of the Mess

Mes area consists of PT. Inhutani, Immigration and Police with a total area of 1,830 Ha/ 18292,675 m², with a percentage of 6.796%.

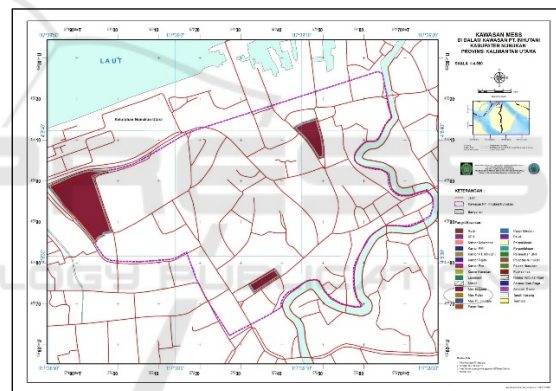


Figure 7: Map of the Mess.

3.7 Map of the Market

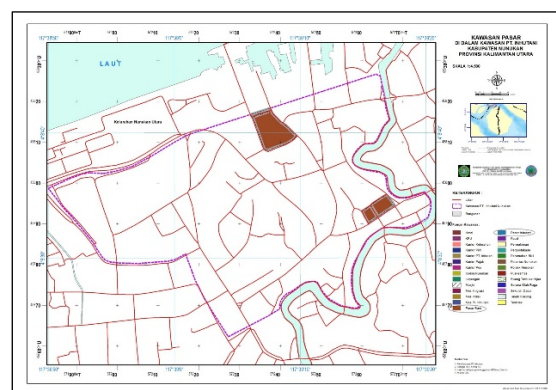


Figure 8: Map of the Market.

The market area consists of the Inhutani market and the new market, with a total area of 0.832 Ha/ 8321.291 m², with a percentage of 3.090%.

3.8 Map of Educational Facilities

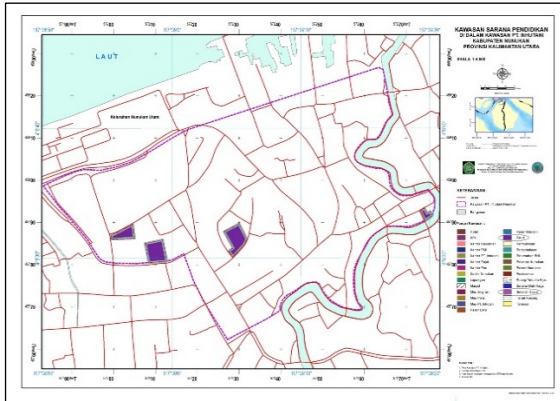


Figure 9: Map of Educational Facilities.

The area of educational facilities consists of elementary schools and early childhood education with a total area of 0.576 ha/ 5768.262 m², with a percentage of 2.139%.

3.9 Map of Green Open Space Area

Green open space area with a total area of 0.540 Ha / 5394.313 m², with a percentage of 2.005%.

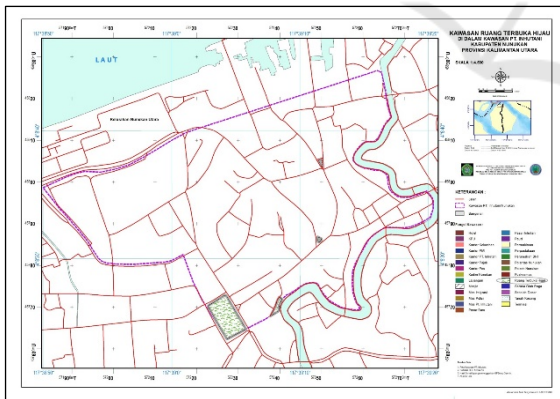


Figure 10: Map of Green Open Space Area.

3.10 Vacant Land Map

Empty land with a total area of 0.214 Ha/2142.659 m², with a percentage of 0.008%.

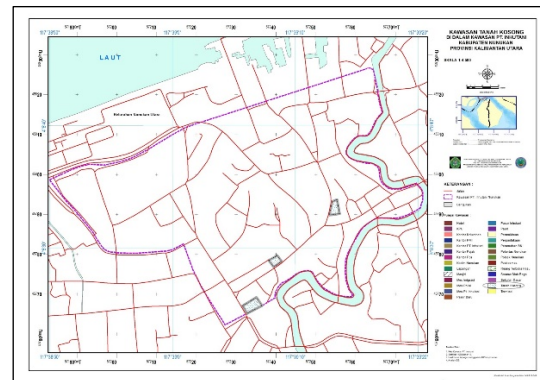


Figure 11: Vacant Land Map.

3.11 Hotel Area Map

Hotel area land with a total area of 0.045 Ha/ 454.431 m², with a percentage of 0.167%.

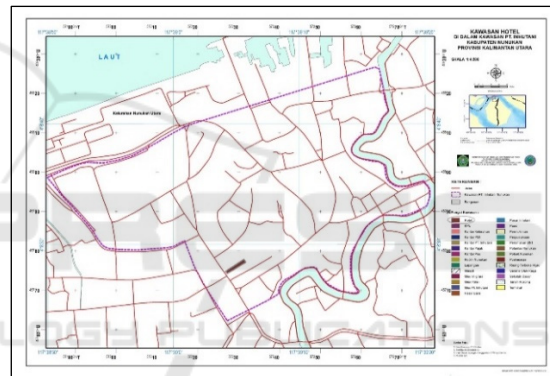


Figure 12: Hotel area map.

3.12 Terminal Map

Terminal area land with a total area of 0.499 Ha / 4990,441 m², with a percentage of 1.85%.

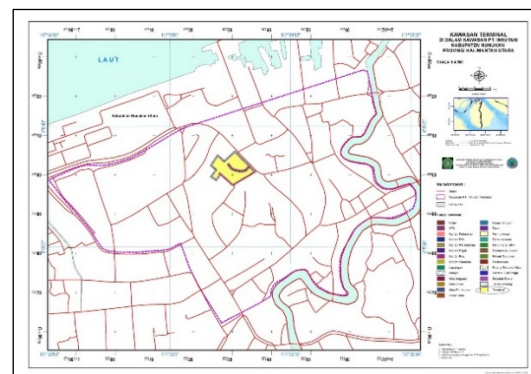


Figure 13: Terminal Map.

3.13 BNI Residential Area Map

BNI's public housing area has a total area of 0.190 Ha/ 1896,766 m², with a percentage of 0.71%.

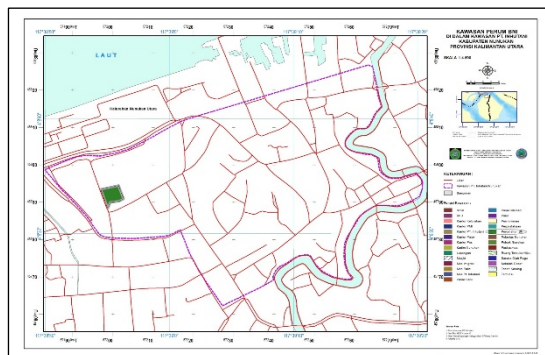


Figure 14: BNI Residential Area map.

4 CONCLUSIONS

The results of the measuring and mapping showed that the area of the settlement area is 19.393 Ha, the area of green open space is 0.540 Ha or equal 5394.313 m².

It is measured that hotel area is 0.145 Ha or equal 454.431 m², and the office area is 1.435 Ha or equal 14358,398 m². It is also mapped that the area of public and social facilities is 1,375 Ha or equal 13738,705 m², mess area 1,830 Ha or equal 18292,675 m², and education facilities area 0.465 Ha or equal 4653.861 m². It is identified that market area 0.832 Ha or equal 8321.291 m², terminal area 0.499 Ha or equal 4990, 441 m², while vacant land area 0.214 Ha or equal 2142.659 m².

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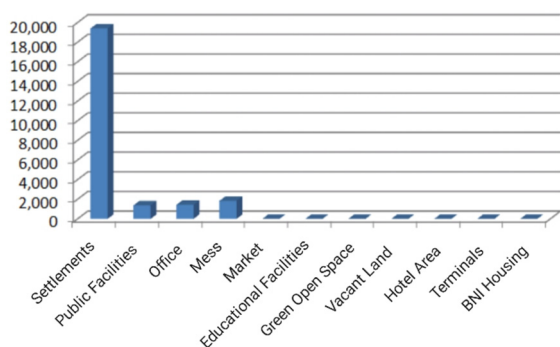


Figure 15: Land Area Diagram.

When compared with North Nunukan Village which covers an area of 48.72 Ha, then 55.27%, the area of when compared with North Nunukan Village which covers an area of 48.72 Ha, then 55.27%, the area of North Nunukan Village which is controlled by PT. Inhutani Nunukan.

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