

## Highest and Best Use Analysis for Landed Houses or Vertical Houses in Kenjeran, Surabaya

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**Abstract.** East Surabaya is a territory that is developing in infrastructure and located in a tourism area. With a lot of potential vacant land in East Surabaya, the owner of a vacant land at Bulak Kali Tinjang Timur road, Kenjeran plans to build a residential area.. The decision for the best use of alternative plans, can be obtained using the highest and best use (HBU) analysis method. The HBU analysis itself must fulfill 4 criteria, that is, legally permissible, physically possible, financially profitable, and maximum productivity. The alternative planning obtained is two scenarios of landed houses including conventional and clusters concepts, and also two scenarios of vertical houses including vertical houses with basement and without basement. Of the four scenarios, the HBU is vertical houses without basement's scenarios, which have an annual IRR of 61%, NPV IDR 329,871,606,870, with payback period 24,63 months and discounted payback period 24,81 months.

**Keywords:** landed houses, vertical houses, residential, highest and best use

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### 1. Introduction

Surabaya is the 2<sup>nd</sup> largest city in Indonesia after Jakarta city. Where East Surabaya is a territory that is developing infrastructure, especially the construction of Outer East Ring Road (OERR) and is located in tourist areas, such as Kenjeran beach, Surabaya Park, Taman Hiburan Pantai Kenjeran (THP), Ria Kenjeran Beach, and fisherman's village. With the large number of vacant land that has the potential to be developed in East Surabaya, the landowners plan to build a residential area like landed houses or vertical houses in Bulak Kali Tinjang Timur road with an area of 4ha. The Decision for the best use of an alternative plans, can be obtained using Highest and Best Use (HBU) analysis method. HBU analysis must fulfill 4 criteria, there are legally permissible, physically possible, financially feasible, and maximum productivity (KPSPI, 2015).

## 2. Theoretical Basis

Highest and Best Use (HBU) must fulfill 4 criteria and requirements according to KPSPI (2015), namely:

1. Legally Permissible

Things that need to be seen in the regulatory aspects include the requirements for inspecting location's zone and building codes (Mubayyinah and Utomo, 2012).

2. Physically Possible

Tests of physical aspects have a close relationship with soil characteristics (Hidayati and Harjanto, 2003), there are:

a) Size and Shape

- Housing Concepts

- Conventional concepts, residential areas with very clear plots of land and relatively similar forms of plots spread evenly across the entire land.
- The Cluster concept, a residential area that is grouped into shared spaces to get a high density in an area, so that other land can be used for open space.
- Planned Unit Development concept, a flexible multi-functional development without rigid division for each activity zone.

- Road Hierarchy

- Primary Arterial Road, a road that connects a residential environment.
- Primary Collector Road, a connecting road between a city-scale activity center.
- Secondary Arterial Road, roads that connect activities between primary collector roads.
- Secondary Collector Road, a road that connects activities between secondary arterial roads.
- Primary Local Road, a road that connects local activities and is an uninterrupted road despite entering a residential area.
- Secondary Local Road, roads for local needs.

- Road Pattern

- Straight Pattern (Grid/Straight Street), road network that forms geometric and rectangular.
- Curved Patterns, have a pleasant and natural shape, especially on contoured land.
- Round (Loop) Pattern, providing security and an economic deadlock without the difficulty of turning.
- Cul-de-sac Pattern, providing high privacy and relatively low traffic frequency.

- Principles of Plot Distribution

- Orientation, most Surabaya developers will choose the orientation north, south, east and avoid the west.
- Shape and Area of Plots, standard plots are generally square and rectangular. While the area of the plot is influenced by the width of the road, the wider the road the wider the plot is determined.

b) Topography

Information relating to soil contours, natural drainage, natural conditions, views and other general physical conditions.

c) Utilities

A consideration in the provision of adequate urban utilities with good conditions, including the provision of electricity, telephone and water lines.

d) Location

Location factors determine achievement to a property whether easy or difficult to achieve. Property that has a location in the city area can be easily reached and has a complete infrastructure.

e) Accessibility and Environment

Cash Property located in the CBD area (Central Business District), has a high value because the cost of accessibility allows the property as a commercial property.

3. Financially Profitable (Financial Feasible)

a) Cash Flow

- Payback Period, a method used to determine the time period for returning money invested in investments (Ross, 2008).

$$\text{Payback Period} = \frac{\text{Initial Expenditure}}{\text{Average Revenue Per Year}} \times 1 \text{ Year} \quad (1)$$

- Discounted Payback Period, a method used to determine the period of time needed to repay investments that have been made through discounted future cash inflows (Ross, 2008).

$$\text{Discounted Cash Inflow} = \frac{\text{Actual Cash Inflow}}{(1+i)^n} \quad (2)$$

$$\text{Discounted Payback Period} = A + \frac{B}{C} \quad (3)$$

Information:

$i$  = *discounted rate*

$n$  = *year of cash entry period*

$A$  = *last year with discounted cumulative cash flow (-)*

$B$  = *value of discounted cash flow at the end of period A*

$C$  = *discounted cash flow during the period after A*

- Net Present Value (NPV), the method for ranking investment proposals that is equivalent to the present value of future net cash flows, which is discounted at capital costs (Brigham and Houston, 2008). The NPV value is 0, then the investment made will not change the value of the company.

$$NPV = \sum_{t=1} \frac{C_t}{(1+i)^t} - C \quad (4)$$

Information:

$C_t$  = *cash flow in period t*

$t$  = *time period of year t*

$C_0$  = *total initial investment*

$T$  = *invest rate*

- Internal Rate of Return (IRR), a method that calculates a discount rate that makes the present value of all estimated cash inflows equal to the present value of expected cash outflows (Hazen, 2009). The IRR results obtained are greater than the interest rate so the investment made produces a return that is greater than expected.

$$NPV = \sum_t^n \frac{FCF_t}{(1+IRR)^t} - I \quad (5)$$

Information:

*FCF<sub>t</sub>* = the annual free cash flow generated by the project

*I<sub>o</sub>* = present value of investment costs after tax

*IRR* = internal rate of return

*t* = time period

- Profitability Index (PI), the present value ratio of future free cash flows to initial expenditures (Keown, 2011).

$$PI = \frac{\text{PV of Cash Inflow}}{\text{Initial Investment}} \quad (6)$$

#### 4. Maximum Productivity (Maximally Productive)

Where the use of HBU analysis will produce the highest residual value of a land and consistent with the guaranteed rate of return for the market (KPSPI, 2015).

### 3. RESEARCH METHODOLOGY

This research uses quantitative descriptive method by conducting data collection techniques and observing carefully about certain aspects related to the problem under study.

Table 1. Source of Data Collection

No.	Variable	Data Type	Data Source
1.	Selection of Alternative Properties	Primary	Interview with landowners
2.	Law	Secondary	Surabaya C-Map and Surabaya Major Regulation No.57 2015.
3.	Physical	Primary and Secondary	Direct observation, obtaining data from land owners, conducting SWOT analysis.
4.	Financial	Secondary	Related comparison property

### 4. ANALYSIS AND DISCUSSION

#### 4.1 General Description of Research Object

The object of this research is a housing project that will be built on an area of 4ha and is located at Bulak Kali Tinjang Timur road, Kenjeran, part of East Surabaya. Where this research will be carried out using the Highest and Best Use (HBU) analysis.

## 4.2 Research Results

### 4.2.1 Legal Aspects

In zoning, based on the Surabaya C-Map, shows that the location of the land as a residential area.

Table 2. Surabaya Major Regulation No.52 2017

<b>Residential Home</b>		
Building Base Line (GSB)	Min.3m	
Building Base Coefficient (KDB)	Max.60%	
Building Floor Coefficient (KLB)	Max.1,8	
Green Base Coefficient (KDH)	Min.10%	
Building Height	Max.3th floor	
<b>Flats</b>		
Building Base Line (GSB)	Min.6m	
Building Base Coefficient (KDB)	Max.60%	Max.50%
Building Floor Coefficient (KLB)	Max.4,8	Max.12
Green Base Coefficient (KDH)	Min.10%	
Building Height	Max.8 <sup>th</sup> floor	Min.9 <sup>th</sup> floor
Number of Basement Floor	Max.3	

### 4.2.2 Physical Aspects

Table 3. Site Analysis Tables based on Physical Conditions of Research Objects

No.	Parameter Point						Information
		1	2	3	4	5	
1.	Site Location				x		The location is directly facing the Kenjeran beach and adjacent to several other tourism objects.
2.	Area & Site Shapes				x		The shape of the location extends backward by comparison 1:2.
3.	Site Limits & Contours			x			The location borders on vacant land and undeveloped people's homes. Having land contours tends to be flat.
4.	Track of the Sun			x			Overall sunlight location.
5.	Accessibility & Traffic Density			x			Across road to the location must pass through the houses of undeveloped residents, with a road width of 5m.
6.	Landscape & Vegetation					x	Has a relatively good quality view.
7.	Noise			x			The location is quite close to places of worship and fishing villages.
8.	Utilities					x	On road access, electricity, water and telephone lines have been passed.
9.	Public Facilities				x		Adjacent to hospitals, schools, entertainment venues, places of worship, and public transportation.
	Total	0	0	12	12	10	Good

Information:

- 0 – 9 = Very Bad
- 10 – 18 = Bad
- 19 – 27 = Medium
- 28 – 36 = Good
- 37 – 45 = Very Good

### 4.2.3 Site Planning

#### 1. Scenario 1

Site planning in scenario 1 is a landed houses with conventional concept. From site planning, the residential area obtained was 52%, and 22% of the area consisting of public space and facilities, 3% for clubhouse, 4% for shop house, 15% for Green Open Space, and 26% road infrastructure area. Then the scenario of land selling price is IDR 10.120.000/m<sup>2</sup>, the selling price of the building is IDR 10.000.000/m<sup>2</sup> and the selling price of the shop house is IDR 25.260.000/m<sup>2</sup>.

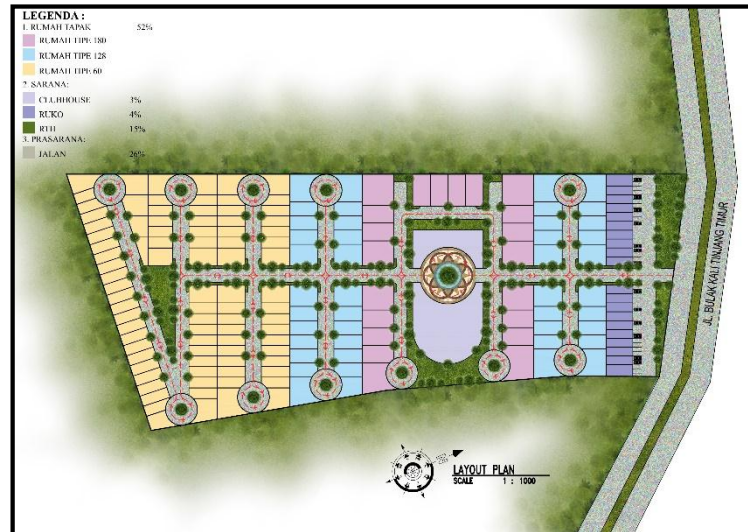


Figure 1. Site Planning of Landed House in Scenario 1

#### 2. Scenario 2

Site planning in scenario 2 is a landed houses with cluster concept. From site planning, the residential area obtained is 18%, and 47% of the area consisting of public space and facilities, 3% for clubhouse, 4% for shop house, 40% for Green Open Space, and 35% road infrastructure area. Then the scenario of land selling price is IDR 10.970.000/m<sup>2</sup>, the selling price of the building is IDR 10.000.000/m<sup>2</sup> and the selling price of the shop house is IDR 25.260.000/m<sup>2</sup>.



Figure 2. Site Planning of Landed House in Scenario 2

### 3. Scenario 3

Site planning in scenario 3 is a vertical houses with basement facilities. From site planning, 52% for apartment area (2<sup>nd</sup>-10<sup>th</sup> floor) and 35% for facility area like gymnasium, multifunction, supermarket, playgroup, health center, 6% for mosque, 4% for shop house (retail), 10% for basement, 15% for green open space (RTH), and infrastructure area like road and circulation is 13%. Then the scenario of selling price of residential units is IDR 20,720,000/m<sup>2</sup> and the selling price of shop houses is IDR 26,410,000/m<sup>2</sup>.



Figure 3. Site Planning of Vertical House in Scenario 3

### 4. Scenario 4

Site planning in scenario 4 is a vertical houses without basement. From site planning, 60% for apartment area (2<sup>nd</sup>-6<sup>th</sup> floor) and 20% for facility area like gymnasium, multifunction, supermarket, playgroup, health center, 6% for mosque, 4% for shop house (retail), 10% for Green Open Space (RTH), and 20% for infrastructure area like road and circulation. Then the scenario of selling price of residential units is IDR 19,710,000/m<sup>2</sup> and the selling price of shop houses is IDR 25,260,000/m<sup>2</sup>.



Figure 4. Site Planning of Vertical House in Scenario 4

#### 4.2.4 Financial Aspects

Financial aspects will use the capital budgeting method with several methods including the Net Present Value (NPV), Internal Rate of Return (IRR) of cash flow. From each cash flow in several alternatives which are landed houses and vertical houses on the Bulak Kali Tinjang Timur road use the most likely sales conditions.

#### 1. Scenario 1

Table 4. Type and Selling Price of Landed House in Scenario 1

<b>Landed House</b>				
Type	Land Area	Building Area	Number of Units	Selling Price
<b>Type 180</b>				
Standard	180	200	13	3,821,600,000
Hook	252	220	4	4,750,240,000
Plus 1	315	220	3	5,387,800,000
Plus 2	248	220	1	4,709,760,000
<b>Type 128</b>				
Standard	128	138	28	2,675,360,000
Hook	192	200	8	3,943,040,000
Plus 1	212	200	7	4,145,440,000
Plus 2	136	138	1	2,756,320,000
<b>Type 60</b>				
Standard	96	128	68	2,251,520,000
Hook	160	180	7	3,419,200,000
Plus 1	150	180	11	3,318,000,000
Plus 2	220	180	1	4,026,400,000
<b>Shophouse</b>				
Standard	75	150	20	2,944,500,000

Table 5. Financial Analysis Table Scenario 1

Total Project Costs	Rp.287,642,618,700
Total Acceptance	Rp.547,188,427,133
Annual IRR	53%
NPV	Rp.286,138,788,971
Payback Period	24,36 months
Discounted Payback Period	24,46 months

#### 2. Scenario 2

Table 6. Type and Selling Price of Landed House in Scenario 2

<b>Landed House</b>					
Type	Land Area	Semi Gross Area	Building Area	Number of Units	Selling Price
Type 96	96	125	192	13	3,289,056,000
Type 60	60	78	120	46	2,055,660,000
Type 40	40	52	80	75	1,370,440,000
<b>Shophouse</b>					
Standard	75		150	20	2,944,500,000

Table 7. Financial Analysis Table Scenario 2

Total Project Costs	Rp.226,530,325,950
Total Acceptance	Rp.493,803,468,030
Annual IRR	51%
NPV	Rp.294,246,667,724
Payback Period	25 months
Discounted Payback Period	27 months



### 3. Scenario 3

Table 8. Type and Selling Price of Vertical House in Scenario 3

<b>Vertical House</b>				
Type	Area	Semi Gross Area	Number of Units	Selling Price
Unit 1 (3 bedroom)	112	146	108	3,016,832,000
Unit 2 (2 bedroom)	64	83	432	1,723,904,000
Unit 3 (1 bedroom)	32	42	180	861,952,000
<b>Shophouse</b>				
Type	Area			Selling Price
Shophouse 1	160		6	4,225,600,000
Shophouse 2	128		6	3,380,480,000
Shophouse 3	80		10	2,112,800,000
Shophouse 4	64		43	1,690,240,000

Table 9. Financial Analysis Table Scenario 3

Total Project Costs	Rp.714,550,609,136
Total Acceptance	Rp.1,663,940,739,248
Annual IRR	25%
NPV	Rp.34,757,936,610
Payback Period	60,46 months
Discounted Payback Period	60,8 months

### 4. Scenario 4

Table 10. Type and Selling Price of Vertical House in Scenario 4

<b>Vertical House</b>				
Type	Area	Semi Gross Area	Number of Units	Selling Price
Unit 1 (3 bedroom)	112	146	70	2,869,776,000
Unit 2 (2 bedroom)	64	83	410	1,639,872,000
Unit 3 (1 bedroom)	32	42	270	819,936,000
<b>Shophouse</b>				
Type	Area			Selling Price
Shophouse 1	32		50	808,320,000
Shophouse 2	40		19	1,010,400,000

Table 11. Financial Analysis Table Scenario 4

Total Project Costs	Rp.606,101,725,927
Total Acceptance	Rp.1,783,022,839,723
Annual IRR	61%
NPV	Rp.329,871,606,870
Payback Period	24,63 months
Discounted Payback Period	24,81 months

#### 4.2.5. Maximum Productivity

Land values of several alternatives will be compared with the value of vacant land to find which alternative has the highest increase in land value.

Table 12. Maximum Productivity Analysis Table

Uraian	<b>Alternative</b>			
	1	2	3	4
Property Value	287,642,618,700	226,530,325,950	714,550,609,136	606,101,725,927
Building Value	174,642,618,700	113,530,325,950	601,550,609,136	493,101,725,927
Land Value)	100,000,000,000	100,000,000,000	100,000,000,000	100,000,000,000

### 4.3 Discussions

Table 5. Highest and Best Use Analysis Table

Criteria	Scenario			
	1	2	3	4
<b>Legal Aspects</b>	SHM	SHM	SHMSRS	SHMSRS
<b>Physical Aspects</b>				
Accessibility	Easy	Easy	Quite Easy	Easy

Concept	Conventional concept	Cluster Concept	With basement concept	Without basement concept
Facilities	Shop house	Shop house	Shop house	Shop house
	Clubhouse	Clubhouse	Gymnasium	Gymnasium
			Multifunction	Multifunction
			Supermarket	Supermarket
			Playgroup	Playgroup
			Health Center	Health Center
			Musholla	Musholla
Landed or Vertical House	Landed House	Landed House	Vertical House	Vertical House
	52%	18%	52%	60%
Facilities				
Facilities	3%	3%	6%	6%
Shophouse	4%	4%	4%	4%
Green Area	15%	40%	15%	10%
Basement			10%	
Infrastructure				
roads	26%	35%	13%	20%
Floor levels	2 floors	2 floors	10 floors + 1 basement	6 floors
<b>Financial Aspects</b>				
Annual IRR	53%	51%	25%	61%
NPV	286,138,788,971	294,246,667,724	34,757,936,610	329,871,606,870
Payback Period	24,36 months	25 months	60,46 months	24,63 months
Discounted Payback Period	24,46 months	27 months	60,80 months	24,81 months
<b>Maximum Productivity</b>				v

After the three aspects of Highest and Best Use (HBU) fulfilled in Table 5, legal aspects, physical aspects, and financial aspects. Therefore the maximum productivity in HBU aspect which produce highest land value is the 4<sup>th</sup> scenario which are a vertical houses without basement facility. This is because from legal aspect, RTRW has already appropriate to its allotment which is for residential area and fulfilled the regulation of Surabaya's number 52 on 2017, with SHMSRS land owner certificates. From physic aspect, site planning in the 4<sup>th</sup> scenario has considered the size and shape of the property that determines the concept, road hierarchy, road pattern, and plot arrangement. And from financial aspect, what determines the investment decision is a scenario with highest Net Present Value (NPV) and it is the 4<sup>th</sup> scenario:

## 5. Conclusions and Suggestions

### 5.1 Conclusion

The 4<sup>th</sup> scenario is the scenario with the highest and best use, in the form of vertical house with facilities without basements. The composition of vertical house is about 60% (2<sup>nd</sup>-6<sup>th</sup> floor), the area of facilities is 20% in the form of gymnasium, multifunction, supermarket,

playgroup, health center, mosque 6%, shop houses (shop) 4%, Green Open Space (RTH) 10%, and the infrastructure area in the form of road 20%. This scenario has an annual IRR of 61%, NPV IDR 329,871,606,870, with payback period of 24,63 months and discounted payback period of 24,81 months.

## 5.2 Suggestions

- a. It is expected that in the next study, not only think about planning the effectiveness of the site plan, but also consider every risk in the planning and development of a project.
- b. It is expected that in the next study, always use the test market tastes in each planning scenario before making a sale or selling a project.

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