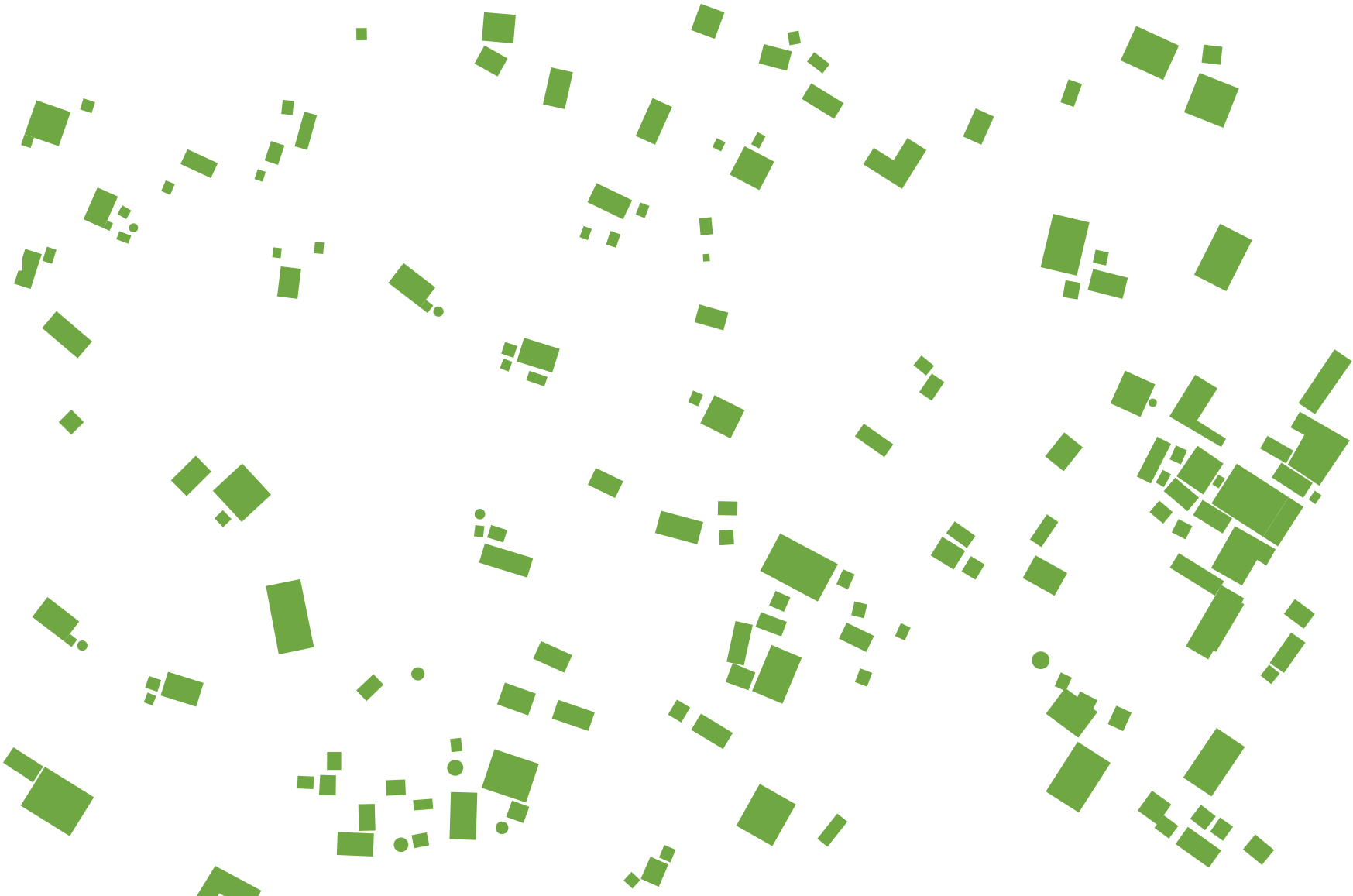
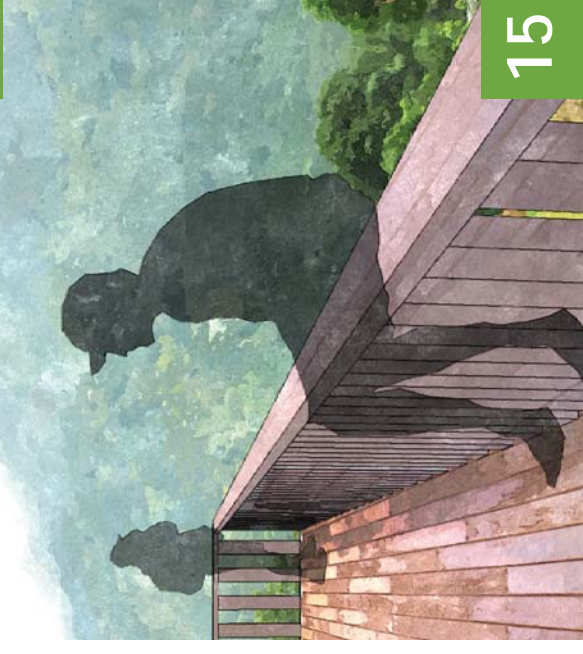
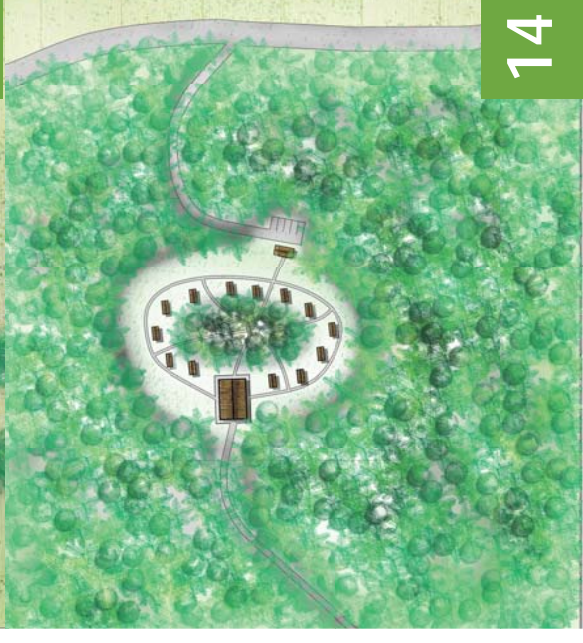
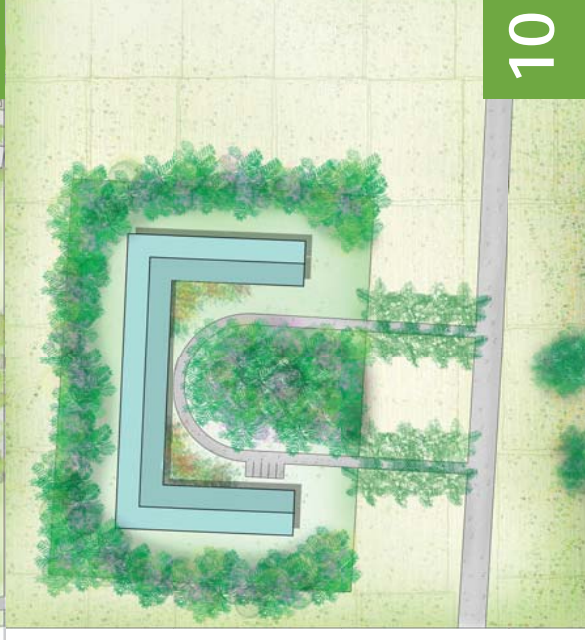
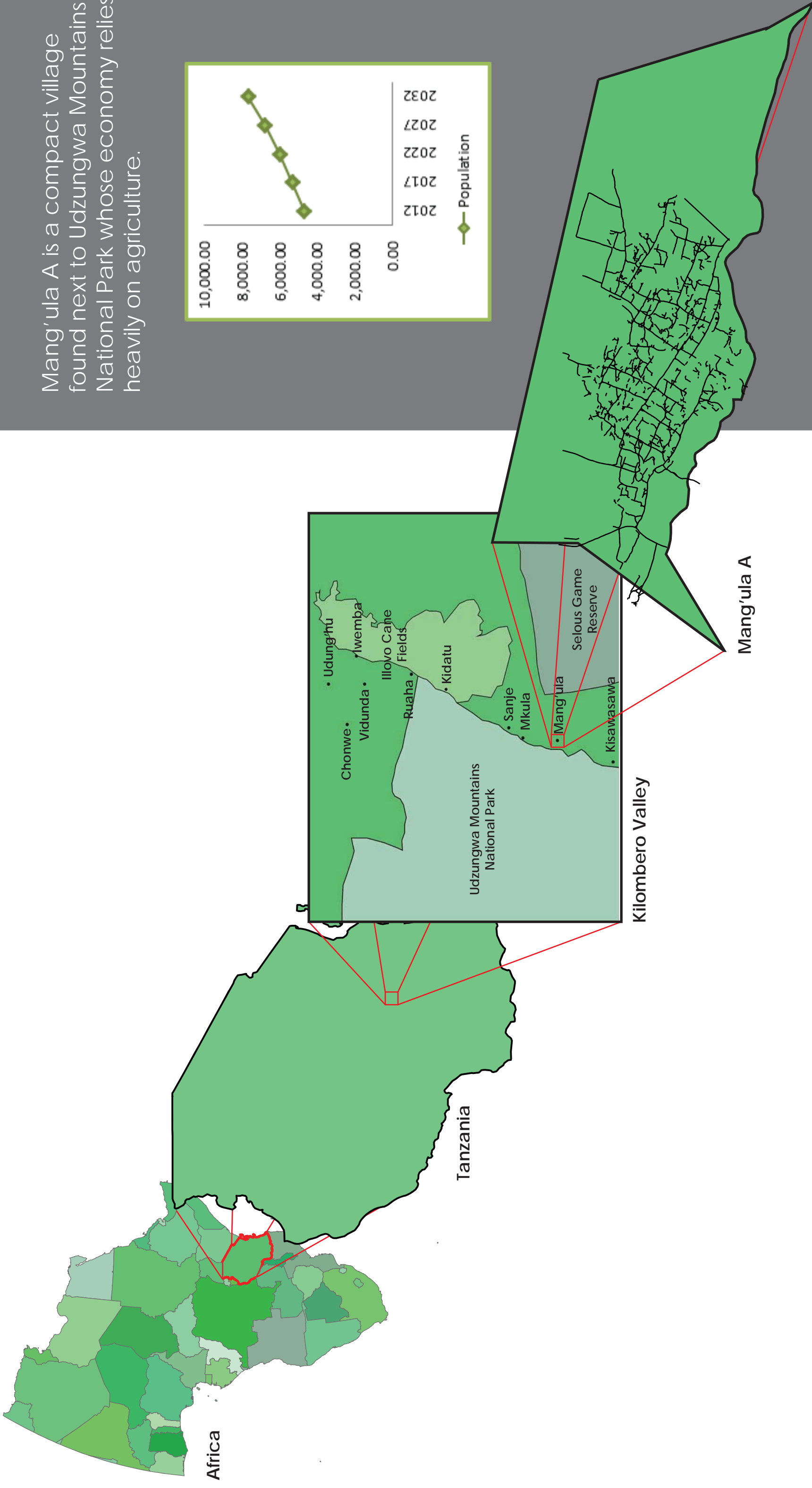


Tom Lauro & Ryan Hitchcock
The Pennsylvania State University
Department of Landscape Architecture
June 2013

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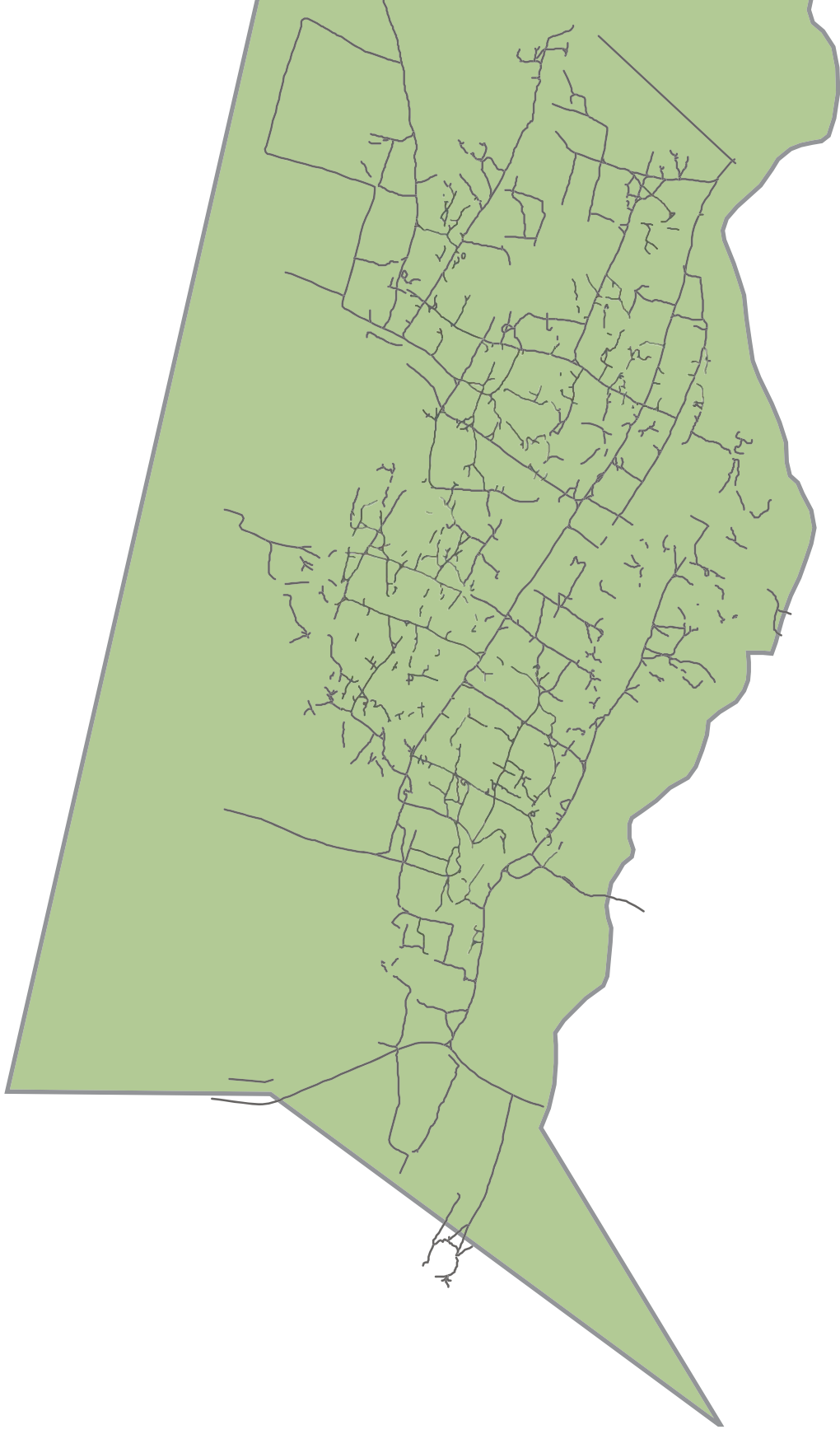


Background



Mang'ula A is a compact village found next to Udzungwa Mountains National Park whose economy relies heavily on agriculture.

Project Overview



Farming, a growing population and potential tourism in Mang'ula
A demand increases in community and economic development.

These developments include:

- Efficient residential plots
- More infrastructure
- Additional community facilities
- More accommodations for tourists

With availability of land limited, Mang'ula A can only support a certain population. The human carrying capacity of Mang'ula A can sustainably increase by improving land management practices and the development of other industries like tourism.



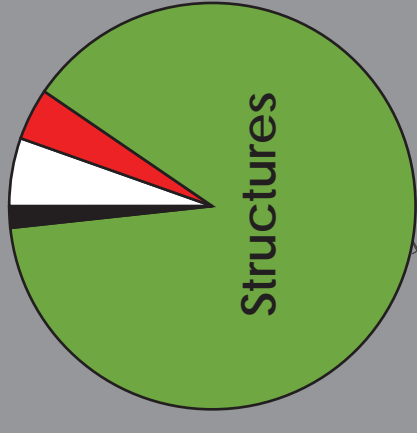
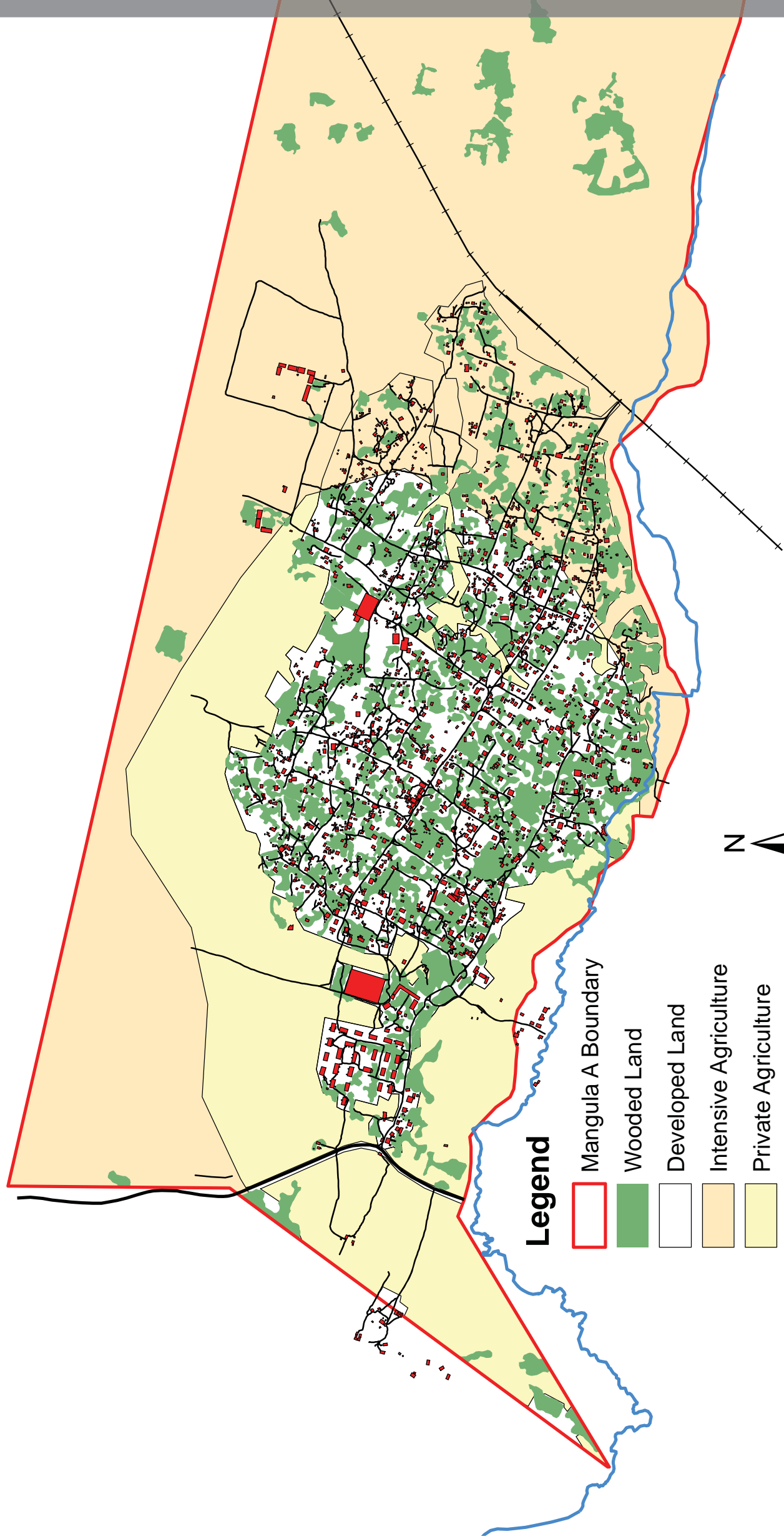


scenario

Residential Planning

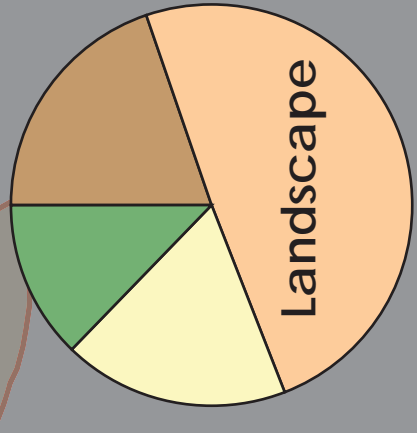
1

Current Land Use



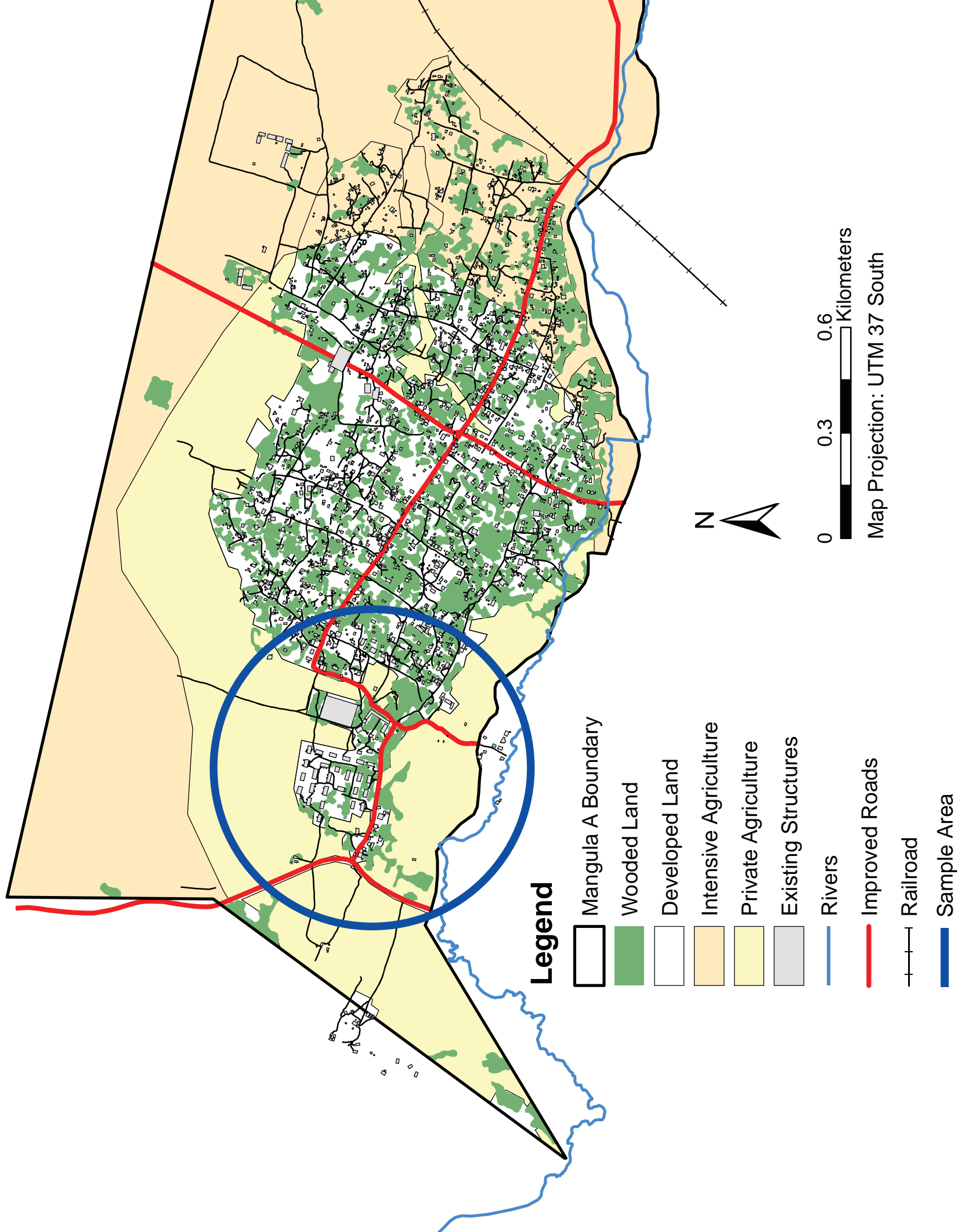
5.4% Commercial
4.1% Community
1.7% Workshops
88.8% Residential

Current Distribution	
Structures	
Building Type	Total Buildings
Commercial	54
Community	41
Residential	885
Workshops	17
Total	997
Landscape	
Land Use	Total Land (ha)
Developed	103.3
Intensive Agriculture	258.2
Private Agriculture	95.2
Wooded	66.7
Total	523.4



12.7% Wooded
19.7% Developed
18.2% Private Ag.
49.4% Intensive Ag.

Road Improvement Proposal



Road Repair & Construction

1. Current Condition

Ponding in pot holes

2. Infill & Preparation

First fill layer with rough crowning

3. Structural Support

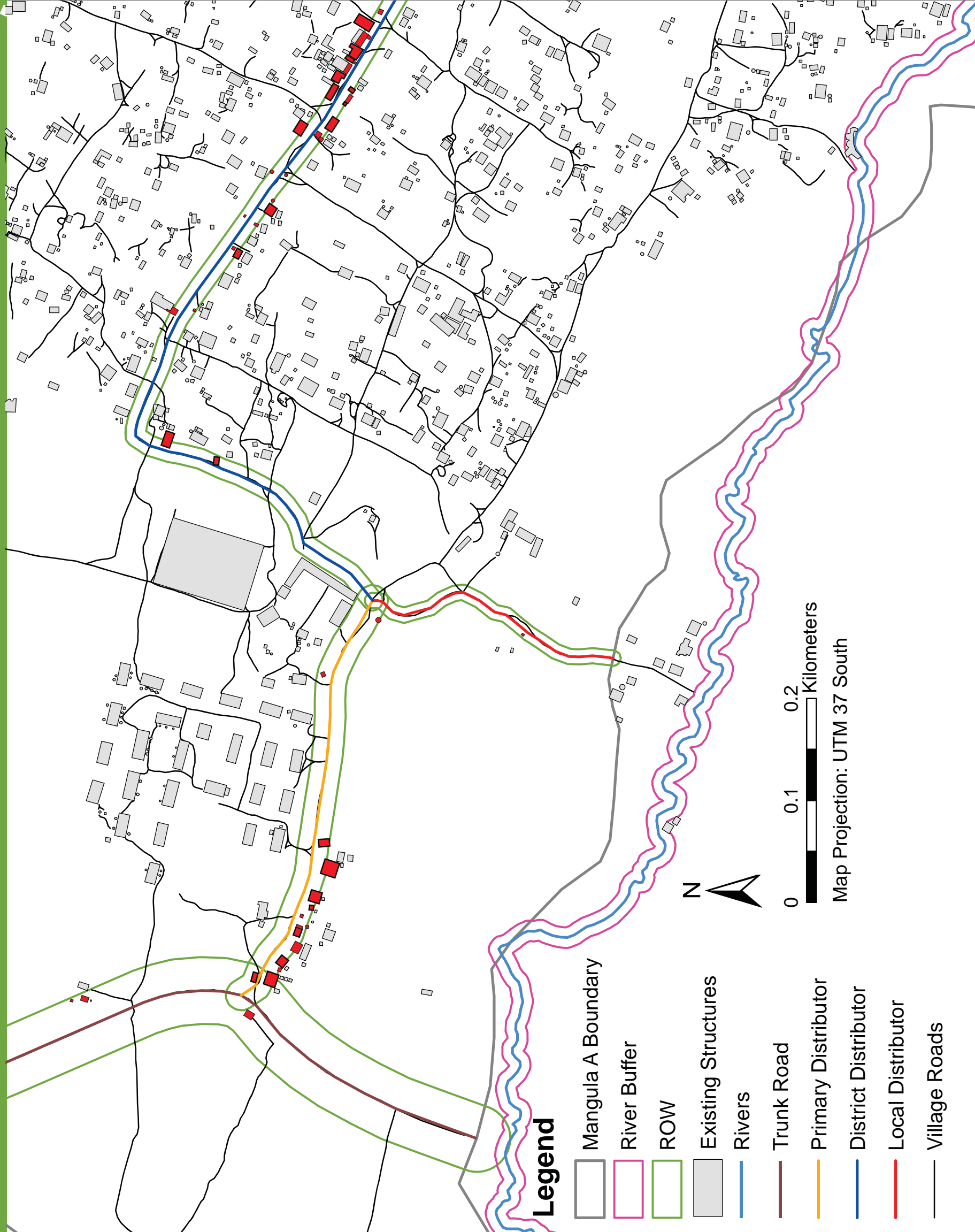
Geotextile fabric
Second fill layer

4. Finished Surface

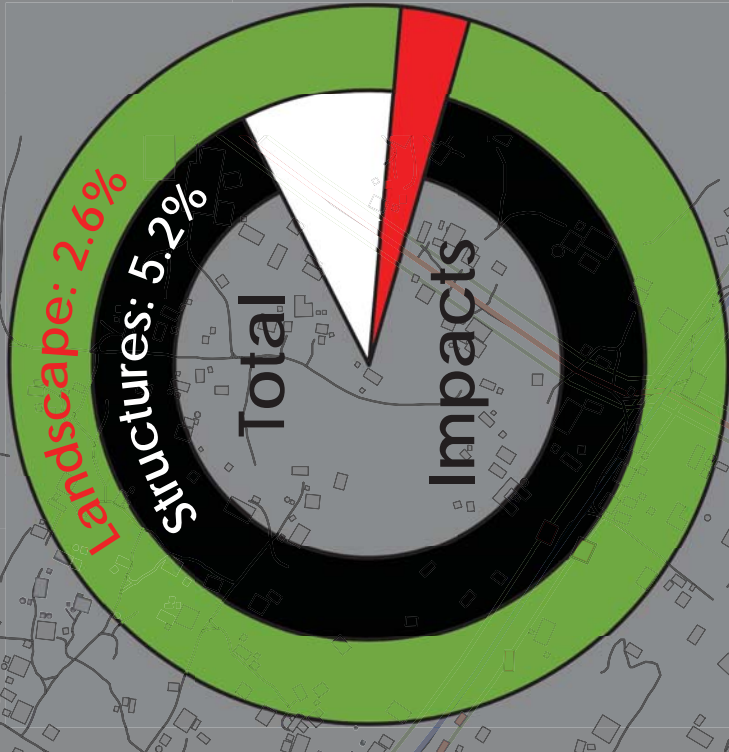
Final layer of aggregate

Drainage

Road Improvement Sample



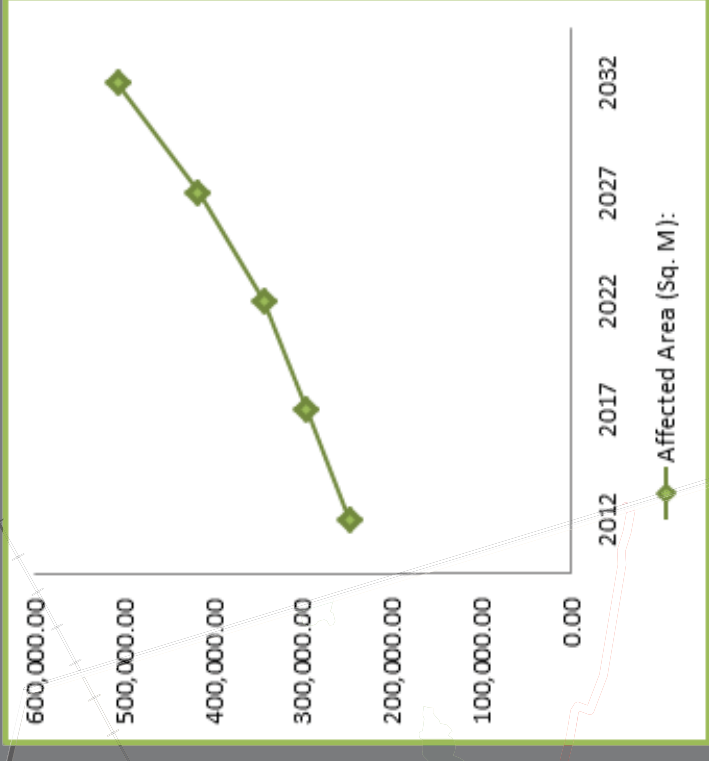
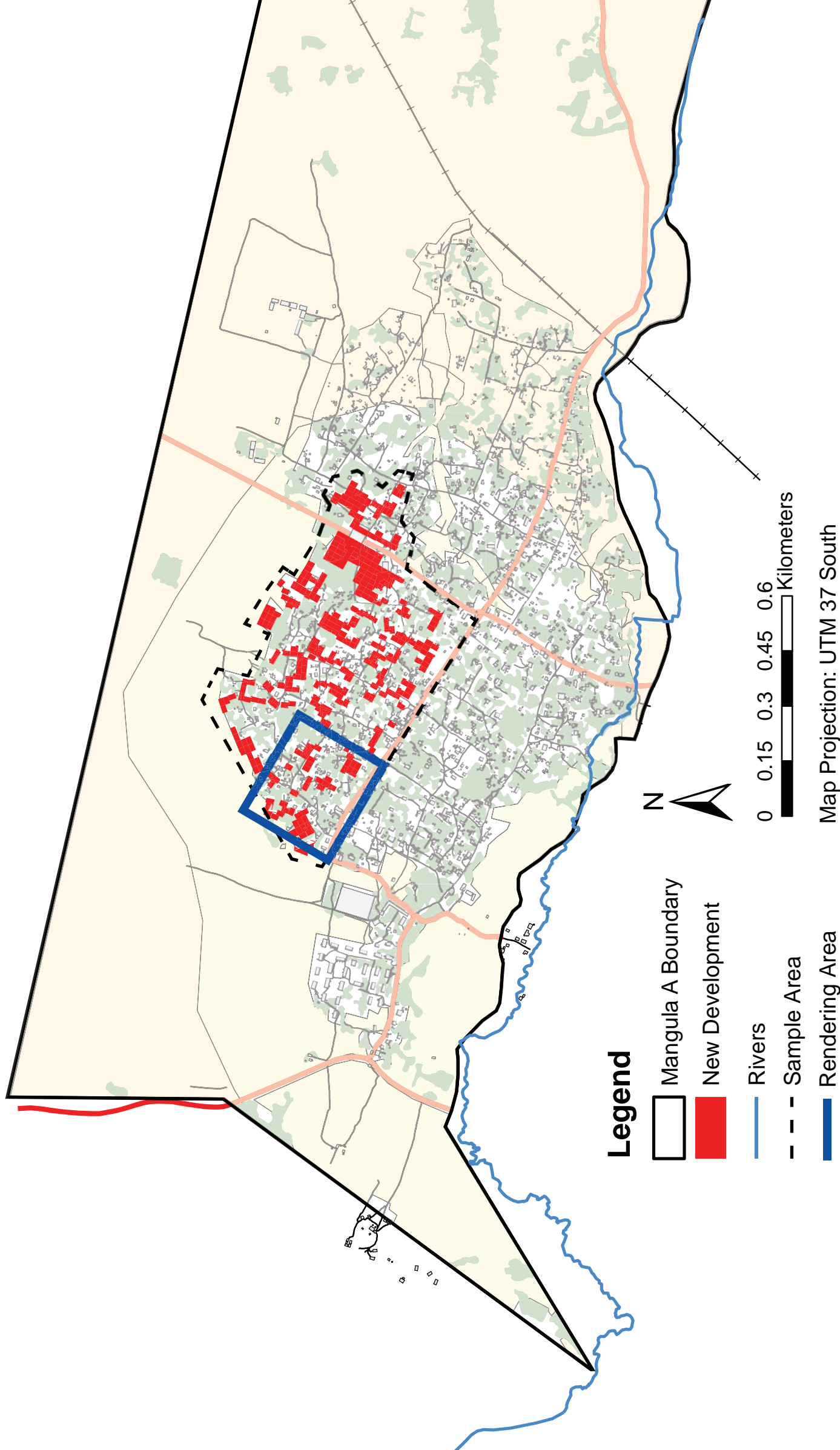
Road Standards		
Type	Right of Way (ROW) (m)	Carriage Way (CW)
Trunk Road	60-70	12-15
Primary Distributor	30-40	7-10
District Distributor	20-30	7-10
Local Distributor	15-20	5-7.5



Distribution of Impacts									
Building Type	Structures			Landscape			Total	District	Local
	Total Buildings	Trunk	Primary	Total Land (ha)	Trunk	Primary			
Commercial	54	1	3	103.3	0	0.7	18	1	1
Community	41	1	0	258.2	0	0	6	0	0
Residential	885	2	2	95.2	3.3	0.1	33	0.2	0.5
Workshops	17	1	0	66.7	0.3	0.3	1	1.3	0.5
Total	997	5	5	523.4	3.6	1.1	58	6.5	2.5

Residential Development

The required houses for the projected population take up a lot of area (507,612.36 Sq. M in 2032). Appropriate placement prevents overcrowding, agricultural displacement and deforestation.



Scenario 1: Illustrative Plan



High Density Residential Standards					
Tanzania Standards					
Total Site Area	Plot Size	Setbacks			Plot Coverage
		Front	Side	Rear	
900 sq m	400-800 sq m	3m	1.5m	2m	40%
Altered Standards					
Total Site Area	Plot Size	Setbacks			Plot Coverage
		Front	Side	Rear	
900 sq m	280 sq m	3m	1.5m	1.5m	31%

Distribution of Impacts			
Structures			
Building Type	Total Buildings	New Buildings	
Commercial	54	54	3
Community	41	41	0
Residential	885	885	51
Workshops	17	17	0
Total	997	997	54
Landscape			
Land Use	Total (ha)	Impacted (ha)	
Developed	103.3	103.3	1.5
Intensive Agriculture	258.2	258.2	0
Private Agriculture	95.2	95.2	0.1
Wooded	66.7	66.7	0.3
Total	523.4	523.4	1.9

Scenario 1: Perspective:





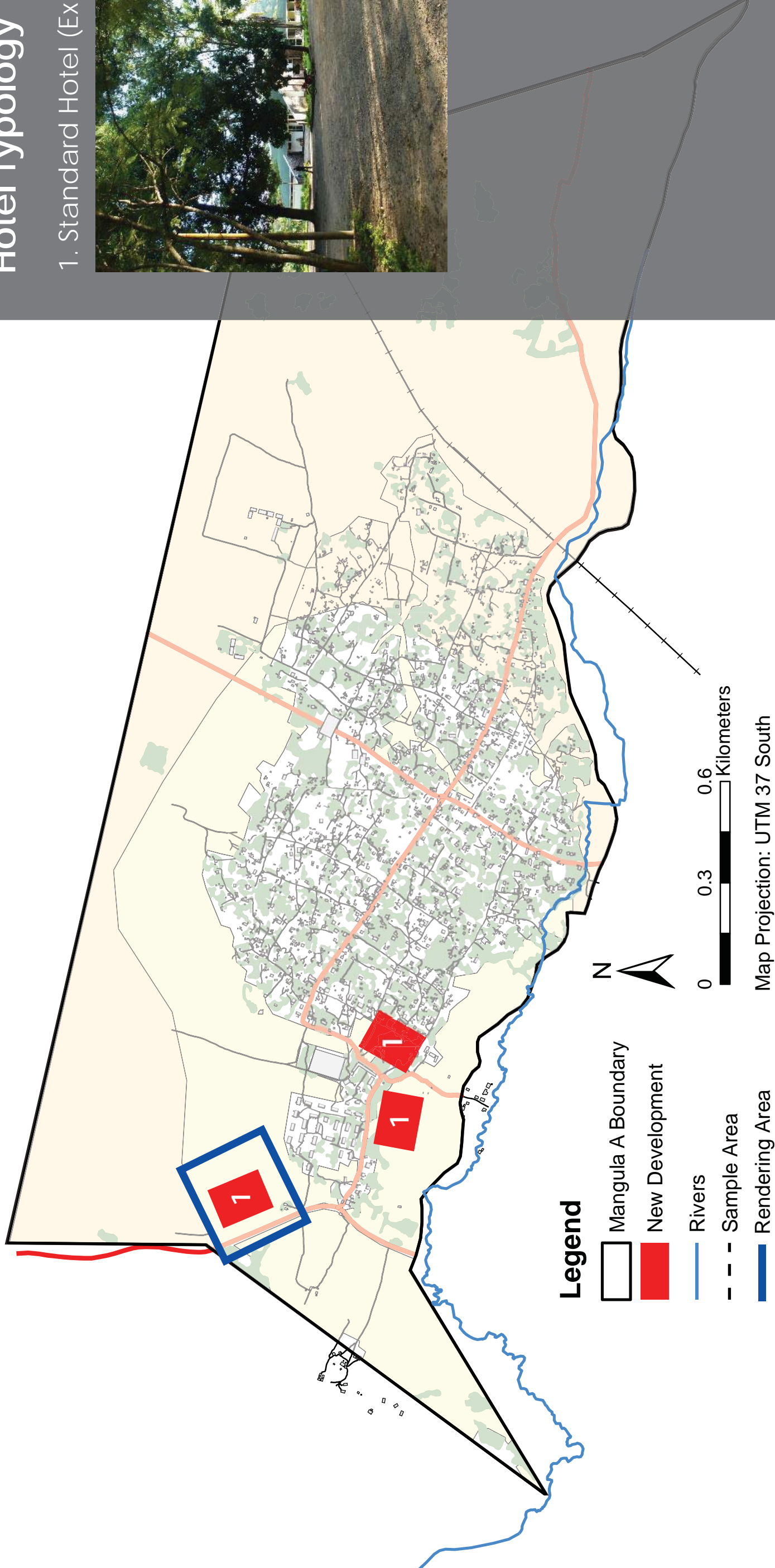
scenario

2

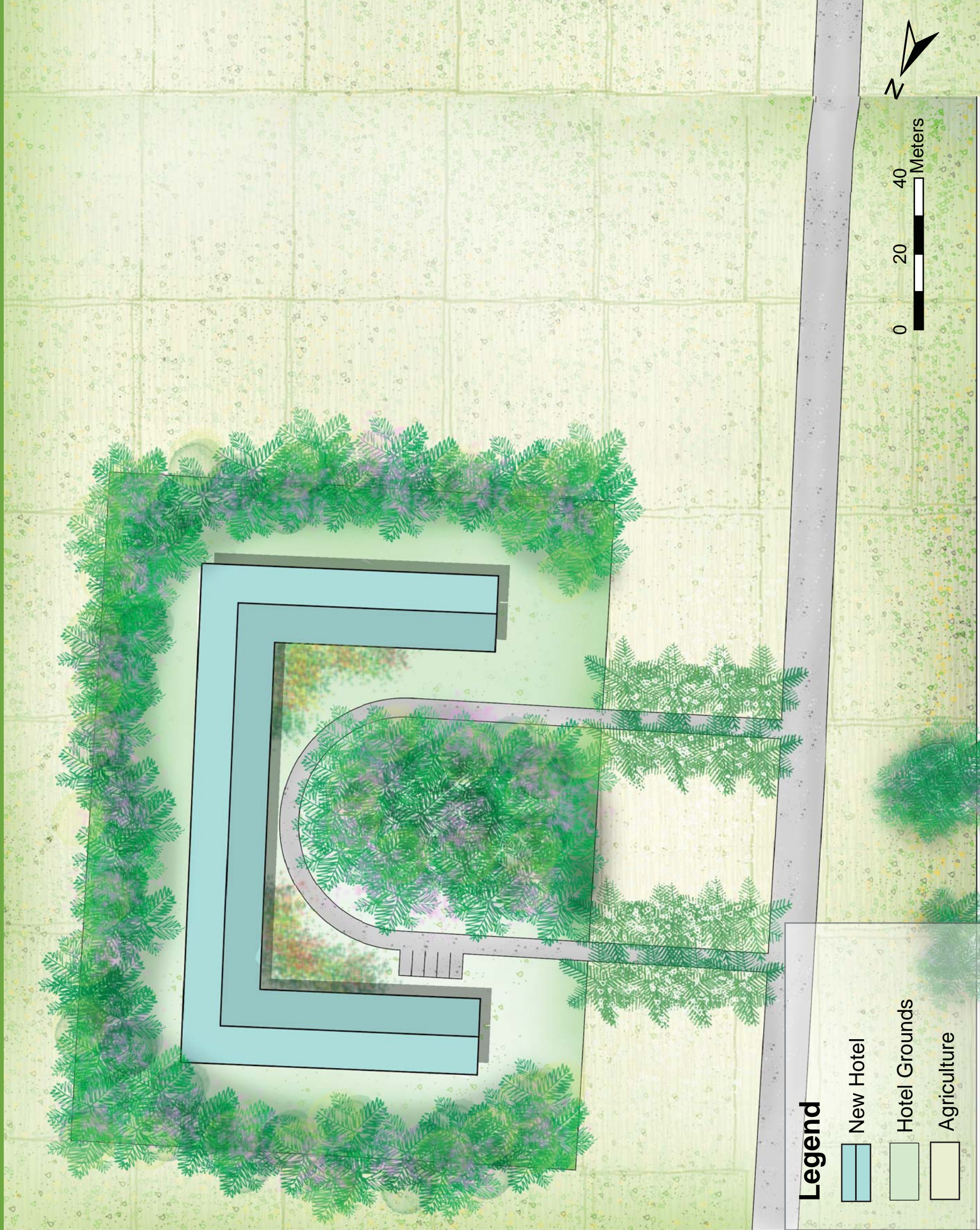
Tourism Planning

Hotel Typology

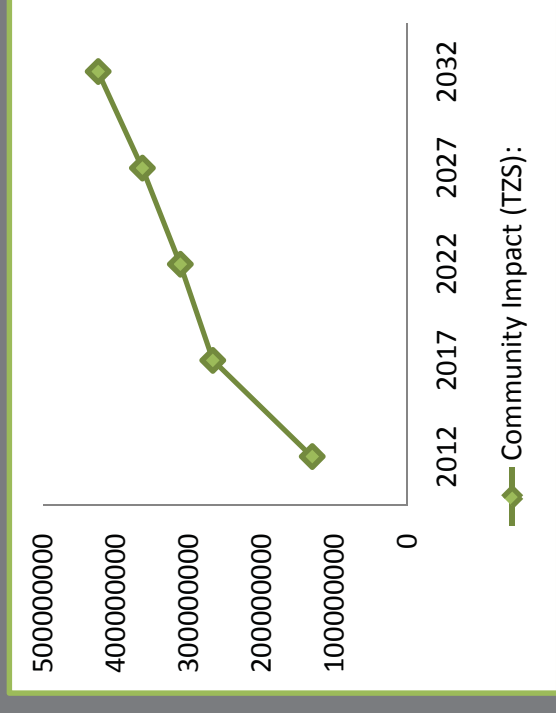
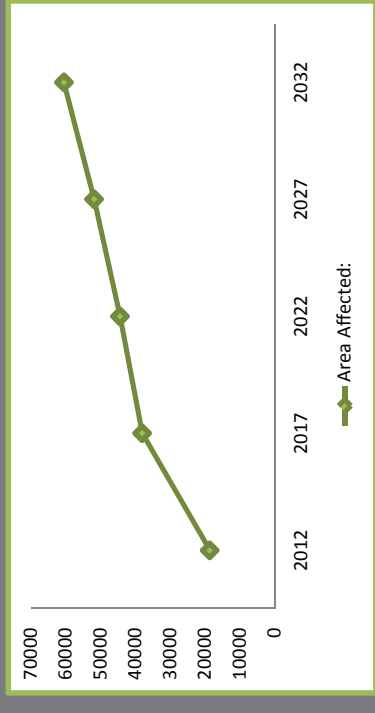
1. Standard Hotel (Ex: Twiga)



Scenario 2: Illustrative Plan



Increasing the number of hotels to accommodate the new tourists would strengthen the economy by collecting more money from tourists.



Scenario 2: Perspective:





scenario

Ecotourism Planning

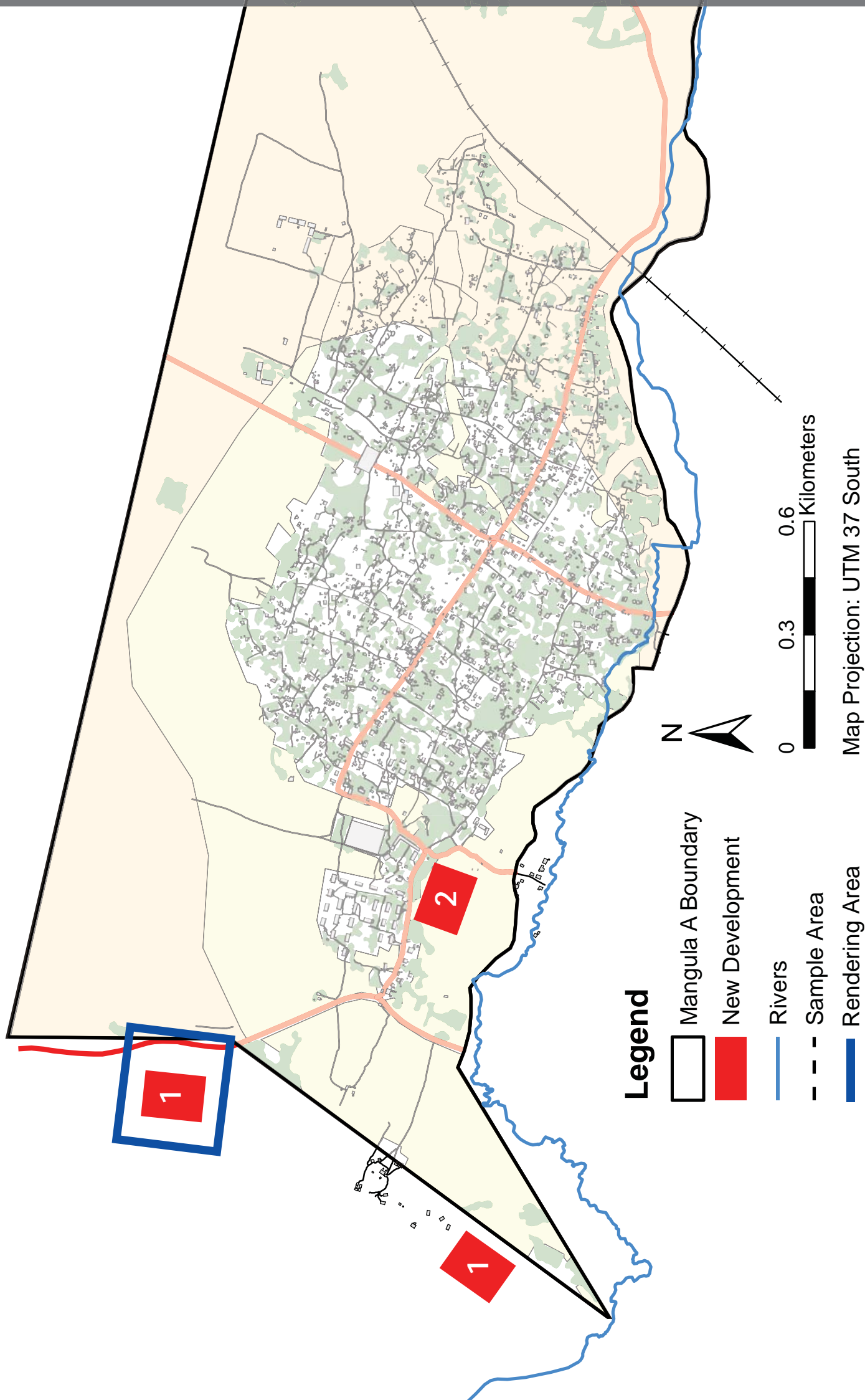
3

Ecotourism Lodging Typology

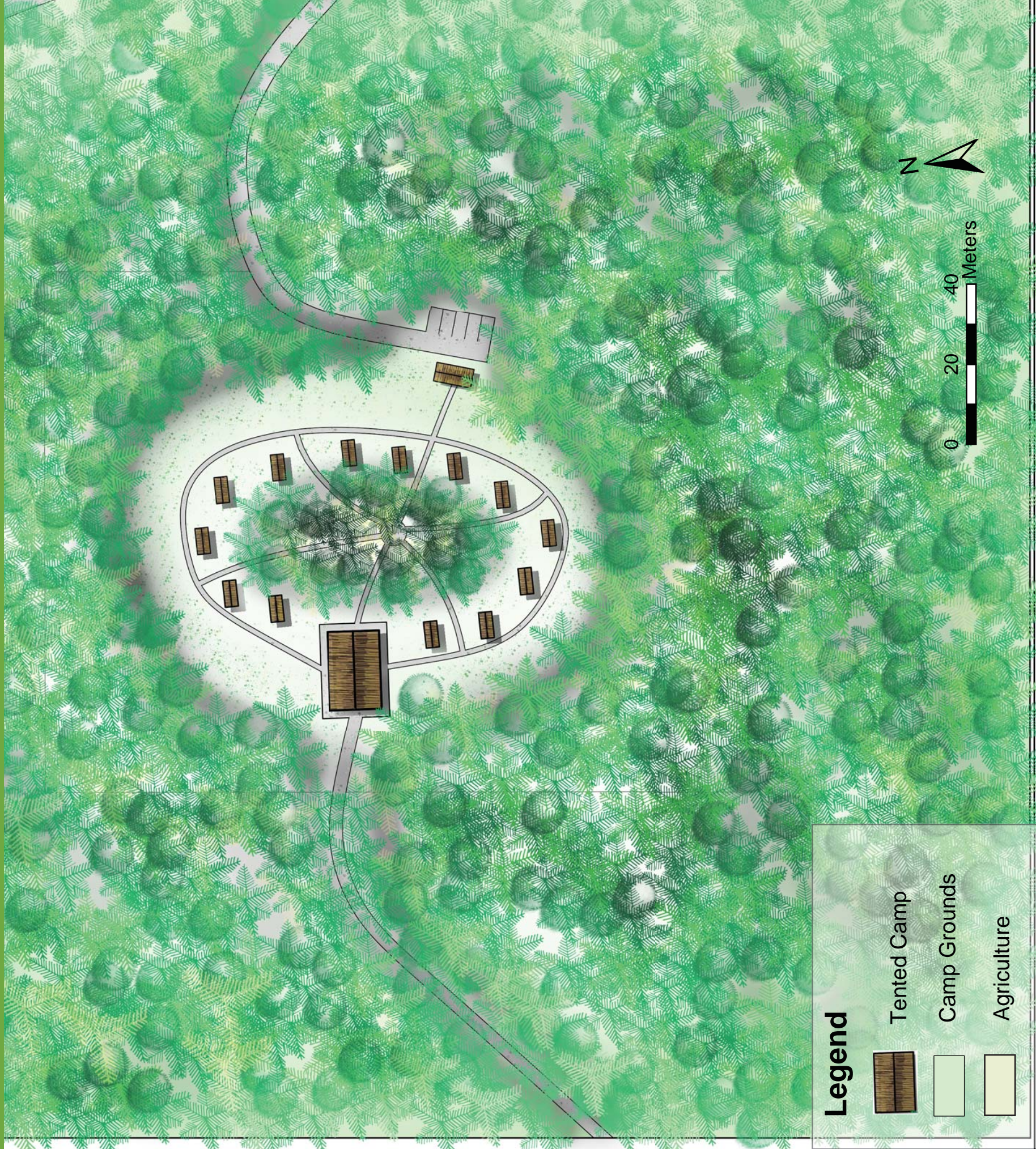
1. Tented Camp (Ex: Hondo Hondo)



2. Lodge (Ex: Mountain View Hotel)



Scenario 3: Illustrative Plan

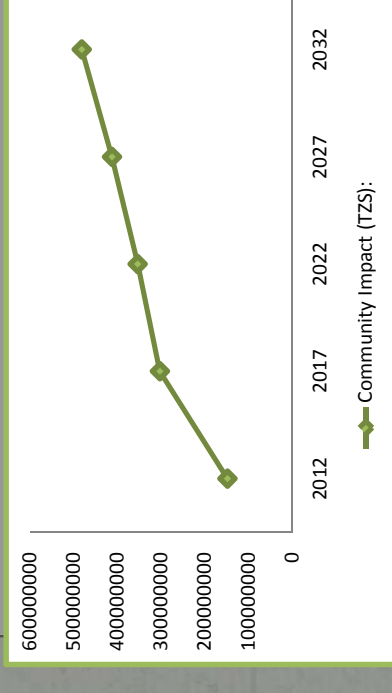
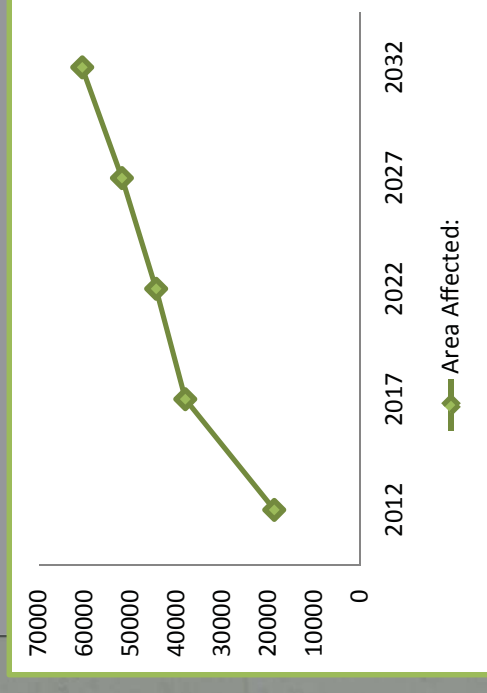


Ecotourism is an industry that benefits conservation and a location's surroundings by constructing eco-friendly facilities such as tented camps while including local residents and culture.

Direct benefits to the community include:

- Employing more residents than traditional hotels
- Increasing revenue exchange
- Promoting culture

This will diversify the local economy sustainably, thus maintaining the village's increased carrying capacity.

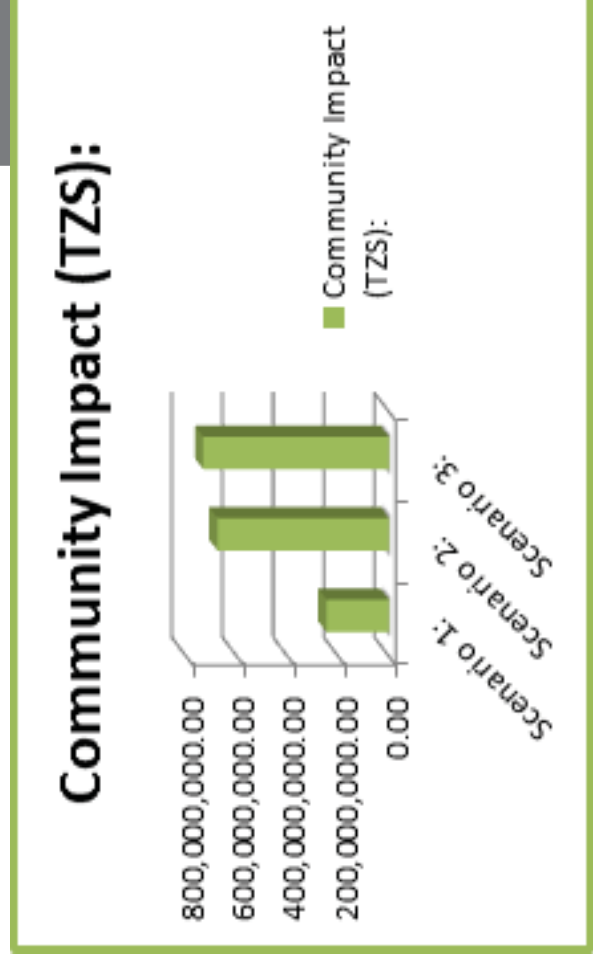
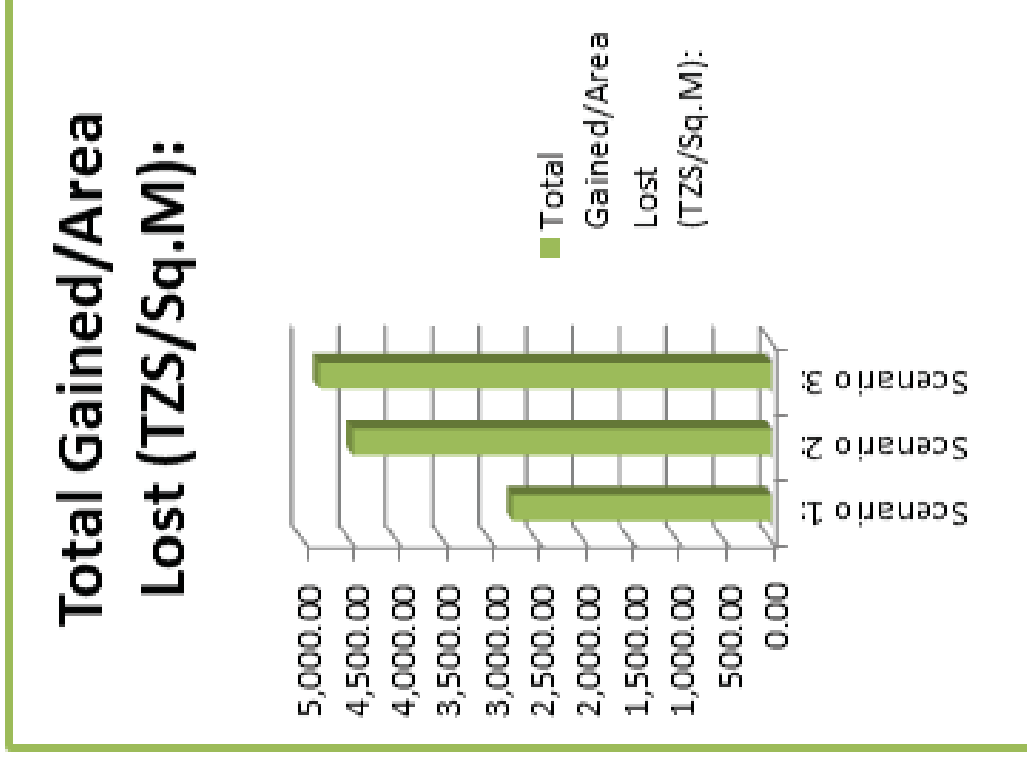


Scenario 3: Perspective:



Conclusions

Implications:	Economic:	Social:
Area Impacted:		
Carrying Capacity:		
Community Impact:		
Job Creation:		
Conservation:		
Community Involvement:		
Key:		
Scenario 1:		
Scenario 2:		
Scenario 3:		
Positive:		
Negative:		
Little to None:		



Though, Scenarios 2 and 3 have similar socioeconomic results, we think that 3 is the best option.

Scenario 3 leads to:

- Higher employment rates
- More revenue in the local economy
- Increased conservation
- More community involvement
- Sustainable community development

In order for these benefits to occur, stakeholders (e.g. Village Council members, villagers, hotel developers, TANAPA staff) must work we each other towards a common goal. Doing so will bring more benefits Mang'ula A's residents and environment.

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Under the Instruction of:

Larry Gorenflo, Ph.D.
Associate Professor of Landscape Architecture
Pennsylvania State University, University Park PA

Brian Orland
Professor of Landscape Architecture
Pennsylvania State University, University Park PA

Produced for:

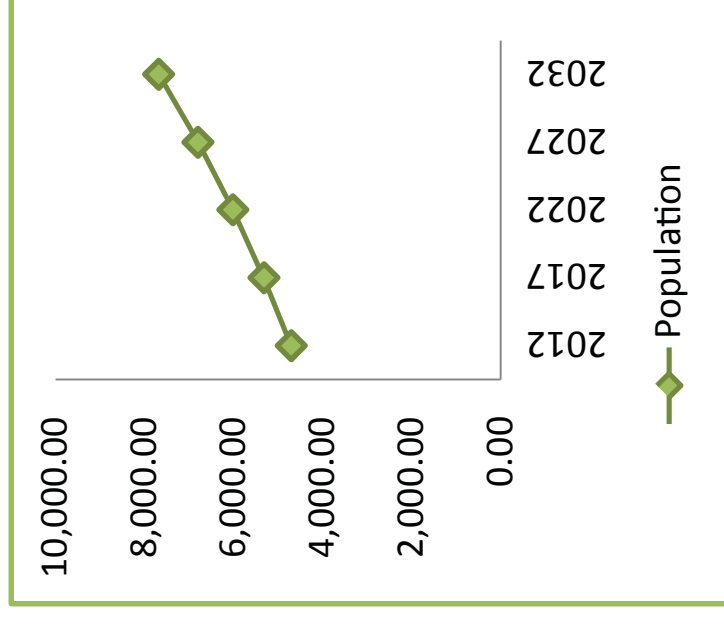
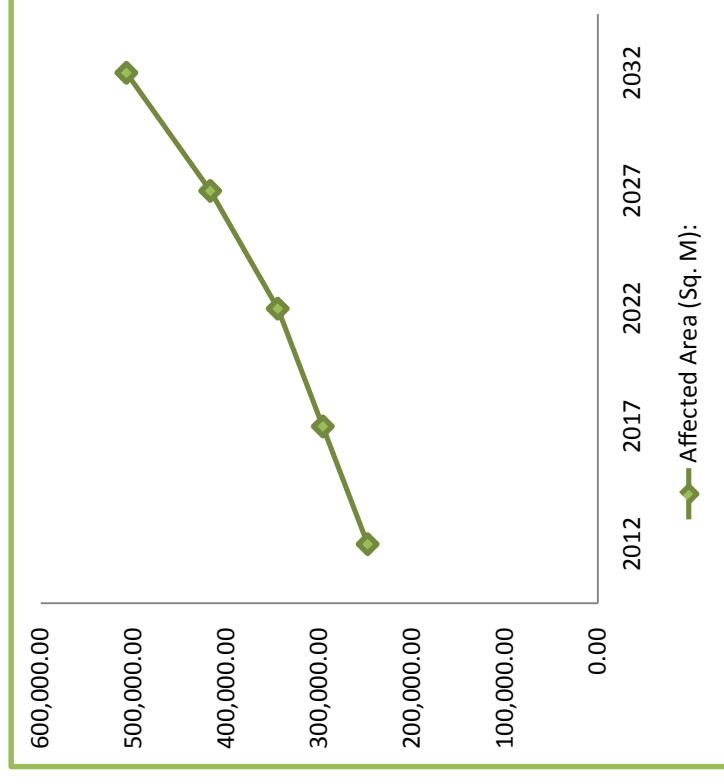
Village of Mang'ula A Planning Commission
Kilombero District, Tanzania

Appendix: Houses

Houses:					
Year:	Population:	# of Houses:	New Houses:	Affected Area (Sq. M):	Cost (TZS):
2012	4,708.00	885.00	0	247,800.00	0.00
2017	5,320.04	1,330.01	445.01	296,200.00	5,758,429,400.00
2022	6,011.65	1,502.91	172.9013	344,612.36	2,237,342,822.00
2027	6,793.16	1,698.29	195.378469	417,412.36	2,528,197,388.86
2032	7,676.27	1,919.07	220.77767	507,612.36	2,856,863,049.41

Key/Equations:	
Cost/House (TZS):	12,940,000.00
Area/House (Sq. M)	280.00
Annual Growth Rate*5 Years:	13.00%
Projected Population: (Population*Rate)+Population	
Occupants/House:	4
# Of Houses: Population/Occupants	
New Houses: (Projected #)-(Previous #)	
Affected Area (Sq. M): # New Houses*(Area/House)	

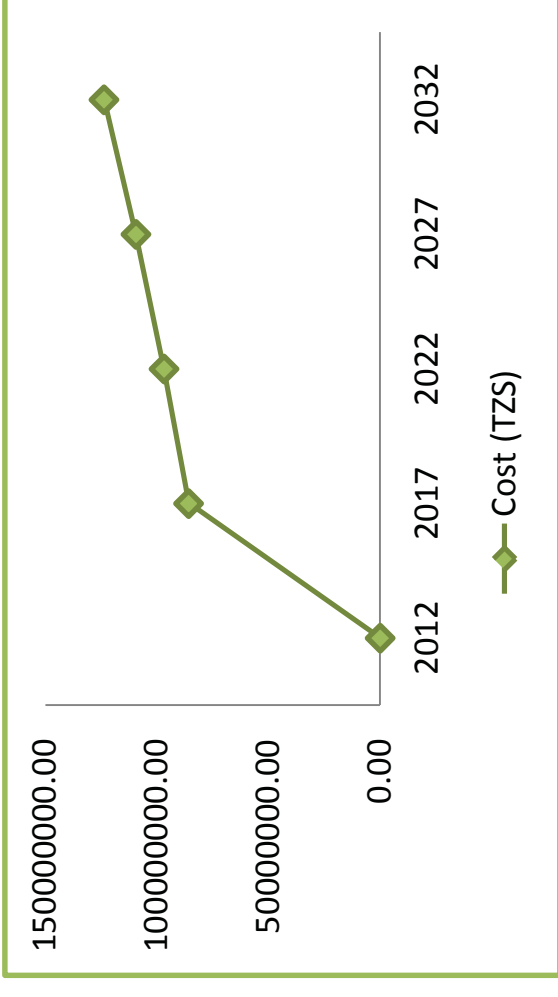
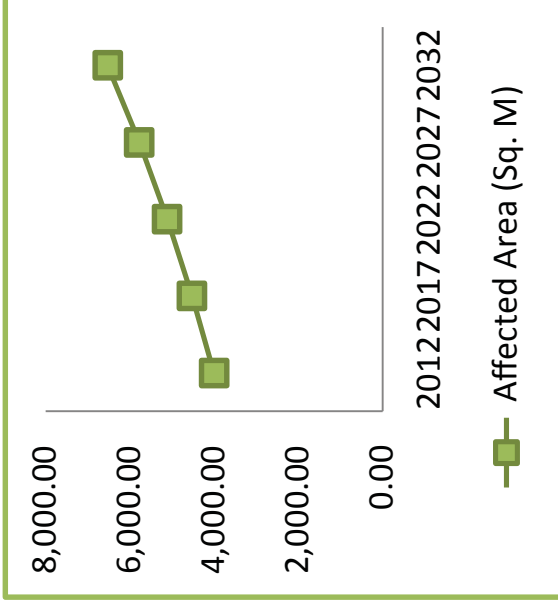
Past Student Project Data:		
Year:	Population:	# of Houses:
2012	4,708.00	885.00
2017	5,918.00	1,127.00
2022	7,432.00	1,419.00
2027	9,365.00	1,419.00
2032	11,730.00	2,234.00



Appendix: Schools

Schools:	Year:	Population:	Primary School Pop.	Schools Needed:	Affected Area (Sq. M)	Cost (TZS)
	2012	4,708.00	900.00	1.00	4,000.00	0.00
	2017	5,320.04	1,017.19	1.13	4,520.85	85,680,654.63
	2022	6,011.65	1,149.43	1.28	5,108.57	96,819,217.04
	2027	6,793.12	1,298.84	1.44	5,772.64	109,404,934.15
	2032	7,676.27	1,467.70	1.63	6,523.12	123,628,363.45

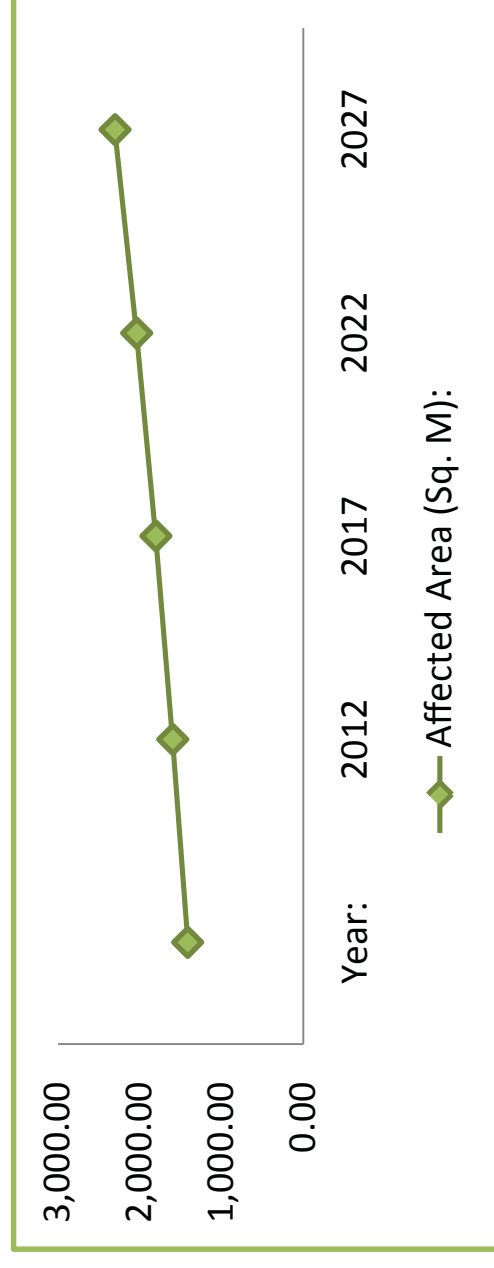
Key/Equations:	
School Size/Population:	19.12%
Children/School:	900
Class Size (Children):	107.50
Area/School (Sq. M):	4,000.00
Cost/Classroom (TZS):	9,055,000.00
Schools Needed:	Prim. School. Pop/(Children/School)
Area Affected (Sq. M):	Schools Needed*(Area/School)
Cost (TZS):	(Prim. School. Pop/Class Size)*(Cost/ Classroom)



Appendix: Churches

Churches:					
Year:	Population:	Affected Area (Sq. M):	Number of Churches:	Cost (TZS):	
2012	4,708.00	1,412.40	1.41	141,240,000.00	
2017	5,320.04	1,596.01	1.60	159,601,200.00	
2022	6,011.65	1,803.50	1.80	180,349,500.00	
2027	6,793.12	2,037.93	2.04	203,793,480.00	
2032	7,676.27	2,302.88	2.30	230,288,100.00	

Key/Equations:	
Space/Person (Sq. M):	0
Plot Size (Sq. M):	1000
Price/Sq. M (TZS):	100,000
Affected Area (Sq. M):	Population*(Space/Person)
Number of Churches:	Affected Area/Plot Size
Cost (TZS):	Affected Area/(Price/Sq. M)

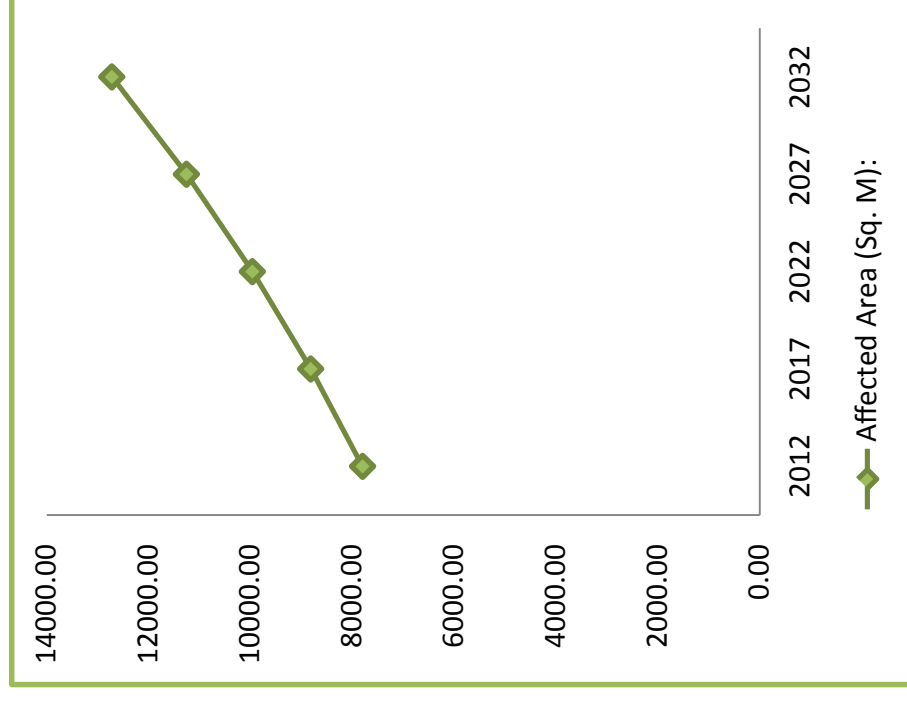
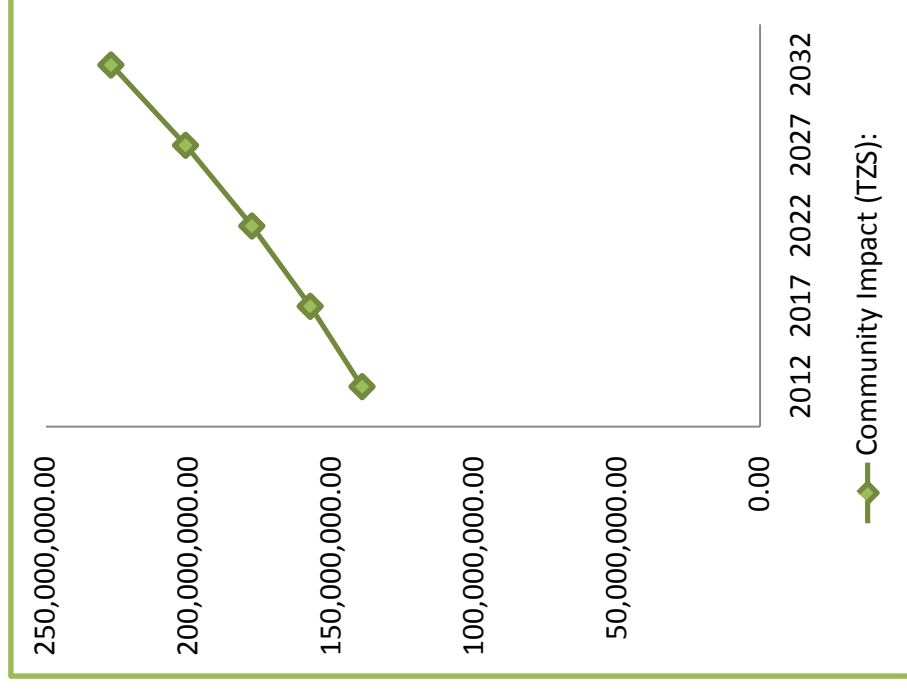


Appendix: Shops

Shops:						
Year:	Population:	Number of Shops:	Affected Area (Sq. M):	Gross Revenue (TZS):	Net Profit (TZS):	Community Impact (TZS):
2012	4,708.00	26.00	7800.00	566,280,000.00	116,090,000.00	139,308,000.00
2017	5,320.04	29.38	8814.34	639,920,865.96	131,186,715.63	157,424,058.76
2022	6,011.65	33.20	9960.21	723,111,155.91	148,241,107.03	177,889,328.44
2027	6,793.12	37.52	11254.96	817,109,772.35	167,511,254.98	201,013,505.98
2032	7,676.27	42.39	12718.18	923,339,927.10	189,288,924.45	227,146,709.34

Key/Equations:	
People/Shop:	181.07
Plot Size (Sq. M)	300
Average Gross Income (TZS):	21,780,000.00
Average Net Income (TZS):	4,465,000.00
Economic Multiplier:	1.2
People/Shop:	2012 Population/Number of Shops:
Number of Shops:	Population/(People/Shop)
Affected Area (Sq. M):	Number of Shops*Plot Size
Community Impact (TZS):	Net Profit*Economic Multiplier

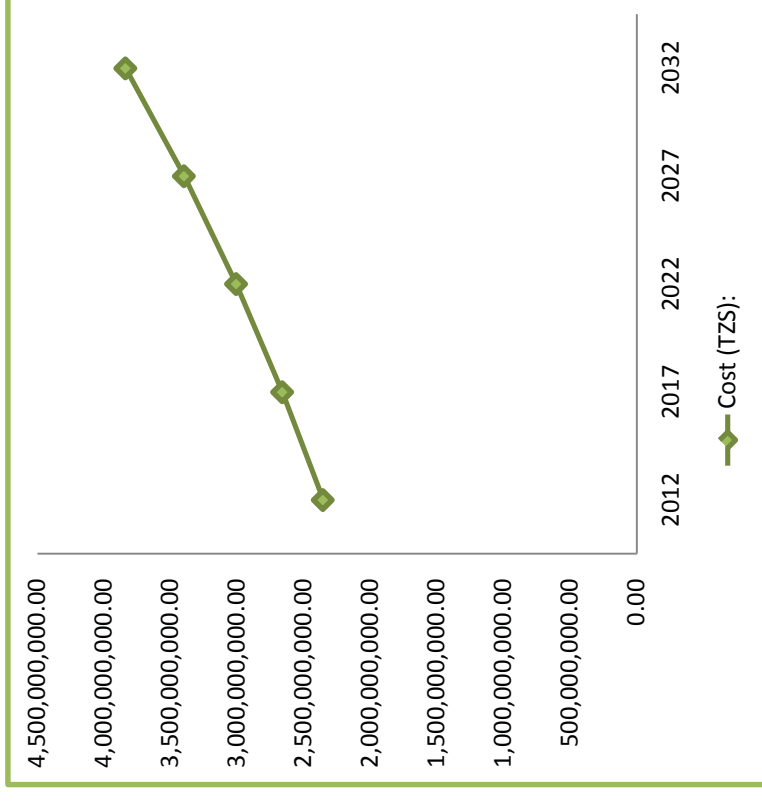
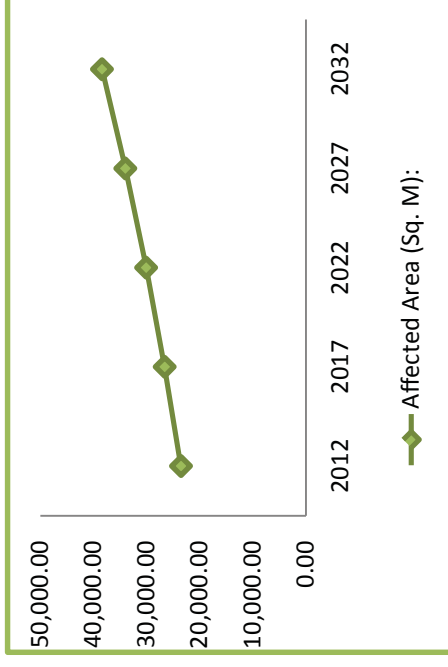
Survey Results:		
Store:	Gross Income (TZS):	Net Income (TZS):
Hardware Store:	24,000,000.00	4,800,000.00
Retail Store:	54,750,000.00	7,300,000.00
Electronics Store:	12,000,000.00	3,600,000.00
Pharmacy:	7,200,000.00	4,800,000.00
Snack Shack:	10,950,000.00	1,825,000.00
Total (TZS):	108,900,000.00	22,325,000.00
Average (TZS):	21,780,000.00	4,465,000.00



Appendix: Recreational:

Recreational Spaces:				
Year:	Population:	Affected Area (Sq. M):	Number of Spaces:	Cost (TZS):
2012	4,708.00	23,540.00	2.354	2,354,000,000.00
2017	5,320.04	26,600.20	2.66002	2,660,020,000.00
2022	6,011.65	30,058.25	3.005825	3,005,825,000.00
2027	6,793.12	33,965.60	3.39656	3,396,560,000.00
2032	7,676.27	38,381.35	3.838135	3,838,135,000.00

Key/Equation:	
Space/Person (Sq. M):	5
Plot Size (Sq. M):	10000
Price/Sq. M (TZS):	100,000
Affected Area (Sq. M):	Population*(Space/Person)
Number of Spaces:	Affected Area/Plot Size
Cost (TZS):	Affected Area/(Price/Sq. M)



Appendix: Agriculture

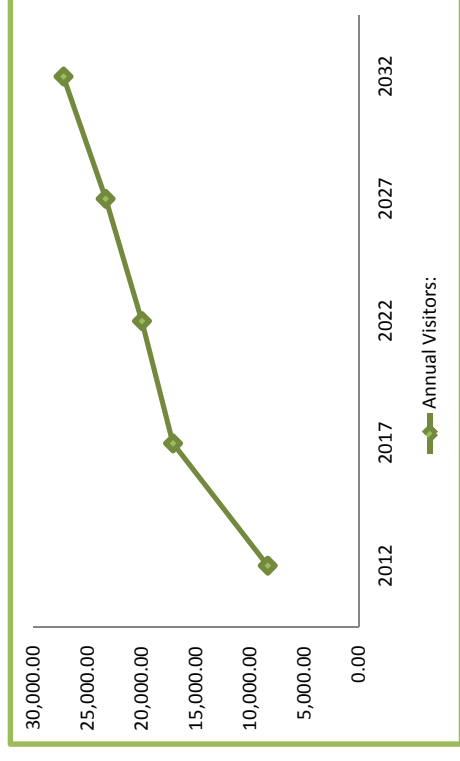
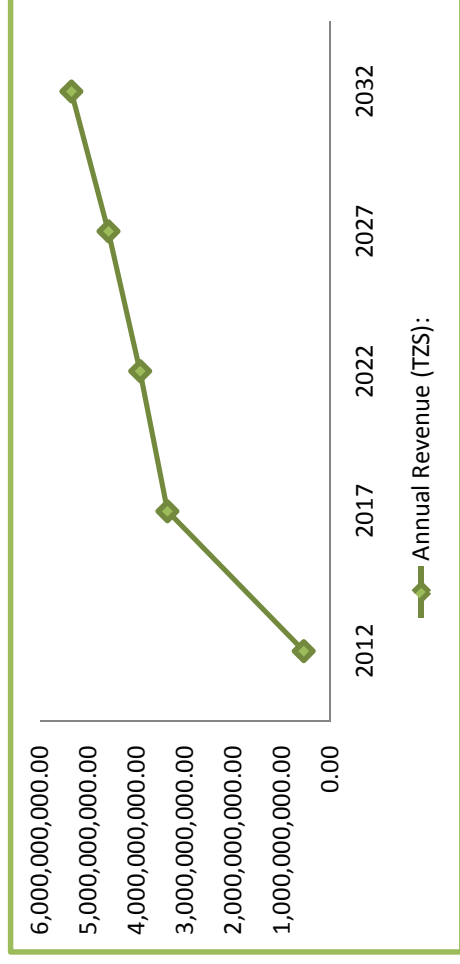
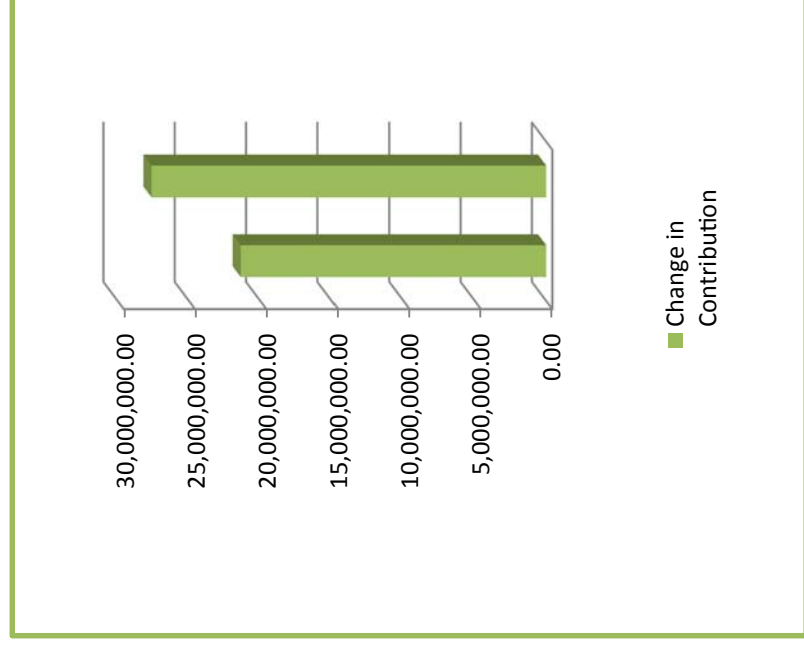
Agriculture:								
Scenario 1:								
Year:	Population:	Area Lost (Sq. M):	Revenue Lost (TZS):	Community Impact (TZS):	Total Community Impact (TZS):			
2012	4,708.00	0.00	0.00	0.00	160,680,000.00			
2017	5,320.04	53,183.00	-691,379.00	-760,516.90	178,035,541.86			
2022	6,011.65	53,811.11	-699,544.43	-769,498.87	177,119,829.57			
2027	6,793.12	78,900.61	-1,025,707.93	-1,128,278.72	221,257,227.26			
2032	7,676.27	97,094.41	-1,262,227.33	-1,388,450.06	247,130,259.28			
Scenario 2:								
Year:	Population:	Total Area (Sq. M):	Revenue Lost (TZS):	Community Impact (TZS):	Total Community Impact (TZS):			
2012	4,708.00	0.00	0.00	0.00	0.00			
2017	5,320.04	91,252.02	-1,186,276.26	-1,304,903.89	451,006,148.50			
2022	6,011.65	98,243.40	-1,277,164.20	-1,404,880.62	516,041,583.45			
2027	6,793.12	131,759.87	-1,712,878.31	-1,884,166.14	563,180,644.84			
2032	7,676.27	157,621.90	-2,049,084.70	-2,253,993.17	677,437,843.80			
Scenario 3:								
Year:	Population:	Total Area (Sq. M):	Revenue Lost (TZS):	Community Impact (TZS):	Total Community Impact (TZS):			
2012	4,708.00	0.00	0.00	0.00	0.00			
2017	5,320.04	91,252.02	-1,186,276.26	-1,304,903.89	486,638,763.30			
2022	6,011.65	98,243.40	-1,277,164.20	-1,404,880.62	557,630,205.85			
2027	6,793.12	131,759.87	-2,712,878.31	-1,884,166.14	639,291,249.07			
2032	7,676.27	157,621.90	-2,049,084.70	-2,253,993.17	734,091,531.80			

Key/Equations:		
Area Lost (Sq. M):	(All Affected Areas (Scenario 1))*1	
Revenue Lost (TZS):	(Area Lost*(Price/Sq M))*1	
Community Impact (TZS):	Revenue Lost*Economic Multiplier	
Total Community Impact (TZS):	All Community Impact (Scenario)	
Price/(Sq. M) (TSZ):	13	
Economic Multiplier:	1.1	
Tanapa Outreach Scenario 1 (TZS):	21,372,000.00	
Tanapa Outreach Scenario 2&3 (TZS):	27,642,467.63	

Appendix: Tourism Increase

Tourism Increase:			
Year:	Annual Visitors:	Annual Revenue (TZS):	Community Outreach (TZS):
2012	8,400.00	550,530,960.00	21,372,000.00
2017	17,131.06	3,368,278,967.76	27,624,467.63
2022	19,994.53	3,931,288,401.17	27,624,467.63
2027	23,336.62	4,588,405,129.47	27,624,467.63
2032	27,237.35	5,355,359,231.81	27,624,467.63

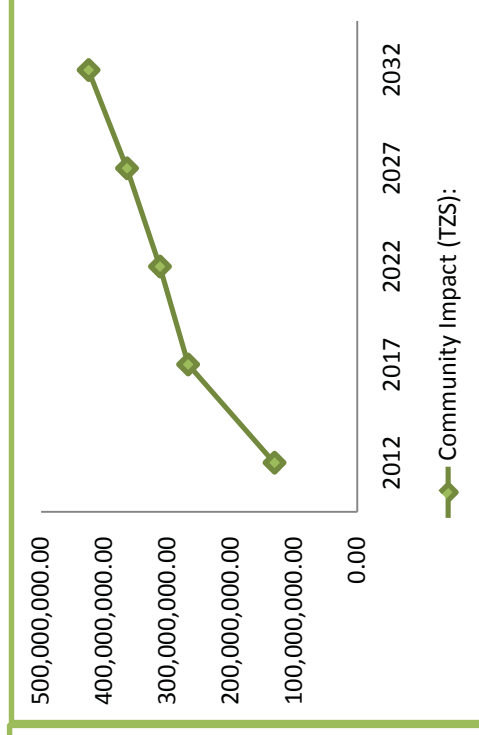
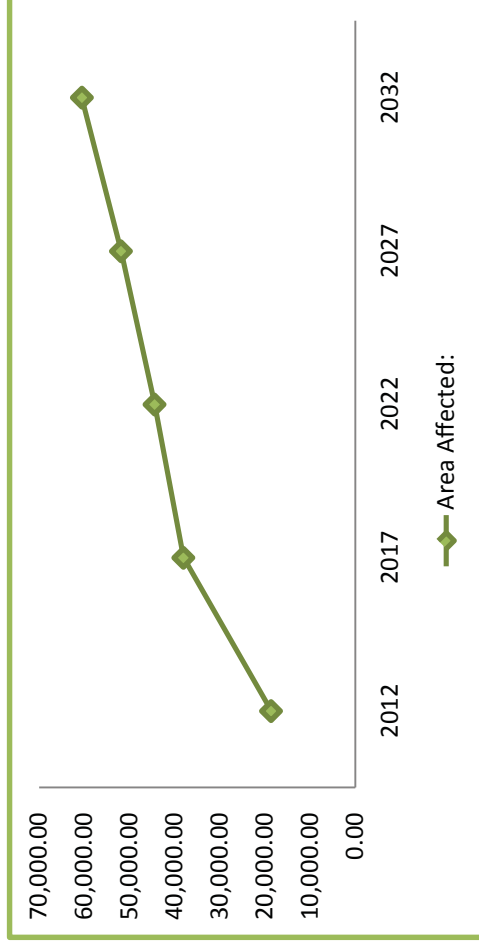
Key/Equations:	
Annual Tourism Growth Rate *5:	1.17
Canopy Walk Tourist Increase:	7,327.00
UMNP Admission Fees <2013 (TZS):	65,539.40
UMNP Admission Fee <2013 (TZS):	98,309.10
Canopy Walk Fee (TZS):	98,309.10
Canopy Walk Investment (TZS):	1,636,473,730.61
Canopy Walk Maintenance (TZS):	80,159,841.39
2012-2013 Annual Budget (TZS):	274,000,000.00
Projected UMNP Annual Budget:	354,159,841.39
% Budget Given to Villages:	0.08
Admission Fees:	Entrance+ Guide
Annual Revenue:	Annual Visitors*(Admission Fees+CanopyWalk Fee)
Projected UMNP Annual Budget:	2012-2013 Budget+(Canopy Walk Investment)
Community Outreach:	% Budget Given to Village *Annual Budget



Appendix: Hotel Development

Hotel Development:							
Year:	Annual Visitors:	Hotels Needed:	Area Affected:	Gross Annual Income (TZS):	Net Profit (TZS):	Community Impact (TZS):	
2012	8,400.00	0.93	18,666.67	109,200,000.00	87,360,000.00	131,040,000.00	
2017	17,131.06	1.90	38,069.02	222,703,780.00	178,163,024.00	267,244,536.00	
2022	19,994.53	2.22	44,432.29	259,928,890.00	207,943,112.00	311,914,668.00	
2027	23,336.62	2.59	51,859.16	303,376,060.00	242,700,848.00	364,051,272.00	
2032	27,237.35	3.03	60,527.44	354,085,550.00	283,268,440.00	424,902,660.00	

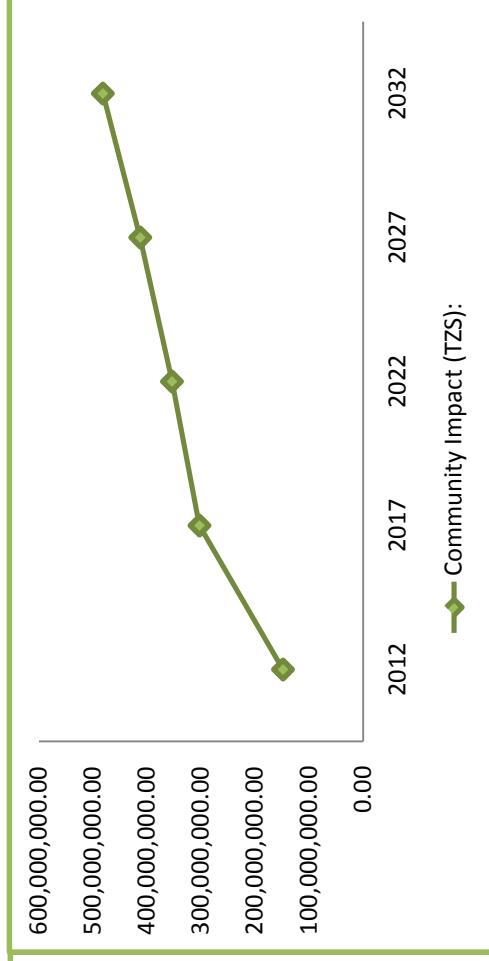
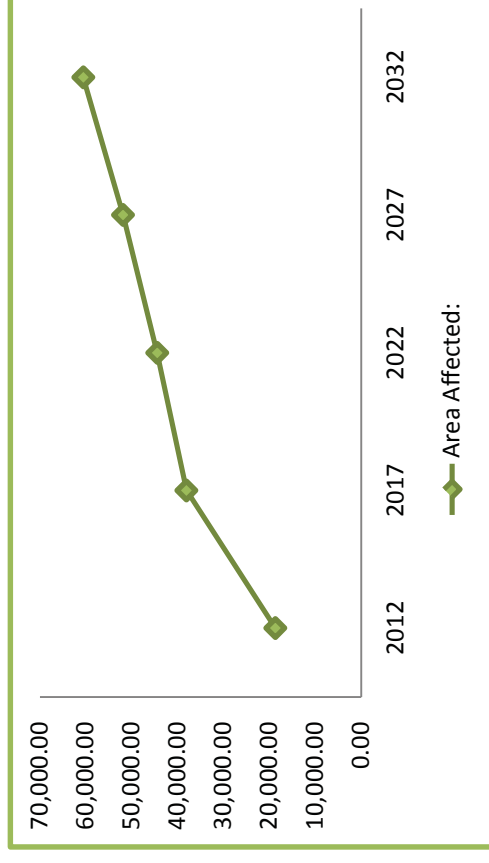
Key/Formulas:	
Area/Hotel (Sq. M):	20,000
Hotel Capacity/Year:	9,000
Price/Night (TZS):	13,000
Tax:	20%
Economic Multiplier:	1.5
Hotels Needed:	Annual Visitors/(Hotel Capacity/Year)
Gross Annual Income (TZS):	(Annual Visitors*(Price/Night)
Net Annual Profit (TZS):	GAI-(GAI*Tax)
Return To Community:	NAP*Economic Multiplier
Area Affected (Sq. M):	Hotels Needed*(Area/Hotel)



Appendix: Ecotourism

Ecotourism:	Annual Visitors:	Hotels Needed:	Area Affected:	Gross Annual Income (TZS):	Net Profit (TZS):	Community Impact (TZS):
Year: 2012	8400	0.93	18,666.67	109,200,000.00	87,360,000.00	148,512,000.00
2017	17131.06	1.90	38,069.02	222,703,780.00	178,163,024.00	302,877,140.80
2022	19994.53	2.22	44,432.29	259,928,890.00	207,943,112.00	353,503,290.40
2027	23336.62	2.59	51,859.16	303,376,060.00	242,700,848.00	412,591,441.60
2032	27,237.35	3.03	60,527.44	354,085,550.00	283,268,440.00	481,556,348.00

Key/Formulas:	
Area/Facility (Sq. M):	20,000
Facility Capacity/Year:	9,000
Price/Night (TZS):	13,000
Tax:	20%
Economic Multiplier:	1.7
Facilities Needed:	Annual Visitors/(Hotel Capacity/Year)
Gross Annual Income (TZS):	(Annual Visitors*(Price/Night)
Net Annual Profit (TZS):	GAI-(GAI*Tax)
Community Impact (TZS):	NAP*Economic Multiplier
Area Affected (Sq. M):	Hotels Needed*(Area/Hotel)



Appendix: Conclusions

Conclusions: 2032					
	Population:	Total Area Lost (Sq. M):	Community Impact (TZS):	Jobs Created:	Total Gained/Area Lost (TZS/Sq.M):
Scenario 1:	7,676.27	97,094.41	247,130,259.28	79.98	2,765.37
Scenario 2:	7,676.27	157,621.90	677,437,843.80	219.24	4,473.24
Scenario 3:	7,676.27	157,621.90	734,091,531.80	237.57	4,832.67

Key/Equations:	
Average Salary/Year (TZS):	3,090,000.00
Tanapa Outreach Scenario 1 (TZS):	21,372,000.00
Tanapa Outreach Scenario 2&3 (TZS):	27,642,467.63
Jobs Created:	Total Community Impact/Average Salary
Capital Gained/Area Lost (TZS/Sq. M):	Total Community Impact/Total Area Lost

