# NYAMEDUA CITY - CONCEPTUAL DESIGN

The AFICA123 Professional Team has visited the site and completed a preliminary examination of the primary features. The site is on gently sloping, well-drained land. There is a well-maintained tar road from Nkoranza all the way to the south through the western edge of the land, including the village of Donkronkwanta. Most of the land is farmed by subsistence farmers and there are a few cashew nut plantations. Some of the farmed land would be occupied by the urban development core but the intensity of farming would increase given that the urban development could make irrigation a possibility and that a larger market would make food production more attractive.

The Watershed and its Management

Watershed management is the process of implementing land use practices and water management practices to protect and improve the quality of the water and other natural resources within a watershed by managing the use of land and water resources in a comprehensive manner. All activities that occur within a watershed will somehow affect that watershed's natural resources and water quality. The regenerative model promotes a land use regime that improves and protects the quality of the water in the system. The careful design of Landuse, landshape and spatial connectivity thus creates a spatial model that correlates with a financial model that in turn underpins the regenerative economic development.
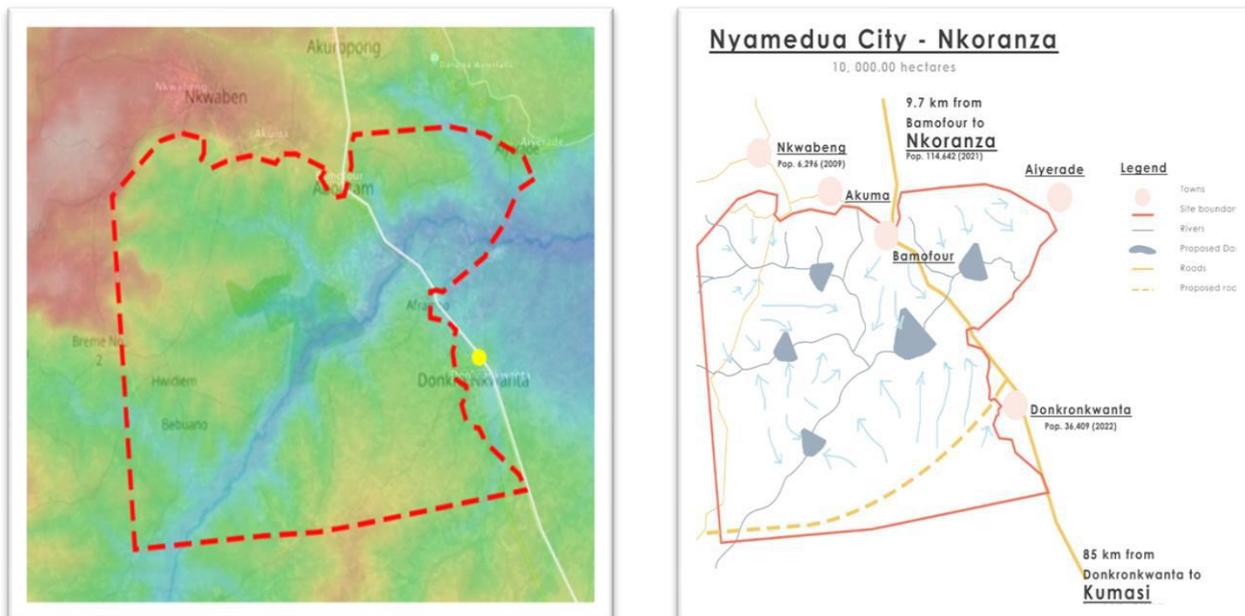
Contours represented by colours and 2. river system and landform

Create a Functional Urban Node

Creating a functioning urban node which provides institutional facilities such as schools, clinics, social services, parks, housing and agricultural training and research laboratories, circular industry labs and industry will support localised live, work, play and learn environments with reduced transport dependencies, multiple choices and options of lifestyles and employment.

Availability of physical infrastructure is key for the development of a competitive agro-industry. The urban node provides the physical infrastructure such as roads, telecommunications and electricity as well as markets for credit and insurance.

The model proposes to:
- Cluster middle, higher and some lower order facilities at the urban node
- Provide lower order facilities at the village street settlements if these can be supported and if these are necessary or desirable

The urban centre provides the location for agro-processing centres. Fresh produce and dairy products need to be kept fresh, refrigerated and transported from the farm gate to agro-processing plants or storage facilities to minimize post-harvest losses. Therefore, the agro-industries and small-scale agro-processing enterprises will be located close to the sources of raw materials (the agri village streets).

A technical advisory centre, agro processing hub and smart technology centre could be located in the urban centre, which will provide access to agricultural training, inputs and markets.

A full range of other urban business activities would cluster in the urban node to provide the full suite of urban services and opportunities commensurate with a small city.

Nyamedua City - Nkoranza
10, 000.00 hectares
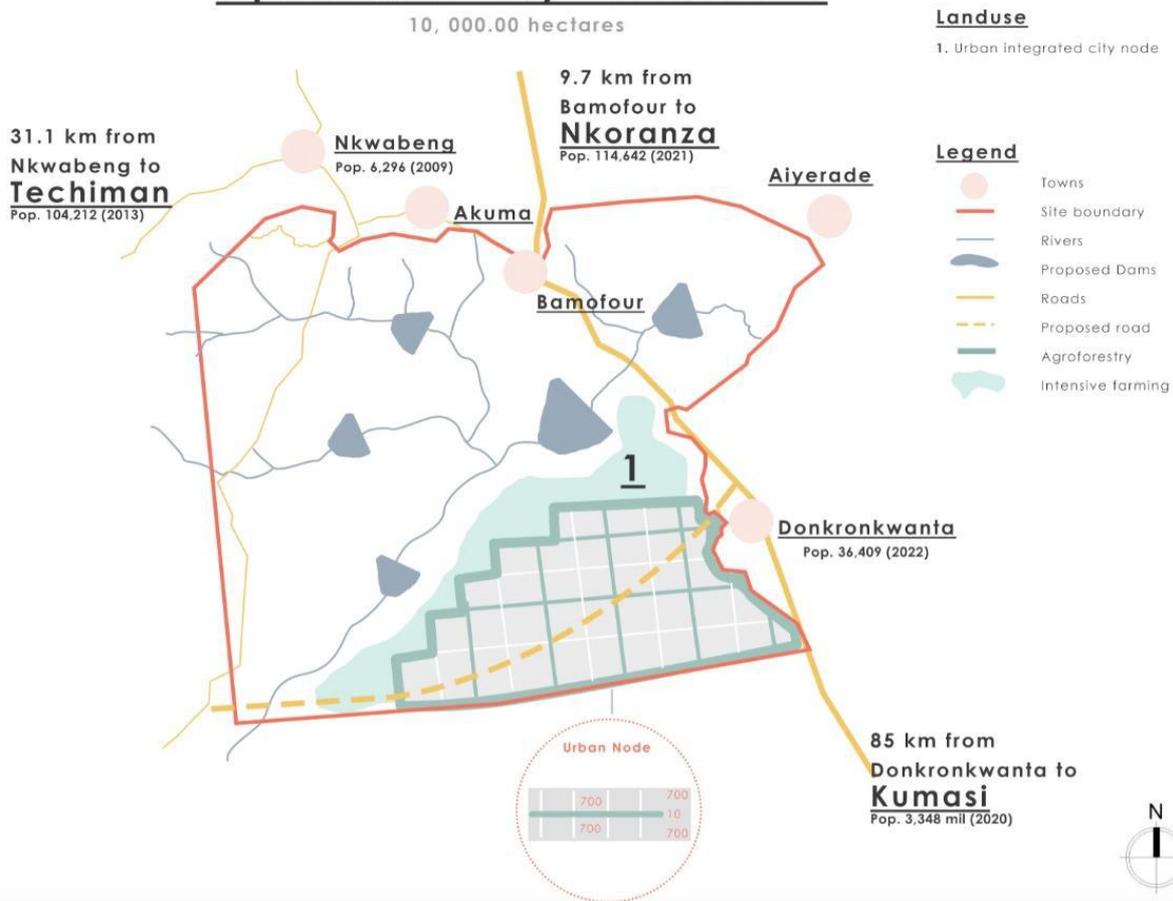
Urban Node in the south east area of the site

Transition from subsistence to intensive circular agriculture farming along a village street

The regenerative model will provide a spatial plan that locates smallholder plots of 1 to 2Ha organised along a village street. Larger farms would be strategically placed as advised by farm planners. This offers the best of both worlds. It allows direct access to farming and also supports access to lifelong intergenerational and vocational choices. The village street organisation provides access to goods and services as well as transport to markets. These markets will be located in the well-resourced urban node.

Construction of roads

Feeder roads need to be constructed to open up the village street areas for agricultural production, harvesting, processing and cold-chain to link these villages with the markets in the larger towns and onwards to national and international trade routes.

Provision of storage and processing facilities

The provision of processing facilities for farmers located close to the production area is essential for the success of the model. The villages will be located within easy access of the agricultural hub in the urban core.

Provision of agricultural/technical support

Agricultural technical support includes circular economy farming and access to improved seeds, irrigation, drought-tolerant crop varieties, climate-resilient crop varieties, organic soil amendments, and soil and water conservation practices and the use of livestock, poultry and organic protein uses. Access to capital, sharing of equipment, planned production, harvest work teams, etc. can also be co-ordinated from the agro-industrial hub.

Woodlots and Re-forestation

Establishment of trees that recharge the aquifer and act as urban food, forest, woodlots with related nurseries and urban maintenance and management is another critical requirement of the regenerative balance

Forest plantations can make a significant contribution to the local and national economy through income diversification and wood and non-wood industry expansion. Plantations enhance the establishment of socio-economically valuable indigenous woody species by functioning as foster ecosystems; thereby increasing diversity and productivity of native tree species that are beneficial to society.
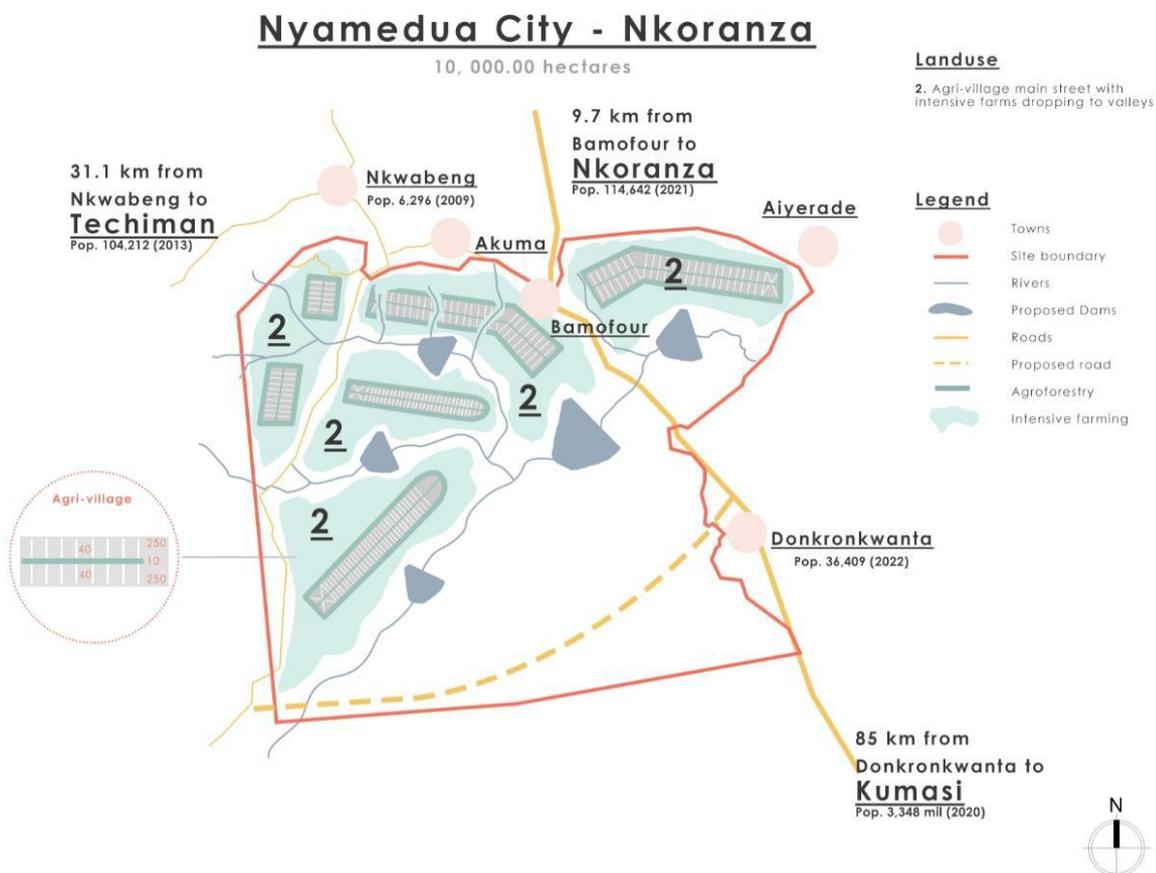
Conceptual Layout of the Agri-village streets

Agro-and Urban Forestry

A system of agro-urban forestry will be introduced as part of the project. Agro – forestry is a system that includes both traditional and modern land use systems in which trees are managed together with crops and/or animal production systems in agricultural settings. Agroforestry includes a full range of tree planting and woodlot management practices e.g. living fences, hedges, woodlots, fruit trees near houses and woodland use. In order to revive some of the indigenous forest, the following is proposed: farmers/labour allowed to plant crops in between timber trees during the early stages of forest plantation establishment.

Reduces evaporation

Monoculture agricultural systems do not fully utilise rainfall due to losses from evaporation, runoff and deep drainage. The presence of trees in an agroforestry system allows for increased quantities of water used for tree/crop transpiration. The microclimate modification occurring under tree shade has a positive effect on water status, gas exchange and water use efficiency of the understorey grasses. Agroforestry improves water use of a production system by allowing for utilisation of offseason rainfall, where the perennial plants make use of the additional soil water at greater depths.

Reduces soil erosion

Growing trees and woody perennials on contours and field bunds reduces soil erosion. Research confirms that agroforestry enhances soil fertility, improves soil structure and soil organic matter.

Increases biological diversity and ecology

Agroforestry has a positive impact on landscapes connectivity through the influences exerted on the ecological processes such as the presence and spread of fauna and flora, water & nutrient cycling, microclimate and disease and pest dynamics.

Nyamedua Composite Concept

The diagram below illustrates the possible combination of land uses cohered into the 10,000Ha land unit. The proportion of each will have to be tested and probably varied for the purposes of this initial concept the diagram represents the high level prefeasibilty concept of the proposed Nyamedua City.

Conceptual Layout of Proposed New City-Build

Conceptual Allocation of Land Uses

The table below sets out a preliminary apportionment of land uses to the 10,000Ha land parcel made available to AFRICA123. There are three broad categories of land use; agricultural/natural, urban and industrial and each are sub-divided into smaller categories for purpose of this prefeasibility document.

65% of the land remains for agriculture and natural systems while 35% is allocated for urban and industrial – mainly agro-industrial and food related manufacturing. There are 5 categories of agricultural at this conceptual stage;

- 1 Hectare intensive farms along agri-village streets
- 2-10 Hectare farms between the village streets and the river courses
- Commercial farms that are larger in size and located in the best positions for specific crops that may, for example, be targeted at an export market to bring outside revenue into the area.
- Re-forest areas where original forests are replanted to recover benefits of the indigenous forests.
- Urban forests that are within and surrounding the urban settlements to create shade, improve local climates and allow for some wood harvesting.

The Dams and waterways are to protect the original waterways and to allow for selective damming of the rivers to create check-dams and reservoirs for irrigation.

The 4 Urban categories are as follows:

- Urban Core - where the highest density of residential units will be located along with shops, places of entertainment, restaurants, urban schools, etc.
- Urban Density 1 – less dense than Urban Core and in the middle areas on the Urban Node but still walkable distance to the amenities in the Urban Core.
- Urban Density 2 – the least dense of the urban areas and on the outskirts of the urban node.
- Education / Civic allows for the provision of schools, public facilities, churches, mosques, etc. to be distributed through the Urban Node.

The Industrial categories are as follows:

- Light Industrial – Food. This is particularly important and relevant to Nyamedua City as it is located in a rural location with the intention of catalysing agricultural production in the area and beyond. Local Agro-processing is seen as a key opportunity to add value close to source and also to stem the growing tide of young people moving to the large towns and cities in search of an urban lifestyle. In other words provide more sustainable jobs in the rural areas of the country.
- Light Industrial – General allows for other light industries that may be downstream or upstream of the agro-processing industries or not related at all. Again the intention is that there be a variety of job opportunities created for the local or incoming population.
- Both Medium Industrial categories are not envisaged to be appropriate to this location but rather to the settlements closer to the larger cities.
- Waste to Resources is a critical component of the new city as it is intended to harvest the entire range of solid waste from organic to non-organic and either create compost, energy, recycled materials or other useful resources so that nothing is thrown away or wasted.
- Circular Economy Labs and Depot is the agricultural resource, supply and support centre supporting the entire agricultural industry in Nyamedua and beyond.

The Summary shows the total number of houses that can be supported on the 10042 hectares of land on the assumption that the Urban Node has an average density of 40 dwelling units per hectare (du/Ha), with the Urban Core being as much as 100 du/Ha including 4 storey walk-up apartments etc. to a lower density of 20 du/Ha on the edges of

the Urban Core. The 1 Hectare farm lots have 2 houses per lot and the larger farms have up to 4 houses each. The total capacity of the city would be about 120,000 households supporting a population of approximately 350,000 people.

The city would be built in phases and may take many years to reach its full potential in terms of the total number of households. It will also take some time to transition the farming lots from the patchwork of small farm lots that exist now to the future agri-villages and urban node.

NYAMEDUA CITY - NKORANZA SOUTH

	Category	100%	10050
Agriculture	1 Ha Farms	16.5%	1658
	2-10 Ha Farms Silvopastoral	10.0%	1005
	Commercial Farms	10.0%	1005
	Re - Forest	5.0%	503
	Urban Forest	5.0%	503
	Dams, Waterways	20.0%	2010
	Sub-Total	**66.5%**	**6683**
Urban	Urban Core	9.5%	955
	Urban Density 1	7.0%	704
	Urban Density 2	7.0%	704
	Education /Civic	5.0%	503
	Sub-Total	**28.5%**	**2864**
Industrial	Light Industrial - Food	2.5%	251
	Light Industrial - General	0.5%	50
	Medium Industrial 1	0.0%	0
	Medium Industrial 2	0.0%	0
	Waste to Resources	1.5%	151
	Circular Economy Labs & Depot	0.5%	50
	Sub-Total	**5.0%**	503
	Overall Total	**100%**	**10050**
Summary	**Households**		Hectares
	Average Urban density	40	du/ha
	Number of Urban Households	114570	
	Number of Farming Households	5422	
	Total number of Households	119992	