

Concept of a plantation

Drafted by GI Grupa

Asjeba Biofuel project Ghana



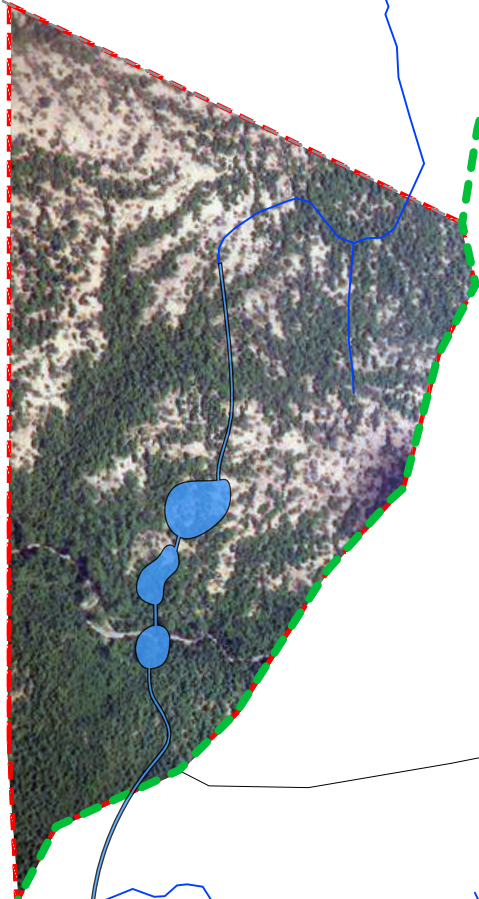
SUSTAINABILITY. FAIRNESS. OPPORTUNITIES. OUR VISION

Asjeba's philosophy is driven by economical goals to achieve sustainable soil management while creating at the same time an environment for local populations to have a better future for themselves and their children. The fundamental five-pronged approach include: rehabilitating degraded soils; making use of organic fertilisers only; promoting soil carbon enrichment; selecting only areas that are affected by or at risk of soil degradation; and promoting land-use planning and landscape-based approaches. Asjeba places people at the epicentre of its processes of consensus-building and planting will be done in cooperation with agricultural universities to achieve practice-oriented and applied research.

Location

Proximity to Existing Infrastructure

- (i) Roads
- (ii) Power /Energy
- (iii) Water
- (iv) Drainage

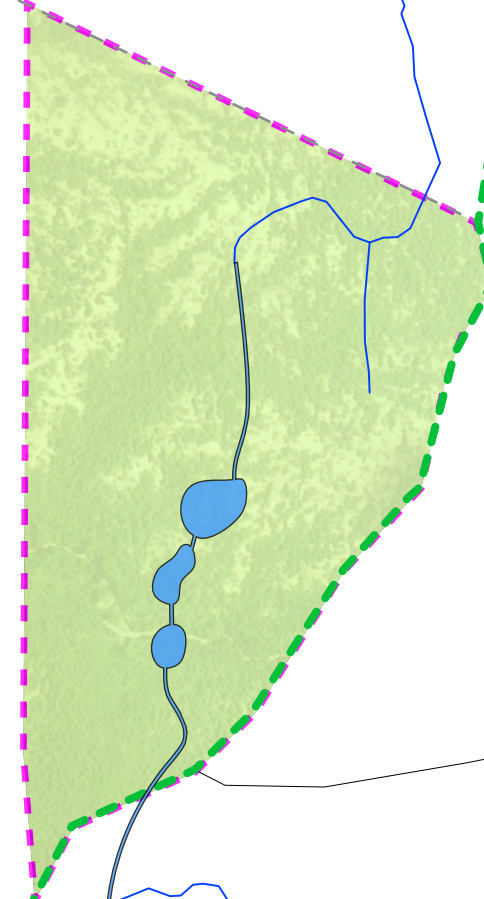


Orientation

Proximity to Existing Villages /Towns etc

- Topography (linked to Point 1)
- Landscape
- Geology
- Water

Incumbent Population Demographic + number of eligible age /capability status
Existing Facilities /Service which can be integrated into the Plantation



Plantation Network

GRID (Note: this is a diagram that illustrates the concept . Actual layout and form will be determined by the Ground conditions that can influence any one 1000 hectare bloc plan.)

- Phasing
- Start-Up Camp
- Infrastructures



Principle to the business of the Plantation will be:

- Employee Wealth fare
- Stable Infrastructures
- Roads

New Plantations requires 3 levels of Roads /Routes and in principle will follow the Net that a plantation is set-down on i.e. the rows of its planting. In addition we must consider

- Ease of Access
- Durability and Maintenance
- Main Access Roads : to connect to existing local/national Road network

- Secondary Roads: Local traffic and plantation use
- Pathway: Plantation machinery and works routes
- **Water:** Combination of Three practical processes.
 - (i) Use of existing (if available)
 - (ii) In any case introduce Water Retention Landscape ponding and Lakes
 - (iii) Deep Bore holes to collect fresh water.



In all case of the above 3 measures Asjeba Group intent to provide a fully integrated Water Management scheme that in time can be transferred to local government operatives.

Water is vital to the success of the Plantation to the sustainability of life across any large region.

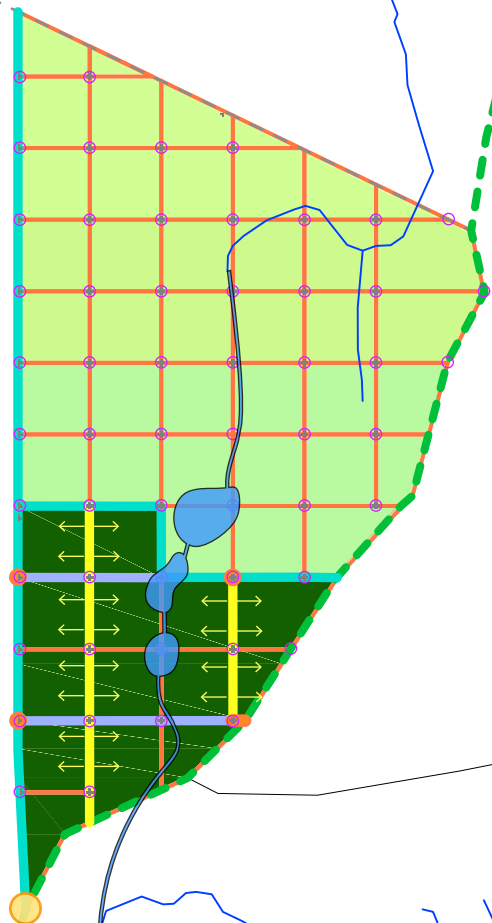
Power:

Mostly considered a a combination of Bio Fuelled generator units linked like to exchange cabinets to combine with energy from Wind and Solar installations. We would assume a power consumption of between 4-8 Kw/day but could rise to 10-15 kw if climatic unit6s are introduced.



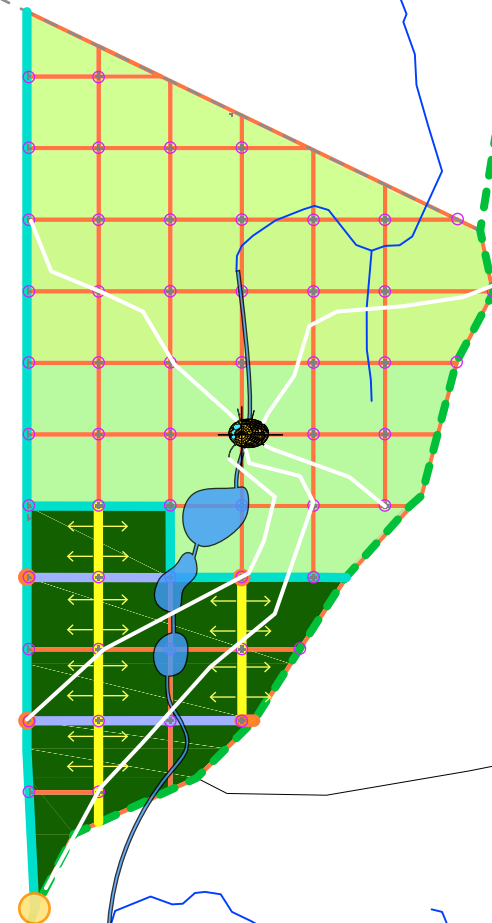
Villages and Settlements

Each Plantations has several Phases of Development



Start-Up Camp

Nursery Units, circa 15 hectares, main machinery depot, administration facility building and 15-20 dwelling units – Main road conditions and secondary road net for Phase 1



Phase 1

30% of Plantation + 50% infrastructures including Villages and larger Villages

Phase 2

30% of Plantation + 50% infrastructures including Villages and larger Villages

Phase 3

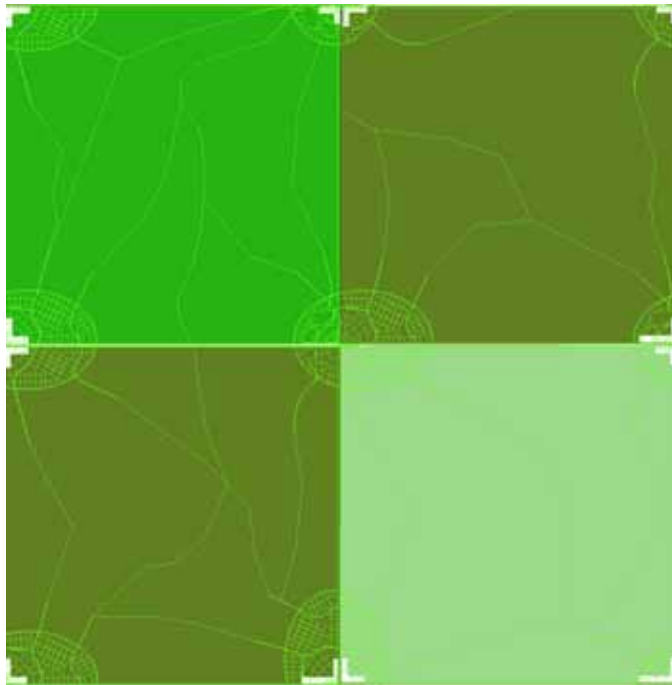
20% of Plantation + Villages and Settlement

Phase 4

20% of Plantation – Remaining dwelling units as required

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Typical plantation parcel



- 1 Plantation parcel
- 2 Secondary road
- 3 Tertiary road
- 4 Typical settlement
- 5 Settlement

Note: this presentation illustrates a typical arrangement of one Plantation Sector and would be subject to detail planning.

Each Village is assembled according to the full extent of each Plantation Zone.

Social Aspects and Housing Development

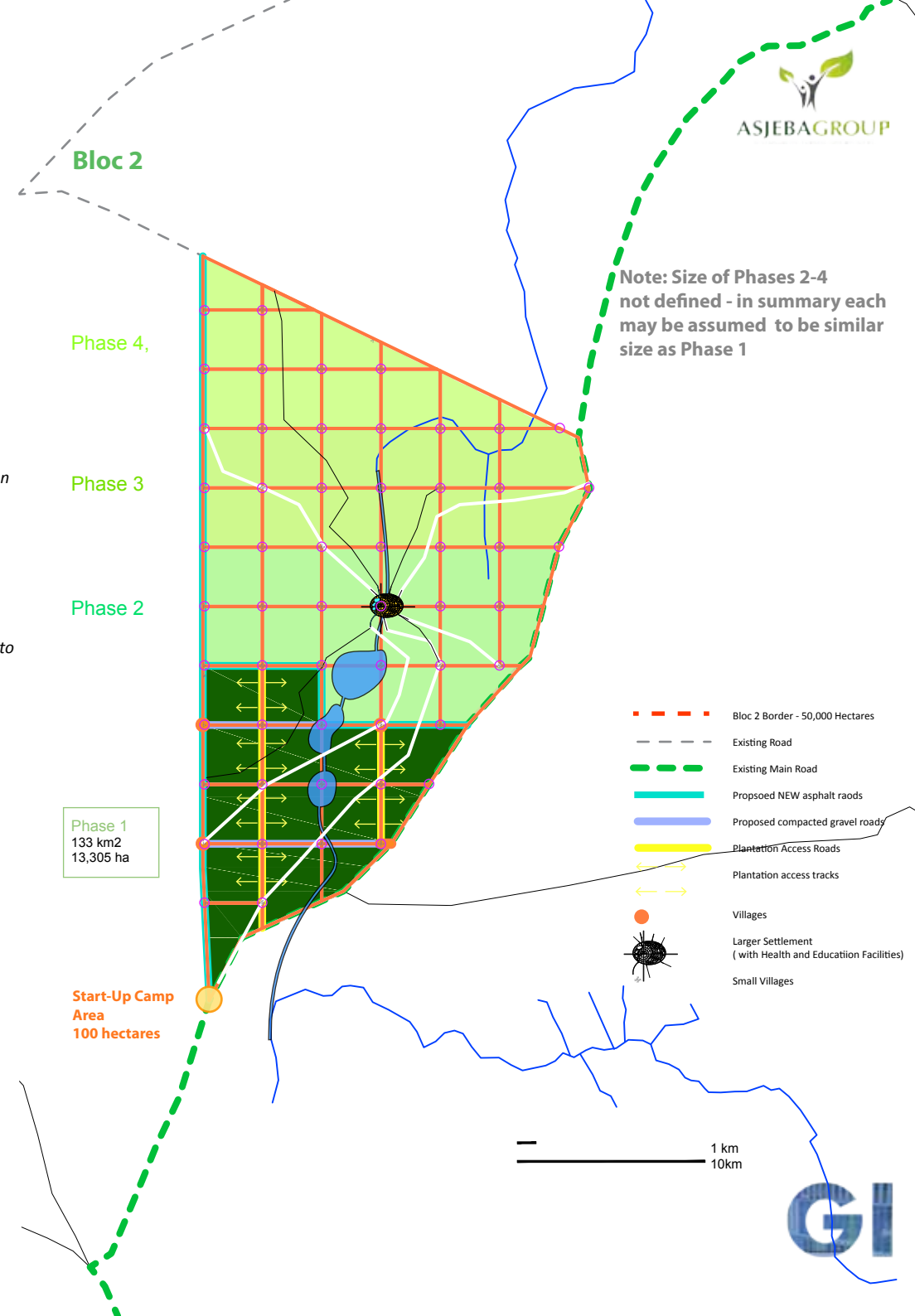
Settlements and Infrastructure

As the operation of the plantation will require the employment of approximately 7,500 people plus their families, about 60 villages spread over the whole 75,000 hectare area will be constructed. This will also require the providing of water supply systems, electricity, waste and water waste management, schools, health care, markets, shops and other public facilities.

Each Village will essentially be attached to a plantation Zone of approximately 1000 hectare as a base minimum.

In the plantation sectors there would be a larger Plantation Settlement attached to the main Plantation Sector administration and processing facilities.

Villages, Roads and infrastructure facilities will be developed in phasing according to the phasing of the plantation.





As we have stated before, the success of the plantation as a business will depend of the welfare of those that work there and the supporting infrastructures which must be installed for long-term durability.

Welfare and Durability go hand-in-hand in a sustainable development and we shall, in due course, consider details of methods and materials for delivery and execution of all the buildings and infrastructures. Critical to this will be the balance between local incumbent resources (both in terms of materials and labour) and requirements to import both separate materials and prefabricated elements.

We consider the Plantation as a start to this sustainable Value Chain and in time (circa 7-10 years*) the built and agricultural environment will evolve with further commercial business strands stating-up and a shift (growth) in the population as continuum of the Value Chain







Combating soil erosion

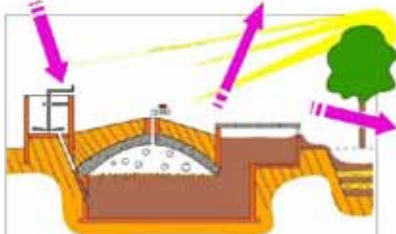
In several districts of Ghana, soil erosion is a key challenge every rainy season, where run-off can form deep gullies that affect about 40% of the landscape. To take on this problem, it is proposed to encourage farmers to organise community-based organizations that include more than 1000 households. The members, 60% of whom can be women and young people below the age of 25, are likely to be part of a family which has a member working with Asjeba and will increase on-farm tree cover by their own crop plantation.. Through this partnership, more than 40 tree nurseries per community can be established, with capacity to produce 140 000 high quality seedlings per season. The selection of the tree species will be based on farmers' needs and technical advice from Asjeba staff. Sale of the seedlings will generate income for the community and the nursery will supply the local community with high quality tree seedlings for agro-forestry and wood-planting. The number of tree nurseries, as well as their capacity, could increase five-fold in a five year period. With a survival rate of 75%, the on-farm tree population could increase by at least 500 000 trees over that same five-year period.



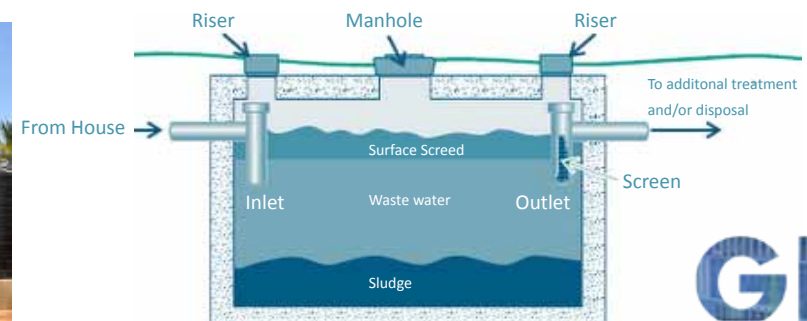
Infrastructure/environmental strategies

Biogas plants transform traditional manure management - reducing CH₄ emissions

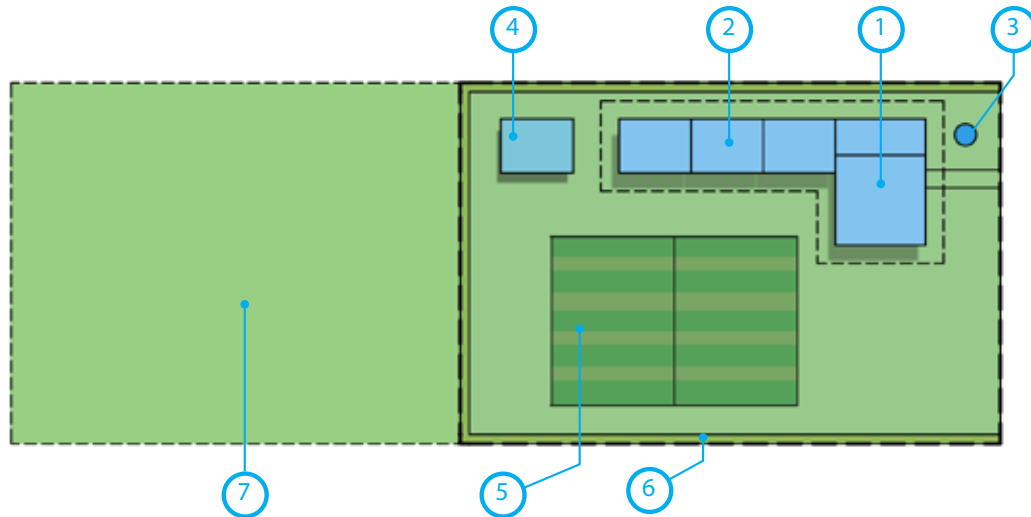
Biogas substitutes conventional domestic energy sources, reducing reliance on fossil fuel and firewood (CO₂)



Bioslurry can substitute chemical fertilizer, reducing N₂O emissions



Typical housing parcel



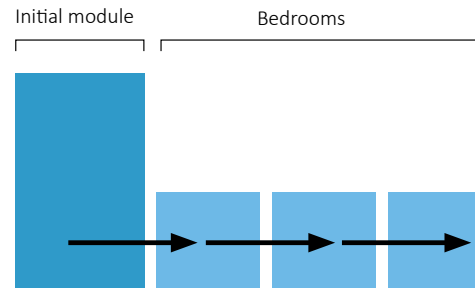
Note: this is a schematic proposal at this stage and should not be read as a literal solution to form, appearance or materials.

- 1 Initial housing module - living, kitchen and bathroom
- 2 Expansion modules - bedrooms
- 3 Rainwater tank
- 4 Storage, animals, etc.
- 5 Garden
- 6 Hedge
- 7 Expansion area

The Village House is considered as a module configuration which can be added to or built according to actual requirements. i.e. Living space with Bathroom and Kitchen facilities and thereafter bedrooms in which 2 can sleep.

The Living space could be added to and the living modules added according to the size of the Family.

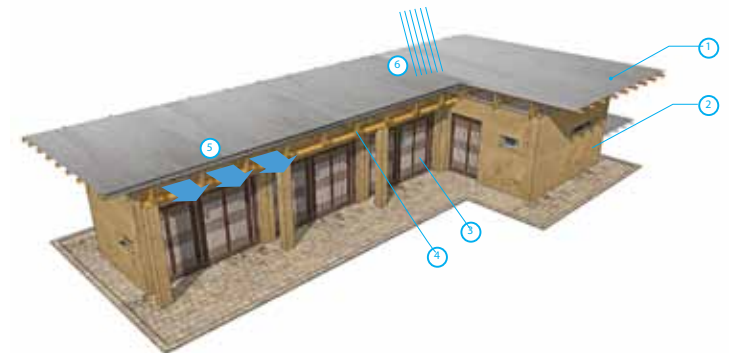
Module can be prefabricated either with a Container as a base, a timber frame or aluminium panels system. All demountable and removable and/or extendable. Panels system is built off a reinforced concrete foundation deck-slab OR on leg-footings.



House expansion principle

An Alternative model (low carbon footprint) can be to source all materials locally - Block/clay and plaster/daub walls with timber doors and windows. Aluminium profile sheet roof deck on insulated flat roof with timber truss and purlin structures. Face-mount installations. Wooden flooring with ceramics in kitchen and bathroom.

Plot can be configured to suit possible extension of house units and/or garden – small agriculture functions.



- 1 Corrugated aluminium roof
- 2 Walls - prefab/masonry or wood frame with masonry infill
- 3 Wooden shutters
- 4 Wooden roof trusses
- 5 Air circulation under roof
- 6 Rainwater collection

1. Plantation layout

Note: this is a schematic proposal at this stage and should not be read as a literal solution .

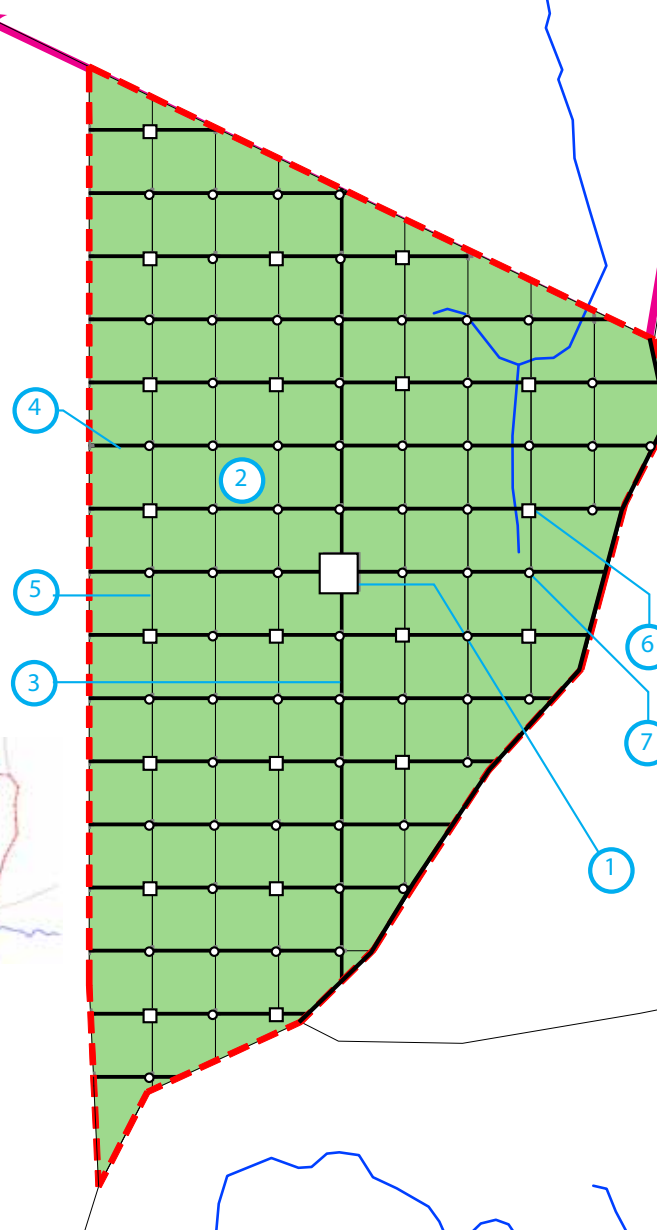


Roads 1 Roads 2 Roads 3 Plantation parcels Settlement grid Existing Topography



- 1 Settlement- Administrative center/Processing
- 2 Plantation parcel
- 3 Main road
- 4 Secondary road
- 5 Tertiary road
- 6 Village with additional amenities
- 7 Village

Plantation total area- 75.000 ha



1.0 Settlement and Villages

- Plantation Sectors, each of 1000 hectares
- 2 worker per 10 hectares (so 200 workers per Plantation Zone)
- 1 worker = one dwelling Unit
- Dwelling = allow for optimum size of family of 5 (average)
- Each dwelling = Domestic Plot for each house (enough for House and garden and small live-stock functions – cca max_1000 m² per plot) - we take an average of 600 M2 in this analysis.
- 60,000 Hectare Planted Zone = cca – 60 Villages of 200 dwellings each. Total Plantation Area: 75,000 hectares
- One Main Settlement with Health, Education and admin and market/retail components and main Plantation facilities And thereafter
- A larger zone can be cultivated, by the inhabitants for "other" agriculture according the development plans agreed between the Plantation Consortium and the Government.

2.0 Infrastructures:

- Drinking Water : One water-well per Village (if possible, according to source and depth of water)
- Utility water : grey-water recycling and rainwater collectors per dwelling
- Waste Water: One mini treatment unit per Village
- Power: Combined PV power and generator power unit (fuelled by Plantation oil) – PV per village + Heat-Power unit shared by 2-5 Villages.

3.0 Roads: 3 types

- main utility asphalt roads to link to existing Road net
- Link roads to villages and settlements (no covering but drained)
- Local track/roads to plantations



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