URBAN DEVELOPMENT INITIATIVE (UrDI)

FOR THE CANAAN AREA OF PORT-AU-PRINCE

URBAN STRUCTURE PLAN

2016

Acknowledgments

This project is funded by USAID and coordinated by UCLBP in collaboration with the Haitian Government represented by the Unité de Construction de Logements et de Bâtiments Publics (UCLBP).

The analysis and diagnostics have been developed by UN-Habitat consisting of Urban Planners from the Country Team office in Haiti, the Urban Planning and Design Lab in Kenya, and the Urban Economics Branch; with the support of USAID, UCLBP, American Red Cross and Croix-Rouge Haitienne.

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UCLBP

American Red Cross

USAID
FROM THE AMERICAN PEOPLE

UN HABITAT
FOR A BETTER URBAN FUTURE

TABLE OF CONTENTS

LIST OF ACRONYMS

UPD-LAB	Urban Planning and Design LAB
GES	Gaz à Effet de Serre
UCLBP	Unité de Construction de Logements et de Bâtiments Publics
RN	Route Nationale
PaP	Port-au-Prince
USAID	United States Agency for International Development
CRA	Croix Rouge Américaine
NGO	Non Governmental Organization
MPCE	Le Ministère de la Planning et de la Coopération Externe
MTPTC	Ministère des Travaux Publics, Transports et Communications
MICT	Ministère de l'Intérieur et des Collectivités Territoriales
MENFP	Ministère de l'Éducation Nationale et de la Formation Professionnelle
MEF	Ministère de l'Économie et des Finances
DGI	Direction Générale des impôts
DINEPA	Direction Nationale de l'Eau Potable et de l'Assainissement
EDH	Électricité d'Haïti
IHSI	Institut Haïtien de Statistique et d'Informatique
SPA	Stratégie de Plantation d'Arbres.
SDF	Strategic Development Framework
OSM	Open Street Map
DPC	Direction de la Protection Civile
UrDI	Urban Development initiative
CIAT	Comité Interministériel d'Aménagement du Territoire
NMT	Non Motorised Transport

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

URBAN DEVELOPMENT INITIATIVE (URDI)

Haiti has been experiencing a political instability for a long time. This political unrest has led to poor living conditions with an economic and social exclusion of many strata of society. The country is facing an exhaust in capital resources, weakening of economic opportunities, lack of security and an increase of violence. Today, with around 10 million inhabitants and the rapid growth, the status quo is defined as a depleted country where the lack of basic services represents a threat to the development.

The earthquake in 2010, the worst hazardous event in the region, led to a rapid pace deterioration of the country's situation. Following the environmental crisis, an area in the northern metropolitan Port-Au-Prince, Canaan, was declared of public utility to host vulnerable people who were left homeless after the earthquake. Today Canaan hosts about two hundred and fifty inhabitants (250,000).

The perpetual migration towards Canaan is still growing and unfortunately leading to an uncontrolled urbanization. Since 2011, several actions were raised solely with a view to find the best approaches for restructuring the territory according to urban standards and principles and lining them with the international vision of urban development.

The Haitian government is conscious of the rapid growth challenge and its impact on urban planning and territorial development. At the same time the government sees the potential offered by the area in question, Canaan, which covers 33 km2 of metropolitan Port-Au-Prince and the necessity to restructure it. Canaan has the potential to be a solution for the critical issue of housing deficit. The focus area is facing serious threats and therefore intervening in it would require to consider critical issues from urban, economic, legal, and social to environmental aspects.

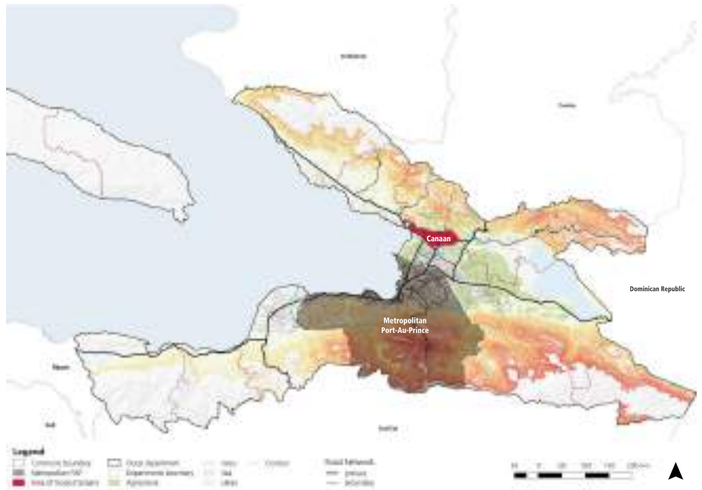


Fig.1: Localization of Canaan (in red) in metropolitan PAP © UN-Habitat

This action plan for urban restructuring of Canaan, although coordinated by UCLBP, leaves space for different stakeholders, to whom the constitution and laws grant the power, to intervene in the management of land and the urban development. The action plan, according to UCLBP, focus on four (4) main priority actions:

- Empowerment of territorial coordination projects by MICT
- Regulation and restructuring of the urban fabric by MTPTC and DINEPA
- Building resilience and reinforcing risk prevention measures by the MICT / Civil Protection (DPC);
- Support and promotion of private initiatives by UCLBP

The Urban Development Initiative (UrDI) looks into all the priority points that fall under the action plan of UCLBP, providing a holistic understanding on many levels. The initiative delve into the needs of the area on different scales and gathers different stakeholders through a series of Charrettes that promotes participative decision making.

In order to achieve an enhanced social integration and transform potential urban development into economic opportunities, the initiative tackles two main challenges:

1. Secure that Canaan will develop as a city district and not as an informal settlement with a deficit of services and infrastructure

2. Channel current developments in the northern fringe and turn them into opportunities

Fig.2: Charrette 1 in Haiti © UN-Habitat

THE URBAN DEVELOPMENT INITIATIVE STRUCTURE

The urban development initiative is a holistic approach that uncovers different strata of studies on many levels. It has been developed as a collaborative effort between international and local stakeholders under the supervision and guidance of the Unité de Construction de Logements et de Bâtiments Publics (UCLBP). Financial and human resources provided by the American Red Cross, USAID, Haitian Red Cross and the UN-Habitat country team office in Haiti, have been instrumental in the development of the project as well as in the mobilization of different community groups engaged in the planning exercise.

The project has brought together, through a series of charrettes, participants from the national government, municipal government, international and local organizations, academia, community groups and planning experts to discuss these three key components of sustainable urbanization in the reconstruction of Haiti.

The current report "Urban Structure Plan" falls under the city-wide scale where a precedent analysis and diagnostic were delivered in the comprehensive analysis and diagnostic report. A set of recommendations and propositions will be delivered in the following documents to shape up and provide a new structure for the Canaan area.

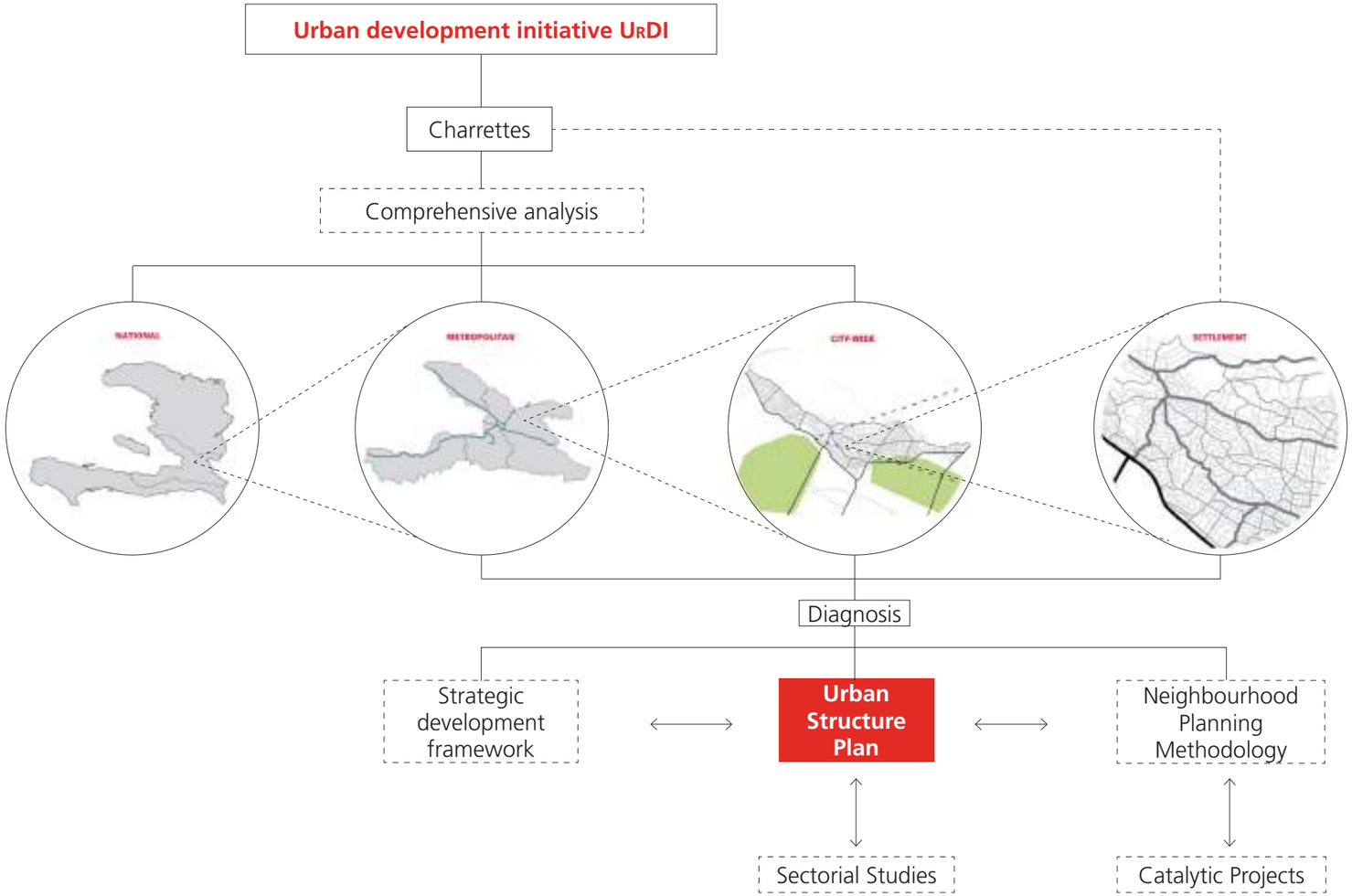


Fig.3: Urban Development Initiative structure

2. URBAN STRUCTURE PLAN

With a rapidly growing population estimated at over 200,000 today, the Canaan area presents a serious challenge to the central government, municipal authorities, and community groups struggling to provide adequate housing, basic services, public infrastructure, and employment opportunities for its residents in a sustainable manner. To prevent the rapid pace growth to mature informally, UCLBP saw the need to call out for an action plan to urban restructure Canaan giving the chance for other stakeholders to intervene in the management of land and the urban development.

The document analyse the existing urban structure and proposes a new one that ensure the provision of urban centres, street network and public spaces and eventually would allow residents to access basic services, public facilities, businesses and working areas within walking distance of their homes. The main boulevards and streets are designed in accordance with the existing topography. They take into account the existing grid in order to provide a comprehensive network of streets and public spaces that are essential not only in limiting urban sprawl, but also in contributing to a compact and connected city. Implementation of the plan will benefit residents and the city as a whole as management strategies aimed at reducing hazardous risks have been adopted.

An Urban Structure plan is mapped through structural urban planning, as a tool for managing demands of development in larger areas with tenure held by multiple owners in an integrated and organized way. Its aim is to achieve sustainable management of natural and physical resources in an urban context. Also the aim is to act as a source for the composition of a land use map. Knowledge gained from participatory gatherings regarding already existing structures such as paths, roads, public spaces and centres of activities are taken into consideration while creating the Urban structure plan. The awareness of this will create a better connection between existing settlement and the new development area. Structure plans provide the foundation for a modulation in activity centres by defining the preferred direction of future growth and articulating how this change will be managed.

The process also incorporates a strategy to identify priority interventions at the sub-metropolitan level and scalable projects at the neighbourhood level, resulting in a list of specific actions that have been discussed with, and prioritized by the government and community groups. This approach will have a direct impact on the quality of life for residents by improving access to main streets, residential streets, public spaces and marketplaces.

Structure planning is to be used to:

The structure plan is used to pre-identify and propose a given urban zone (residential, centres, business, public open space, special purpose zones) to a land that is being urbanized in the upcoming near future in means to prevent any conflicts and informal growth.

The structure delve into:

- Identifying the scale and densities of the urban areas, mix-use pattern of land uses and open spaces; making sure that the pattern is balanced and not mono-functional.
- Ensuring enough space for the street network in order to reach a better connected city
- Protect existing features
- Prevent any development in risk areas to achieve resilience
- Establish urban development and support infrastructure that can lead to a more efficient and sustainable communities
- Create liveable neighbourhoods
- Ensure the support of the proposed land uses and involve key stakeholder, landowners and the community in the development of the structure plan.

PARTICIPATORY APPROACH

From the very beginning of the Urban Development Initiative, the community's participation was required to obtain a meaningful project. The maps, developed with UN-Habitat's Urban Planning and Design LAB with the support of UN-Habitat Office in Haiti, of the neighbourhoods were proposed to the community, who gathered to proofread, validate, amend and make alternative proposals when necessary. This approach to community mapping of the main social, spatial, economic and environmental characteristics of the area enabled multidisciplinary working groups to draft a strategic vision and an urban structure for Canaan. As a result, several social and infrastructure projects that respond directly to the priorities of the local residents has attracted funding for the improvement of streets and public spaces and some are currently being selected for implementation.

The core of UN-Habitat's approach to neighbourhood planning is participatory planning. In developing the provided analysis and recommendations, UN-Habitat worked with each community to organize and conduct multiple workshops. The result of this deep stakeholder engagement was the review and comment on hundreds of detailed plans and a trove of invaluable community insights.

The planning area consists of 15 different neighbourhoods, 12 of which are included within the public utility boundary of 2012. Village des Pêcheurs and Onaville are separated in two, a part of land is located within the public utility boundary and the other is out. On the other side, the newly developed neighbourhood of Philadelphie is completely outside of the boundary.

As a part of the Strategic and Urban planning process of the Canaan area, UN HABITAT organized a series of workshops within the 15 blocks that creates Canaan. These various meetings supported the American Red Cross through their mobilization of partners such as UCLBP, USAID and the Haitian Red Cross and reached other volunteers willing to take part. Members of various neighbourhoods and important people of the community played a leading role during these occasions. Noteworthy is also to stress the importance of participation of young people and women in order to make their voices heard and come up with a wider perspective.

Since the plans were advertised for public comment, and were required to be assessed and endorsed to any necessary modifications, this process helped in refining the final structure plan of the city in means to reach a balanced and harmonized overall structure.

The participatory approach was a key component to reach a visualization of the local structure plan which includes details on housing and densities, road layout, pedestrian and cycle network, public open space, educational facilities, servicing infrastructure, community purpose sites and economic activity centres' locations.

Fig.4: Workshops with the community @UN-Habitat

THE CASE OF HAITI

The area of study for the development of the urban structure consists of the land inside the limit boundary which is defined in the map below (in red). The limit encompasses the fifteen neighbourhoods of Canaan wider area and it edges the national roads from the south. The boundary from the north follows the topography of the area to an extent where future development is still possible and where the terrain is not too steep.

Codification of the 1963 law:

Depending on the state of the site, the history of the city and the current trends of the different types of activities (commerce, industry), zones will be classified as follows:

a) Special residential zones,

b) General residential zones,

c) Special business areas,

d) General business areas,

e) Special industrial zones,

f) General industrial zones,

g) Areas with hazardous substances,

h) Areas with hazardous goods,

i) Open areas for public squares,

j) Special area for agriculture,

k) Normal agricultural zone.

This zoning classification of Haiti is over 50 years' old and is in need to be updated in order to follow up with the new urban planning trends. For example, the two first codes related to the residential uses, only differentiate between special and general residential areas. Following UN-Habitat's principle 2, it is recommended to have multiple densities in one city; low, medium and high. However, sustainable cities always advocate for high density creating as such a more connected and compact neighbourhoods. Haiti's law of 1963 does not mention in its land use the reservation of lands for public services like schools, health and administration. It is the right for every person to have access to these services and therefore every city has to ensure a fair distribution of facilities within a walking distance from settlements. More to that, the Haiti law does not acknowledge the importance of mixed-use areas where commerce, residential and public services are found in one place connected with an adequate hierarchy of roads. This principle 3 of UN-Habitat that encourages multi-functionality helps in reducing car dependency and promotes walkability.

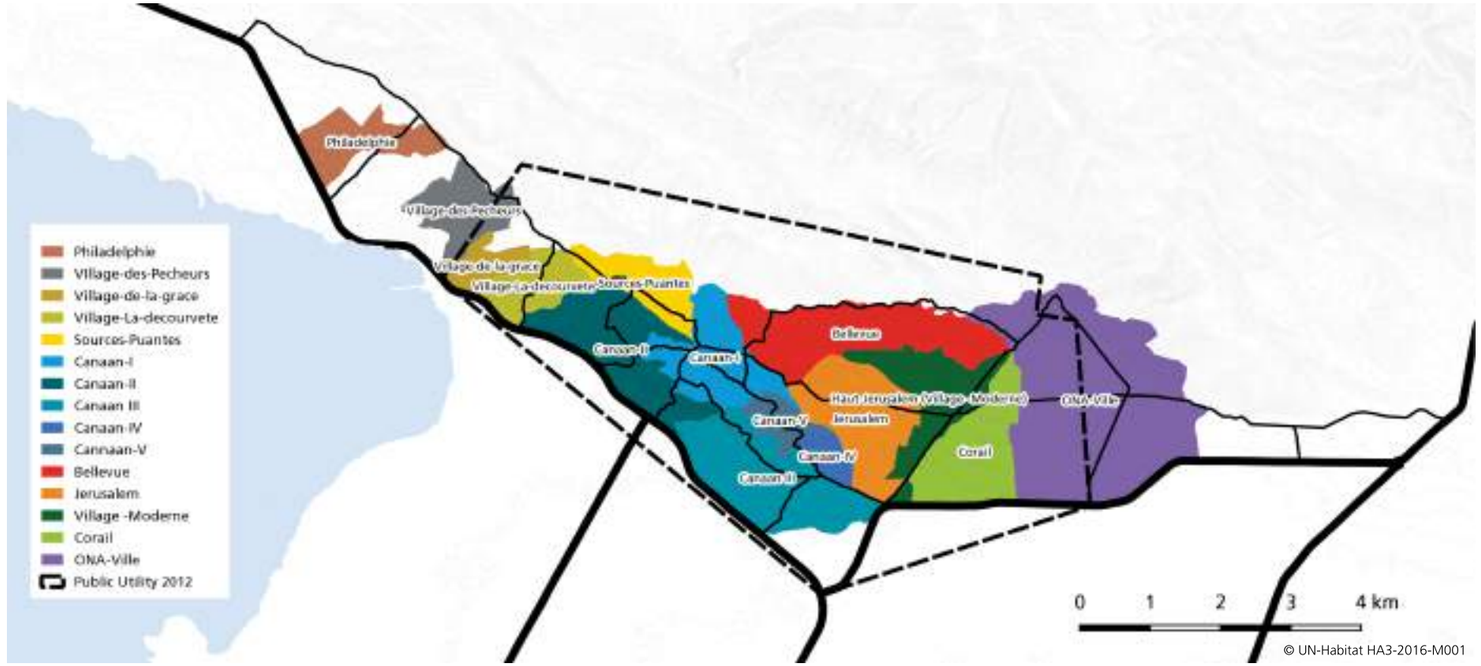


Fig.5: The fifteen neighbourhoods in Canaan

MACRO ZONING AT CANAAN SCALE

The Macro zoning sets out the vision of the future development of Canaan in terms of where development can happen and where it is limited. The zoning plan will serve as a reference for the implementation of future public and private investments.

It allows to visualize: 1) the delimitation of urban areas, extension areas and land not suitable for urbanization as well as providing 2) a realistic proposal of regulation which describes, for each zone defined in the land use, the applicable regulatory provisions.

A zoning plan identifies:

a) The Urban or the existing lands are areas where the composition of the structure is in need for upgrading and where densification strategies are encouraged. The restructuring is applied to existing urban fabric and its aim is to minimize transport and service delivery costs, optimize the use of land and support the protection and organization of open spaces. They can provide benefits in terms of street life, economic viability of activities, proximity and walkability. Types of strategic interventions can include suburban densification, area redevelopment and slum upgrading, brownfield development and transit-oriented developments. Urban infill, densification and renewal can reduce unnecessary consumption of valuable land in the cities' surroundings. These lands requires a solid participatory approach with the community as lands are already occupied. A conversation with the inhabitants is therefore required throughout the whole process in means to validate the existing, review and propose the final use of land.

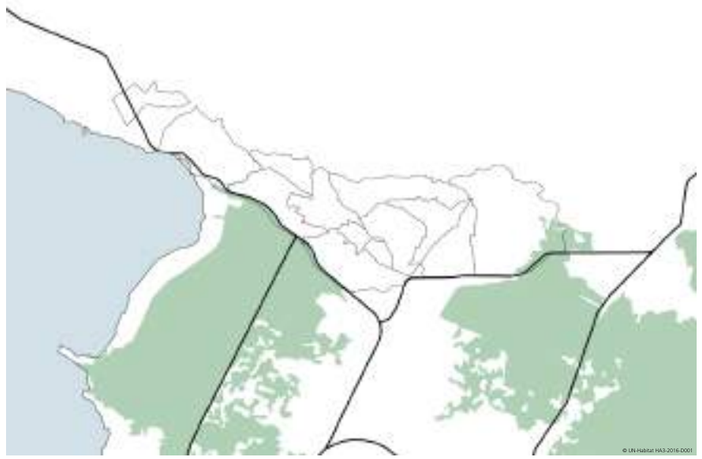
b) The extension areas are areas where possible construction is likely to take place once it is equipped with road, drainage, water and electricity network. The extension areas of undeveloped lands address the pressure for affordable housing and accessible basic services for the growing urban population. This can be achieved through the identification and structuring of planned extension areas that are in proximity to the existing urban fabric and at an adequate scale. In some cases it is not possible to develop extensions contiguous with the existing city. This is particularly relevant when issues of balancing population distribution and expanding the national system of cities are critical.

c) Natural areas or foresteries that needs to be protected are considered as no-built areas in order to preserve their natural character. Future development cannot take place in these lands and they are advisable to be spared from exploitation of built objects. They are also defined as areas where occupation and construction is forbidden for many reasons like environment risks, topography complexity and others. Sometimes, they can be also assigned as protected areas and their purpose is to help mitigate climate change effects.

In Canaan, there is no legal document that prohibits the construction in vulnerable areas. Therefore, legal regulations should be considered in order to prevent any settlement and aim to reduce as much damage to the natural ecosystem as possible.

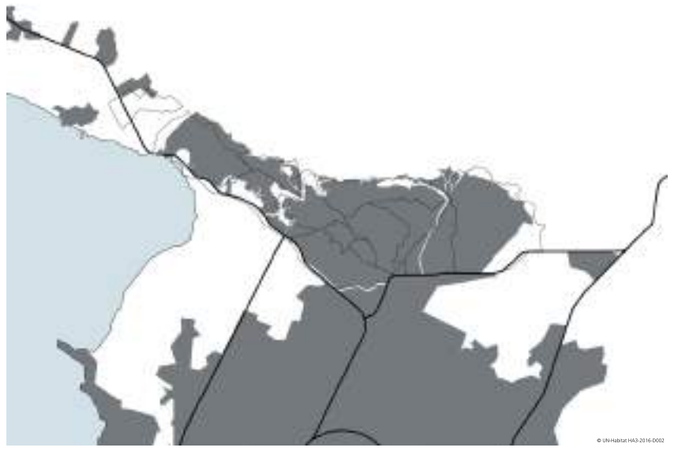
d) Agricultural areas are to be protected due to their agronomic, biological or economic potential offered by the land. Only structures linked to agriculture or to the public services are authorized. It is an area of agricultural interest where the priority of sustainable development is given to agricultural activities.

Agricultural areas



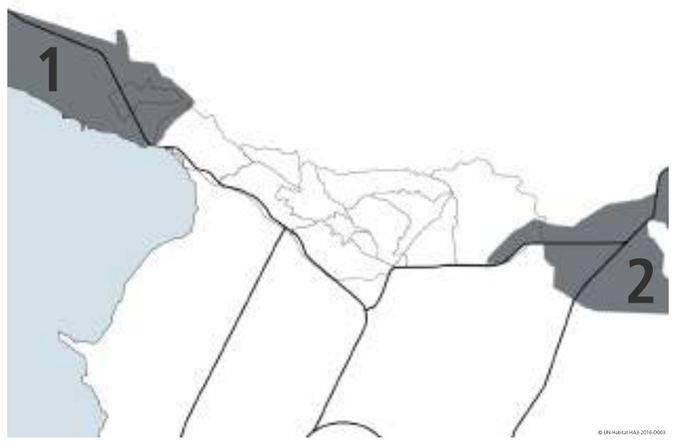
The agricultural areas are mainly located on the plain of Cul-de-Sac and in particular in the western region between Route 9, the coast and the north of Croix-des-Bouquets and on each side of the RN3. Despite the fact that these lands are often flooded, due to their locations, it is highly recommended to preserve them as such, while applying mitigation measures. The community could benefit from agricultural areas for activities and as green spaces acquired in the city.

Existing urban areas



Urban areas or existing areas are spreading rapidly in an informal manner in Canaan. The concentration of human settlements is abundant in the centre, as well as in the north-eastern part. While some areas are already condensed and leave no room for densification, others however have the potential to be in-filled. Densification should goes hand-in-hand with the consultation of the inhabitants already in place. Road network can be modified and blocks can be merged in order to create bigger ones with higher density. Infill does not only mean providing residential uses, but also public services and commerce that respond to the growth of the area. It is also common to change the land use of existing functions from residential to commerce depending on the scenario and the location.

Extension areas



There are two main areas for extension in Canaan, one located on the north-west of the area of study and the other one on the eastern side.

Area 2 is not suitable for extension and presents a high environmental risk. The area is often flooded and an extension approach will requires mitigation and climate change prevention measures.

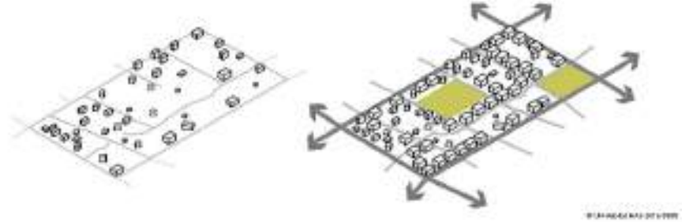
The focus of the extension is therefore shifted to the area 1 where growth is possible with no confrontation to risks. A meticulous study of the road network grid as well as the distribution of basic services is required from the outset in means to achieve a sustainable development.

No-built areas

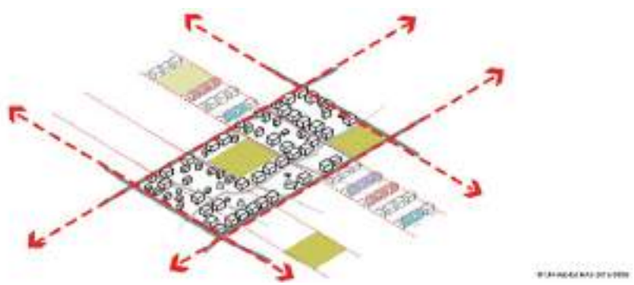
Areas that cannot be urbanized are concentrated mainly in the north of Canaan. This is due to the natural topography and the steepness of those areas which do not allow any development to occur. Areas around rivers and ravines are also considered as protected areas for they are highly prone to flooding. It is mandatory to create buffer zones to mitigate environmental damages.

Strategies and approaches to follow:

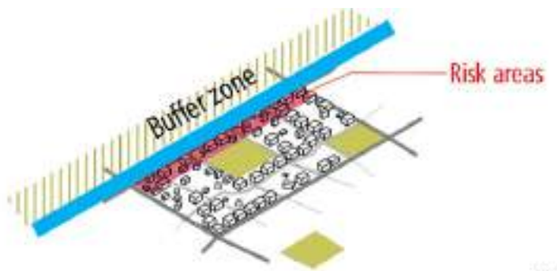
Densification, infill and renewal



Extension



Prevention and mitigation



Macro-Zoning plan in Canaan

Fig.6: Macro-zoning plan in Canaan.

LAND USE

A land use plan offers a vision for the future possibilities of development in neighbourhoods, districts, cities, or any defined planning area. It gives guidance and standards for planning and land requirements of the different uses (residential, public service facilities, commercial and industrial uses) and should be used during the city-wide strategy planning to guide the development of urban plans. Land use plans define and control where certain activities can take place and where various uses can be permitted. The land use plan also looks in assigning special areas of spiritual, ecological or cultural importance for protection, and areas designated for development as well as non-aedificandi areas.

In order to select the best land-use options, various assessment of land and water potential needs to be completed. Also, studies on the impact of the land use on the environment and the community should be conducted.

Adequate space for streets and an efficient street network

PRINCIPLE 1

30%

15%

Street network

- National roads
- Arterial roads
- Main roads
- Secondary roads
- New streets

Public spaces

- Public spaces (Squares, market, park...)

Mixed land-use: developing a range of compatible activities and land uses close together in appropriate locations and flexible enough to adapt over time to the changing market.

PRINCIPLE 2

30-50%

At least 15,000 people per km²

Residential areas

- Low density
- Medium density
- High density

At least 40 per cent of the floor space is allocated for economic use in any neighbourhood.

PRINCIPLE 3

40-60%

10%

Commercial

- Commercial activities (Mixed uses)

Industrial areas

- Light industry
- Heavy industry

Public services

- Education
- Health
- Other public facilities (sports, cultural, etc.)

Promote agricultural preservation

- Agricultural land

The reserve of land for environmental uses

Zone Non-Aedificandi

- Open spaces
- Livestock
- Reforestation
- High environmental risks areas
- Quarries

Urban Infrastructure are the backbone of the health and well-being of any society

- Water and sanitation
- Electricity and energy
- Waste removal

2.1. STREET NETWORK

The urban structure of a city relies significantly on its street network as streets provide the backbones for activities of urban agglomeration that promote sustainability. Planning the street layout in advance is a crucial part of sustainable development. A land-use plan must categorize the street network according to the hierarchy of existing and planned roads; national, arterial, main and secondary streets. This eventually results in improved traffic circulation and quality of life especially in residential areas. Additionally, the public transport system, pedestrian paths and cycling should be prioritized before the private automobile when planning the network of roads. If adequately planned, the street network will ensure an ease of movement, good accessibility to public and basic services, as well as safety for the inhabitants of the area.

Topography of the city both limits and helps the development of a road layout that aids in urban circulation. Altimetry is a deciding factor in assigning the appropriate hierarchy to the proposed roads and creates a grid that guides the rest of the urban structure of the area. It is important to identify and categorize the existing roads and their function, condition and importance to the city. If formulated appropriately, this will create a better connection between the existing settlement and the new development area

UN-HABITAT PRINCIPLES

The first of UN-Habitat's five principles for sustainable neighbourhood planning revolves around the provision of adequate space for streets and an efficient street network. Roads should encompass at least 30% of the land and have 18 km as a minimum of street length per square kilometre. The principle aims to develop an adequate level of street network that does not depend only on vehicles and public transport, but also promotes walkability by providing for example pedestrians and cyclists lanes. The principle also highlights the importance of the having a street hierarchy with arterial roads and local streets based on traffic speed differences. This will help shape the urban structure by defining block sizes.

The grid varies accordingly with the density, in high density cities, the surface coverage of roads must be high as to prevent congestion. In such density, 20-30 per cent of urban land should be allocated for roads and parking.

Street network and mobility

The street network must be well integrated within the proposed land use of the city in order to have a rich urban structure. The planning of the network (roads, public transport, cycle and pedestrian networks, parking) must ensure that the roads are safe, direct, legible, attractive and well connected. The road network and hierarchy of streets are two aspects that must be relied on to support the movement of different types; pedestrians and vehicles. As an interconnected area, it must be accessible first to pedestrians, as this will likely continue to be the primary form of mobility, while including multiple access points to and from the area for service vehicles and public transport.

The planning of the land use should go back and forth with the roads' grid as they are eminently dependent on each other. For instance, commercial areas should have bigger roads than areas that are strictly residential. It should also take into account the accessibility to public facilities and amenities, public spaces and economic centres, and make sure inhabitants can easily access them. Ideally, residents should be able to reach the above mentioned facilities within a moderate walking distance.

Intersections are extremely important not only in defining different block sizes, but also in mitigating traffic and congestion. The distance between the different types of roads are the constraint for the street grid design, urban structure design and neighbourhood size.

The design of the street network must follow the following aspects in means to reach a sustainable mobility:

- Streets must be walkable and cyclist friendly, this can be measured by the walking distance to main services; this is usually from 400 to 450m taking approximately 15 minutes.
- Walkability should be reinforced with public transport catchment where the suggested distance between two arterial routes is between 800m to 1km. This aspects usually defines the urban structure design and neighbourhood sizes for the street length per square kilometre must be no less than 18km.
- Road hierarchy is mandatory for that it creates a balance between street and other land uses. It has a huge impact on reducing and preventing congestion.
- The planning must provide sufficient parking space.

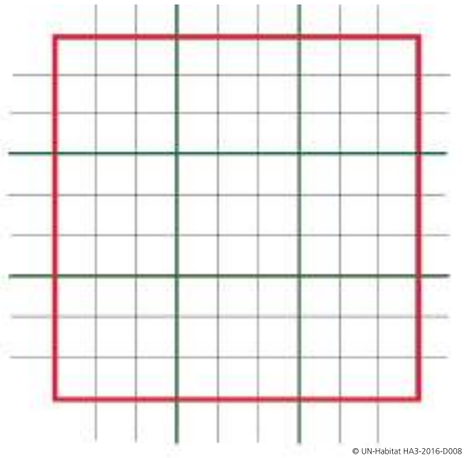


Fig.7: UN-Habitat Principle 1 on street network

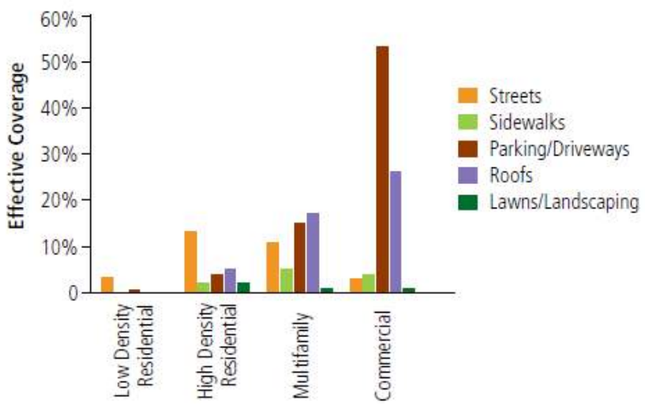


Fig.8: Principle 1 : Surface coverage.
Source: Arnold and Gibbons, 1996

URBAN PLANNING REGULATIONS IN HAITI

In Haiti, the absence of a framework law defining the basic principles of urban planning at all level raises many questions for urban planners. Another concerning matter is the insufficient use of laws and regulations as well as the lack of updated legislation.

To facilitate the research and to provide urban planner with a quick comprehensive view, CIAT has grouped several regulatory and legislative texts into one document entitled "Lois et Règlements D'urbanisme". The document present in general the possible land uses classification without getting much into details. It mentions the four types of streets in the city (national roads, arterial roads, main roads and secondary streets) and links them with the typography. The bigger the width of the roads is, the less its slope should be. The hierarchy of roads in Haiti are as such:

National roads are defined as heavy roads for high speed and without crossing. Minimum width is 32 metres with a slope of no more than 5%	**32 m**	**5%**
Arterial roads receives traffic flowing between different parts of the city. Minimum width is 23 metres and the maximum slope is 5%	**23 m**	**5%**
Secondary roads connects the local streets to the main ones. Minimum bounding 15 metres with maximum 8% slope.	**15 m**	**8%**
Local streets provide access to plots and residential areas. In general, it should lead to a connection path. Minimum width is 13 metres, however in steep areas where the slope exceeds 25%, the width may be reduced to 10 metres. The slope of the road must not surpass 12%.	**13 m**	**12%**

Fig.9: Street dimensions and slopes percentage.
Source: Lois et règlements d'urbanimse, CIAT

HAITI ROAD HIERARCHY

In order to determine the proper specifications for the new roads in Canaan, UN-Habitat's principles for mobility and Urban Planning Regulations of Haiti have been aggregated. There are few precedents for this type of development and therefore the existing structure of National Roads, the adhoc street network built as a result of the increasing informal settlements, and the complex natural landscape have been taken into account in order to create the hierarchy of streets. Many of the choices about the street network were made in order to promote the largest and most accessible network of streets in view of a disaster, poverty and social inequality-resilient urban area.

Fig.10: Existing national road in Canaan.

NATIONAL ROADS

The National roads RN1 and RN3, which wind their way through the south of Canaan, are important connections to the adjacent areas of Northern Port-au-Prince. This means that they are both important lateral connections for the new urban area and provide a fork that acts as a barrier for limiting growth of the new settlements.

It is also therefore proposed to establish at least two significant transit centres (nodes) alongside the National road in the south. As a way of augmenting the connectivity of this, six perpendicular connecting arterial roads stretching from the north to the south are proposed. It is suggested that the national roads should be widened to be able to establish a service lane or side road. This will encourage separated functions along the road, and promote more pedestrian walkability along the sides because of the lower speed of traffic. This non-motorized transport (NMT) connectivity is also augmented by creating pedestrian bypasses. National Roads do not necessarily have to be free of commercial activities on the sides, and should also not be seen as designed strictly for motorized traffic. If bicycle lanes are not established immediately, the side roads should be limited speed for motorized vehicles and shared spaces for slower moving cars and other NMT vehicles.

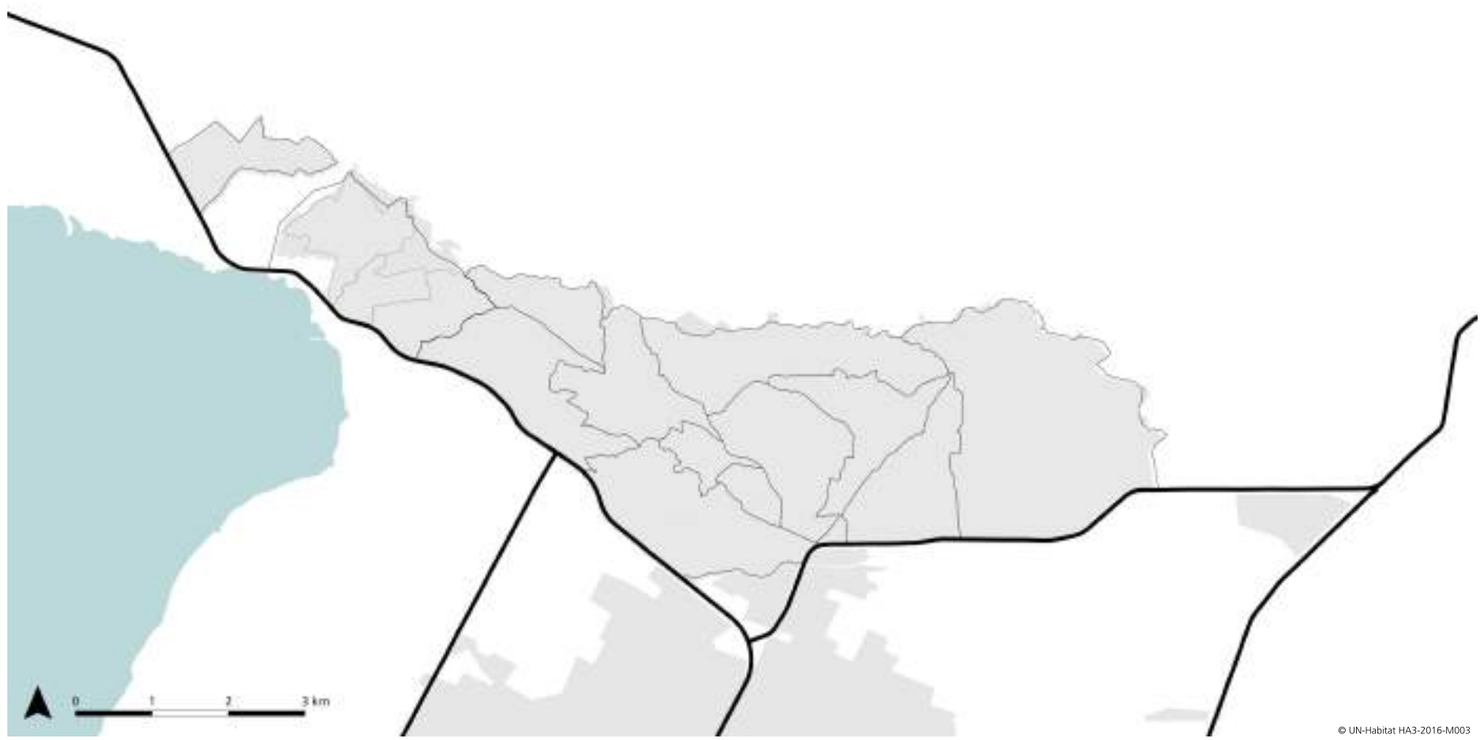


Fig.11: National road in Canaan

ARTERIAL ROADS

The arterial roads (green) serve as the main connections throughout Canaan. Setting aside space for this type of street is highly recommended since the dimensions of much of the available space currently are too narrow to serve as an arterial road. The existing boundaries vary between 17 and 12 metres. There are also no paved areas that function as a way of encouraging walkability and the physical condition of the streets is insufficient for easy manoeuvrability.

A standard width of a minimum of 23 metres is considered suitable if the slope does not exceed 5 per cent. The width has been established from a combination of the Regulations issued by CIAT in 1982, the UN-Habitat normative recommendations and the mobility report. If the consequences of the widening of the streets are too disastrous for the already built environment a secondary alternative for dimensions of 18 metres are suggested. Some of the arterial roads serve to vertically connect the less populated areas in the north and west with the southern denser parts.

Six arterial roads are to be established throughout the area that wind in a northeasterly direction with a distance of roughly 400 metres between them. It also seeks to relieve pressure from traffic from the National road, currently considered the most strained connection in the region.

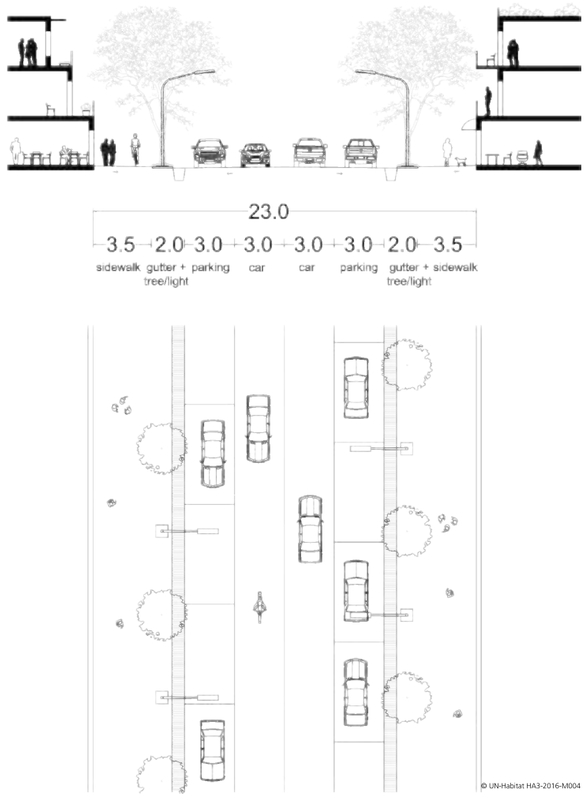


Fig.12: Section and plan: arterial road , 23 metres

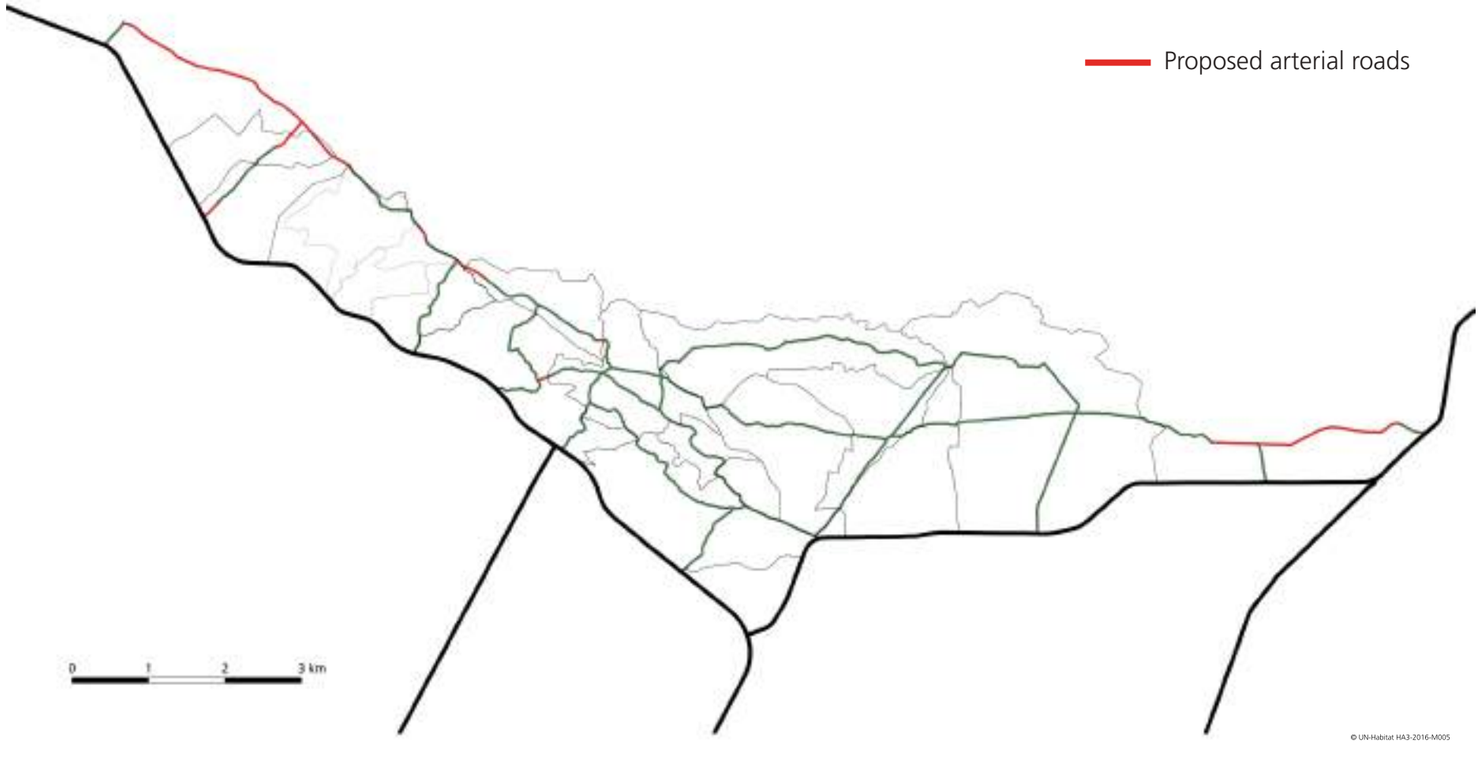


Fig.13: Proposed arterial roads in Canaan

MAINS ROADS

The main roads (yellow) connect both the neighbourhood boundaries with each other as well as the local parts of a specific area. The dimensions of the main roads currently vary a lot. In some junctions the streets might reach a width of 16 metres whilst in others the width may be only 8 metres. There are generally no paved areas of main roads and at some parts, the street conditions are insufficient for mobility.

The regulations issued by CIAT states directives for the streets and also the acceptable topographical grade for each street. The suggested dimension for a main road is 18m in width if the incline does not exceed 8 per cent. In some circumstances where the streets are narrow, the allowance is set to 12 metres. The flexibility of this street typology is important as it prevents monotonous neighbourhood structures. The blocks that appear in between the network of main roads, should in principle have an average dimension of 300x300m.

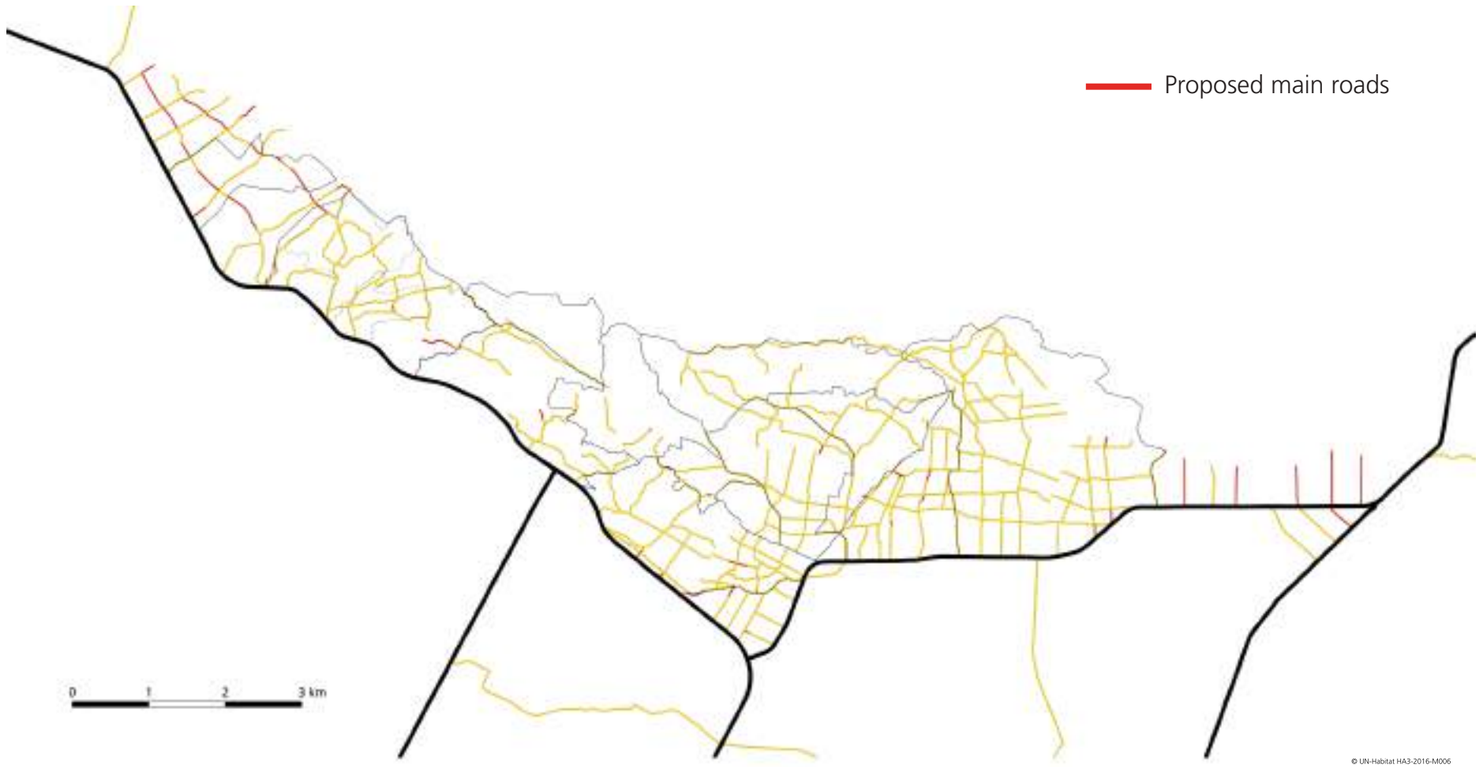


Fig.14: Proposed main roads in Canaan.

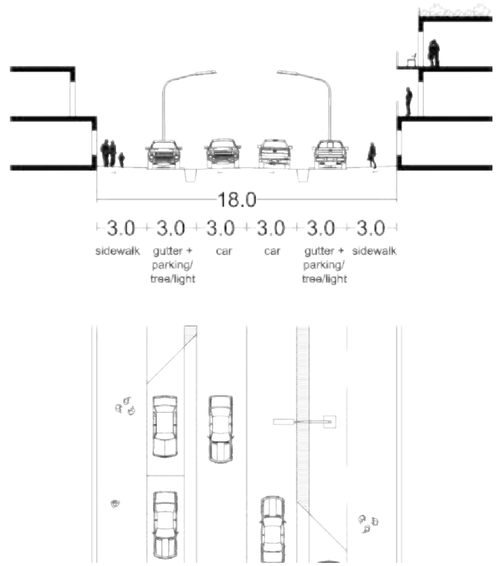


Fig.15: Section and plan: main road, 18 metres

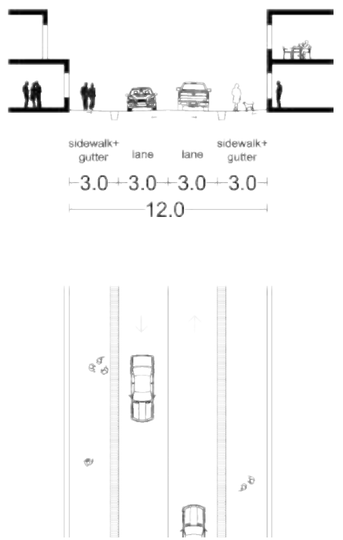


Fig.16: Section and plan: main roads, 12 metres.

SECONDARY STREETS

The secondary streets (white roads shown on the map) are the smallest roads that create a very intricate network of streets and blocks. The dimensions of current secondary roads are around a maximum of 8 and minimum of 4 metres in width. The dimension of the blocks typically extend to approximately 100x100m.

The regulations issued by CIAT propose a minimum bounding of 13 m if the steepness exceeds 25 per cent. Cases where the incline does not exceed 12 per cent can have a width of up to 10 m.

Exceptions can occur since the implementation of the street network may interfere with the existing built environment. A range of between 9 and 12 metres is therefore suggested in consideration of the UN-Habitat principles and the mobility report.

Some suggestions of certain street connections were abandoned during the process, for reasons of topographical challenges. Therefore, the recommended connectivity levels can not be obtained because of the steep topography.

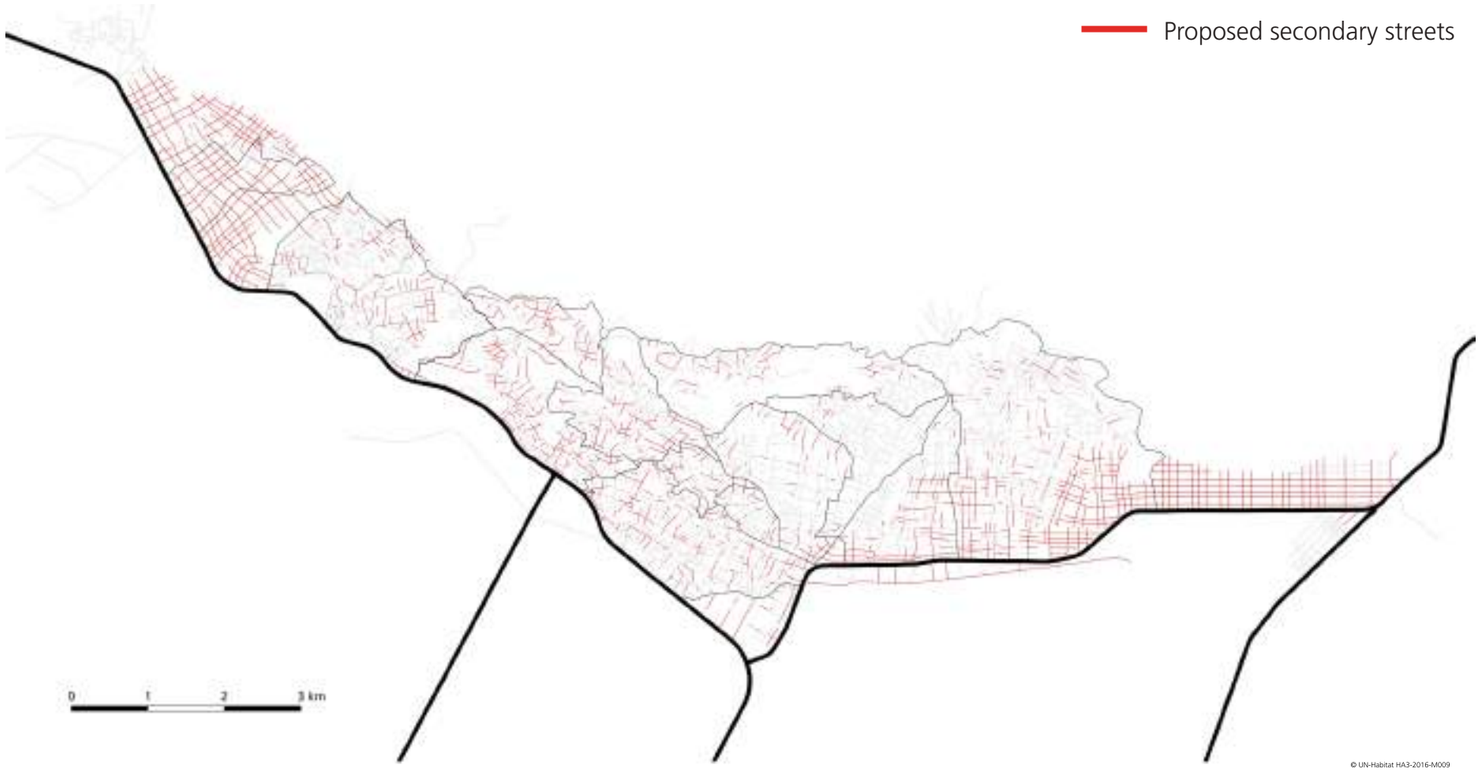


Fig.17: Proposed Secondary streets in Canaan

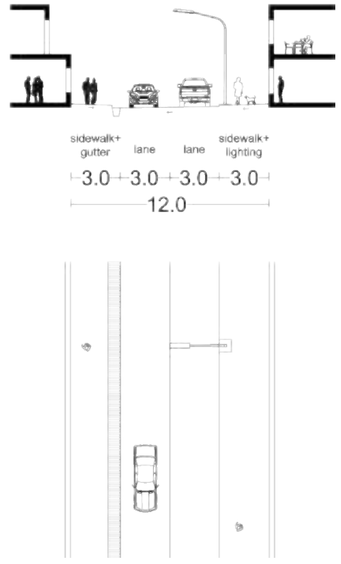


Fig.18: Section et plan: Secondary road, 12 metres.

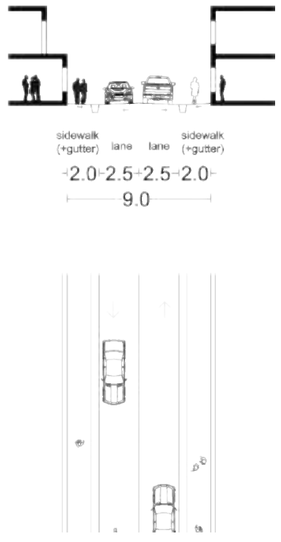


Fig.19: Section et plan: Secondary road, 9 metres

STEEP SLOPES

In order to establish the street network, the steepness of the topography has to be considered. Significant issues can arise from steep slopes, for that it is important that municipal planning boards consider the consequences before allowing development. Development of roads is not recommended in areas with very steep slopes because of potential consequences of erosion and landslides. Also, steep slopes limits the access of emergency vehicles to access the areas on the hillsides. It is recommended that the roads follow the natural topography of the terrain.

In certain parts of the area, where the terrain is very challenging, the recommended street dimensions have to be decreased, modified or even cancelled. This differs according to road type, the wider the roads are, the more complex the structure and the materials are. A flexibility in defining the road widths is therefore advised that depends highly on the value of steepness. Another component is the type of soil in certain areas which is highly prone to landslide. Roads are to be avoided in these location to prevent negative consequences.

The parts in red on the map are areas where the slope is too steep for roads' development. The ones in yellow are also steep areas and wide roads such as arterial and main cannot be developed there. However, the green areas are adequate for any type of roads.

Fig.20: Bellevue, Canaan.

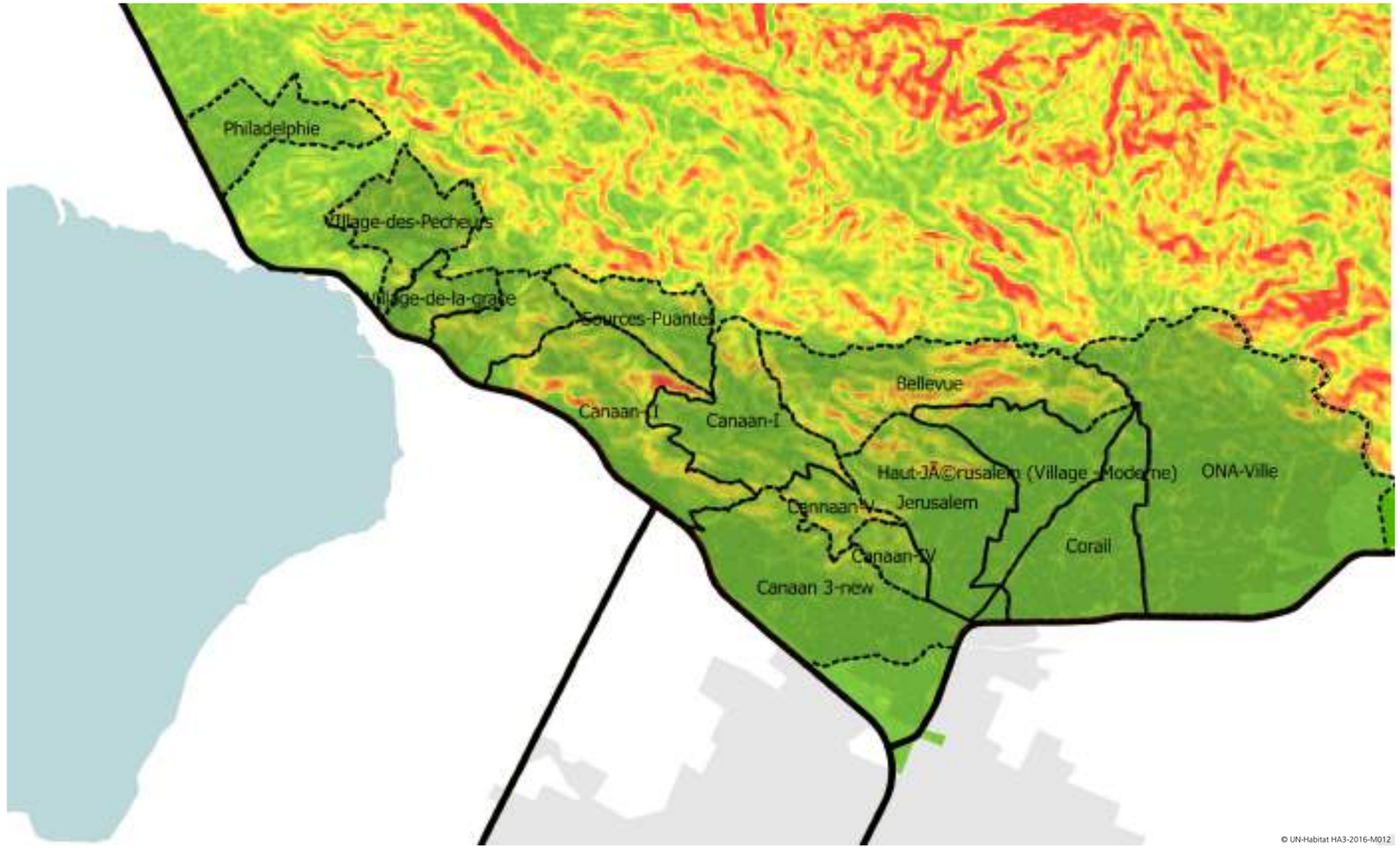


Fig.21: Slope analysis in Canaan wider area

MOBILITY

The quantified approach on the mobility that was conducted by ARCADIS demonstrated that if the population continues to increase strongly and if individual mobility also increases (which is likely in the event of economic growth) road networks will become saturated even with the widening of R9. Therefore it is important to upgrade the public transport in means to reduce saturation and congestion

The propositions are as follow:

- The RN1 will be designated for common transport but also for heavy transport and BRT.
- The proposed arterial road will be for public transport; TapTap and bus
- Bon Repos will be upgraded and will act as major transport hub
- A secondary transport stations will be located on the intersections of the RN1 with R9 and RN1 with the arterial road.
- Tertiary TapTap stations will be located all along the arterial roads
- Ensure a limited number of accesses on the national roads so as not to affect its capacity.
- Encourage the installation of jobs inside Canaan in order to limit travel to Port-au-Prince.
- If possible, dedicate spaces near the RN1 / RN3 to the installation of activities: This location makes it possible to limit the logistical flows inside Canaan.

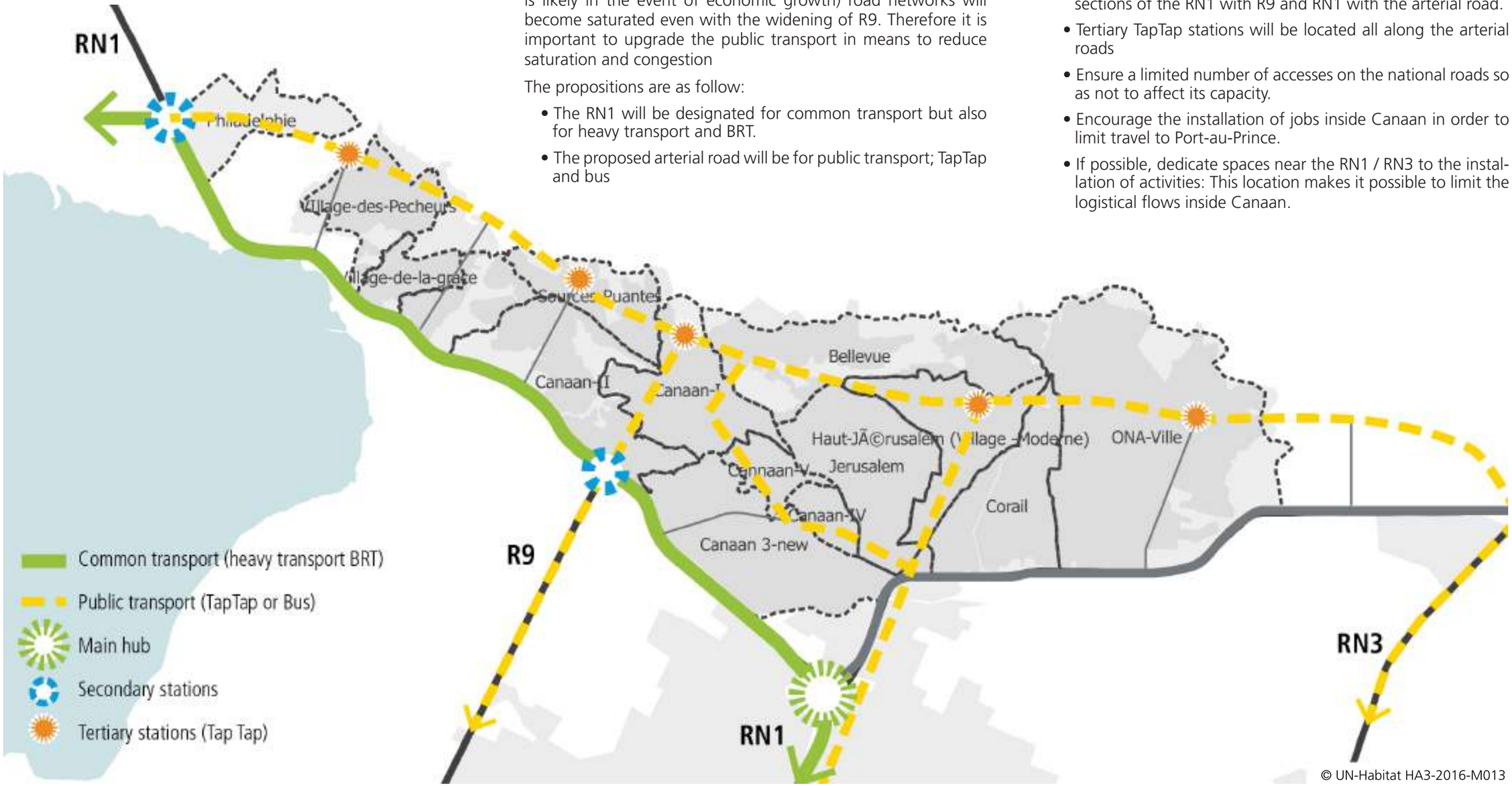


Fig.22: Mobility and public transport in Canaan

Existing Situation

Roads percentage

UN-Habitat: 30%

9%

Proposed street network

Roads percentage

22.5%

Arterial road: 24m
Main road: 18m
Secondary street: 12m

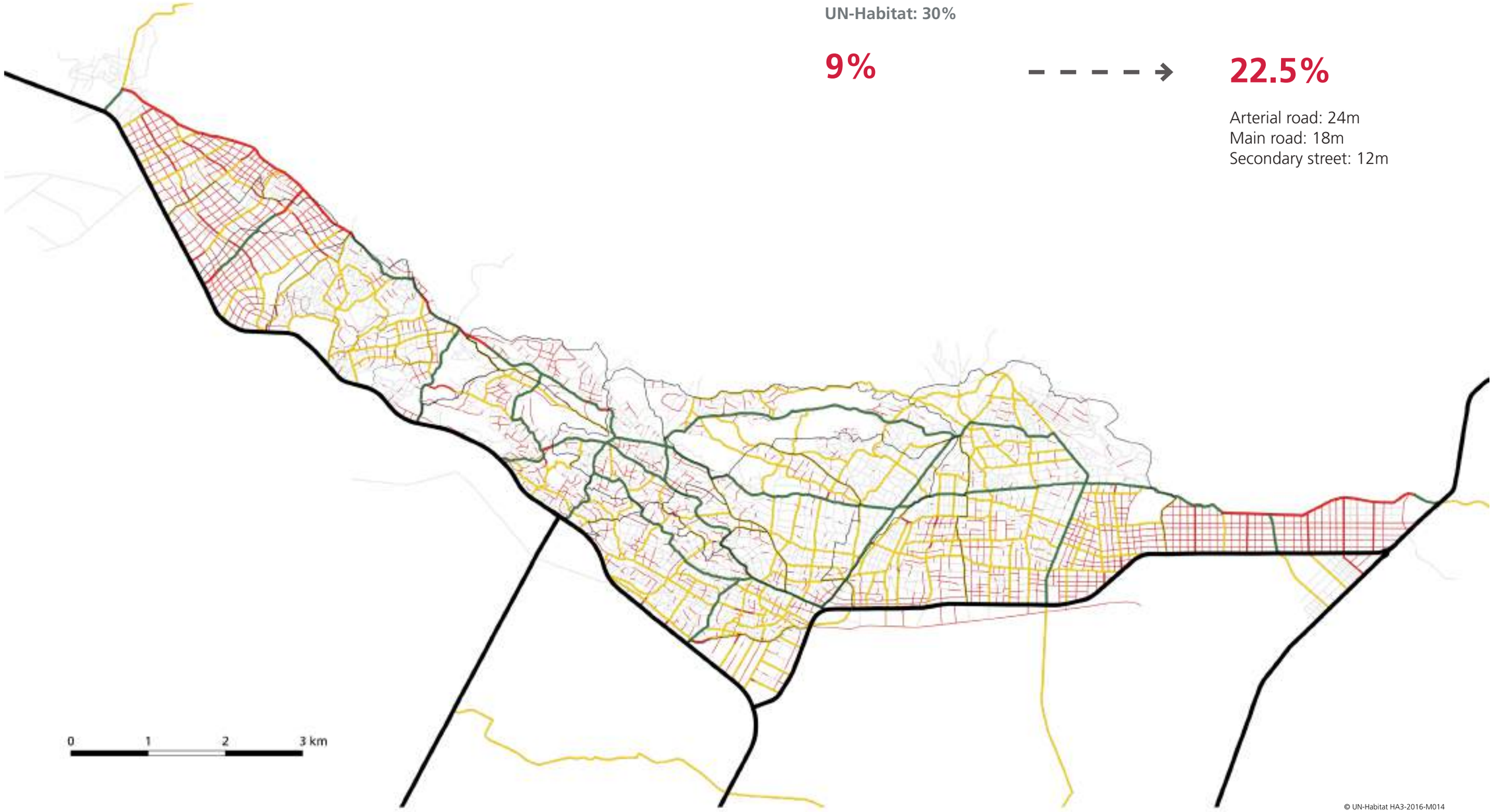


Fig.23: Proposed street network in Canaan

"Public spaces are all places publicly owned or of public use, accessible and enjoyable by all for free and without a profit motive. Public spaces are a key element of individual and social well-being, the places of a community's collective life, expressions of the diversity of their common, natural and cultural richness and a foundation of their identity. […] The community recognizes itself in its public places and pursues the improvement of their spatial quality."

-- The Charter of Public Space --

Public spaces are a key component of successful cities as they help in building community essence, reinforcing civic engagement, facilitating social capital and economic development. Public space, if continuously used as a public good, can lead to better environments that are healthy, safe, and well maintained making the city more attractive place for living and working.

In successful cities like Barcelona, Manhattan and Brussels, the ratio of the public space form 50% of the total land use, where 35% are allocated to streets and 15% for other public uses. For that, a strategy for public space preservation should be taken in consideration in order to meet the demand of future urbanized growth in order to keep up with this ratio. Every inhabitant of the city should have at least one kind of a Public space reachable within a 400m buffer zone. Urban development should consider pockets of spaces for community use such as playgrounds, squares, public markets and recreation parks. Their presence is vital for a prosperous city and they usually serve in the improvement of the social aspect.

Fig.24: Public Space allocation of a sustainable city

Different types of public spaces can be distinguished and can be grouped into five main grades, starting with those that ensure maximum access and versatility:

1. Streets as public spaces:

This first category is the most used in our daily lives and should form the highest ratio among all the other public spaces. Streets, avenues and boulevards, squares and plazas, pavements, passages and galleries and bicycle lanes are all components of this category.

2. Public open spaces:

The second category is the common form that comes to mind when we think about public spaces and that is also used on daily basis. They are usually accessible during daylight and with no charge. In some cities, a privatization of these common goods can be witnessed and actions towards these illegal activities should take place. Those spaces can be parks, gardens, playgrounds, public beaches, riverbanks and waterfronts.

3. Public urban facilities:

The third category is when spaces require high maintenance and are used only during the day such as public libraries, community centres, municipal market, public sports facilities.

The planning of public space cannot be random and their location must be well studied. One public space alone is not capable to create an impact on a city, therefore it is always advisable to have a network of public spaces that are interconnected through an adequate network of streets in means to have a greater impact on the city. For that, the provision of public spaces must be highly visible from streets and of a scale and quality to meet identified community needs. It is always important to recognize that the community are active participants in these spaces and therefore their needs must be prioritized.

To measure how well a public space is functioning, several factors are to be considered:

- Access: finding your way and getting about to the public space must not be complicated.
- Use: The activities in the opportunities that the space can offer must be well defined.
- Maintenance: How clean the space is and how much well maintained it is.
- People centred: The space must caters all different needs of the users, especially the most vulnerable.
- Environmental: The space must be secure, safe and comfortable, especially for women and girls.
- Design and appearance: The design of the space can impact on its accessibility and safety and therefore it should be sensitively designed so to prevent complicated layout.

Hence, for these factors to be met and in order to have well -functioning public spaces, it is always favoured to use participatory approaches for planning and design. As the use of the spaces will be mostly by the inhabitants themselves, they have all the rights to define what are their needs and desires and it is up to the planner to meet their requirements through design. This process can be conducted through assemblies with the community, which is the case of Canaan where community meetings were held to come up with adequate public space design. Also, participatory approaches can be done through other tools, like Minecraft which is a video-game that enables people to design and model spaces virtually inside the game. The Minecraft tool was used to design Bon Repos transport hub and market which is located at the intersection of RN1 and RN3. Drivers, vendors and people from around the area had inputs on the concept of the space and their priorities were taken into consideration for the final design.

Fig.25: Onaville community assembly

Fig.26: Minecraft model of Bon Repos

Fig.27: Reviewed map by the community

Fig.28: Minecraft workshop in Bon Repos, June 2016

Existing situation

UN-Habitat: 15%

0.33%

Proposed public spaces

9.29%

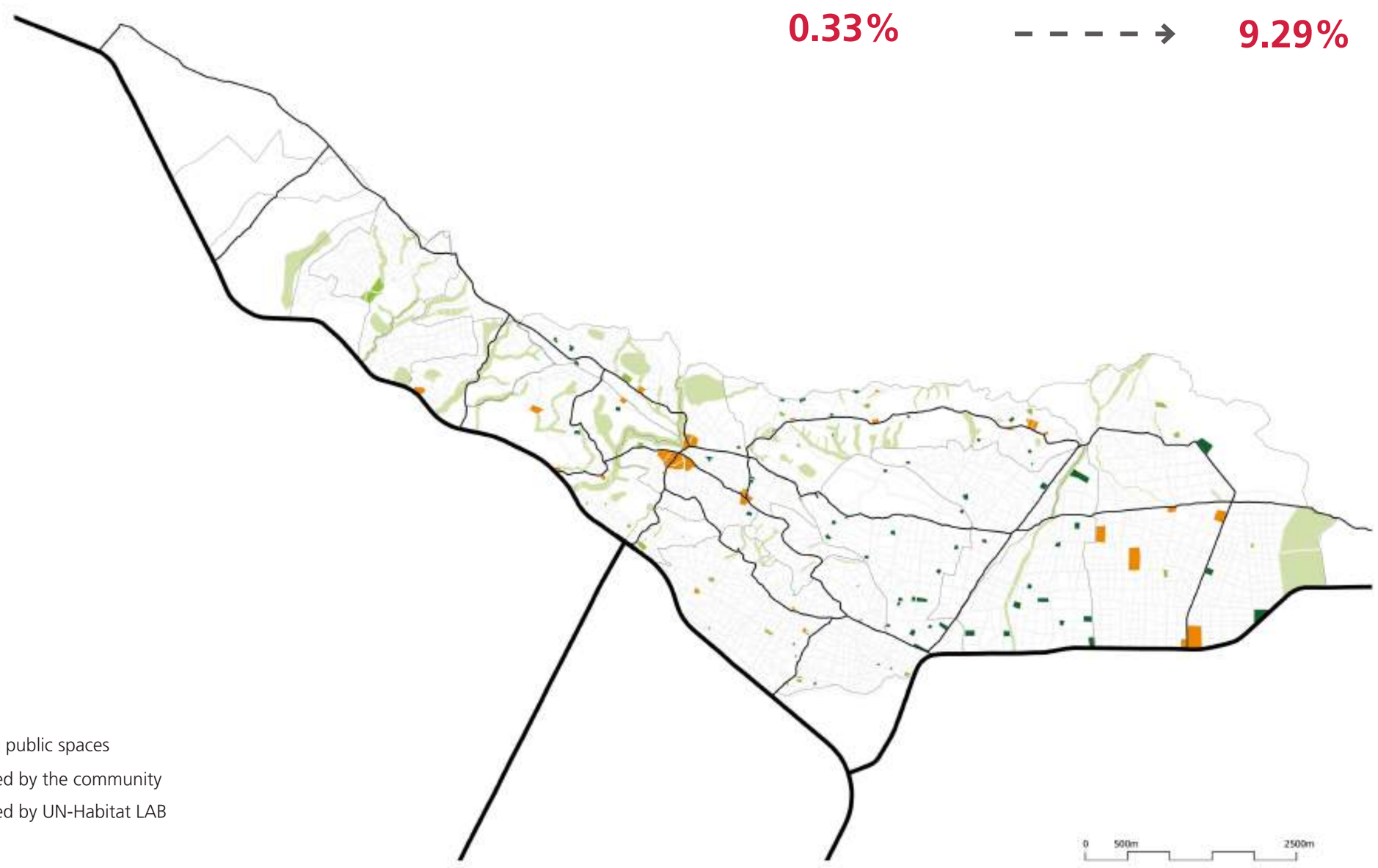


Fig.29: Proposed public spaces in Canaan

2.3. RESIDENTIAL

Cities and towns often consist of different types of housing. Typically this includes everything from small houses to high-rise apartments. A land use plan determines which areas are suitable for residential use. The plan can determine what types of housing are there today and what types of housing may be needed in the future.
Residential areas should be a mix of residential densities and household types sufficient to support the viability of centres, public transport and mixed-use communities and provide housing choices as well as a wide socio-economic mix.
We have categorised the residential areas into three different types according to topography, accessibility and existing settlements. A constant factor, which should be considered at all times is the importance of a mixed land use interlinked with a strong socio-economic mix.
High-, mid- and low density housing areas are suggested based on the style and typographical differences allowed for by the topography. High density housing should preferably be located along arterial roads and main streets. Low density housing appears where the landscape makes construction challenging. The existing dwellings may remain although it is recommended that the site not be built up further implying a low-density site.
Urban compaction aims to increase the built area and residential population densities; to intensify urban economic, social and cultural activities and to manipulate urban size, form, structure and settlement systems in search of the environmental, social and global sustainability benefits, which can be derived from concentrating of urban functions.

UN-HABITAT PRINCIPLES

Principle two of UN-Habitat's strategy for sustainable neighbourhood planning addresses population growth and is a direct response to rapid global urbanization. To prevent urban sprawl and promote sustainable urban extension, it is necessary to achieve high density. High density essentially means a concentration of people and their activities. It is suggested to plan for at least 15,000 people per km²; that is, 150 people/ha or 61 people/acre

Above all, this demonstrates that all communities should strive for mixed land use and socio-economic variety; two aspects of urban planning that must always be taken into account. The fifth principle defines "Mixed Land Use" as ...at least 40 per cent of floor space allocated for economic use in any neighbourhood". Additionally, 20-50 per cent of residential areas are to be preserved for low-cost housing in order to provide a range of different rent levels. Combined rental and ownership property models are also suggested.

URBAN PLANNING REGULATIONS IN HAITI

The environmental disasters that have recently occurred in Haiti have put urban planning on hold. Measures addressing resilience, rapid recovery and mitigating further catastrophes are the current priority. A large segment of the population primarily living in the coastal areas have been displaced and are residing in the Canaan area. In order to register and formally acknowledge these populations on their housing sites, this process must be made as efficient and sustainable as possible and this should be done in accordance with principles expressed by UN-Habitat and shared by many leading urban development authorities around the world.

The aim is to provide a variety of lot sizes, housing typologies and financing packages to cater to the diverse housing needs of the community, at densities which can ultimately support the provision of local services and maximize available housing types. By promoting a high density urban growth, urban sprawl is alleviated and land efficiency improved in order to achieve a more long-term sustainable urbanisation.

Fig.30: Canaan I © UN-Habitat

LOW DENSITY

Low density housing areas are suggested where the topography is too challenging for urban settlements or are located far from main connections and basic services. The already existing housing found in such areas may remain but are not suggested to be further improved or extended due to inaccessibility. In these cases resettlement packages should be offered, including reference to each individual's role in the larger scale of neighbourhood growth.

Low density
8.000-12.000 people/km2

Plot: 400-600m2
Settlement: 150m2
Height: 1 floors
Commerce: 0-5%

MID DENSITY

Mid density areas are defined as where the land is challenging to build new structures that could be densified or the land is completely unsuitable. Areas where mid density is considered may have places where there is challenging terrain, but have some potential for terraced farming, water retention or natural ecosystem regeneration. These areas may be located far from public utilities, facilities and connected roads, but are still appealing to some residents.

Mid density
12.000-18.000 people/km²

Plot: 300-400m2
Settlement: 150m2
Height: 2 floors
Commerce: 10-30%

HIGH DENSITY

High density residential areas are areas where construction of new structures is made easy by the topography and low-erosion levels in the topsoil. It is recommended to establish high density residential areas along arterial and main roads, at junctions as well as in other easily accessible areas. In addition, commercial areas benefit from being surrounded by dense residential areas. The implementation of such areas addresses many challenges within the urbanisation agenda. It promotes accessibility, enhances proximity to work and home and reduces reliance on motorized vehicles thus diminishing air pollution and alleviating road congestion. Densification also enables a social mix while promoting integration.

High density
18.000-24.000 people/km²

Plot: 200-300m2
Settlement: 90m2 – 60 m2
Height: 2-5 floors
Commerce: 30-50%

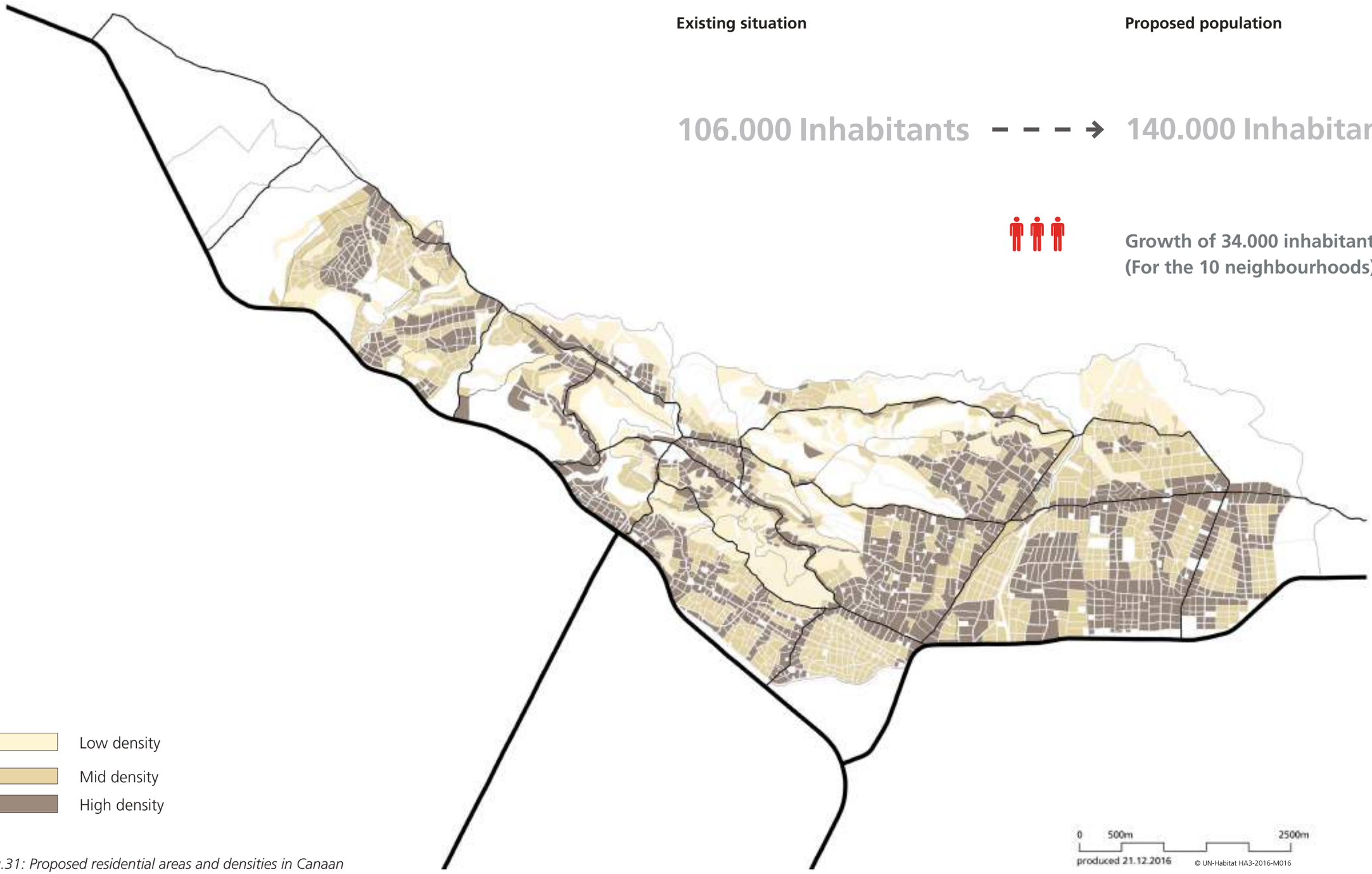


Fig.31: Proposed residential areas and densities in Canaan

2.4. COMMERCIAL

Commercial areas are demarcated areas preserved for economic purposes. Activities with any commercial purpose are included such as commercial services, basic utilities and activities. By the idea of a mixed land use, some of the shops are expected to be integrated with residential areas. Implementing business-focused areas designated for specific purpose will provide stimulating mechanisms for local empowerment by creating new jobs and therefore enhancing the local economic context giving opportunities for economies of agglomeration.
It is imperative that these areas are easily accessible for the inhabitants and should therefore be situated abundantly throughout the neighbourhood. Intersections of the main and arterial roads where such functions are most appropriated located due to topography, accessibility and the location of extant services have formed the bulk of where activity centres are planned.

THE UN PRINCIPLES

The UN-Habitat principles encourage high density mixed land use, which is one of the main factors ensuring a lively street life. Commercial areas should be seen as active streets and mixed-use areas, by also allowing residential uses. It is recommended that services are based on the ground floor of buildings along the street. The principles also stress the urge to foster local employment, local production and local consumption. The ensuing high population density generates sufficient industrial and commercial service demand while mixed land use provides adequate inner-city manufacturing and service space for locally-relevant production. Being able to link demand with supply and thus stimulating a substantial street life that nurtures both residents and visitor's material and spiritual needs while creating a safe and vibrant city life must be highlighted. This coupled with a land use of 20-30 percent of urban land and 40-60 percent of commercial centre land for roads and parking is a key feature of sustainable cities.

HAITI'S CASE

No regulations and restrictions are issued by stakeholders in Canaan regarding commercial services in their local area. There are already many existing commercial activities occurring in the area of Canaan, and this clearly emerged from the daily needs, habits and patterns of the current inhabitants. A reasonable approach is to restore, provide entrepreneurial training and expand presently established businesses.

COMMERCIAL SERVICES

A high population density has been shown to generate a high commercial service demand, and if local services exceed the needs of the public, public spending into the local economy increases in turn. In a self-sustaining community, supply is strongly linked with demand and excess is used for ulterior purposes. This concentration of activity generates a prosperous city street life satisfying people's material and spiritual needs while leading to a safe and vibrant city. Commercial areas in Canaan have been placed along arterial roads, where arterial roads intersect with main streets as well as at major intersections. It is recommended to have a commercial core in every neighbourhood to increase local employment and development potential. The area should be zoned in a more flexible manner, however that ensures an effective ratio of commercial, to public services to residential uses. Plot sizes, shapes and layout around the urban core should be designed so that commercial use can expand efficiently into these areas as the population and demand increase.

LOCATION:

Sufficient commercial activities already exist in Canaan to demonstrate the potential of the area for further economic expansion. The location is considered suitable for such activities since many commercial activities are responding to a local human need while taking habits and daily patterns into account. The second consideration touches on the need for accessibility in that services should be abundant in order to be available for all inhabitants.

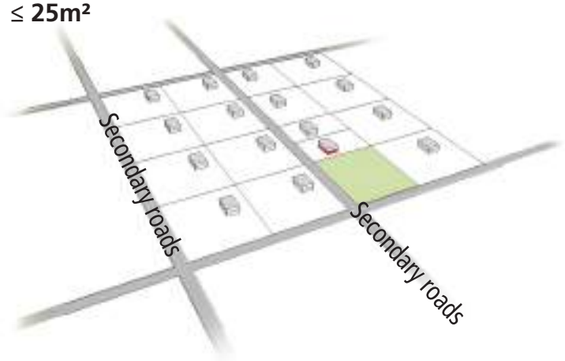
It is also preferable to reduce demand on the road network including likely challenges for vehicle and pedestrian circulation – each neighbourhood must have a central commercial core where basic services are available. This not only reduces pressure on the transport network and pollution but also provides the effect of localizing the availability of services and therefore hopefully reducing travel costs to the end user.

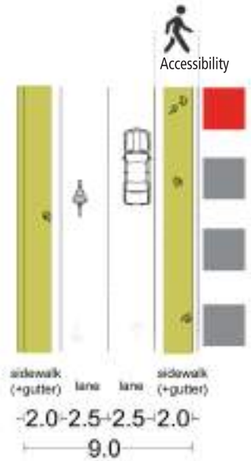
The nodal structure of each commercial area ensures that each neighbourhood has a core at an intersection between either arterial roads, one arterial or one main or two main roads. This means that commercial activities are encouraged not restricted to around hubs of transport availability. As services also are needed on the interior of the residential areas of neighbourhoods leading to mixed land use development, the 'decaying node' structure is used to encourage higher density at the intersections and a progressively lower density on commercial enterprises into the neighbourhoods. This does not mean that residential cores of neighbourhoods are to be completely devoid of commercial activities. There is always reason to promote the growth of small cafés, grocery stores or public service facilities at the core of neighbourhoods but these nodes of community must be limited because of noise and traffic issues.

CROSS-CUTTING: **RESIDENTIAL/COMMERCE/STREET NETWORK**

LOW DENSITY

Small retail
≤ 25m²



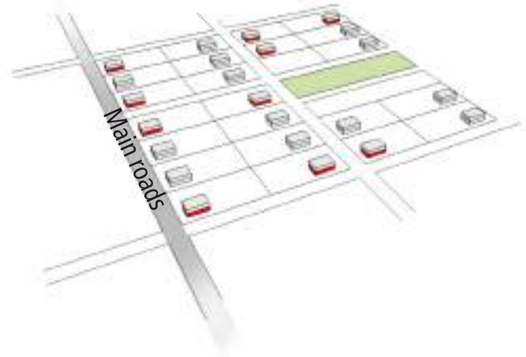


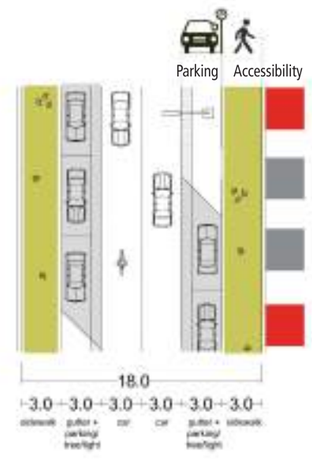
Small Retail:
- grocery
- Drugstore
- Corner store
- Tailor

Low density residential does not strictly consist of housing. Certain types of commerce can also take place in this classification. The commercial uses should be small retail shops with access to a pedestrian path and are often facing a secondary road. These stores usually does not require much time for shopping like neighbourhood grocery shop and drug-stores.

MID DENSITY

Medium size retail
≤ 100m²





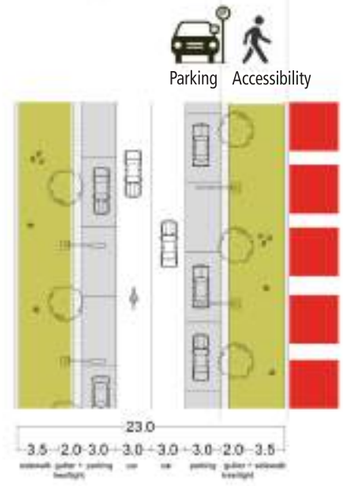
Medium size retail:
- Cafes
- Hairdressers
- Minimarket

etc.

Medium density residential can accommodate medium size retail shops like cafés, hairdressers and mini-market. The users habitually require 30 minutes of their time in those stores. They often face the main roads and are accessible through a wide pedestrian path. It is advisable to have side parking lanes for these kind of uses.

HIGH DENSITY

Big retail and/or Commercial streets
≥ 100m²



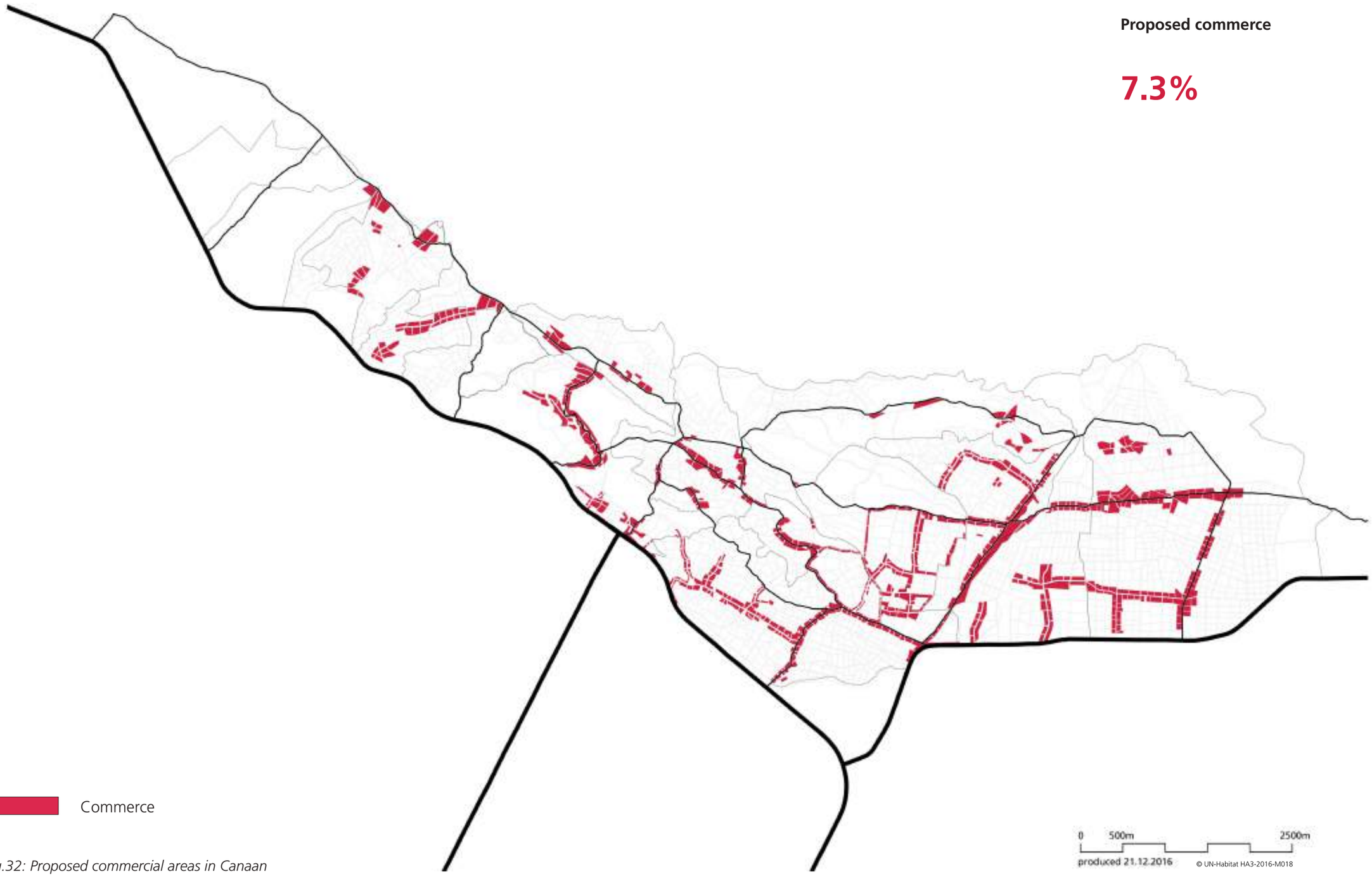
Big Retail:
- Supermarket
- Shops
- Restaurants
- Hotels

etc.

High density residential areas can accommodate big commercial activities like supermarket, restaurants and hotels. Commercial streets can also take place in this classification and shops can occupy the first floor. These commercial services face arterial roads where the pedestrian paths are wide and side parkings are available. The time spent in these services take up to one hour.

Proposed commerce

7.3%



Commerce

Fig.32: Proposed commercial areas in Canaan

2.5. INDUSTRIAL

The land use plan also determines the location of industrial areas. Canaan's industrial sector is to be mostly light industry for example, the storing of products and materials, small scale manufacturing or warehouses, petrol stations and workshops. Heavy industries will likely be located closer to the water and include manufacturing, processing, assembling, handling and storing of products and materials. Sites such as quarries fall under the category of heavy industry. Industries tend to open up large quantities of low-medium-paying jobs, which boosts the income for the entire area, but not the individual salary. As transportation to these areas can be challenging, strategic locations such as along National Roads are proposed in order to facilitate both access for employees and the transit of goods.

UN PRINCIPLES

Industries of all kinds create job opportunities and promote economic development - a key to poverty reduction. Despite the advantages of easy access to workplaces and economic zones that are integrated with urban areas, industries are often separated from people's' daily lives for reasons of health and safety. It is therefore imperative to provide services and smaller commercial outlets nearby industrial areas to ensure people's access on their way to and from work, lessening the challenge of the commute. Additionally, direct vehicular access and frontage to an industrial service road makes the ease of access much less of a challenge for workers and company owners.

Responsibility of industrial areas in Haiti

Société Nationale des Parcs Industriels (SONAPI) is an industrial and commercial autonomous body under public law, whose duty is to implement, promote, organize and manage Industrial Parks in the Republic of Haiti.

LIGHT INDUSTRY

Light industries are defined mostly as facilities that specialize in the storing of products and materials, workshops, small scale manufacturing or warehouses and petrol stations. The harm these activities cause on the surroundings are minor compared to the gain of providing job opportunities within the urban area. It is therefore recommended to place these services in conjunction with commercial and residential areas in a type of mixed land use.

HEAVY INDUSTRY

SONAPI, in collaboration with the US government, established the Caracol Industrial Park[1] (CIP) as a main manufacturing hub for Northern Haiti. The CIP[2] is a mixed-use light manufacturing facility that began operating in 2012 in the commune of Caracol. Other larger-scaler industrial production in Haiti are recommended to be separated from urban areas due to possibilities of endangering public health and the impact on residential living conditions. Depending on the type of industry, the capacity and production method, the implementation of a buffer zone can help to prevent noise pollution, environmental pollution and health impacts and damage to the built environment. The street network and road capacity serve an important role if industry is to be separated from the urban areas. Roads will have to meet certain standards in order to manage the expected traffic to and from industrial sites. This can be seen in the Street Network section of this document where the qualifications for arterial, main and secondary roads are established.

1. http://www.ute.gouv.ht/caracol/index.php
2. https://www.usaid.gov/haiti/caracol-industrial-park

2.6. PUBLIC FACILITIES

Schools, worship centres and other basic services are to meet the spiritual and educational needs of the inhabitants. The different locations of the services are chosen due to already existing facilities and the aim to distribute them equally over the neighbourhood and its population.

Education centres, healthcare facilities and community administration centres must meet the learning, health and wellbeing and service needs of all inhabitants. The area for each service provision has been established according to a set of principles developed in accordance with community consultation and principles of high-density mixed land-use. Specifically, stipulations have been made regarding the distance of service facilities from one another. Attention has been paid also to the importance of mixity and integration of various facilities into complexes where educational, medical and administrative activities can be conducted in close proximity. This is key to promoting better access to public services, and for the Government to witness tangible changes in the population of Canaan that ensures its success as a new urban centre.

EDUCATION

Education centres must be distributed equally throughout any new urban area soon to be expecting a rapid increase in population. These can include but are not limited to; primary schools, secondary schools, skills/vocational training centres, technical colleges, community education centres, adult education centres etc. Many of these facilities can include multiple components as not to affix the land use for one particular demographic. Even with these mixed-uses, the principle idea is to formulate new typologies of education centres, providing more diversity of services than simply adhering to existing recommendations.

Strategically, education centres must be located in areas where the local socio-economic state demands it. There are many locations around which it makes logical sense to zone an area to have an education facility, but typically the results are positive when such a facility, especially one targeted at children is placed adjacent to a recreational facility. Additionally, education centres can be the focus of a community, if coupled with additional services. Examples of this are few and far-between, but studies of such ‘Community Schools’ have shown that nodes of urban learning coupled with other services and commercial aspects provide better chances for marginalized populations to benefit and find a niche within the community. For this reason, proximity to commercial areas has also been a significant priority when establishing the location of the planned educational institutions in Canaan.

Types of Education Centres

Primary schools should be located away from main arterial roads, separated from automobile heavy areas. For reasons of noise pollution and safety, access to primary schools has been planned by analysing traffic flows and expected neighbourhood density. Additionally, it is important for children to have the experience of walking to school, which will encourage this community to be further sustainable and safe. If access to primary schools is not car-centric as the distance is walkable for all students, car-use will decline improving overall urban connectivity. Secondary schools in Canaan are planned adjacent to commercial areas to provide more engagement and visibility for students and opportunities to explore the economic opportunities available in the local area. Ideally because of noise and safety issues especially during peak hours at the start and end of day, secondary schools are to be located no more than one street over from a main or arterial road. Universities are to be located in areas where high civic engagement is possible. Because of the typical size of universities, they require a lot more land than other types of educational centres. Other educational centres such as adult education centres, vocational training centres are planned close to the areas where engagement in the sectors or fields taught is most possible. Many can be along commercial corridors and in proximity to major intersections of urban connectivity. All educational institutions have been planned with a buffer zone of 500 metres, meaning that on average, students have to commute no farther than 1 kilometre to their chosen institution. All types of education centres must be located within 100 metres of an exterior or covered public space.

HEALTH

As with education centres, health facilities although often viewed as ensuring the well-being of the public, rather than contributing to it, come in a variety of forms and need to be viewed as facilities that can offer a variety of services, not only limited to physical health. From a health promotion perspective a health-care facility is not only limited to an establishment that serves the medical and dental care needs of a community. It is also a facility that inspires prevention and encourages. For this reason, the land use plan reflects the goal of mandating integrated health facilities throughout the newly-developing community of Canaan.

Types of Health Facilities

Urgent medical care centres must have emergency road access at all times. This means that access should be ideally from two arterial roads, ensuring access if one road is blocked in an emergency situation. Extended care facilities should be planned to be slightly removed from large arterial roads for the sake of recuperation and respite for the patients. Other facilities such as hospices, care homes and mental health care centres, should be integrated into the residential urban fabric to provide opportunities for inclusion. Community health care facilities such as clinics or public health units can be thought of in a two-fold manner. Some facilities must be planned on main or arterial roads with direct access to public transport facilities. As these facilities are likely to be frequented by more marginalized populations, access must be assumed to be either by foot or by public transportation. However, community medical facilities must also be located in the centre of residential areas, to provide ‘care nodes’ for a very specific

area. Particularly in areas with highly vulnerable populations, local health clinics with access to even basic treatment is essential. Currently as Canaan has developed in an adhoc manner, many small medical facilities such as pharmacies and small clinics have been requested in areas with challenging terrain. Responding to this should be seen as a necessary directive for the location of medical facilities with the opinions of locals included.

Mobility is imperative for all types of public health facilities. Rather than approaching health centres as places for aiding people's medical issues only, they should be seen as prevention facilities. This public health view of the area means that through an integrated perspective, the population can become healthier and better adapt to the new urban environment of Canaan. For this reason, recreation facilities must be seen as public health facilities that operate in a prevention rather than reparative function.

All health-care service centres must be barrier-free to ensure access to people with a variety of physical challenges. Local clinics can have simple stair ramps placed over the stairs for wheelchairs and stretchers to be moved in and out. Other care centres can install full ramps providing better access for the greatest number of people.

Other public facilities

Public facilities include many different types of institutions, administrative offices and leisure centres.

Religious

Religious institutions should be developed and encouraged in areas where they are demanded by the population. They should also be geared to be adjacent to recreation facilities with access to the community. As is already apparent in Canaan, the religious centres that have been established tend to be built on larger outcroppings, where they can be seen from afar. When the area is to be fully electrified, these hills will serve as beacons for local religious activity and provide outlets for the local population. As most people will continue to walk to their place of worship, the structure can be easily located at the centre of a primarily residential area. It not only provides a walkable hub for the residents, but also ensures 'eyes on the street' in areas which improves safety and visibility.

Public Administration

Public administration facilities must also be located in places of high mobility and high visibility. This ensures equal access for all citizens. When dealing with government services access is often challenging and people tend to have to take time off from their work to attend to business. Government registries, licensing centres and other administration facilities all take time and therefore rapid access to ensure efficient delivery of service is required.

Community Centres

Community centres are to be equally distributed among the neighbourhoods of Canaan. Each neighbourhood must have the capacity to reproduce its own identity and community centres are seen as imperative for this formation in the early days of the new urban area of Canaan.

It is also strongly recommended that community centres are located directly adjacent to recreation facilities. In accordance with the principles for the land use for educational facilities, community centres can also be promoted as part of larger education hubs, meaning that when possible community centres should be linked directly with primary and secondary schools.

Sports and leisure

While it is extremely important to consider the economical and resilience functions of Haiti. It is extremely crucial for planning processes to incorporate preservation and enhancement of the social fabric of citizens. A city which considers these factors would be in a better position to provide a 'breathing space' for people from routine problems and motivate them to tackle everyday issues with more vigour. Infrastructure which assist sport and entertainment would also prove to be a valuable investment in curbing rising health issues and also preserve the ethnic cultures of the city.

Security

The full potential of any city cannot be totally harnessed without proper security facilities. An appropriate amount of police, fire and emergency response personnel assist inhabitants and tourists alike to better use facilities of the city at all times. Planning principles must seek to strike a balance in terms of open space and the number of inhabitants, an excess of each reduces the perception of safety leading to citizens not being able to fully explore the potential of the city.

These facilities, such as fire stations, ambulance services and police stations should be always located on major arteries. These types of emergency services are the first respondents at any emergency and therefore must have first priority access to all major routes. Specifically fire and ambulance service centres should be located directly on evacuation routes. Smaller police 'boxes' are to be placed within the residential neighbourhood context. This functions as a public safety net, but also as a public information area.

Cemetery

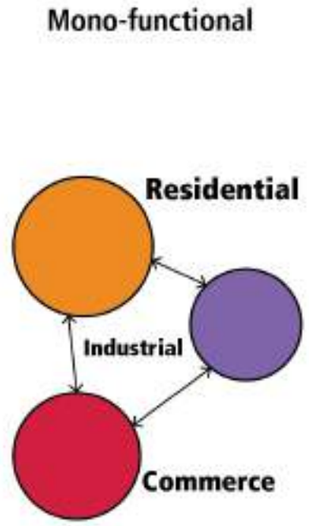
The sensitive nature of a cemetery must be considered while planning a city, while the spatial nature of a cemetery is large and is of progressively growing nature. A cemetery must be located on the outskirts of the city with substantial areas of green areas around. The cultural differences (if any) must be understood and accommodated for in the design of this space. According to Haiti's law of 1963, a cemetery must be located 100m from any settlement.

All public facilities with regular public access should be barrier-free to allow people with physical challenges to have equal access to the services provided. Additionally, the majority of public facilities should be located on foreseen public transit routes, adjacent to existing or planned larger nodes. This means that they should not be forgotten when considering areas of high-density mixed use as this will give citizens more access and better opportunities to establish themselves in the newly forming neighbourhood of Canaan.

MIXED USE

The purpose of mixed land use, the mix of economic and commercial activities with residential areas, is to avoid mono-functional spaces, segregation and city congestion. This means that the local economy is promoted through the provision of local jobs within walking and cycling distance. Public services are more accessible and this reduces dependency on cars. Enhancement of areas of interest in proximity to one another reduces congestion in traffic, air pollution and unburdens the infrastructure. Social mix and mixed land use are interdependent features of the demographics and spatial structure of a city.

In a neighbourhood with a variety of density, social mixes and land uses, job opportunities are generated for residents from different backgrounds and with different income levels. This forms a diverse and enriching social network. It is recommended that between 20 and 50 per cent of the residential floor area is allocated to affordable housing and one single tenure type should not exceed 50 per cent of the residential floor area. Careful design and management can facilitate different functions in one neighbourhood and ensure that economic and residential activities are compatible and well balanced with each other. Mixed land-use is an inherent part of the nature of cities and is a pillar of sustainable urban development.



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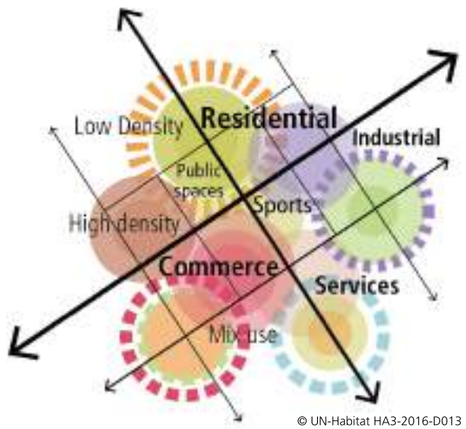

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Mixed use:
- Residential
- Commercial
- Education
- Offices
- Ligh industry

etc.

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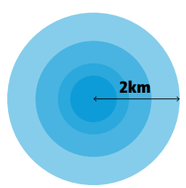
Mixed use areas are often situated on arterial roads for they can accommodate a higher influx of people. The uses should face a wide pedestrian path and the street must be equipped with a side parking lane. The users often takes more than an hour in these hubs.

SERVICES PER CENTRE

NEIGHBOURHOOD CENTRE

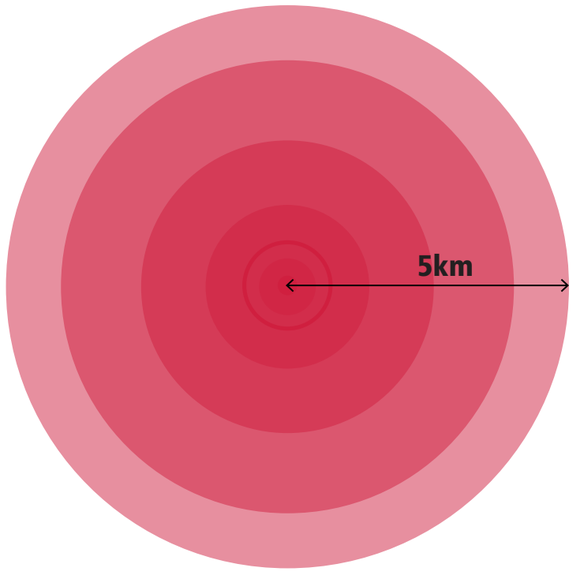
- Primary school
- Secondary school
- Place of worship
- Kindergarten
- Neighbourhood park/public space
- Pharmacy
- Health post
- Market

DISTRICT CENTRE



- Secondary school + high school
- Maternal and child health care centre
- Worship (large)
- Youth centre
- Social hall, community centre
- Public library
- Municipality district centre
- District administration centre
- Police station
- Court
- Post office
- Fire brigade
- Home for orphans, aged, disabled
- Market area
- Sport area / public space

URBAN CENTRE



- University
- Cultural centre (museum, main library)
- Sport complex
- Post office HQ
- Central government regional office
- Regional court
- Major city park
- Police HQ
- General hospital and specialized health facility
- Central business district
- Prison
- Cemetery

Fig.33: Main services for each of the centres

2.7. NATURAL RESOURCES AND ENVIRONMENT

The reserve of land for environmental uses responds to the principle of sustainable urban development that aims at balancing social and economic development with environmental preservation and development. Parallel to the urbanization of new areas, urban development should ensure the preservation of protected areas, reforestation, the balanced exploitation of natural resources and the promotion of agricultural activities that sustain urban areas. Fostering urban-rural linkages promotes a development model that benefits both urban areas and rural areas, which play a complementary role in development. Urban areas demand products and environmental services from rural areas while rural areas benefit from urban demand and specialized services.

The maintenance, enhancement and/or protection of the natural character of the land is key for the sustainable development of Canaan. Developers must demonstrate how the proposed land use, subdivisions and development controls respond to such values including the following:

- The integration of green networks (such as natural freshwater and coastal ecosystems, and ecological corridors) with open space and pedestrian networks. It must be shown how the development reflects the underlying natural character and provides opportunity for environmental restoration and biodiversity.
- Measures to manage natural hazards and contamination, including avoidance, adaptation, or remediation.
- The location of mineral resources and how they are to be managed.

UN-HABITAT PRINCIPLES

UN-Habitat supports countries to develop urban planning methods and systems to address current urbanization challenges such as population growth, urban sprawl, poverty, inequality, pollution, congestion, as well as urban biodiversity, urban mobility and energy. A strategy for green spaces should be included in order to reach a complete, sustainable solution for a new developed area. The strategy emphasizes mixed land use, acknowledgment of possible environmental risks and accessibility for all residents of the area.

The Urban Structural plan has been primarily designed with the topography of Canaan and other environmental factors in mind. Avoiding and ideally preventing environmental risks such as erosion and flooding is imperative to limiting interference with the urban structure. The community assemblies provided important information regarding the location of potential flooding as well as erosion is likely to occur. Riparian, agricultural and reforestation areas are recommended as a way of mitigating the risks associated with natural challenges. Riparian zones are areas restricted around rivers, ravines and streams to avoid the effects of flooding on the urban structure. Reforestation areas are suggested where the slopes are too steep to construct dense buildings. These areas also serve as green corridors to encourage improved air and water quality and provide more opportunities for recreational activities. Livestock grazing zones are also provided within the area to further provide opportunities for local economic empowerment as well as subsistence farming. Steep topography with the potential to induce erosion as well as flood risk areas are zones where development should be avoided.

THE CASE OF HAITI

There are few specific rules and regulations regarding land uses in Haiti. Ideally the existing regulatory framework should be incorporated as a framework to implement an operative overall plan for the Canaan area. While the law of 1963 only mentions 3 categories – areas with harmful materials, areas of dangerous substances and agricultural lands – The rules and regulations in Haiti are not enough and are in need to be upgraded. A deep knowledge of current land use (& land resources) is needed for formulating changes leading to sustainable use of the resources.

For the purpose of this document, the following classification is used to assign the different land uses related to natural resources and environmental function of land:

Fig.34: Abandoned quarry in Canaan

A. REFORESTATION AREAS

Land uses designated as reforestation refer to the establishment of trees on land that was a forest and has cleared of forest within the relatively recent past. In some cases, reforestation refers to the conversion of land use back to forest after a period of some other land use. Reforestation is the natural or intentional restocking of existing forests and woodlands that have been depleted, usually through logging. Areas for reforestation are suggested either where slopes are too steep to easily facilitate a built urban landscape or preserved areas that contributed to better quality air, water and natural land resources.

B. URBAN GREENERY AND LANDSCAPING AREAS

Land use linked to the beautification and increase of quality of the urban area. The designation of areas as greenery has strong impacts in the enhancement of the air quality, the reduction of heat island effects, the replenishment of the underground aquifer system, the increase of quality of life and the reduction of noise and stress levels.

A tree planting strategy is considered as one of the central strategies for the consolidation of urban greenery land use. As the current land tenure in Canaan is a mix of both public and private land, tree planting is a viable option for many of the areas to both mitigate erosion and provide both nutritional and financial sustenance for the residents.

A tree planting strategy has been developed in order to prevent natural disasters and enrich both private and public land areas. The planting of trees will improve the soil quality, provide shade and increase human well-being as well as offer opportunities for livestock grazing. The trees will further protect surrounding landscapes from wind, prevent erosion and increase water retention in the soil.

Some residents already have knowledge of composting and therefore introducing sustainable methods of fertilizing the new trees would not necessarily be a big conceptual leap for residents to make. Additionally, most have an awareness of the risk of natural disasters and therefore are looking for solutions to mitigate the threats posed by the lack of resources disasters can ultimately cause. Above all, a major issue in Canaan identified by the community is the lack of greenery which leads to challenges in air quality, soil erosion and ultimately urban heat islands.

C. EXPLOITATION OF NATURAL RESOURCES

Comprising the different activities that involve the balanced exploitation of natural resources such as land and raw materials

• Farming, tilling, plowing, harvesting, or related activities

Agricultural activities, such as farming, plowing, tilling, cropping, seeding, cultivating, and harvesting for the production of food and fibre products. Also includes sod production, nurseries and orchards. Excludes forest logging and timber-harvesting operations.

Urban agriculture areas are regarded as a way to complement the agricultural production of rural areas in order to balance the inputs and outputs of the urban-rural linkages. Areas designated for agriculture are densely spread throughout Canaan. Agricultural areas should be seen as a constraint of urban growth, but the challenges for the industry lie in the absence of a good supply of agricultural products. Areas used for agricultural purposes are encouraged to be preserved, and new typologies of terraced agriculture developed where the topography is too steep or flood events are likely to occur. The community could benefit from these areas in terms of an increase of activities for residents and an increase in green areas for the city.

• Livestock related activities

Activities associated with feeding and raising of livestock in pens and confined structures. Land for livestock grazing is provided with a view to assist not only in the ecological regeneration of the area, by providing ecosystem services, but also to develop multiple ways in which community members can become economically self-sustaining. In order to avoid the emergence of food islands in Canaan, where the soil is not particularly appropriate for subsistence farming, livestock including chickens, goats and cows must be integrated into the community for the benefit of all. However, in order to keep disease at bay, separate areas for grazing and slaughter must be designated and use must be enforced.

• Pasturing, grazing, etc.

Activities normally associated with feeding and grazing in open ranges. Land for livestock grazing is provided with a view to assist not only in the ecological regeneration of the area, by providing ecosystem services, but also to develop multiple ways in which community members can become economically self-sustaining. In order to avoid the emergence of food islands in Canaan, where the soil is not particularly appropriate for subsistence farming, livestock including chickens, goats and cows must be integrated into the community for the benefit of all. However, in order to keep disease at bay, separate areas for grazing and slaughter must be designated and use must be enforced.

• Logging

Activities normally associated with forestry and comprises establishments that operate timber tracts for the purpose of selling standing timber.

• Quarrying or stone cutting

Includes activities normally associated with borrow pits. The land from some disused quarries is reserved as non-aedificandi zones. Also many areas that were designated as quarries one, have been fully expropriated and there still exists large sections of the mountain that are untouched. These areas should be preserved. Specifically, the quarry of Canaan is active so urban expansion near the excavation site is impossible. Contamination due to dust, noise and vibrations limits the potential for structures to be sustainable in nearby areas. As post-mining areas often have a significant number of environmental challenges, the idea for many of these areas is to convert them into public parks, flexible outdoor spaces or gardens for the public to enjoy. Urbanization of quarry-areas can also induce erosion, and thus all of these areas must be secured as areas of environmental revitalization.

D. PROTECTED AREAS

An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means." Protected areas include strict nature reserves, wilderness areas, national parks, and management areas. (World Conservation Union)

Sensitive natural areas

These land use category is applied to areas preserved for natural ecosystems, spared from exploitation of built objects. They are mainly linked to high risks areas, and therefore not considered as suitable for construction. In other words, 'non-aedificandi' are areas that cannot be built up with any infrastructure. In these areas, occupation and construction is forbidden for many reasons like the high potential for environmental risk. In instances where the land is already occupied, the land should be recovered and existent structures should be removed. In Canaan, there is no official legal tool prohibiting building in vulnerable areas or to mandate the displacement of buildings already located in environmentally sensitive areas. This means that non-aedificandi areas are not appreciated by some members of the population and therefore any change in the law should come in conjunction with communication programmes to sensitize residents about the importance of these area for the sustainability of Canaan's urban future. Legal regulation should be considered in order to prevent any habitation and aim to reduce as much damage to the natural ecosystem as possible.

Non-aedificandi areas are also features that can help to mitigate the effects of climate change including sea level rise and natural disasters. They should appropriately generate a transition zone or buffer between water and dry land. This means that land-use specifically near channels, streams, rivers and beaches must be particularly stringently regulated.

Ravines, rivers and streams

The various ravines and streams are maintained to ensure the ecological regeneration of the area. In time, as the limited water supply is channelled through larger streams rather than several smaller tributaries, the existing areas of green will grow and mature. This is to be capitalized upon and must be conserved. Wildlife will congregate in areas where water is channelled through providing extended ecosystem services and setting the area up in future for additional natural regeneration. Some of these areas can be developed for the purposes of small-scale agriculture, while others can be preserved simply as natural zones. The precise nature of each regenerated zone will have to be determined on a case-by-case basis, but it is recommended that no more than 30% of these areas be expropriated for agriculture.

Fig.35: Ravine and house at risk

Fig.36: Houses at risk near Lan Couline in Canaan

Riparian areas

Riparian areas can be defined as transitional areas between water bodies and built areas and/ or lands adjacent to water bodies such as rivers, streams, lakes, dams, springs and wetlands. It plays a vital role as a buffer zone and wetlands, preventing soil erosion, flooding and reducing degradation of environment while contributing to the sustainability and biodiversity of the city. Riparian areas are the ecotones of terrestrial and aquatic ecosystems that extend down into the river, up above the canopy and outward across the valley at a variable width. It is important to bear in mind that the riparian boundary does not stop at an arbitrary, uniform distance away from the river, but varies in width and shape. The width can however, be generalized in a specific area. For example, according to reports made by UN-Habitat, a 30-meter riparian zone is suggested for streams in Nairobi, Kenya. A 50-meter buffer zone is implemented in the urban planning in Gabiley, Somaliland. Depending on the topography in the specific area the spread of water in the case of flooding may vary. Considering the steepness of the topography, flood analyses and other environmental factors, the general riparian zone for the Canaan area is estimated to a width of 50m. The zone preserved for riparian areas can be used for agricultural and recreational purposes and should be seen as mandatory enhancement to the urban development. They can also create greenbelt and network between different neighbourhoods and cities. Furthermore, riparian areas in cities have an ecological importance. They Improve urban environment, Increase recreational lands, store flood water, recharge groundwater, build and maintain stream banks. If the size of riparian area is protected and maintained well, it plays a very important role to minimize degradation and contamination of the environment.

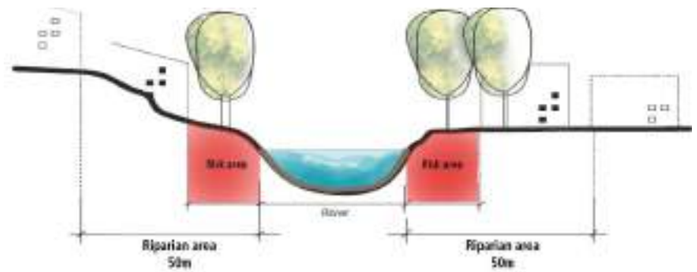


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Fig.37: Riparian area diagram

TURN ENVIRONMENTAL RISKS INTO OPPORTUNITIES

The linkage between open spaces and ecological aspects of the site is seen as imperative to the development of the plan. Employing the principle of ecosystem services, each public space is seen to be integrated with a non-aedificandi area providing mutual benefits to the users and the environment. By maintaining such spaces in a way that works with the existing natural environment, the natural advantages of the site are augmented and capitalized upon. Most of the open areas are seen as flexible space so that they can be adapted to potential future uses as the socio-economic situation of the community improves.

A- Public space

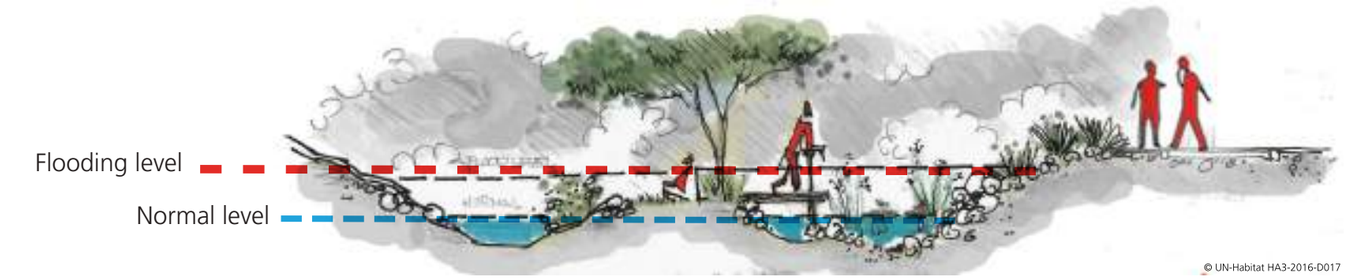

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Fig.38: Riparian area and public space

B- Recreational area + agriculture

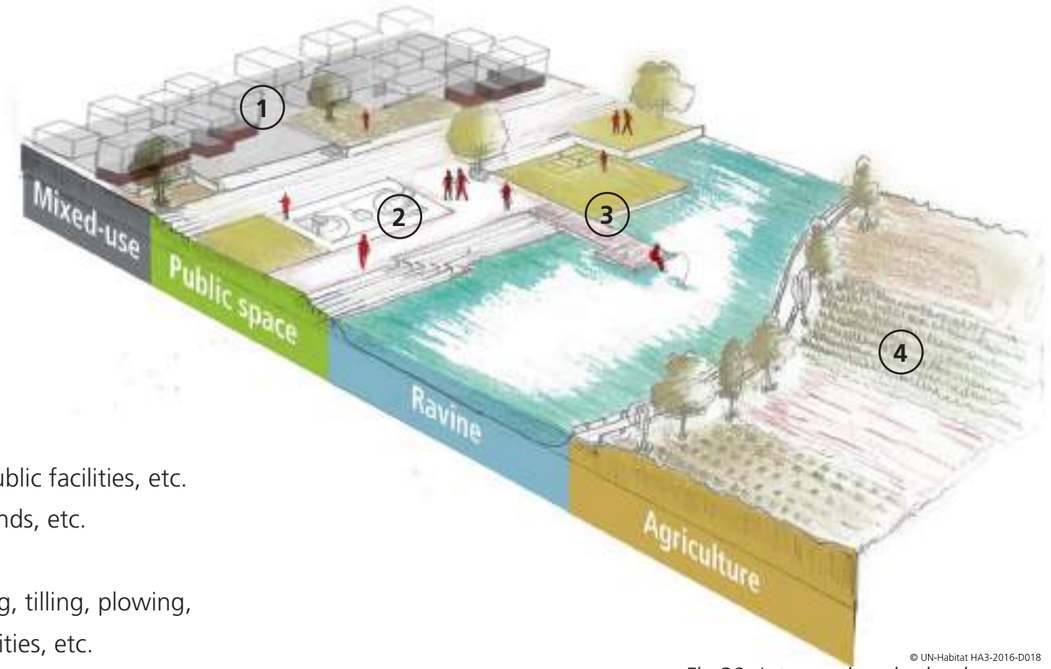

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Fig.39: Interventions in riparian areas

1- Residential, commerce, public facilities, etc.
2- Sports activities, playgrounds, etc.
3- Park, plaza, gardens, etc.
4- Urban agriculture; Farming, tilling, plowing, harvesting or related activities, etc.

Legend

- Riparian areas
- Livestock
- Reforestation
- High environmental risks
- Rivers and ravines
- Quarry

Fig.40: No-built areas in Canaan

2.8. BASIC SERVICES

The location, scale and capacity of public reticulated water supply and wastewater disposal networks. The location and function of stormwater management facilities based on, principles of water sensitive urban design, including the retention of natural water systems and the primary use of onsite flow and quality controls (and related impervious area limits) to manage stormwater from proposed sites and roads. The use of hard engineering solutions is a secondary management approach.

A. WATER AND SANITATION

Basic services such as provisions of potable water and sanitation that are the backbone of the health and wellbeing of any society, are always a challenge in newer communities that have come into existence and increased rapidly in population. There are many different ways in which water can be provided in the short-term. Currently the strategies include; secured storage facilities for households, improving water treatment technologies at distribution points, chlorine tablet distribution, household water filter introduction and increasing communication regarding water safety mechanisms. None of these 'quick-fix' solutions should be seen as standalone processes, as they can also have unforeseen negative externalities that must be addressed in parallel. Additionally, solutions such as secured water storage facilities must be coupled with long-term solutions, with the goal of an extensive and centralized water distribution network. For example, large water buckets should be reusable and modifiable for use when a larger water distribution network is introduced. The storage tanks can be used as a backup system as well, even within a larger network.

Strategies must also aim at revitalizing the natural streams and retention ponds throughout Canaan that have eroded overtime. The plan has identified through extensive topographical analysis backed up with ground truthing, the areas with potential for natural aquifer rehabilitation. In addition to the non-aedificandi areas, zones specifically that have natural concavity in the earth are seen as potential channels for conducting rain/stormwater. They are therefore preserved and must be separated from areas of urban runoff to prevent contamination. In turn this can lead to the formation retention ponds.

Sanitation services consist of only external pit latrines in the area of Canaan. There are no sewers or nor any sanitation network. Therefore the pit latrines are constructed, used, covered and a new one is built. This causes significant damage to the aquifer, so a first major step is to modify the local home-built sanitation retention systems. Any new sanitation technologies must be introduced with the application in mind for adaptation to a future water distribution and drainage network. An ideal future involves treating water the same whether it is part of a distribution network or for direct consumption (potable) -- this is water sustainability.

B. DRAINAGE

A drainage network plan is necessary to increase safety and living quality for the local population. In the case of the Canaan Area, there is no proper drainage network plan other than the natural streams which conflict with the road infrastructure at some points. This results, at multiple locations, in directly flood related problems. Considering long term sustainability, a watershed management in upstream areas could significantly improve the current runoff characteristics and respectively ease the flood problem.

Further to the directly flood related problems, a solid waste management system should goes hand in hand with the sustainable operation and maintenance of drainage systems and their hydraulic structures to prevent any risk of blockages.

In order to begin addressing the present and growing flood risk in the Canaan Project Area, UN-Habitat is following an 'integrated flood management' approach, comprising of both ecosystem-based and engineering solutions. One major element of the flood management strategy is to design and implement a basic drainage network in the project area. In the case of the Canaan Area, the drainage plan must be implemented in an already existing settlement where space and options for routing of canals is very limited.

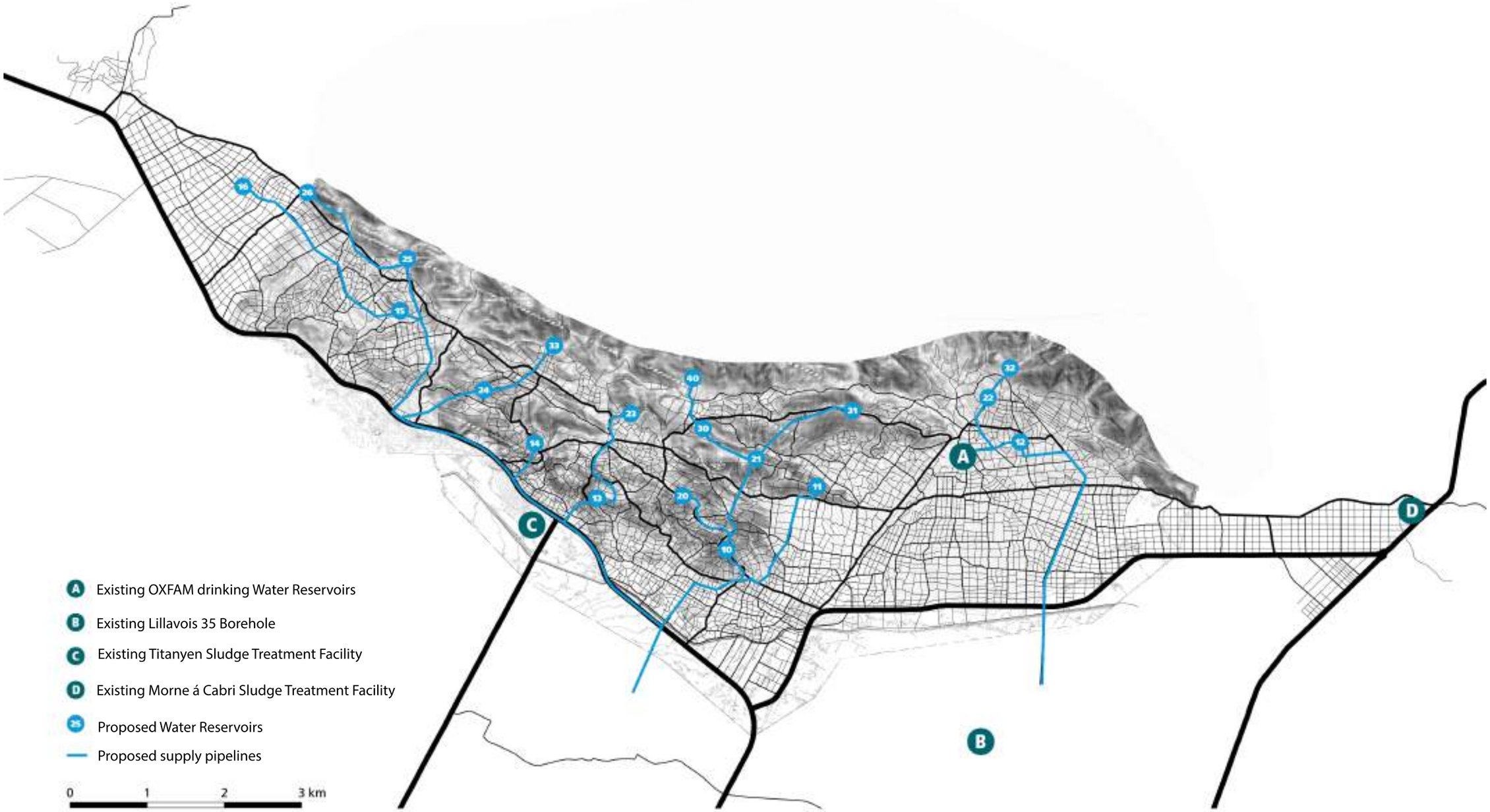


Fig.41: Proposed water supply network and reservoirs in Canaan

Fig.42: Proposed drainage system in Canaan

C. ELECTRICITY AND ENERGY

Most households and commercial business services in Canaan have no access to electricity. Some houses or commercial/service buildings have solar energy, and this is where the vast majority of energy interventions in Canaan can be seen. Solar has the highest energy potential in terms of cost and proliferation. In order however for solar to fully proliferate through Canaan, a system for mapping mixed private and grid-feeding solar projects must be amassed. Existing large-scale projects that feed into the grid, smaller-scale private projects to home installations must all be mapped and a regulatory system be put in place to ensure that those producing more electricity than they can use are able to easily feed back into the grid.

Strategically, certain areas within Canaan are reserved for energy production. In the past, installing solar panels on houses has caused an increase in crime in some areas when panels are stolen. This also requires significant education about electricity as a public resource, and therefore physical energy interventions must always be coupled with communications programs that inform and assert the advantages to all community members of maintaining the energy source. This kind of capacity thus far has not manifested itself in any large partnerships between governmental agencies such as CIAT or UCLBP and external private solar entrepreneurs. Many companies are already active in Haiti that provide in-kind or low-cost solar solutions for private homes or businesses (Sigora Haiti, SELF, and RE-VOLT), but they operate privately and without government partnerships. This is a clear area with significant investment potential and the layout of Canaan has been developed with this in mind.

Electricity plays a major role in the role of investment in the Haitian context. If a community is energy self-sufficient, the potential for any investment to be successful, whether it be in infrastructure, education or health is significantly higher. Having equal access to electricity in a community acts as insurance for any investment and financiers can be certain that the infrastructure will be built, efficiency of implementation is ensured and non-daylight access is ensured. Electrification also has a significant role to play in public safety. If footpaths and roads are electrified at night, there is more visibility which increases the number of people outside in the evening in turn affecting the 'eyes on the street'. It also lengthens the amount of time that people are able to spend outside their homes, encouraging more activity in urban aspects.

D. SOLID WASTE REMOVAL

Solid waste is another significant challenge for the Canaan area. Currently, solid waste removal is non-existent with the exception of private trucks that remove construction debris from internal site. With roads that are unable to support even smaller vehicles, even if existing, waste collection vehicles would be unable to access most internal residential areas. Currently most of the solid waste is combusted emitting pollution and often toxic fumes. Rather than merely providing an alternative, solutions such as the introduction of a landfill must be coupled with communication methods that stress the importance of waste sorting as well. A landfill is a positive medium-term solution, but targeting key locations for waste management facilities has the potential to have a positive effect on the socio-economic conditions in addition to the environmental factors.

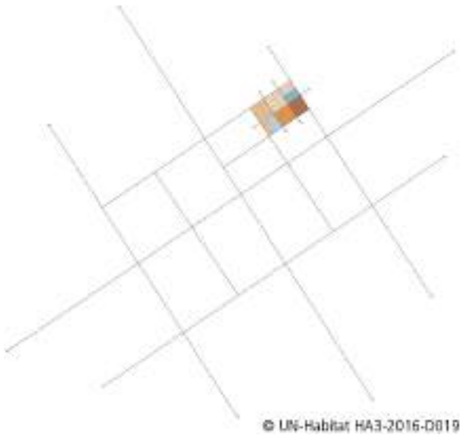
Non-organic waste collection points can easily be implemented near the more commercial centres throughout Canaan, and must double as sorting facilities. These waste management facilities are to be implemented at strategic nodes as pilot projects in several locations, and ultimately with the goal of 2-3 per neighbourhood. Each facility should be located adjacent to a transport hub, and employ between 10-30 local residents in jobs of sorting, separating and material extraction. As many waste products have a high resale value once extracted, encouraging recycling as an economic booster can also affect positively socio-economic outcomes.

Organic waste is to be treated in either one of two ways; it can be sorted as another waste product and processed on site at the waste management facility, or home-based composting facilities should be introduced. Either way, with the increasing population, organic waste disposal methods that don't bring harm to the environment must be communicated properly with residents.

In a more long-term perspective, the feasibility of solid waste removal is possible, however will be much better facilitated by the newly planned road network and the ensuing hierarchy of roads. Main roads will likely be paved increasing the ease of access to many previously isolated centres. Mobility is also a major issue for removal trucks and therefore local populations. Typical waste-removal vehicles are large, heavy and the tires are large and can easily destroy poorly-maintained tarmac. To ensure the longevity of this, new smaller waste removal trucks must be introduced to ensure road conditions remain stable.

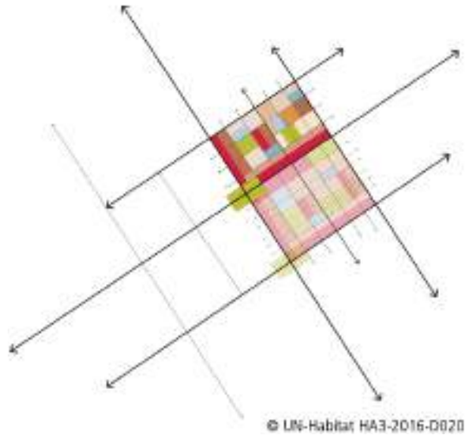
2.9. CENTRALITIES

Community



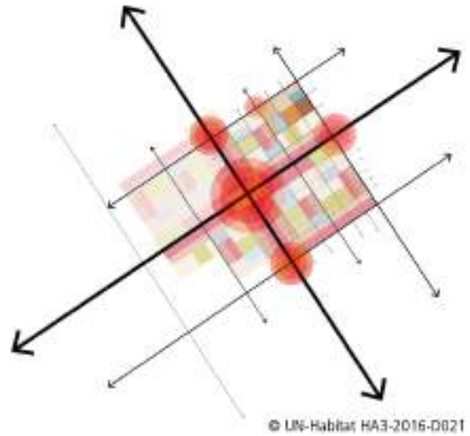
- Streets
- Basic services
- Residential
- Public space

District



- Main roads
- Commerce - Employment
- Green network

Urban centre

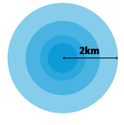


- Major transport
- Mixed-use centralities

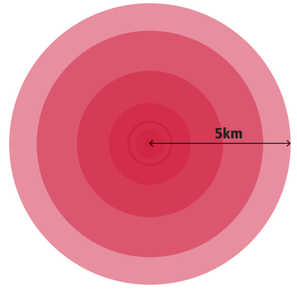
Fig.43: Illustrations of the neighbourhood, district and urban scales

CASE OF CANAAN AREA

Community Centre x60
Buffer distance = 500 metres
Size of area = 0.79 km^2
If density is 15,000p/km^2 =
12,000 people per neighbourhood centre



DISTRICT Centre x9
Buffer distance = 2km
Size of area = 12.6 km^2
If density 15,000p/km^2 =
189,000 people per district centre

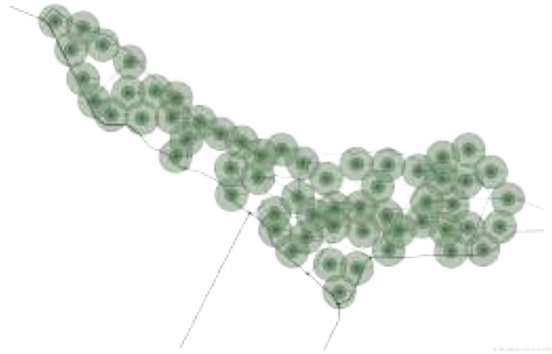


URBAN Centre x2
Buffer distance = 5 km
Size of area = 79 km^2
If density 15,000p/km^2 =
1,185,000 people per urban centre

THE CASE OF CANAAN

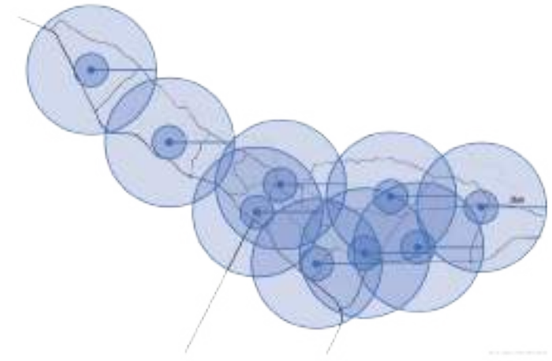
NEIGHBOURHOOD CENTRE

x60



DISTRICT CENTRE

x9



URBAN CENTRE

x2

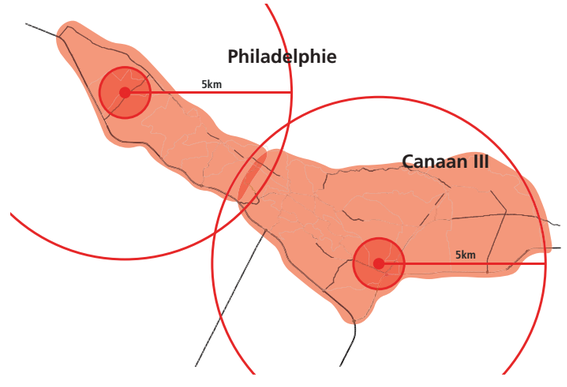


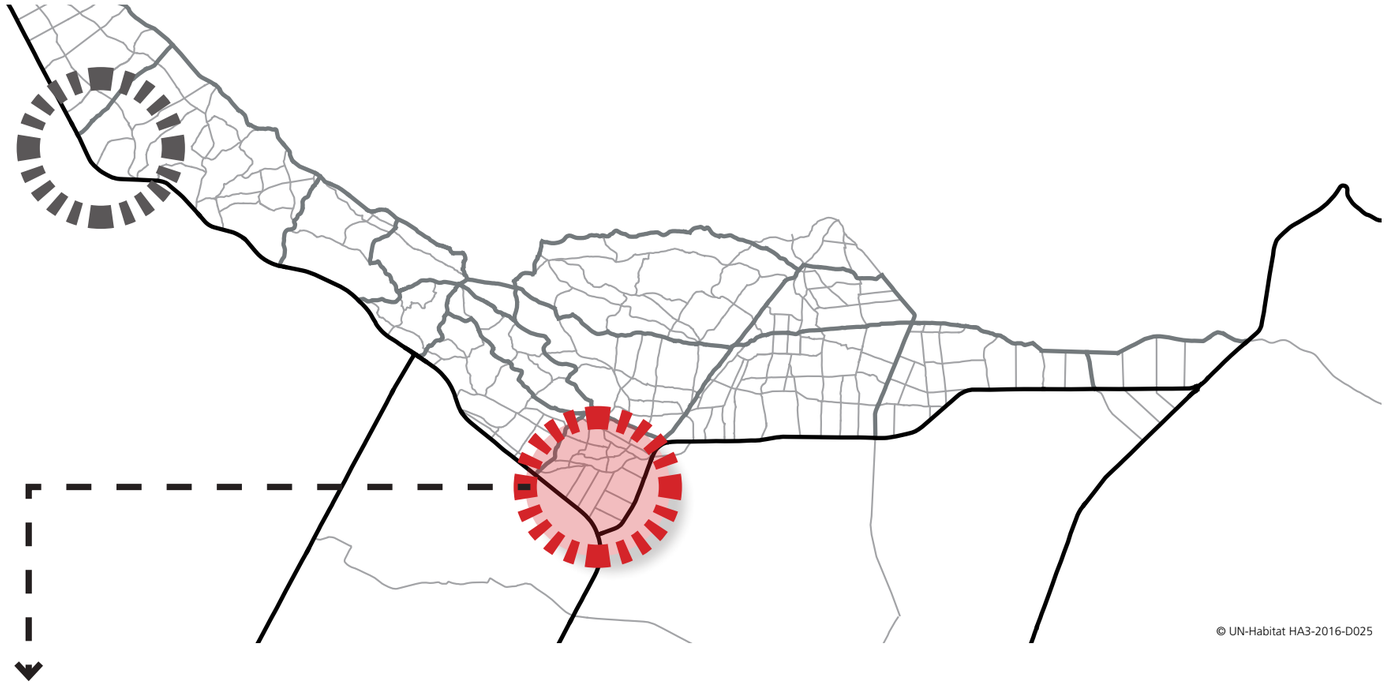
Fig.44: Centres locations in Canaan

PROPOSED URBAN CENTRES

Canaan III
Area 30 km²
If the density is 15,000 hab/km² =
450.000 hab./centre in Canaan III

Philadelphie
Area 15 km²
If the density is 15.000 hab/km² =
225.000 hab./centre in Philadelphie

CANAAN III URBAN CENTRE AS A PRIORITY



ACTUAL SITUATION

Fig.45: Tap-Tap Marché existing situation

LIMITATIONS

TRUCK U-TURN

INFORMAL MARKET AND SPREAD OUT VENDORS

EXISTING INFRASTRUCTURE

POSSIBILITIES

STRATEGIC LOCATION

MEANS OF CONNECTION IN THE AREA

CAN ACCOMODATE THE FLUX OF CARS AND CONGESTION

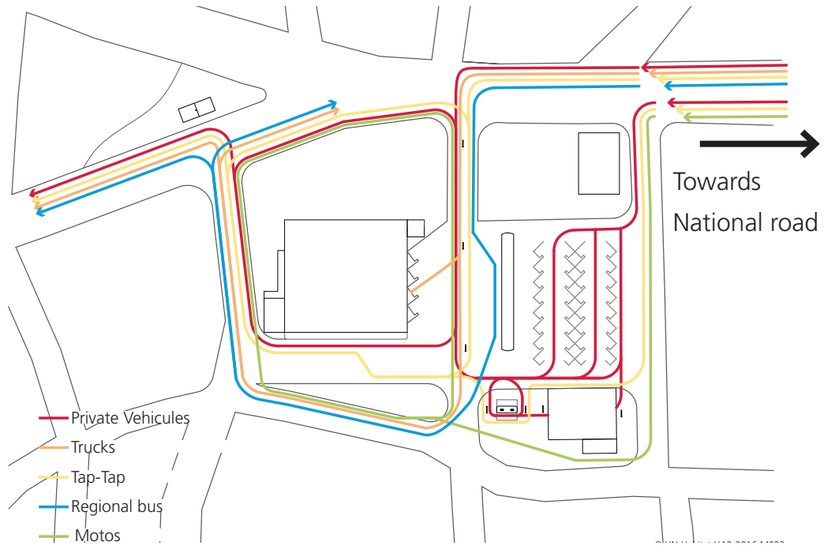


Fig.46: Mobility analysis in the urban centre of Canaan III

UCLBP PROPOSITION

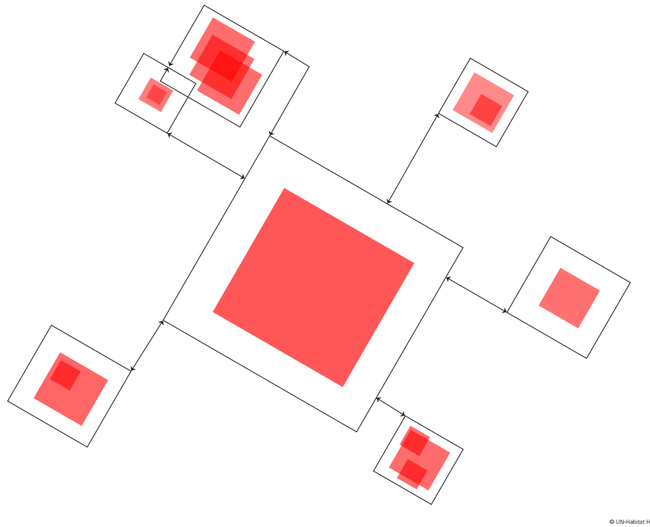


Fig.47: Diagram on the connection of the urban centres with nearby empty pockets

Proposed interventions :

- 4 waiting areas
- 12 vending stalls
- Access (3) pedestrian entrances share a green space
- Bus shelter
- Space for motos (taxi) to park
- Space for trucks
- Toilets (male/female)
- Urban furniture : benches, trashes, lights
- Lighting system
- Petrol station
- Food concessions
- Sanitary blocks for Tap tap and the market
- Space for parking and private cars
- Space for waste and trash
- Service access
- Recreation space for kids
- Cultural space
- Housing

Fig.48: Canaan III Proposed urban centre

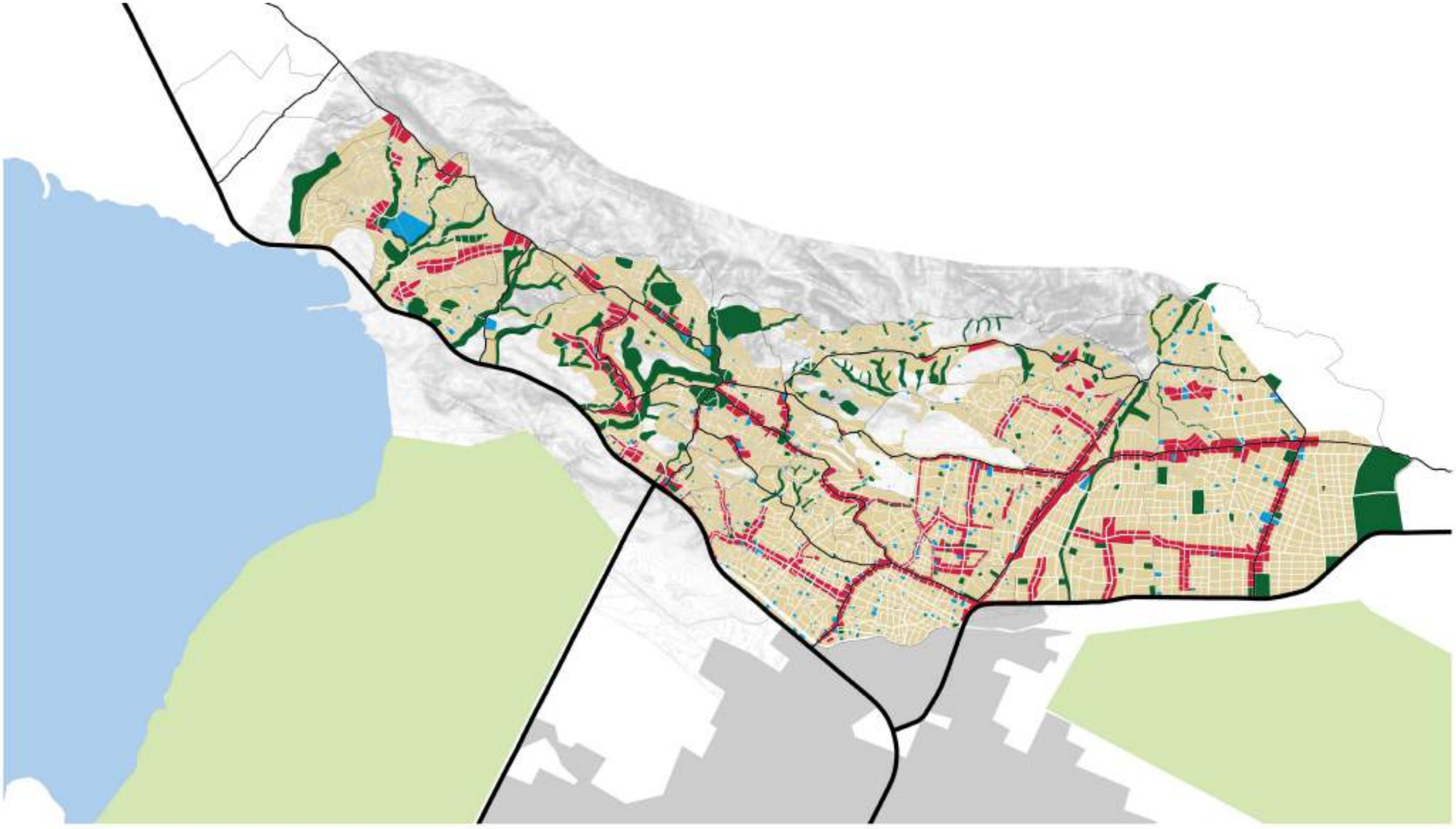


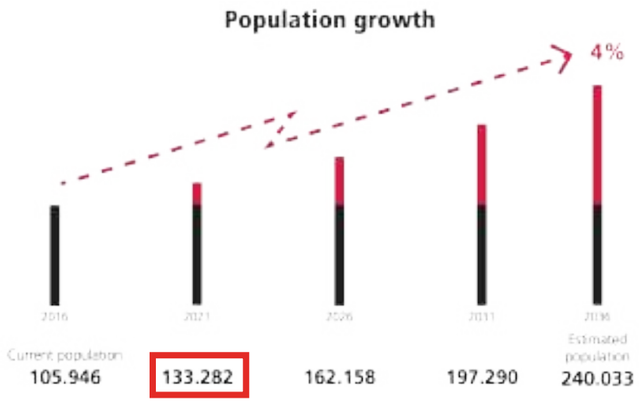
Fig.49: Land use plan in Canaan

CONCLUSION

CANAAN

Neighbourhood	Area m2	Area km²	Residential			Commercial	Industrial	Public facilities	Public spaces		No-built	Street network	Total
			High density %	Medium density %	low density%				Espaces public	Open spaces			
Canaan I	2055094	2,06	0,38	0,22	0,17	0,13	0,00	0,08	0,10	0,34	0,42	0,57	
Canaan II	2765390	3	0,40	0,19	0,49	0,26	0,00	0,02	0,03	0,27	0,95	0,43	
Canaan III	3269102	3,27	0,80	0,59	0,43	0,28	0,05	0,07	0,02	0,02	0,02	1,01	
Canaan IV	465200	0,47	0,13	0,06	0,10	0,05	0,00	0,01	0,00	0,01	0,01	0,11	
Canaan V	578644	0,58	0,05	0,08	0,21	0,05	0,00	0,07	0,01	0,00	0,04	0,07	
Onaville	6432872	6,43	0,14	0,11	0,33	0,06	0,00	0,01	0,02	0,20	0,27	0,29	
Hautes Sources Puantes	1230994	1,23	1,41	1,42	0,43	0,45	0,15	0,11	0,16	0,09	0,52	1,78	
St Christophe	4270862	4,27	0,83	1,34	0,40	0,26	0,00	0,02	0,04	0,65	0,89	0,49	
Total area :	**21068158**	**21,07**	**4,12**	**4,02**	**2,55**	**1,54**	**0,20**	**0,39**	**0,38**	**1,58**	**3,13**	**4,74**	
			19,54%	**19,07%**	**12,09%**	**7,31%**	**0,96%**	**1,86%**	1,80%	7,50%	14,83%	**22,51%**	100,0%
									9,29%		**7,34%**		100,0%

	Proposed population
CANAAN I	15024
CANAAN II	12118
CANAAN III	22477
CANAAN IV	5336
CANAAN V	5041
SOURCES PUANTES	6037
ONAVILLE	41647
CHRISTOPHE	31673
TOTAL	**139.353**

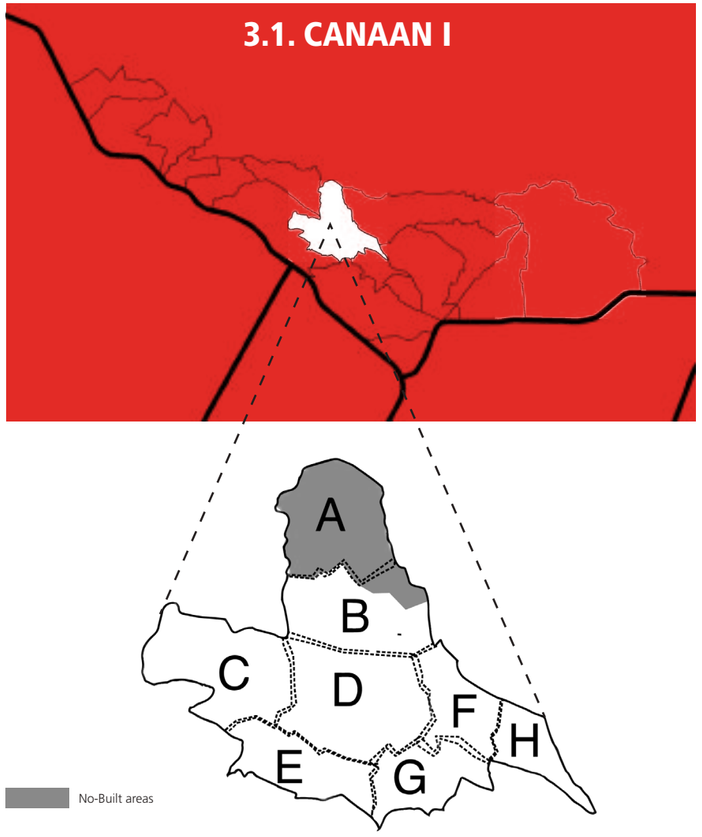


The results of the proposed plan are based on a participatory approach with the community of the fifteen neighbourhoods. This approach usually takes up to three month for each neighbourhood. The team of UN-Habitat maps the existing situation and the community then validates and propose ideas. The Urban Planning and Design LAB double check the proposed interventions and modifies if necessary. Later, a neighbourhood assembly is organized to present the vision and a land use is then developed. It is important to mention that the calculations of the following table are the cumulative of the 10 validated neighbourhoods (until December 23th). The numbers will change as soon as the other five neighbourhoods are added.

The new plan propose in having 32% of space allocated to streets and public spaces, 10% to mixed usages, 50% to residential and 8% to no-built areas. The percentage of the commercial areas will increase soon as the Philadelphie urban centre is added (not yet validated). This plan, if following the proposed densities, could accommodate 140,000 inhabitants. If the growth of Canaan remains of 4%, the new residential areas will not be enough to host the growing population. It is therefore mandatory to think of a city extension plan in means to guarantee its future sustainability.

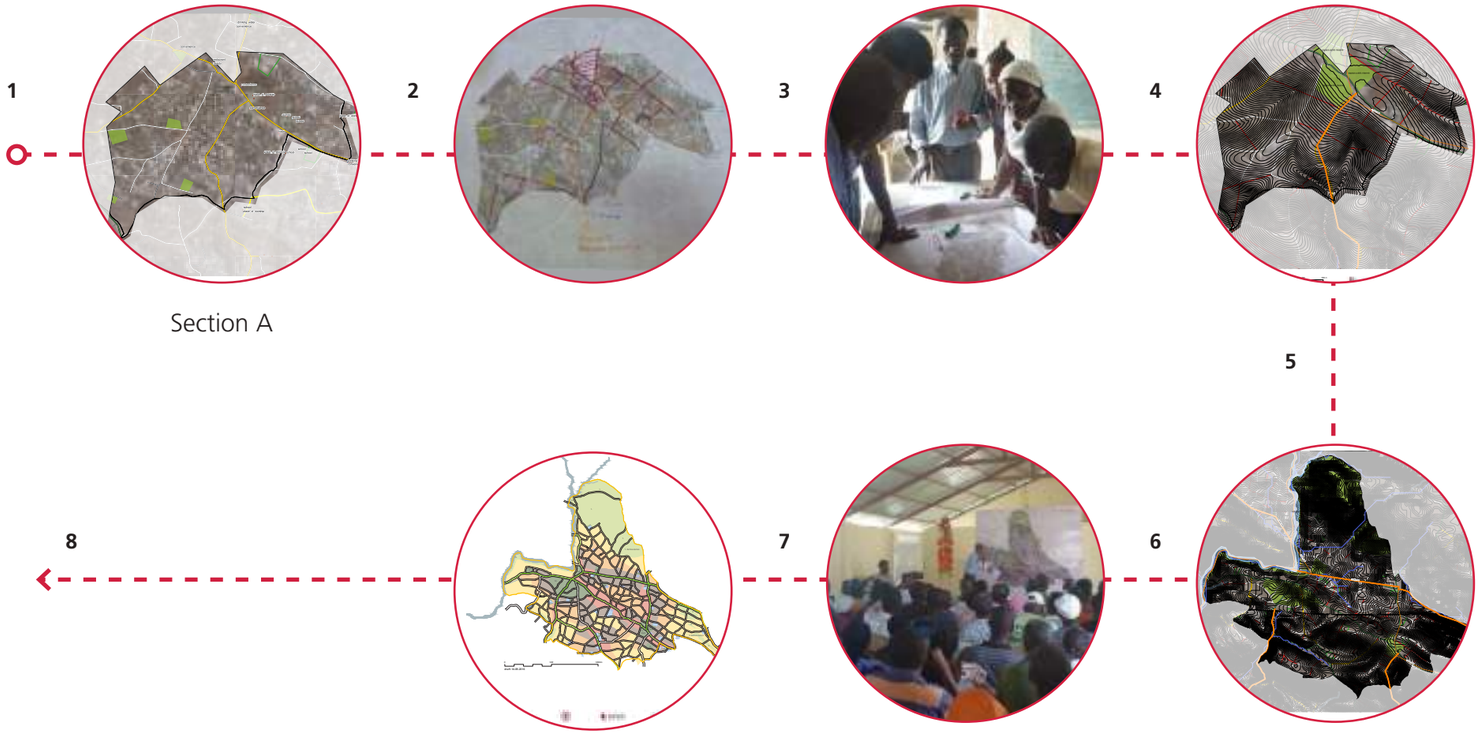
3. NEIGHBOURHOODS' PLANS

3.1. CANAAN I



Canaan I, located in the centre of Canaan, is a mixed usage neighbourhood with a population of 13,779 inhabitants. The central area is the densest in terms of settlements and services; especially around the arterial roads. In the South, the topography of Canaan I has large plateaus and therefore hold great potential for development.

The following land use proposals in this section are based on a participatory process within three months' time-frame. The UN-Habitat team maps the existing situation and the community validates and proposes ideas. The urban Lab rechecks the suggested interventions and modifies if necessary. After that, a neighbourhood assembly is organized to showcase the overall vision and a land use is later developed.



1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.50: Canaan I: participatory planning process

A. STREET NETWORK

Currently, the road network occupies 9% of the total area of the neighbourhood. There is only secondary roads with the majority being dead-ends roads. The northern part is deprived from roads due to the steep slopes.

To guarantee a good mobility and to prevent any congestion, the enhancement of the road network in Canaan I is indispensable. Preserving space for the streets improve the connectivity and ensure smooth traffic flow.

Existing situation

Streets percentage

UN-Habitat: 30%

9%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

14.4 km/sq.km

Fig.51: Canaan I: existing street network

Many arterial and main roads are proposed in the new plan of Canaan I. For these roads, two options (A and B, see below) are suggested, with each, different width are defined for the different types of roads. Following the new recommendations, the percentage of spaces allocated for the roads will increase 20% reaching 27.5%. The proposed road network not only suggests new roads, but also looks into upgrading the existing situation by enlarging the roads for example.

Proposed street network

Streets percentage

27.5% -Option A

Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

- Option B

Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

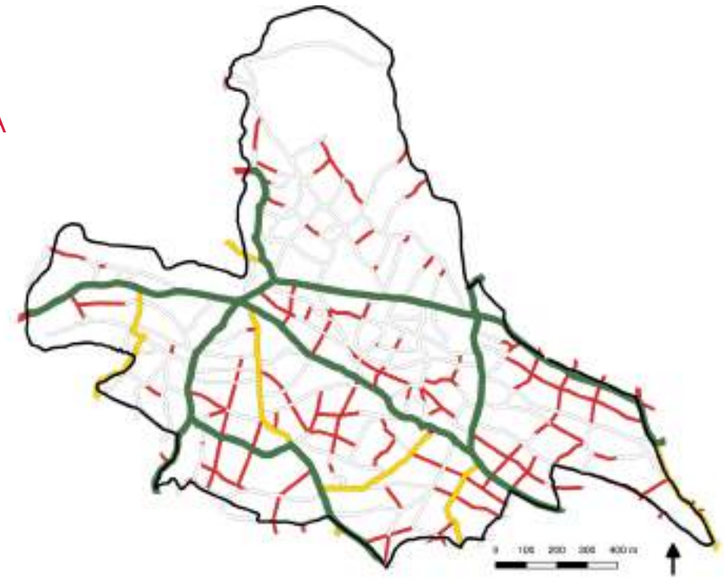


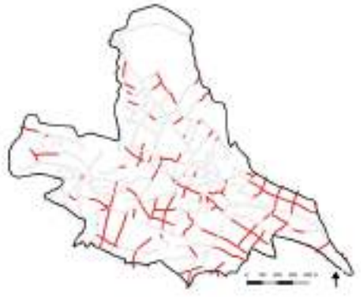
Fig.52: Canaan I: Proposed street network

Layers of the proposed street network

National road

Arterial road

Main roads



Secondary streets

Fig.53: Canaan I: Layers of the proposed street network

B. PUBLIC SPACES

Existing Public Spaces

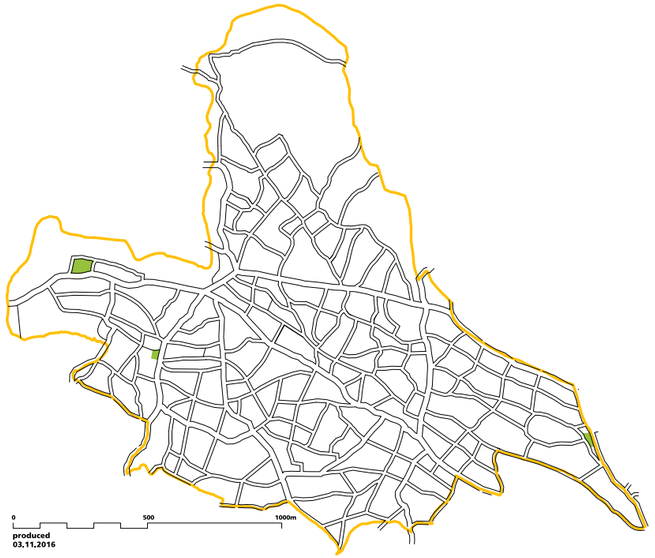


Fig.54: Canaan I: Existing Public spaces

Proposed by the community

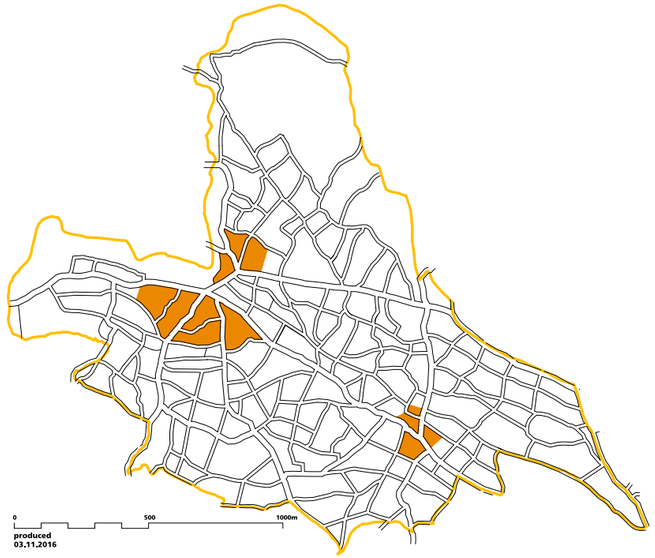


Fig.55: Canaan I: Public spaces proposed by the community

Proposed by UN-Habitat LAB

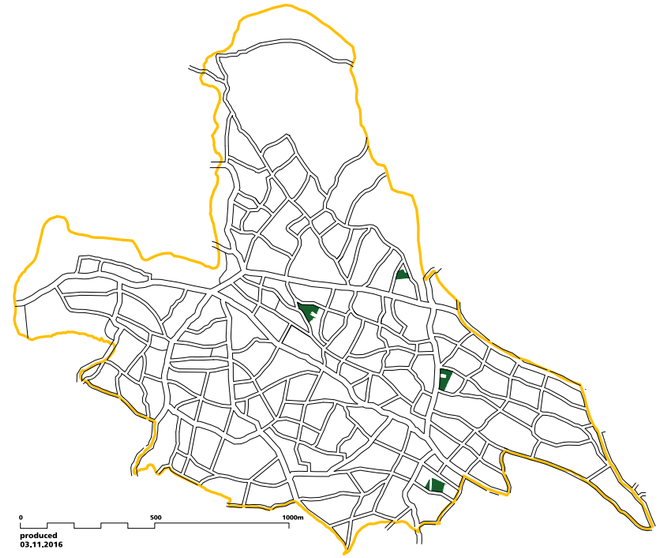


Fig.56: Canaan I: Public spaces proposed by UN-Habitat LAB

#	PUBLIC SPACE CANAAN I	Status	Name (if any)	m2	ha	%
	NEIGHBOURHOOD AREA			2,000,000	200	100%
1	Public space	Existing		950	0.095	
2	Public space	Existing		763	0.0763	
3	Football field	Existing		3,376	0.3376	
				5,089	**0.51**	**0,25%**
4	Park	proposed by the community	Place Publique de Canaan	12,908	1.2908	
5	Park	proposed by the community		53,199	5.3199	
6	Public space	proposed by the community		17,692	1.7692	
				83,799	**8.38**	**4,08%**
8	Public space	proposed by the LAB		2,474	0.2474	
9	Public space	proposed by the LAB		2,500	0.25	
10	Public space	proposed by the LAB		1,085	0.1085	
11	Public space	proposed by the LAB		2,000	0.2	
				8,059	**0.56**	**0,39%**
total:				**96,947**	**9.69**	**4.72%**

Table 1. Canaan I: Percentage of public spaces

Currently, Canaan I has three public spaces including a soccer field. Together, these spaces occupy 0.25% of the total neighbourhood's area. As UN-Habitat recommends a coverage of 15%, it is then necessary to consider vacant lands for the development of new public spaces.

Following the community workshops, the inhabitants expressed the necessity of having spaces allocated to the public good. The community therefore proposed three new spaces where two of them are parks. Adding the community's proposition to the existing situation, the percentage of the public spaces has seen an increase of 4%. Considering that the number is not yet sufficient, the Lab suggested the allocation of four new spaces in the Eastern part of the neighbourhood.

Also, the community and the Lab respectively proposed a re-forestation project and a buffer riparian area. These spaces are designed with the potential of been public spaces. If these proposals are implemented, the designated public space in the Canaan I neighbourhood would reach 21%.

#	PUBLIC SPACE IN Canaan I	Status	Name (if any)	m2	Ha	%
	Neighbourhood area			2,000,000	200	100%
	Public spaces			**96,947**	**9.69**	**4,72%**
12	Reforestation	Proposed by the community		290,000	29	
13	Buffer Zone /Green corridors along streams and rivers	Proposed by the LAB		76,266	7.62	
			Total:	**336100**	**33,6**	**16%**
Public spaces and open areas total:				**433,047**	**43.3**	**21%**

Table 2. Canaan I: Total percentage of open public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

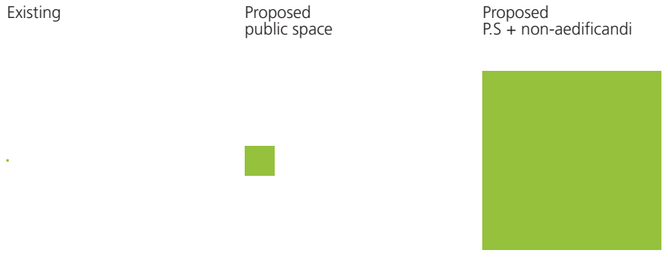


Table 3. Canaan I: Public space area per inhabitant diagram

Proposed public spaces with 400 metres buffer

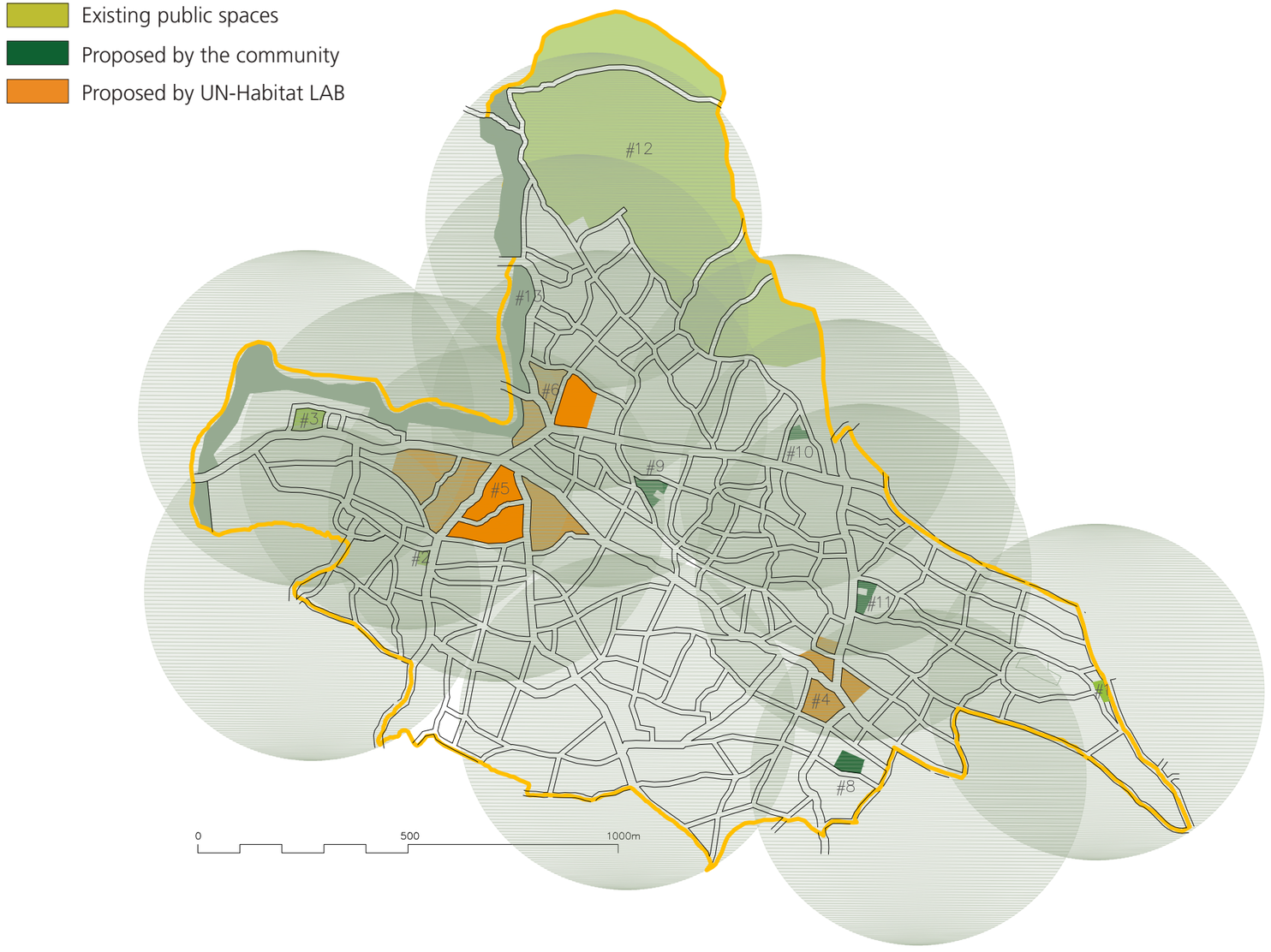


Fig.57: Canaan I : Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREA

2 km²
Neighbourhood area

13,779 Inhabitants
(Source ARC household survey 2016)

6,900 People/km²

Existing residential areas

Fig.58: Canaan I : Existing settlements

With a population of 13,779 inhabitants and an area of 2km2, the density of the neighbourhood is 6,900 people/km2.

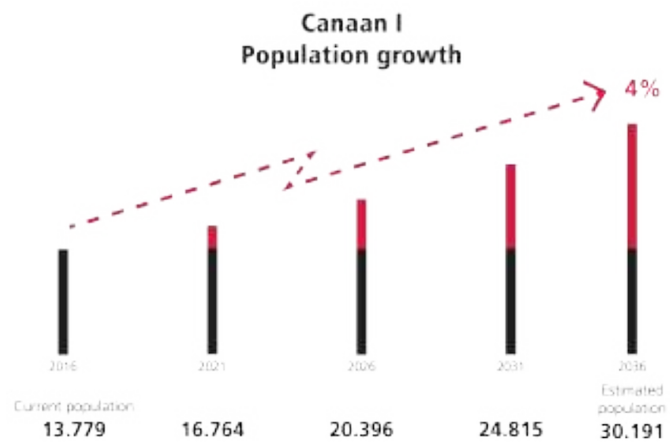


Fig.59: Canaan I: Projected population increase

Fig.60: Canaan I: Contours

Canaan I is therefore one the less dense neighbourhood in the study area. The topography is a bit steep on the periphery, as for the centre, it is moderate.

Proposed densities

Low density

The low density areas are located on the low edge of the neighbourhood and reach the limit of Canaan I towards the south and the steep slopes towards the north. Considering the density is of 12,000 people/km2, the proposed plan can host up to 2,002 inhabitants. The settlements in this classification are often connected to secondary roads. It is possible to have small commercial activities provided that pedestrian access is ensured.

Medium density

Medium-density dwellings are located in the centre and close to the main roads. In the new land use plan, existing areas that are considered as low density, are recommended to be converted to a higher density. This implies that a densification approach must be taken. It is suggested to have 18,000 inhab./km2 in medium density areas. Respecting the proposed plan, Canaan I will accommodate 4,004 inhabitants.

High density

For the high density areas, UN-Habitat recommends to have 15,000 people/km² but considering that the density is already high, we adopted 24,000 inhab/km2 for this neighbourhood. These areas are located in the centre with direct access to the arterial road. It is preferable to situate high density areas near commercial activities in order to have a more compact city. The new proposal can accommodate 9,018 inhabitants in the neighbourhood of Canaan I.

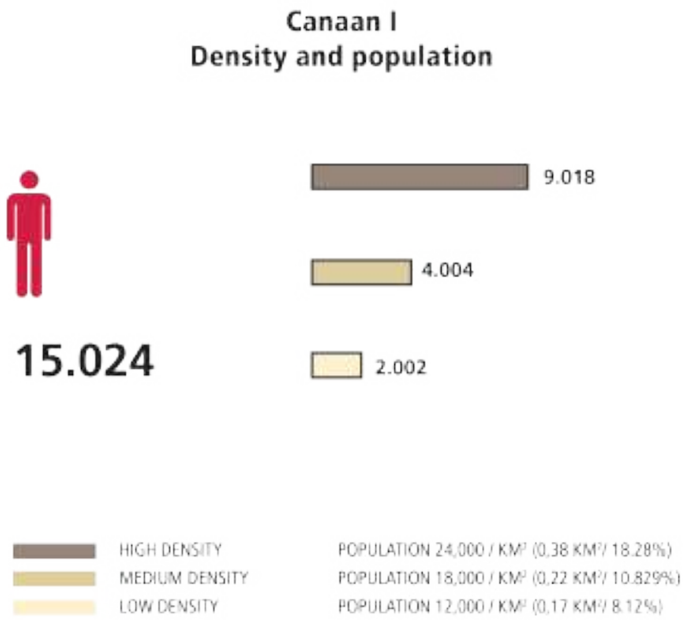


Fig.61: Canaan I: Diagram of population in the new proposed residential areas.

It is expected that the current population of 13,779 inhabitants will reach 30,191 in the upcoming 20 years, if the growth rate remains of 4%. After densifiying some of the areas, Canaan I will be able to accommodate 15,024 inhabitants. This means that the plan, as it is, won't be able to cope with the urban growth. Evacuation measures for inhabitants living in high-risk areas should be considered as well as extension strategies should be put in place.

Economical activities in residential areas is highly encouraged provided they have direct access to the streets. The size shops is strictly related to the types of roads they face and the density of the dwellings; the higher the density, the bigger the commerce and vice versa. The compactness of cities is triggered by the integration of different land uses in the urban fabric.

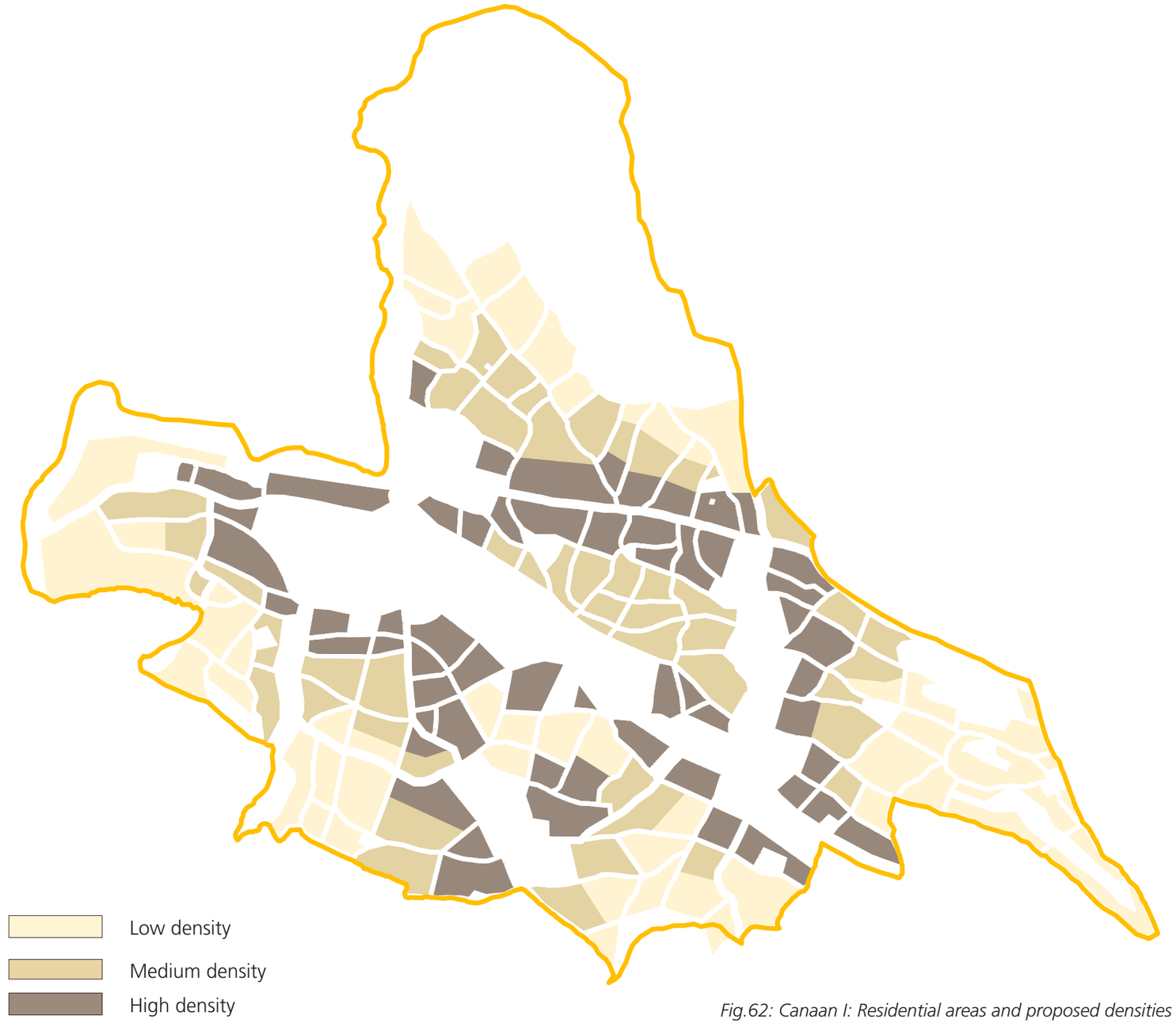
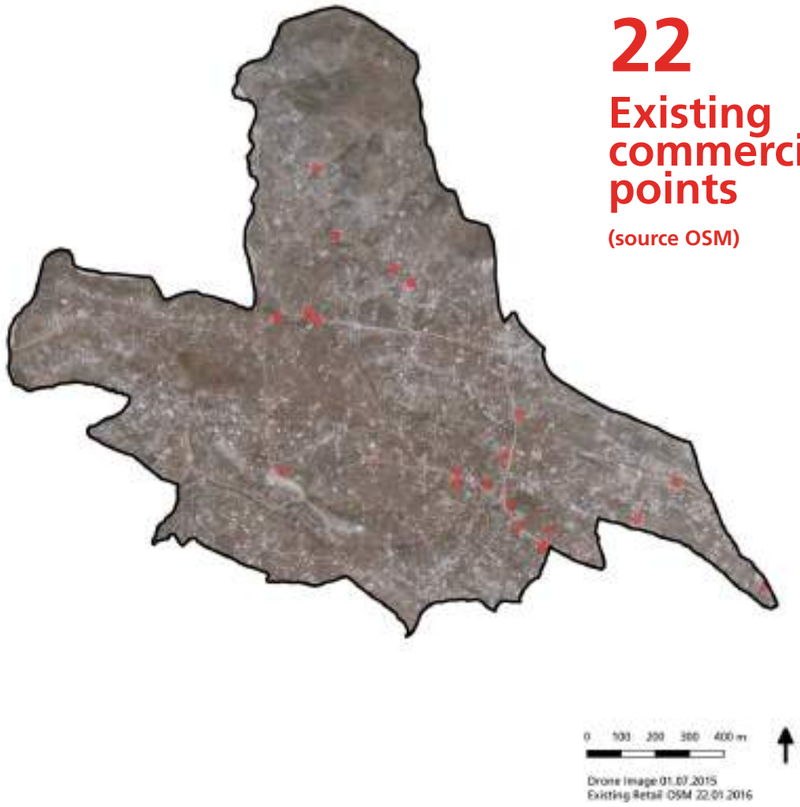


Fig.62: Canaan I: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial



22

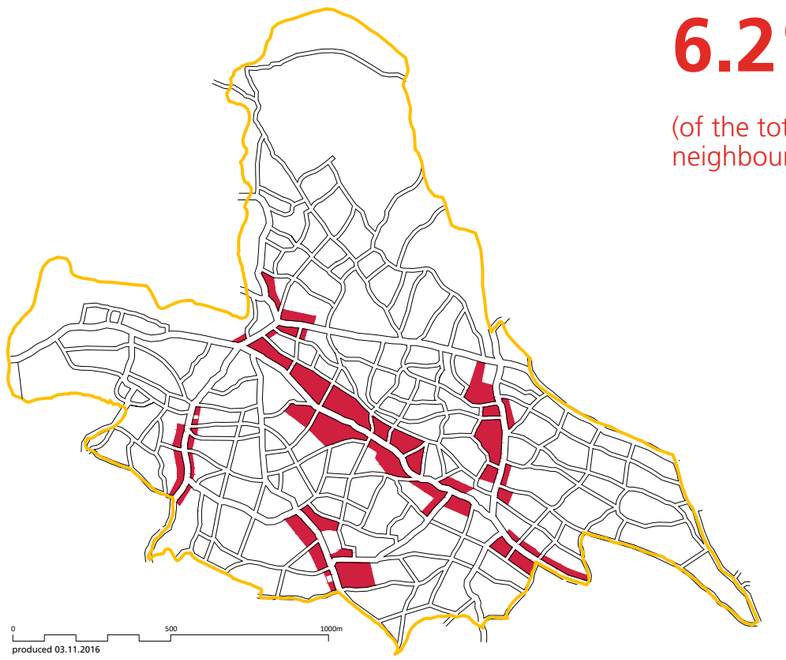
Existing commercial points

(source OSM)

Fig.63: Canaan I : Existing commercial points (Source: OSM)

According to OpenStreetMap databases, there are a total of 22 small shops in Canaan I. These services are located in the southeastern part of the neighbourhood facing the new arterial road. There are several types of commerce in this neighbourhood such as grocery stores, hairdressers and vegetable markets. Canaan I should consider the allocation of new commercial services to enhance local economy. Locating these services in the centre with direct access to the main road is encouraged for a better accessibility.

Proposed commercial areas (mixed-use)



6.2%

(of the total neighbourhood area)

Fig.64: Canaan I : Proposed commercial areas

Following the community workshops, the needs were translated by designating the areas that are adjacent to the arterial road as commercial areas. These activities have the potential to generate a new, highly diverse sector within the local economy, with new job opportunities. They act as catalysts for initiating a structural transformation. The proposed commercial areas in the new land use plan will occupy 6% of the total area of Canaan I.

E. PUBLIC FACILITIES

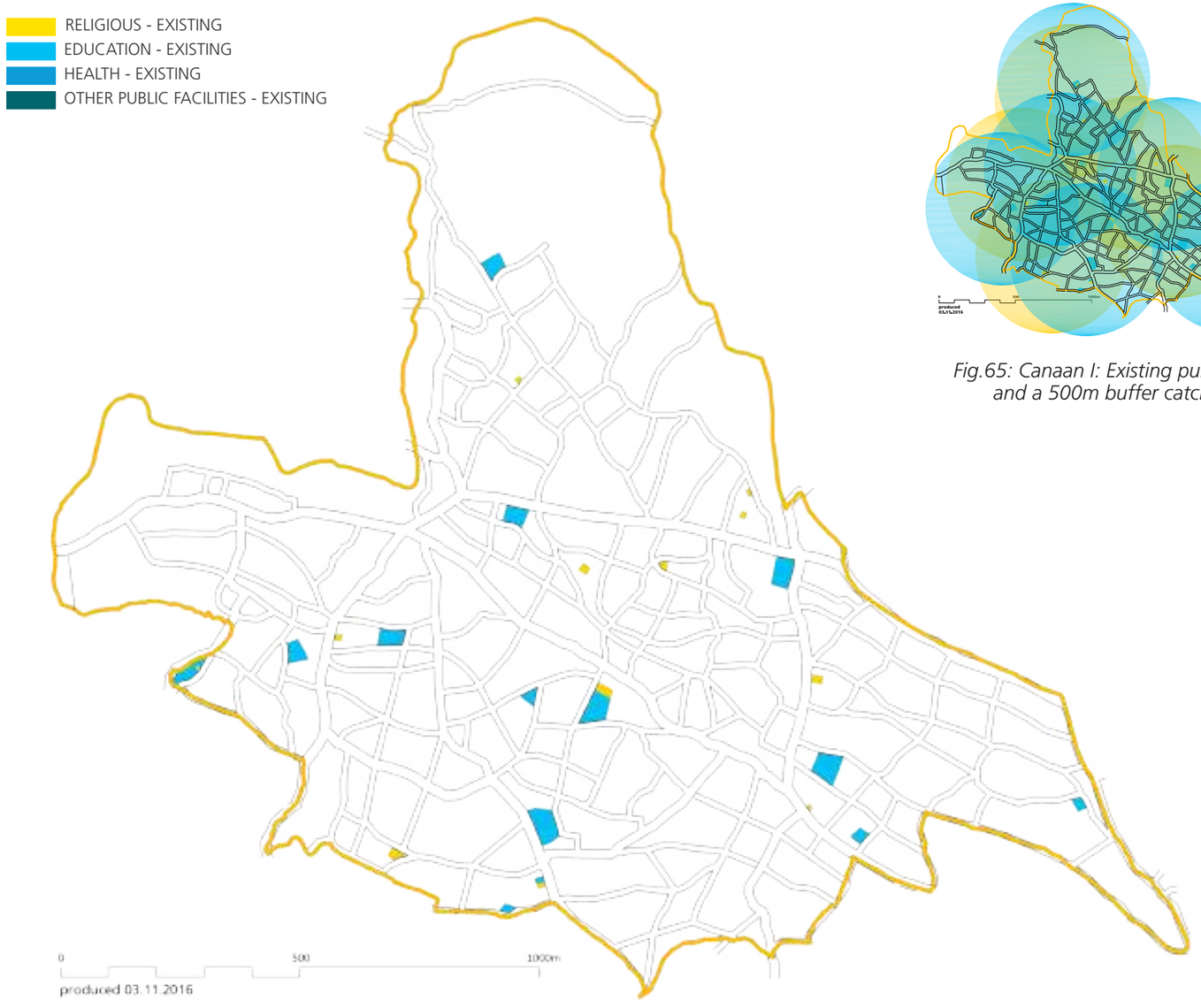


Fig.66: Canaan I : Existing public facilities

Fig.65: Canaan I: Existing public facilities and a 500m buffer catchment area.

Canaan I has twenty-four schools scattered in the neighbourhood. The data has been validated with the community but there is still a lack of information about the types of schools (primary, secondary, etc.). It was a real challenge to anticipate the required number of educational services for the population of Canaan I. Education plays a major role in reducing poverty and inequality, therefore it is always recommended to preserve vacant land for the extension of existing facilities and for the provision of new schools.

21%	Less than 10 years
4%	Illiterate
30%	Primary school (not finished)
13%	Primary school (finished)
23%	Secondary school (not finished)
6%	Secondary school (finished)
1%	Professional school
2%	University

Table 4. Canaan I: Participation level (Croix Rouge Americaine, Juillet 2016)

The neighbourhood has 17 places of worship. There is no information available regarding health services, community centres, security stations and others. For planning purposes, and in order to have a long-term sustainable city, it is essential to consider the services mentioned in the new design of the neighbourhood. Generally, these services require good accessibility to the street network and therefore their location must be well planned. Normally, it is recommended to locate them within 500 metres from the settlements so they can be easily reached

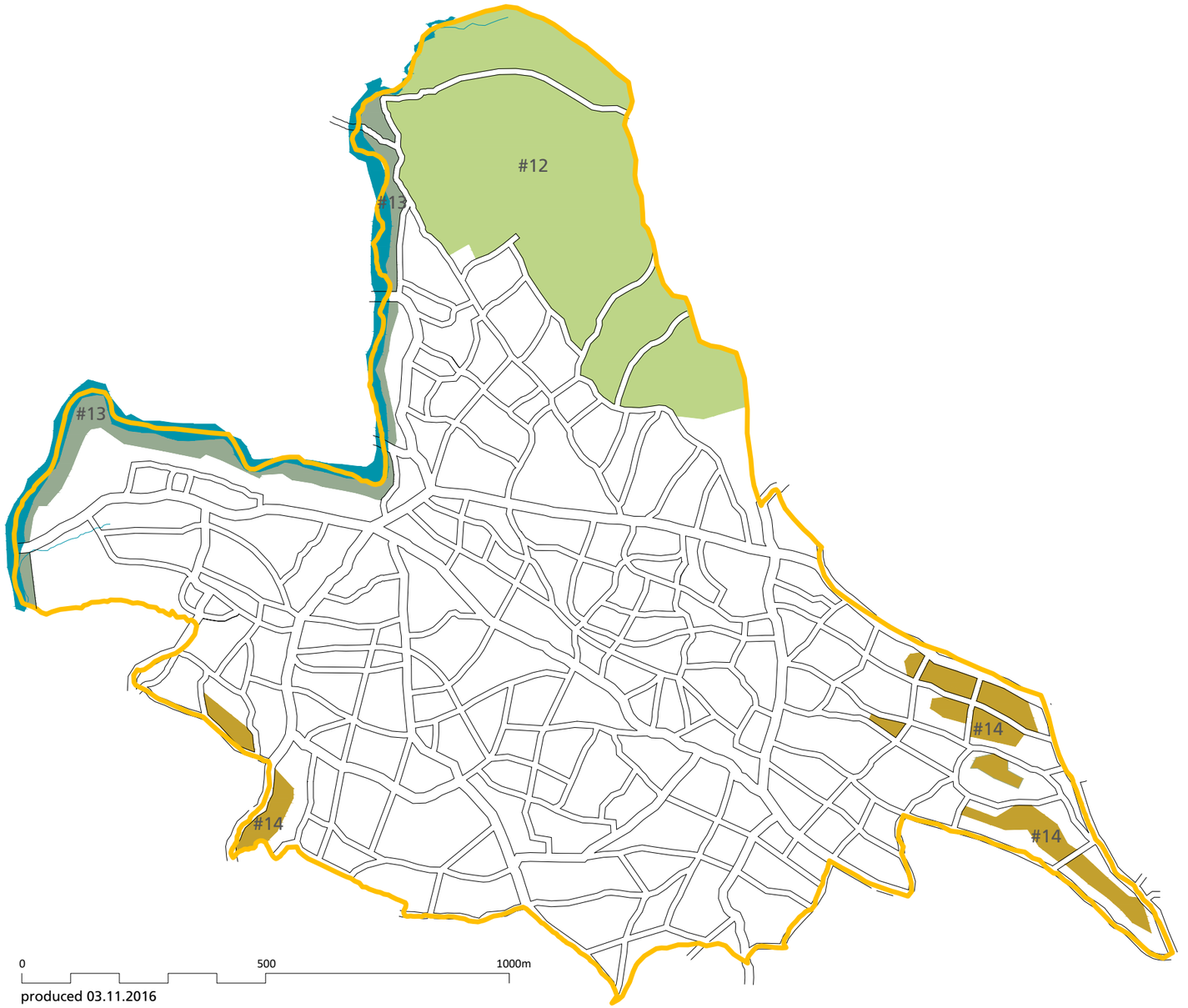
F. NATURAL RESOURCES AND ENVIRONMENT

It is almost impossible to develop the northern part of the neighbourhood since the topography is complex due to the steep slope. The area present a high risk of erosion, and for that, a reforestation project is proposed to prevent any landslides. There is a high potential of flooding in the western part due to the presence of the ravine. A buffer zone of 30 metres on both sides is then planned as a mitigation measure to prevent any risk. This buffer zone has been designed with the potential to become a public space.

No-built areas occupy 20.3% of the total area Canaan I.

#	No-built areas	m²	ha	%
	Neighbourhood area	2,000,000	200	100%
12	Reforestation	290,000	29	
13	Buffer zones / Green corridors along the streams and rivers	76,266	7.6266	
14	High environmental risk areas	52,645	5.2645	
	Total:	**418,911**	**42**	**20.38%**

Table 5. Canaan I: Total percentage of no-built areas

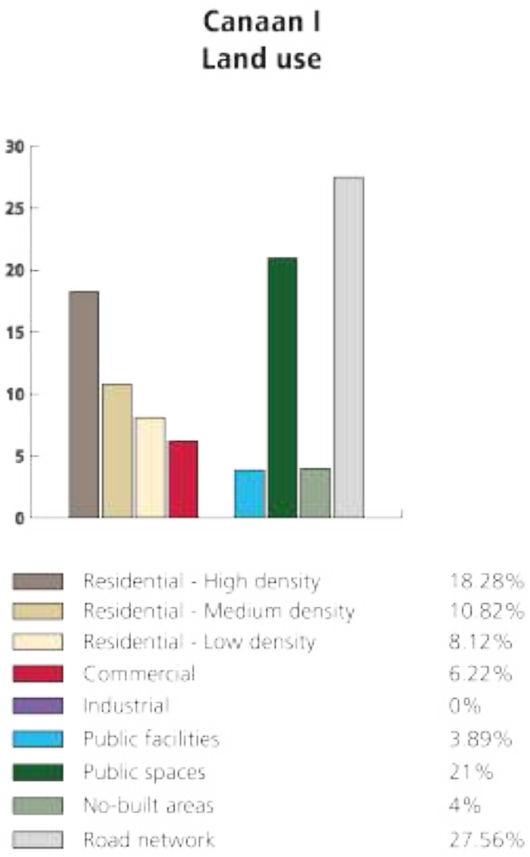


Legend

- Proposed buffer zone along the rivers and ravines
- Proposed area for livestock grazing
- Proposed area for reforestation
- High environmental risk areas
- Existing rivers and ravines
- Quarries

Fig.67: Canaan I: No-built areas

G. CANAAN I LAND USE



The assemblies, facilitated by the UN-Habitat team in Haiti, identified the main needs of the residents of Canaan I. The proposed land-use plan is the result of the ongoing participatory process with the community. It responds as much as possible to their needs and proposes new ideas that can induce prosperity and sustainability.

The plan was reviewed as a whole, taking into account the neighbourhoods nearby and how they connect. It is mandatory to situate each of the individual neighbourhood plans in the whole Canaan area to achieve a coherent and rich structure.

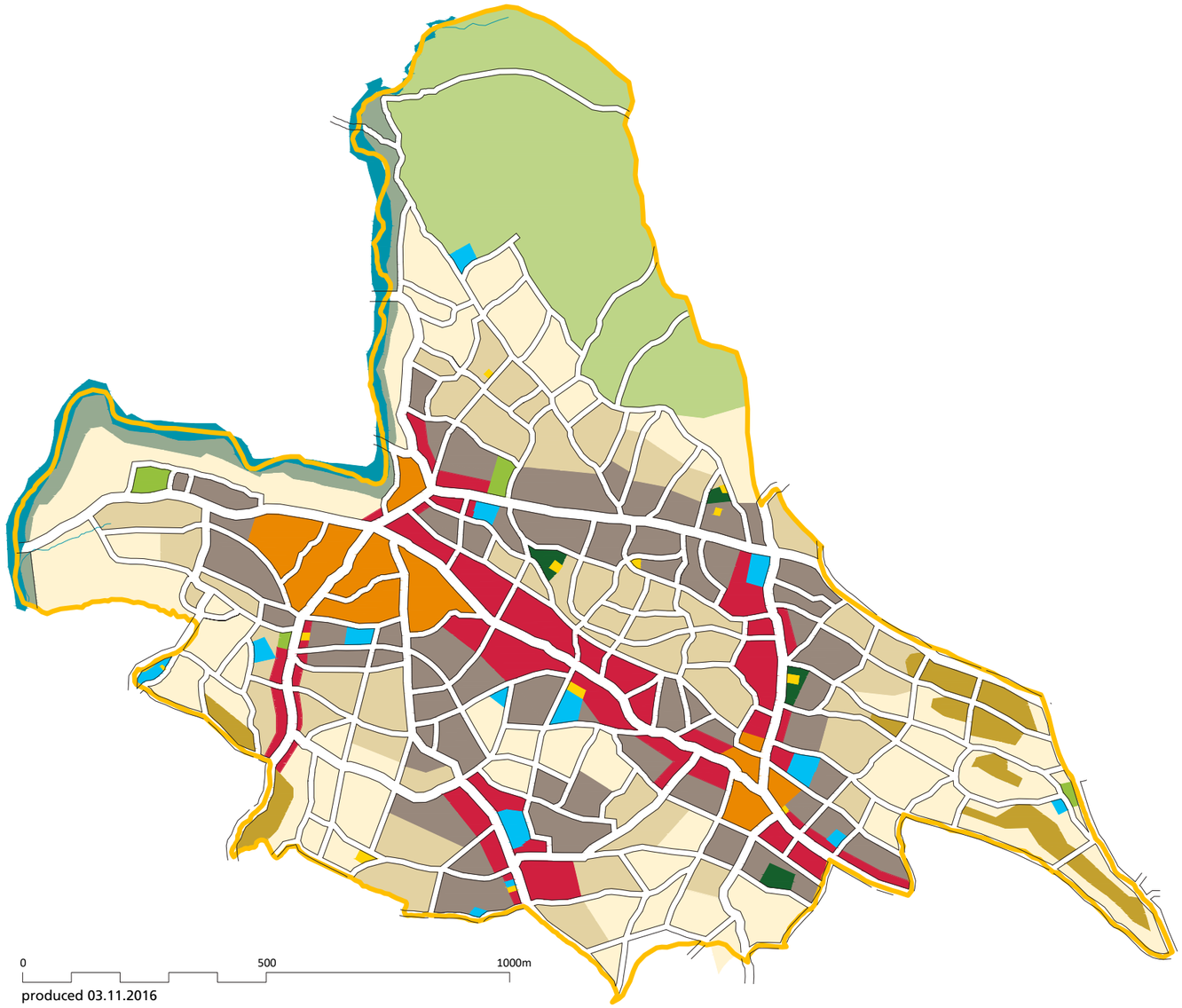
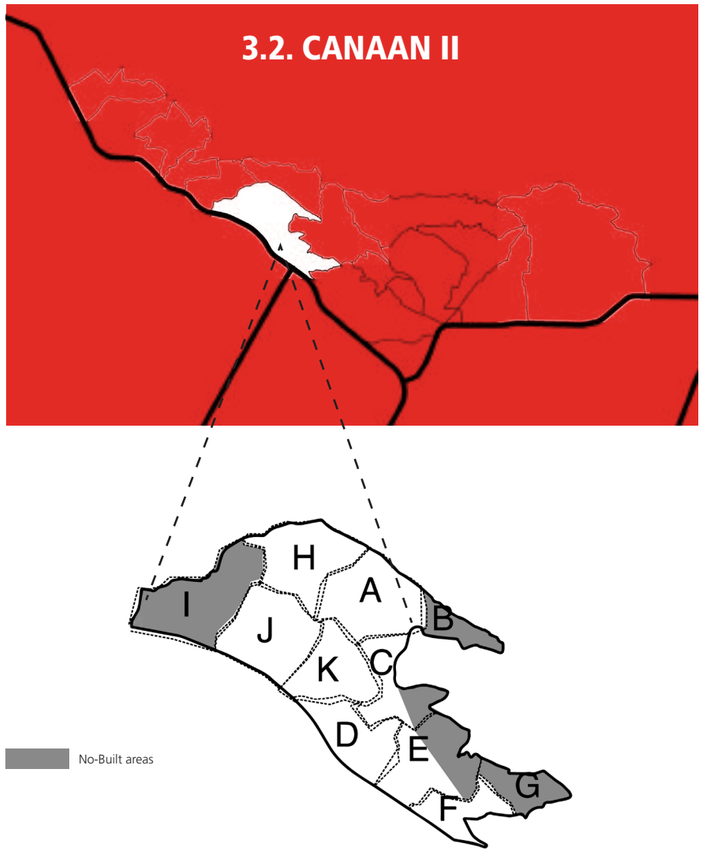
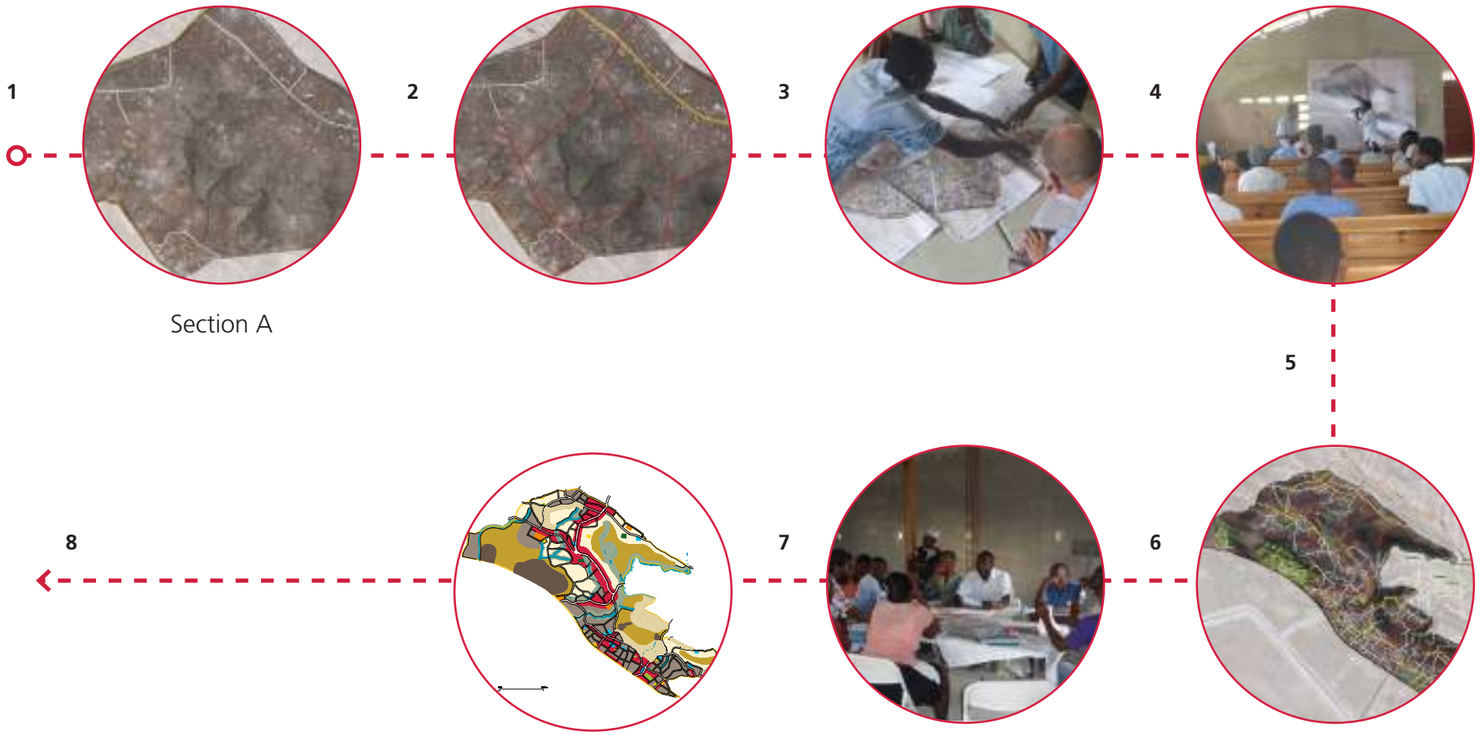


Fig.68: Canaan I : Proposed land use plan



Canaan II, located on the west of the central area of Canaan, has a population of 12,100. It is considered a low density neighbourhood with 4.383 inhab. per km2 and therefore its densification is encouraged. A large part of Canaan II borders the National Road 1 to the south but there is almost no access from it to the neighbourhood. The presence of quarries and the complex topography limit the availability of suitable lands.

The proposals in this section are based on a participatory process with the Canaan II community that lasted an average of three months. The UN-Habitat team maps the existing situation and then the community validates and proposes ideas. The LAB of urban planning and design checks the proposed interventions and modifies if necessary. Then, a neighbourhood assembly is organized to present the vision and a land use plan is developed.



1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.69: Canaan II: participatory planning process

A. STREET NETWORK

Currently, the street network occupies 8% of the total Canaan II area. There are just secondary streets with the majority being dead-ends streets. The presence of roads in the northern and western parts is almost null thanks to the existence of quarries and steep slopes. Appropriate measures on the construction of roads in steep areas have been further elaborated in the mobility report.

In the new plan of Canaan II, two arterial roads that connect the national road 1 with the northern part are proposed. Where the topography is moderate, main roads are suggested to improve the connectivity. Different widths are defined for the different types of roads (Option A and B, see below). The plan does not only propose new roads, but also looks into ways to improve and upgrade the current situation. The new Canaan II road network plan shows an increase of 7.5%.

Existing situation

Streets percentage

UN-Habitat: 30%

8%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

13.6 km/sq.km

Fig.70: Canaan II: existing street network

Proposed street network

Streets percentage

15.5% -Option A

Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

- Option B

Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

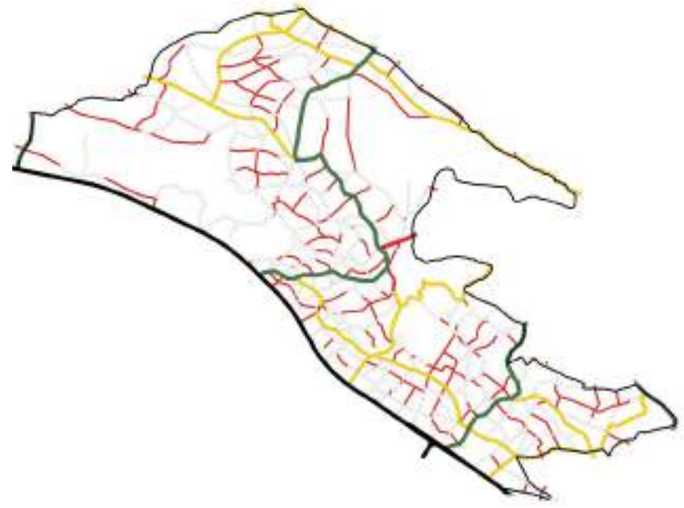


Fig.71: Canaan II: Proposed street network

Layers of the proposed street network

National road

Arterial road

Main roads

Secondary streets

Fig.72: Canaan II: Layers of the proposed street network

B. PUBLIC SPACES

Existing Public Spaces

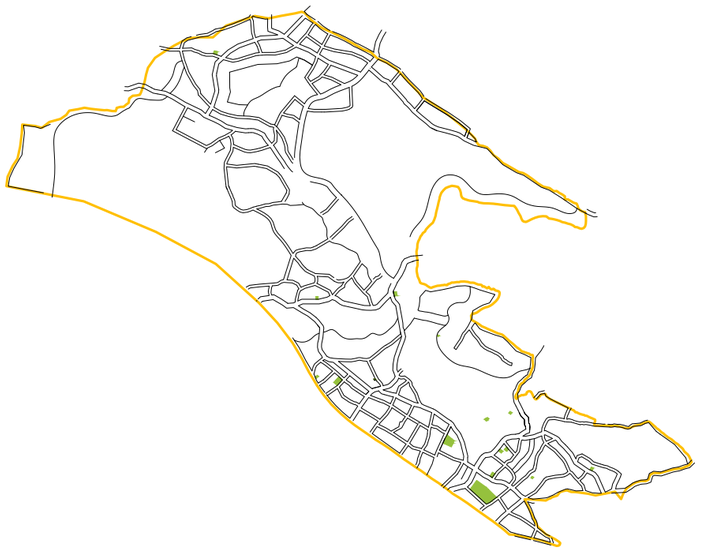


Fig.73: Canaan II: Existing Public spaces

Proposed by the community

Fig.74: Canaan II: Public spaces proposed by the community

Proposed by UN-Habitat LAB

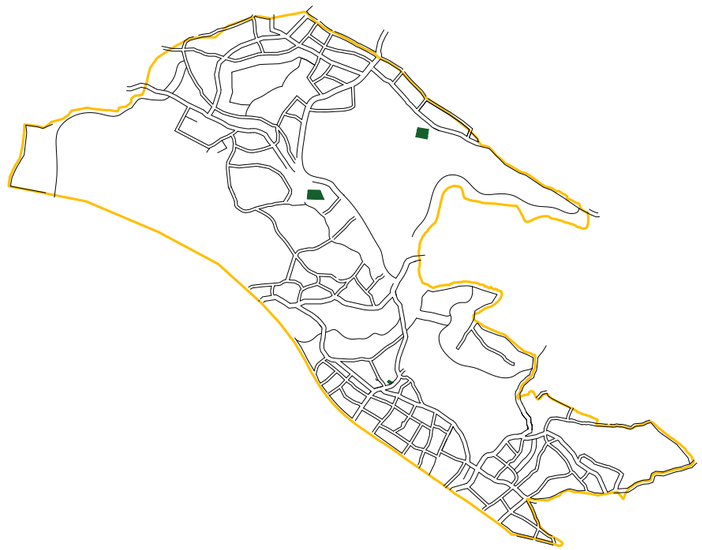


Fig.75: Canaan II: Public spaces proposed by UN-Habitat LAB

#	PUBLIC SPACE CANAAN II	STATUS	NAME (IF ANY)	m2	Ha	%
	NEIGHBOURHOOD AREA			2760000	276	100%
1	Public space	Existing	Terrain de football	660	0,07	
2	Public space	Existing	Terrain de football	1.300	0,13	
3	Public space	Existing	Parc	5.900	0,59	
24	Other public spaces (13)	Existing		2.051	2	
				9.911	**0,99**	**0,36%**
4	Public space	Proposed by the community		8.984	0,8984	
5	Public space	Proposed by the community		2.490	0,249	
22	Public space	Proposed by the community		3.384	0,3384	
23	Public space	Proposed by the community		2.320	0,232	
				17.178	**1,72**	**0,62%**
7	Public space	Proposed by the lab		2.527	0,2527	
6	Public space	Proposed by the lab		2.203	0,2203	
25	Public space	Proposed by the lab		200	0,02	
				4.930	**0,49**	**0,18%**
Total:				**32.019**	**3,20**	**1,16%**

Table 6. Canaan II: Percentage of public spaces

Canaan II has 24 small public spaces, two of them are football fields and the other is a market. The total area of the existing spaces is of 1 hectare consisting 0.37% of the total neighbourhood area. These spaces are located in south where the concentration of houses is abundant. To keep up with the recommendation of UN-Habitat, it is essential to consider vacant lots for the development of new public spaces.

The results of the workshops highlighted the importance and the need of having new public spaces. Considered as a priority, the community proposed to locate four spaces in the north. Adding the community's proposals to the existing situation, the percentage of public spaces is still insufficient. For this reason, the LAB suggested the establishment of two other spaces in the north-eastern part. After the proposals of both parties, the number increased by 3Ha.

It is essential to guarantee from both sides of the ravine t a distance of 30-50 metres as a buffer zone. These areas were also designed with the potential to become public spaces and not just as protective spaces. If these proposals are implemented, the designated public space in Canaan II would reach 10.8%.

#	PUBLIC SPACE IN CANAAN II	STATUS	NAME	m2	Ha	%
	Neighbourhood area			2760000	276	100%
	Public spaces			**32.019**	**3,2**	**1,16%**
16	Buffer zones around the ravine	Proposed by the LAB		149.651	14,9	
17	Buffer zones around the ravine	Proposed by the LAB		23.423	2,3	
18	Buffer zones around the ravine	Proposed by the LAB		10.399	1	
19	Buffer zones around the ravine	Proposed by the LAB		8.830	0,88	
20	Buffer zones around the ravine	Proposed by the LAB		30.298	3,0	
21	Buffer zones around the ravine	Proposed by the LAB		43.662	4,3	
			Total:	**266.263**	**26,63**	**9,65%**
Public spaces and open areas total:				**298.282**	**29,82**	**10,81%**

Table 7. Canaan II: Total percentage of public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

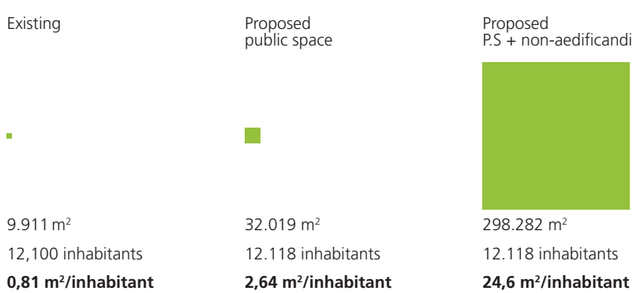


Table 8. Canaan II: Public space area per inhabitant diagram

Proposed public spaces with 400 metres buffer

Fig.76: Canaan II: Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREA

2.76 km²
Neighbourhood area

12,098 Inhabitants
(source ARC household survey 2016)

4,383 people/km²

Existing residential areas

Fig.77: Canaan II: Existing settlements

Canaan II is considered as a very low density neighbourhood. With a population of 12,098 inhabitants and an area of 2.76 km2, the density is of 4,383 inhabitants per km2.

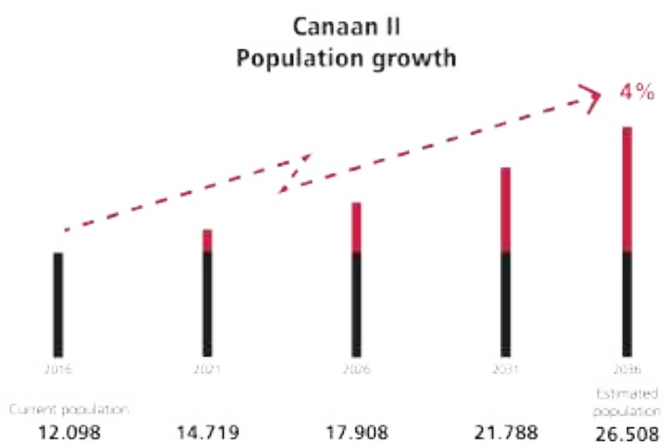


Fig.78: Canaan II: Projected population increase

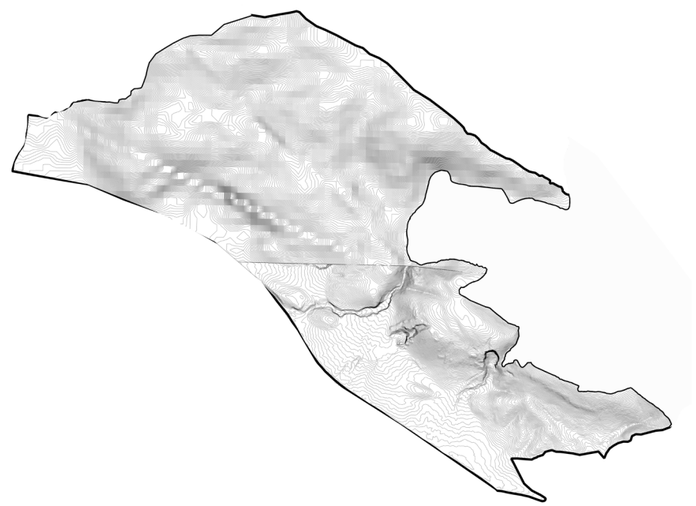


Fig.79: Canaan II: Contours

The concentration of dwellings is mostly in the south where the topography is moderate. In the north, the houses are scattered and have access to secondary streets.

Proposed densities

Low density

In the new proposal for density distribution, most of the low-density settlements will be located in the centre of the neighbourhood. Considering that the density is 8,000 inhab. Per km2, Canaan II will be able to accommodate 3,900 inhabitants. Houses in this classification are often connected to secondary streets. It is possible to have small shops provided to ensure a good access to pedestrian paths.

Medium density

Medium density dwellings in the new plan are located along the arterial road. The topography in these areas is not so steep and densification strategies in existing low density areas is thus feasible. The design proposes to have 12,000 inhabitants per km2 in medium density areas. Respecting the proposed plan, Canaan II will be able to accommodate 2.280 inhabitants.

High density

For the high density areas, UN-Habitat recommends to have 15,000 people/km2. This means that a study should be conducted on plot resizing and land readjustments before densifying the neighbourhood. The areas that would be densified are located where the topography is almost flat. In means to accommodate the congestion and the increasing number of habitants in these areas, the high density settlements should have direct access to the arterial and the main roads.

It usually advised to locate high density habitats near commercial activities in order to have a more compact city.

The new plan for Canaan II is able to accommodate up to 5,950 people in the new high density areas.

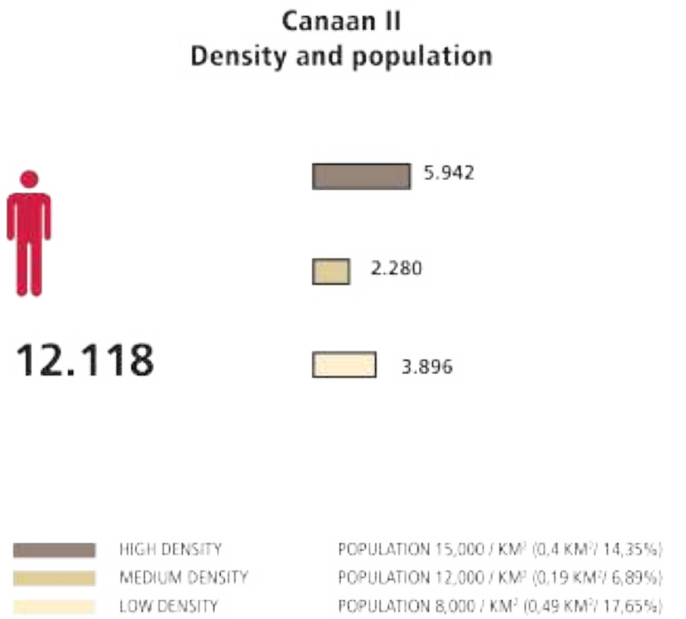


Fig.80: Canaan II: Diagram of population in the new proposed residential areas.

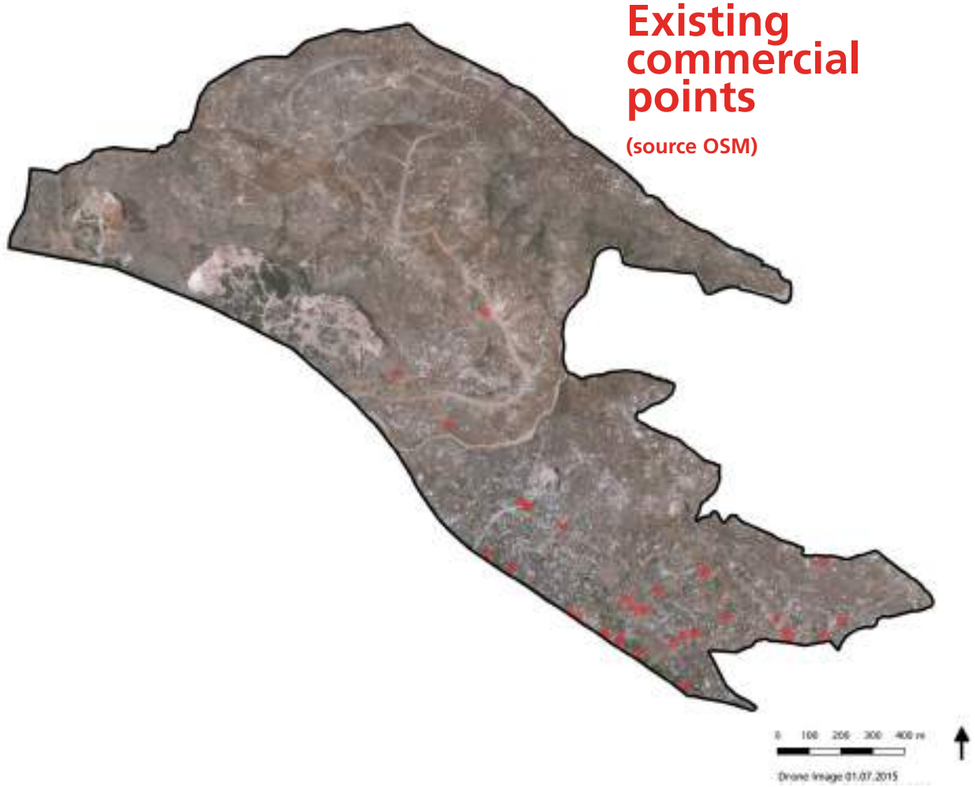
In 20 years from now, and if the growth of the area remains the same, it is expected that the current population of 12,098 will increase up tp 26,508 inhabitants. The densification of Canaan II, as proposed in the new plan, will be able to host 12,118 people, which is yet not sufficient. In order to cope with the rapid growth, it is advisable to further densify the areas that are of low densities and consider planned city extension as well.

The existence of economic activities in the residential areas is highly recommended provided that they have direct access to the roads. The size of the commercial activity is strictly linked to the type of roads they face and the densities; the higher the density the more commerce are big and vice versa. The compactness of the cities is triggered by the different land usages in the urban fabric.

Fig.81: Canaan II: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial



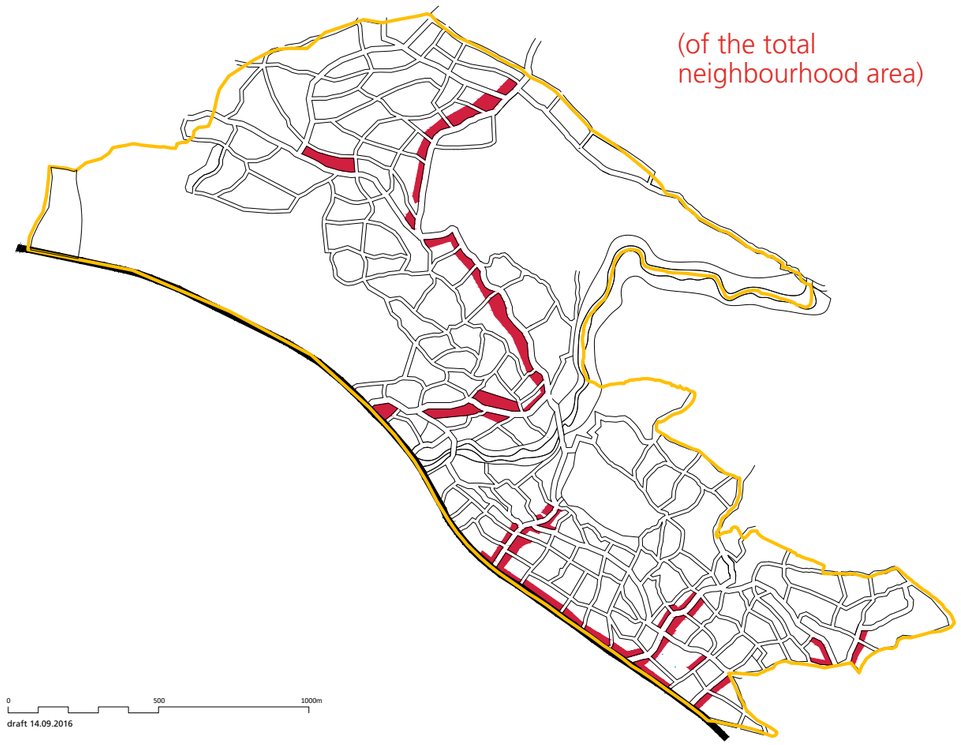
33

Existing commercial points

(source OSM)

Fig.82: Canaan II: Existing commercial points (Source: OSM)

Proposed commercial areas (mixed-use)



9,34%

(of the total neighbourhood area)

Fig.83: Canaan II: Proposed commercial areas

According to the OpenStreetMap data, there are 33 commercial points in the neighbourhood. The concentration of these existing shops is found in the south where the density of habitats is high. The information on the types of commerce is absent. To reinforce the local economy, new commercial services should be considered and strategically located in the neighbourhood with a good road access.

In the new proposal, the commercial activities will be facing the National Road 1. Also, others will be facing the new arterial road and will occupy the ground level. These activities have the potential to generate a new, highly diverse sector within the local economy, with new job opportunities. They act as catalysts for initiating a structural transformation. The proposed commercial areas in the new land use plan will occupy 9.34%.

E. PUBLIC FACILITIES

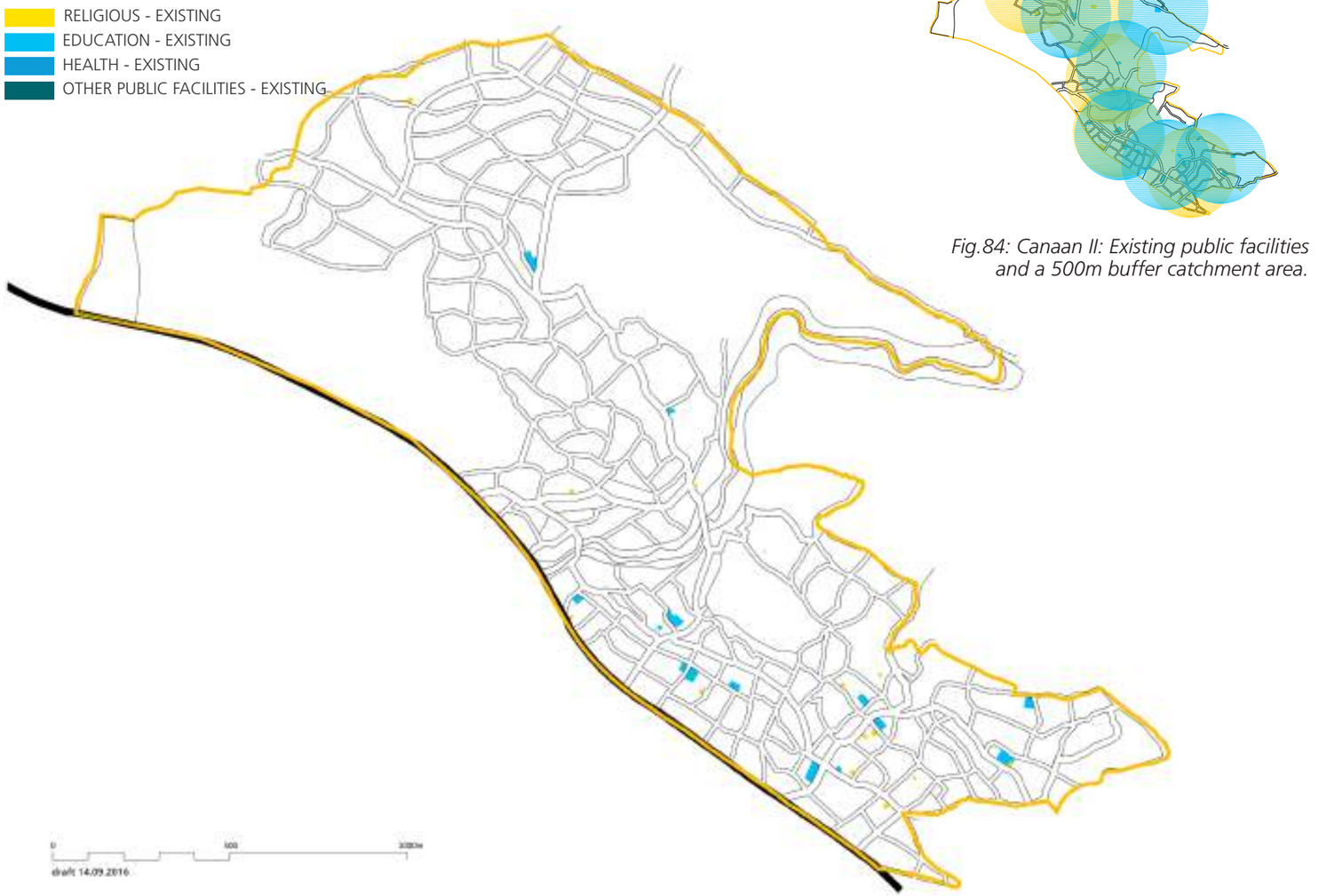


Fig.85: Canaan II: Existing public facilities

Fig.84: Canaan II: Existing public facilities and a 500m buffer catchment area.

Education plays a major role in reducing poverty and inequalities. For that, it is always advisable to reserve vacant land for the extension of existing facilities and/or for the provision of new educational facilities. The existing schools are located in the southern part of the neighbourhood. The data has been validated with the community but there is still a lack of information on the types of schools (primary, secondary, etc.). Therefore, it was a challenge to predict the required number of educational services for the Canaan II population.

16%	Less than 10 years
7%	Illiterate
29%	Primary school (not finished)
11%	Primary school (finished)
26%	Secondary school (not finished)
5%	Secondary school (finished)
3%	Professional school
2%	University

Table 9. Canaan II: Participation level (Croix Rouge Americaine, Juillet 2016)

The neighbourhood has places of worship but no information is available about health services, community centres, security stations and others. For planning purposes, and in order to have a sustainable city, it is essential to consider the services mentioned in the new design of the neighbourhood. Generally, they require good accessibility to the different types of road with good mobility. Normally, it is recommended to locate these services within 500 metres of the houses so they can be easily reached.

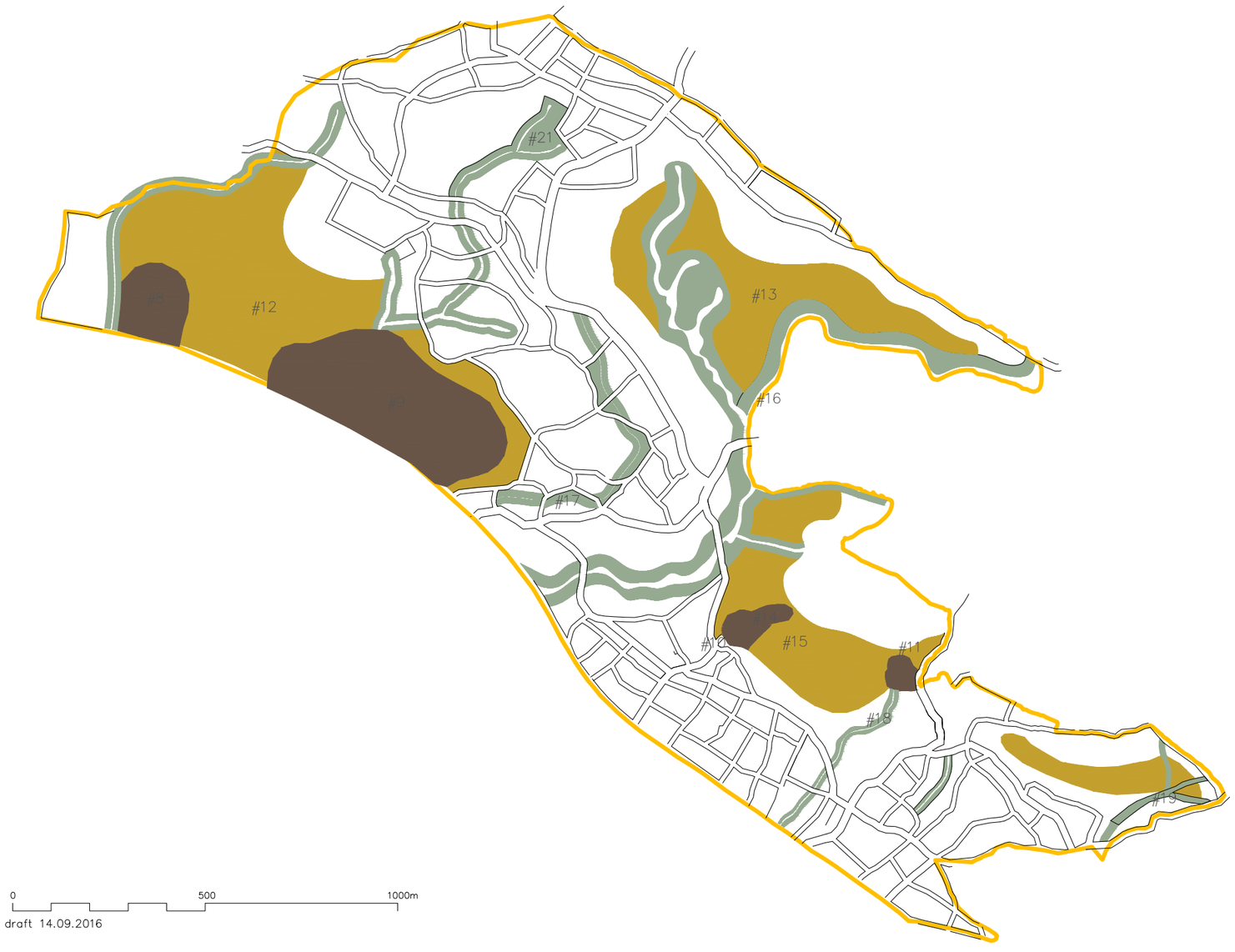
F. NATURAL RESOURCES AND ENVIRONMENT

Given the topography, the presence of quarries and ravines in certain areas will be considered as no-built for environmental protection reasons. There is a high potential for flooding in the centre of the neighbourhood and this is due to the presence of the ravine. A buffer zone of 50 metres on both sides is therefore designated as a mitigation measure to prevent any risk. This buffer zone has been designed with the potential to become a public space. Abandoned quarries must also be converted into recreation projects to benefit from these lost spaces.

No-built areas will occupy about 34% of the total neighbourhood area.

#	No-built areas	m²	ha	%
	Neighbourhood area	2.765.000	276	100%
8	Quarry	31.243	3,1	
9	Quarry	140.296	14	
10	Quarry	13.031	1,3	
11	Quarry	6.677	0,67	
12	Environmental risk area	223.269	22,3	
13	Environmental risk area	128.555	12,8	
14	Environmental risk area	31.268	3,1	
15	Environmental risk area	107.271	10,7	
16	Environmental risk area	149.651	14,9	
17	Environmental risk area	23.423	2,3	
18	Environmental risk area	10.399	1	
19	Environmental risk area	8.830	0,88	
20	Environmental risk area	30.298	3	
21	Environmental risk area	43.662	4,3	
	total:	**947.873**	**95**	**34,28%**

Table 10. Canaan II: Total percentage of no-built areas

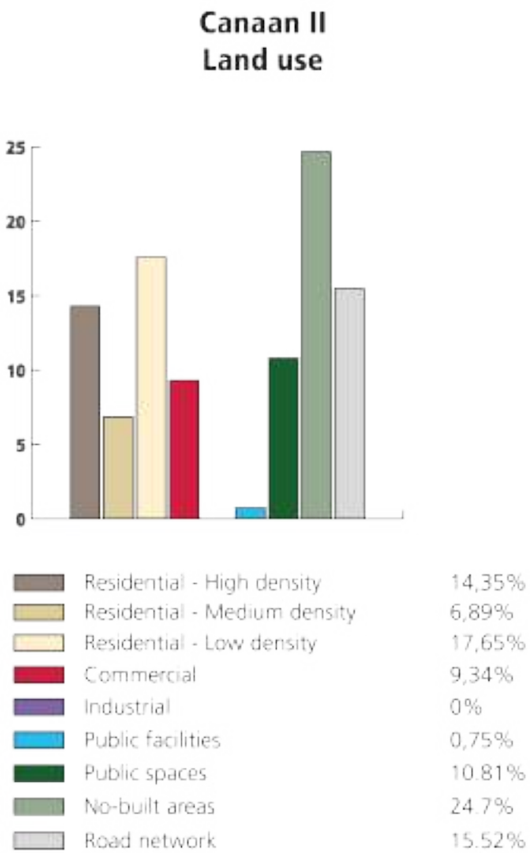


Legend

- Proposed buffer zone along the rivers and ravines
- Proposed area for livestock grazing
- Proposed area for reforestation
- High environmental risk areas
- Existing rivers and ravines
- Quarries

Fig.86: Canaan II: No-built areas

G. CANAAN II LAND USE



The assemblies, facilitated by the UN-Habitat team in Haiti, identified the main needs of the residents of Canaan II. The proposed land-use plan is the result of the ongoing participatory process with the community. It responds as much as possible to their needs and proposes new ideas that can induce prosperity and sustainability.

The plan was reviewed as a whole, taking into account the neighbourhoods nearby and how they connect. It is mandatory to situate each of the individual neighbourhood plans in the whole Canaan area to achieve a coherent and rich structure.

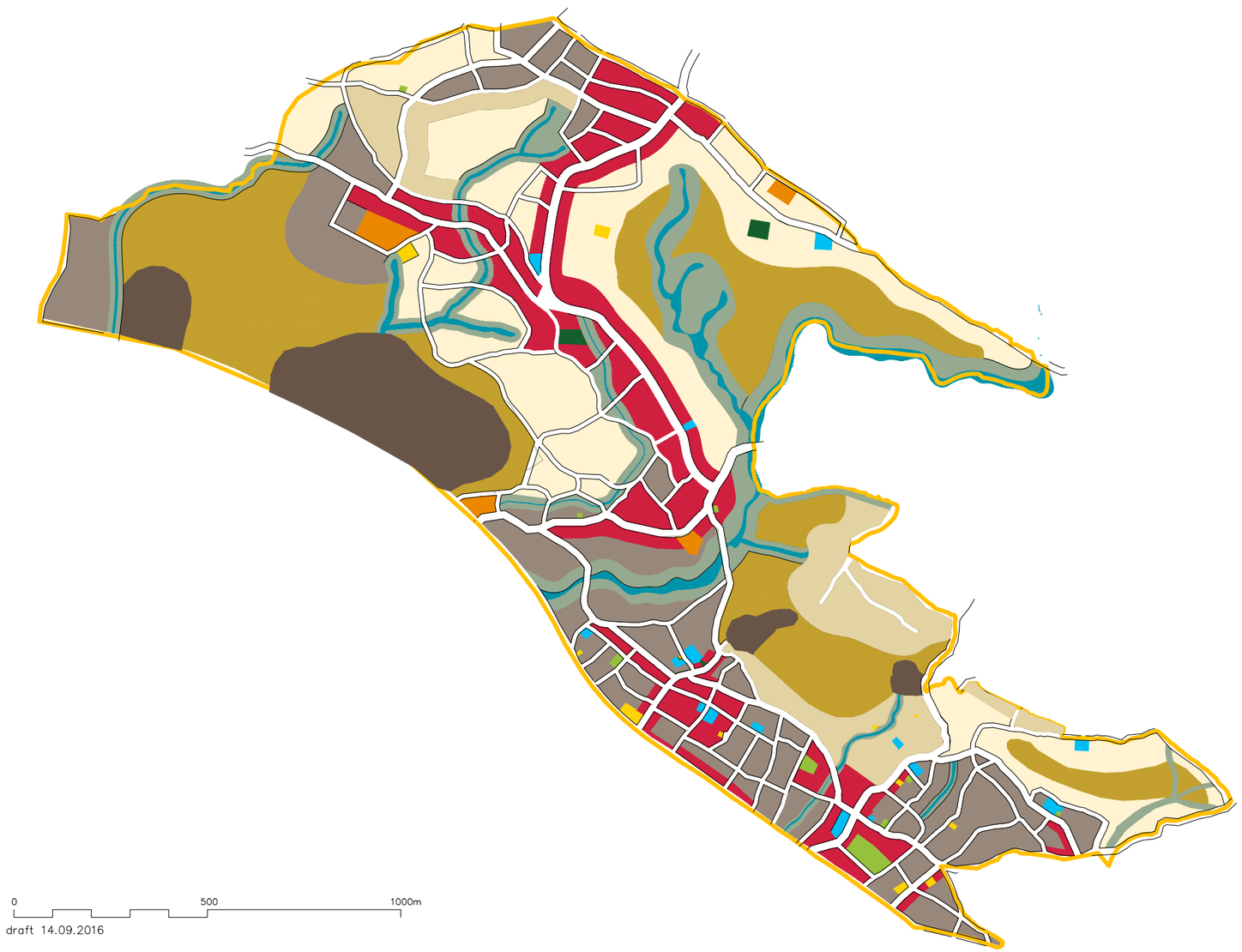
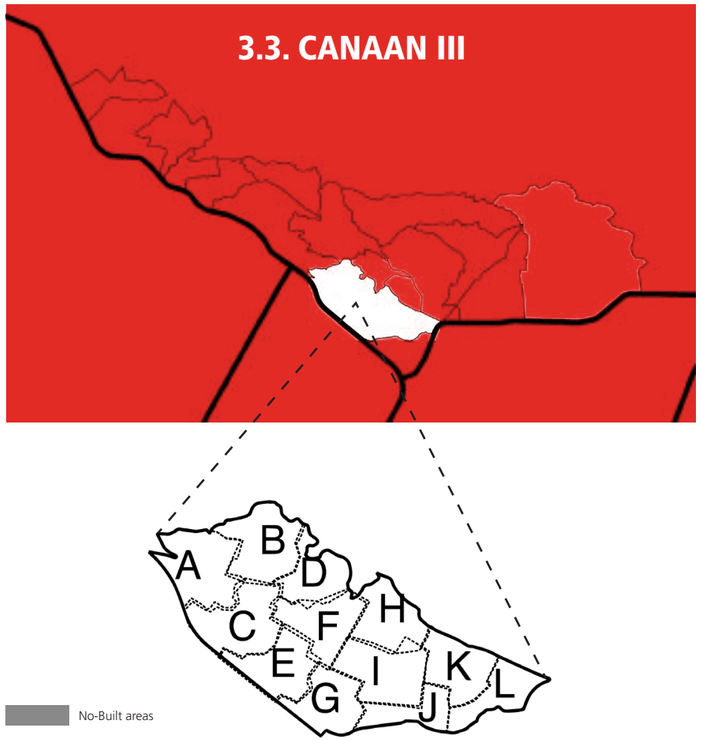
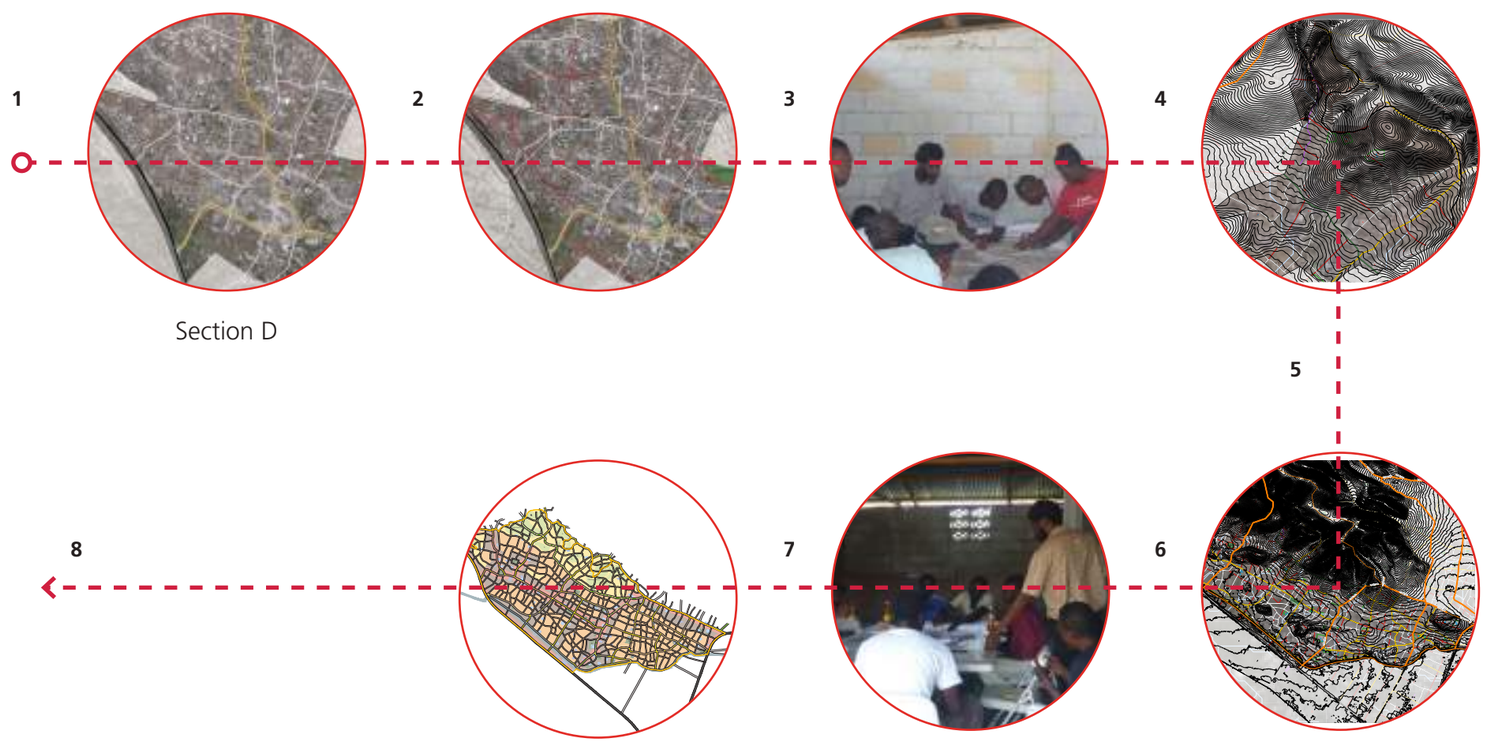


Fig.87: Canaan II: Proposed land use plan



Canaan III, located in the southern part of Canaan, is the densest neighbourhood with a population of 22,413 inhabitants. The densest region is the centre where the concentration of houses and services is abundant. The topography of Canaan III is moderate and opens the possibility for development. This neighbourhood does not face environmental risks and thus has the potential to be a rich neighbourhood. There are few sports facilities, public spaces and small shops in Canaan III, however it is essential to keep ensuring the provision of services in order to support urban growth.

The proposals in this section are based on a participatory process with the Canaan II community that lasted an average of three months. The UN-Habitat team maps the existing situation and then the community validates and proposes ideas. The LAB of urban planning and design checks the proposed interventions and modifies if necessary. Then, a neighbourhood assembly is organized to present the vision and a land use plan is developed.



1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.88: Canaan III: participatory planning process

A. STREET NETWORK

Improving the road network is essential to prevent congestion and traffic, this will help promote connectivity and reduce car dependency. Also, preserving spaces for streets is important before it is too late. There a two national roads that extend along the eastern and western limits of the neighbourhood.

Two arterial roads that link several main streets are proposed, as well as secondary streets that interconnect settlements are also suggested. The LAB, with its new proposal, reached an increase in the percentage of street network from 11% to 31%. The new plan does not only suggests the creation of new roads, but also aims to improve the current situation by enlarging the streets for example. Different widths are defined for the different types of roads (Option A and B, see below).

Existing situation

Streets percentage

UN-Habitat: 30%

11%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

18.48 km/sq.km

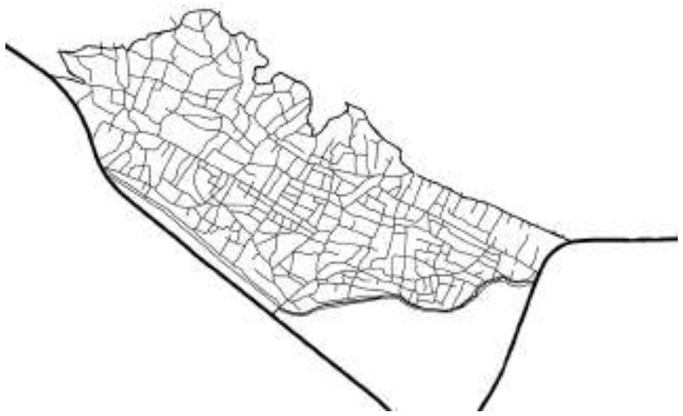


Fig.89: Canaan III: existing street network

Proposed street network

Streets percentage

31% -Option A

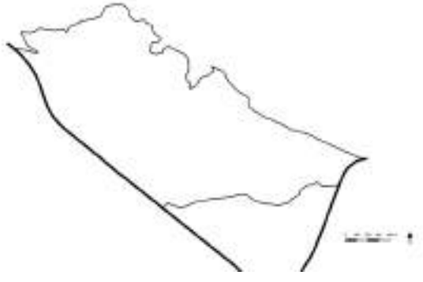
Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

- Option B

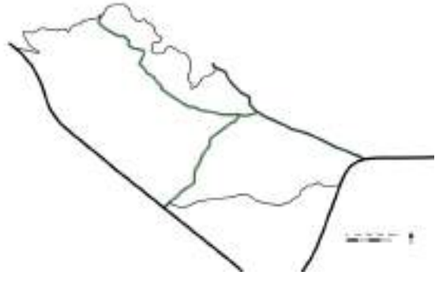
Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

Fig.90: Canaan III: Proposed street network

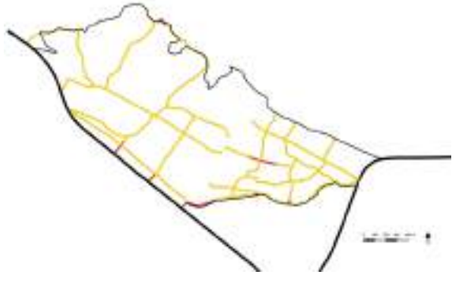
Layers of the proposed street network



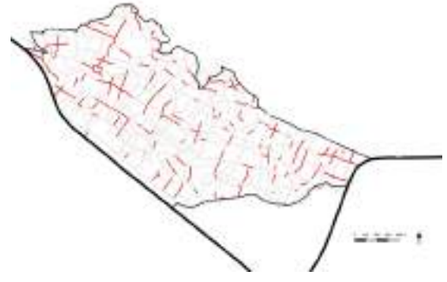
National road



Arterial road



Main roads



Secondary streets

Fig.91: Canaan III: Layers of the proposed street network

B. PUBIC SPACES

Existing Public Spaces

Fig.92: Canaan III: Existing Public spaces

Proposed by the community

Fig.93: Canaan III: Public spaces proposed by the community

Proposed by UN-Habitat LAB

Fig.94: Canaan III: Public spaces proposed by UN-Habitat LAB

#	PUBLIC SPACES IN CANAAN III	STATUS	NAME	m²	Ha	%
	Area of the neighbourhood			3.269.000	327	100%
1	Public space	Existing		3.100	0,31	
2	Public space	Existing		757	0,07	
3	Public space	Existing		3.014	0,3	
4	Public space	Existing		830	0,08	
5	Public space	Existing	Ecole Fondamentale de Canaan	2.760	0,27	
6	Public space	Existing		2.340	0,23	
				12.801	**1,28**	**0,39%**
7	Public space	Proposed by the community		2.883	0,28	
15	Public space	Proposed by the community	Place Delivrance	580	0,05	
8	Public space	Proposed by the community		1153	0,11	
9	Public space	Proposed by the community	Place Publique De Canaan	2.295	0,22	
				6.911	**0,69**	**0,21%**
10	Public space	Proposed by the lab		491	0,04	
11	Public space	Proposed by the lab		556	0,05	
12	Public space	Proposed by the lab		720	0,07	
13	Public space	Proposed by the lab		500	0,05	
14	Public space	Proposed by the lab		400	0,04	
				2.667	**0,26**	**0,08%**
				22.379	**2,23**	**0,68%**

Table 11. Canaan III: Percentage of public spaces

Currently, there are some public spaces in Canaan III that covers 0.3% of the total neighbourhood area. UN-Habitat recommends a coverage of 15% of public spaces. This recommendation implies that these spaces are spread equitably in the neighbourhood. Most of the existing public spaces are concentrated in the centre and therefore a decentralization of these spaces is essential. Ideally they should be easily accessible and located at a maximum distance of 400 metres to reduce car dependency and improve walkability.

During the participatory assemblies, the community strongly expressed its need to improve the green network. The results after the new public spaces propositions shows an increase in the percentage of these spaces, and also a good distribution in the neighbourhood. The amount of public space remains low and could be further improved. To meet the demands of the growing population, ways must be found to preserve more land for public purposes.

It is important to guarantee from both sides of the ravine, a distance 50m as a buffer zone. These zones were designed with the potential of becoming public spaces and not just protection areas. If these proposals are put into place, the allocated public space in Canaan III will reach 1.4% ensuring 2m² of space per inhabitant.

The total number of public spaces remains low and can be further enhanced. More spaces should be considered or preserved for public usages in order to meet the demand of the growing population.

#	PUBLIC OPEN SPACES IN CANAAN III	STATUS	NAME	m²	Ha	%
	Neighbourhood area			3.269.000	327	100%
	Public spaces			**22.379**	**2**	**0.68%**
16	Buffer area next to ravine	Proposed by lab		13.968	1,39	
17	Buffer areas next to ravine	Proposed by lab		9.636	0,96	
			Total:	**23.604**	**2**	**0,72%**
Total Public open spaces:				**45.983**	**4,59**	**1.40%**

Table 12. Canaan III: Total percentage of open public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

Existing	Proposed public space	Proposed P.S + non-aedificandi
12.800 m²	22.379 m²	45.983 m²
22.413 inhabitants	22.413 inhabitants	22.413 inhabitants
0,57 m²/inhabitant	**0,99 m²/inhabitant**	**2 m²/inhabitant**

Table 13. Canaan III: Public space area per inhabitant diagram

Proposed public spaces with 400 metres buffer

Existing public spaces

Proposed by the community

Proposed by UN-Habitat LAB

Fig.95: Canaan III: Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREAS

3.27 km²
Neighbourhood area

22,413 Inhabitants
(source ARC household survey 2016)

6,854 People/km²

Existing residential areas

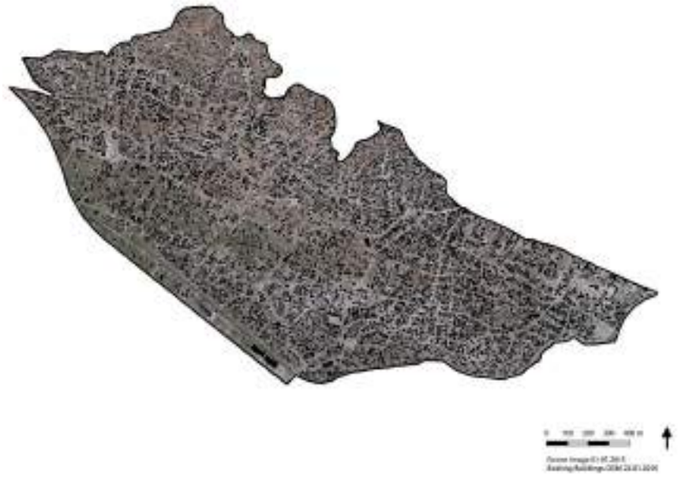


Fig.96: Canaan III: Existing settlements

Canaan III is the densest among the 15 neighbourhoods of Canaan. This is due to the fact that it is situated in the most urbanized areas and with flat topography.

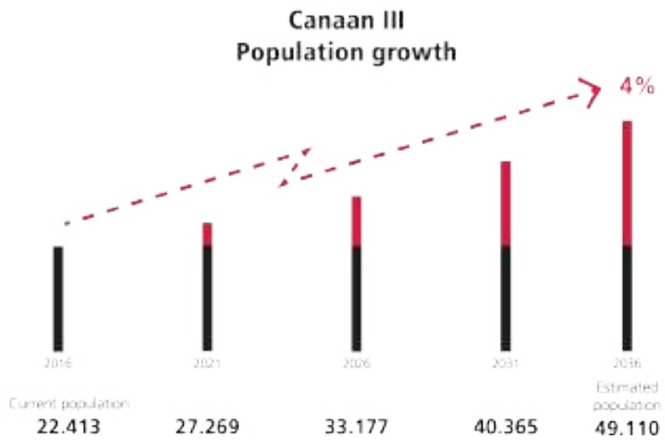


Fig.97: Canaan III: Projected population increase

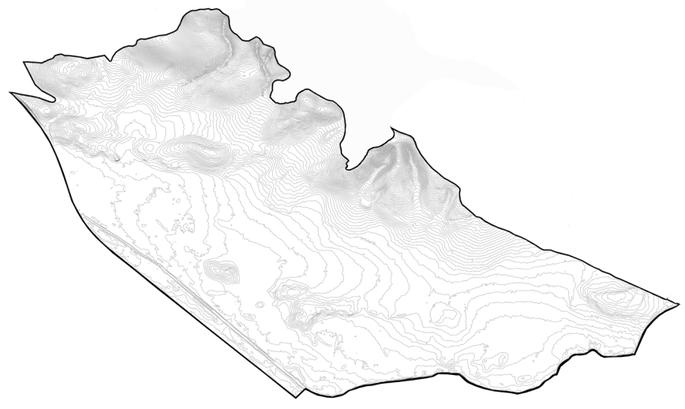


Fig.98: Canaan III: Contours

Located just at the entrance of Canaan, the neighbourhood has a strategic location with a great potential and opportunities for development. The population growth of Canaan III is of 4% per year.

Proposed densities

Low density

Low density housing are suggested where the topography is not complex. With reference to the map on the right, the northern part of Canaan III was designated for low densities where it is proposed to have 8,000 inhabitants per square kilometre. Existing homes may remain, although it is recommended not to further densify the site.

Medium density

The topography where medium density housing is proposed, is abrupt but still considered suitable for dwellings. The level of densification depends on the proximity of the arterial and main streets, as well as the commercial and the service-oriented areas. The in-between areas of the most urbanized and the low density areas are therefore recommended to be of average density with 12,000 people per square kilometre.

High density

High density areas with 15,000 people per square kilometre are advised to take place near the arterial roads. The southern region that is between the RN 1 and the proposed arterial road is to become a completely high density area. It is preferable to combine high residential densities with commercial services with the aim of promoting a mixity of usages. In Canaan III, this was proposed in the central parts of the district, extending horizontally to the north and south. This encourages a compact urban form and also reinforce the urban economic and the social and cultural activities.

Fig.99: Canaan III: Diagram of population in the new proposed residential areas.

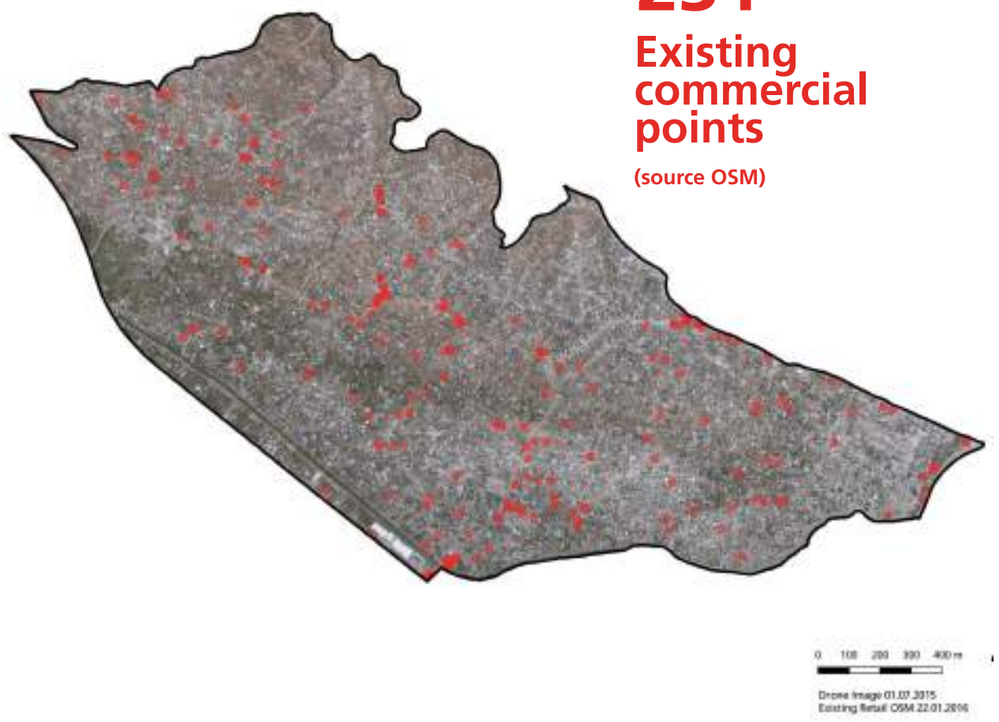
In the plan of Canaan III, the residential areas must not be mono-functional; the integration of mixed uses into the urban fabric is essential to promote walkability, encourage the inclusion of vulnerable people and maintain social cohesion. In 20 years, and if the growth remains of 4%, the current population of 22,400 will reach 49,000 people.

The densification of Canaan III, as proposed, will accommodate 22,470 inhabitants. In order to meet the demands of the growing population, further densification will be required as well as the consideration of an extension plan for the region.

Fig.100: Canaan III: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial



231

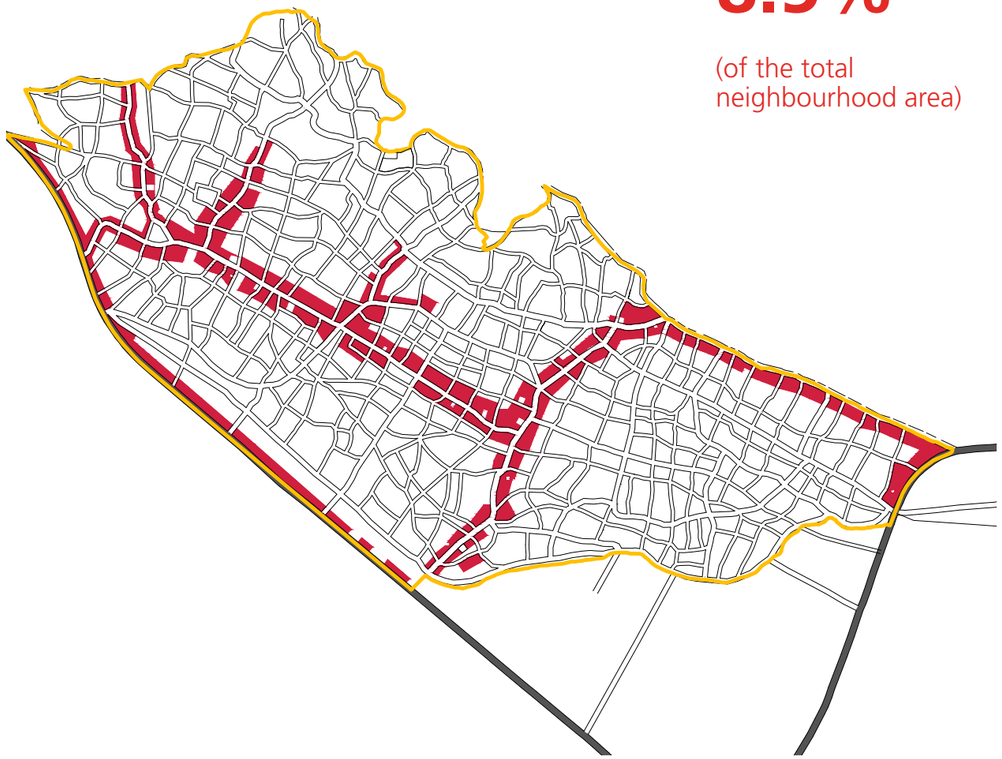
Existing commercial points

(source OSM)

Fig.101: Canaan III: Existing commercial points (Source: OSM)

The commercial activities are found dispersed in the neighbourhood with little concentration. The shops are of different utilisations like vegetable shops, tailor, etc… In order to keep with the urban growth of 4%, it is essential to provide further commercial activities and encourage commercial streets. The decentralization of these services and the good planning of street network will increase employment opportunities for the residents.

Proposed commercial areas (mixed-use)



8.5%

(of the total neighbourhood area)

Fig.102: Canaan III: Proposed commercial areas

After the community workshops, different commercial roads were identified. The location of these services was concentrated near the main roads, as well as the arterial roads. This will ensure that they are easily accessible. Commercial services are catalysts for local economy. It is important to note that these services are not monofunctional and are not limited to commerce but open space for different functions to be present. The new commercial will occupy 8.5% in the new land use plan of Canaan III.

E. PUBLIC FACILITIES

RELIGIOUS - EXISTING
EDUCATION - EXISTING
HEALTH - EXISTING
OTHER PUBLIC FACILITIES - EXISTING

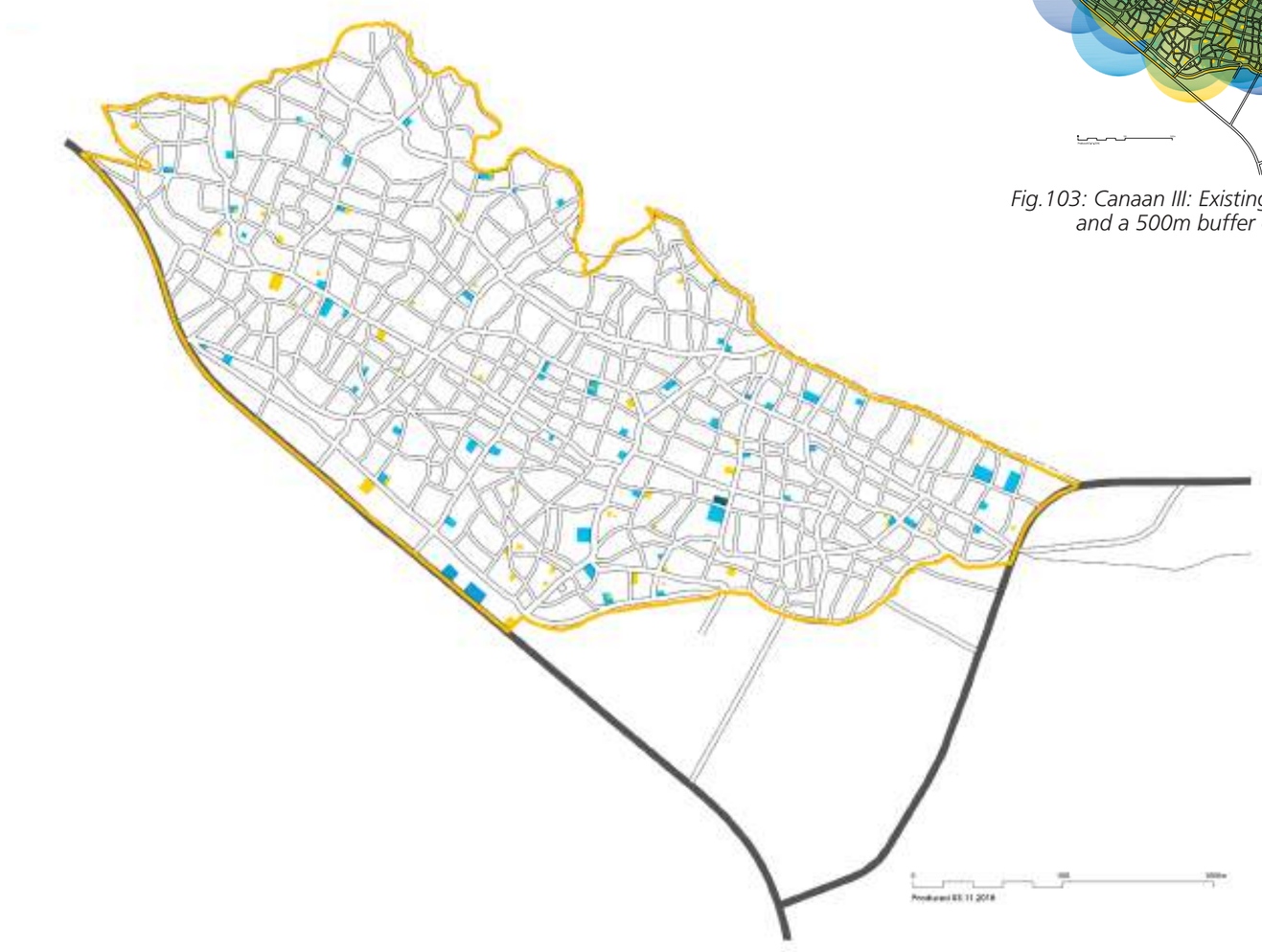


Fig.104: Canaan III: Existing public facilities

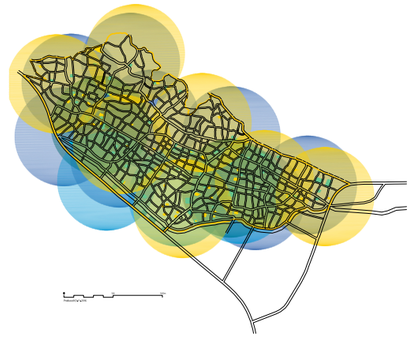


Fig.103: Canaan III: Existing public facilities and a 500m buffer catchment area.

There are 85 plots for schools in Canaan III. These schools are well distributed in the neighbourhood and can support the population growth of the neighbourhood. The data has been validated with the community, however there is always lack of information concerning the types of facilities (primary, secondary, etc.). In consequence, no new school is proposed, but the upgrading of the current facilities and the quality of the educational program is recommended.

16%	Less than 10 years
3%	Illiterate
27%	Primary school (not finished)
10%	Primary school (finished)
31%	Secondary school (not finished)
8%	Secondary school (finished)
2%	Professional school
3%	University

Table 14. Canaan III: Participation level (Croix Rouge Americaine, Juillet 2016)

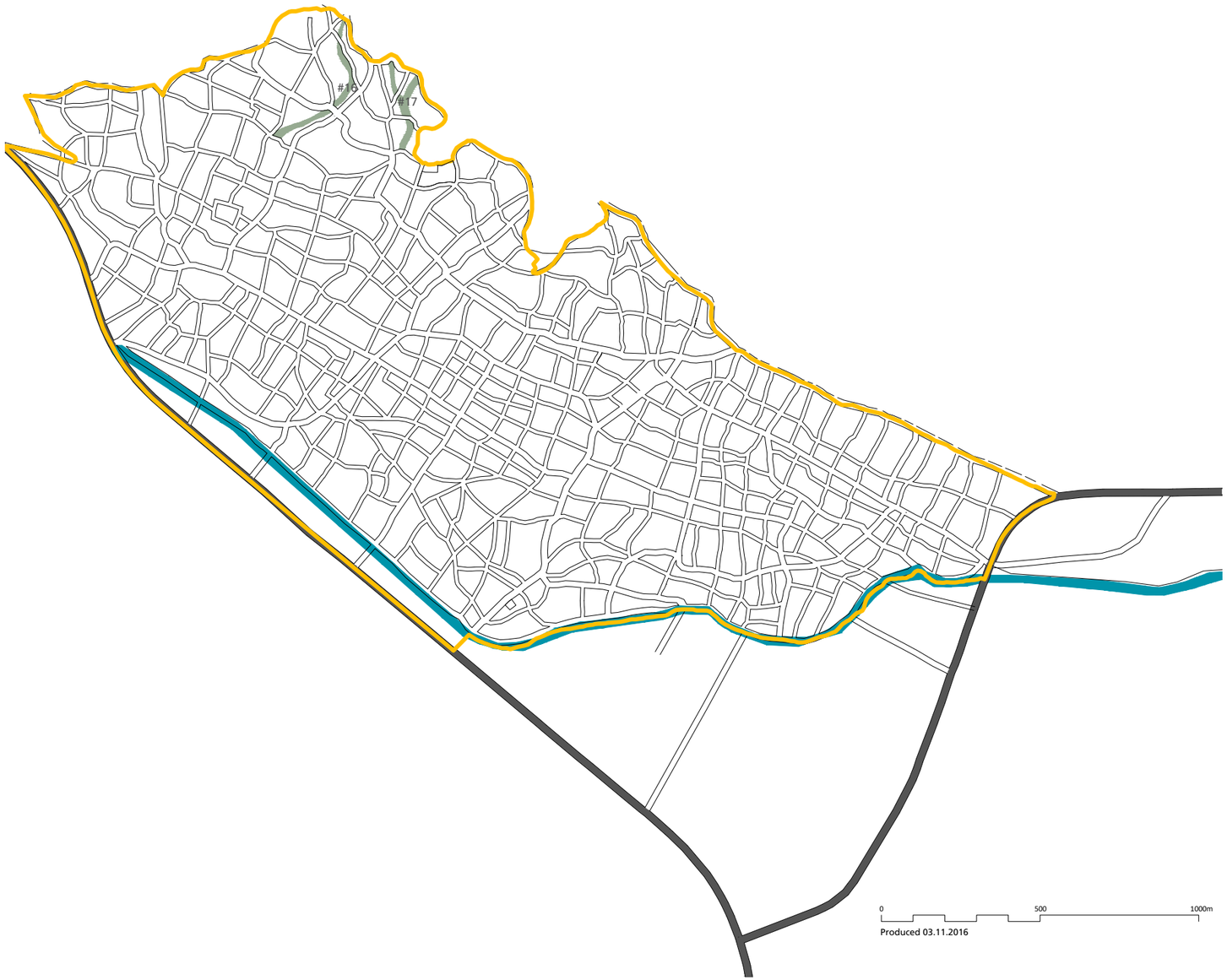
The neighbourhood has 79 worship places. The frequency of these services follows the density of the population. Where the density is high, the religious facilities are found abundant and vice versa. There are no information regarding health facilities, community centres, security and others. For planning reasons, and in order to have a sustainable city, it is essential to consider the mentioned services in the new land use plan of the neighbourhood. Generally, these services demands a good accessibility to the road network and their location should be well studied. Normally, it is recommended to locate them within 500 metres in order to reach them easily within few minutes' walk.

F. NATURAL RESOURCES AND ENVIRONMENT

Due to the topography that is almost flat, there is barely no-built areas in Canaan III. Two ravines that crosses the neighbourhood in the North and therefore buffer zones are proposed to take place. These open spaces of 50 metres from both sides of the ravines are designed to mitigate the risk of flooding and to protect the environment. These spaces were also planned with the potential to become public spaces. The no-built areas in Canaan III form 0.72% of the total neighbourhood area.

#	No-built areas	m²	ha	%
	Neighbourhood area	3.269.000	327	100%
16	Buffer zone next to ravines	13.968	1,39	
17	Buffer zone next to ravines	9.636	0,96	
	Total:	**23.604**	**2**	**0,72%**

Table 15. Canaan III: Total percentage of no-built areas

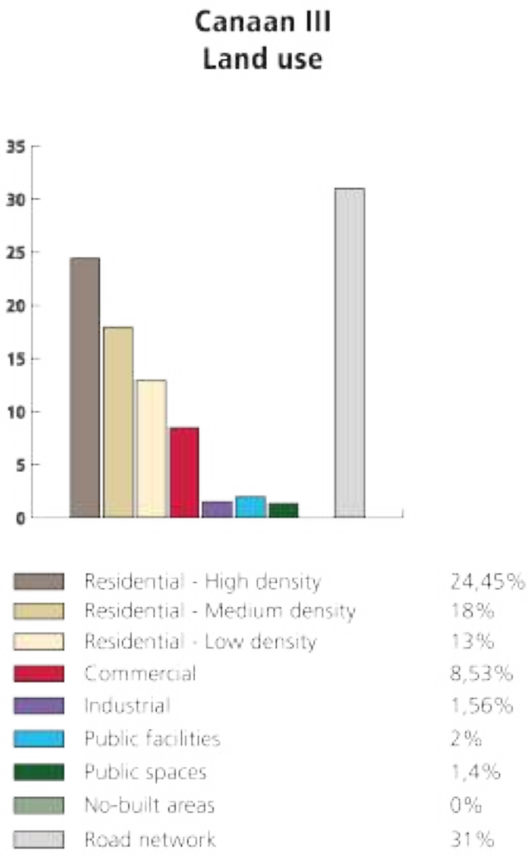


Legend

- Proposed buffer zone along the rivers and ravines
- Proposed area for livestock grazing
- Proposed area for reforestation
- High environmental risk areas
- Existing rivers and ravines
- Quarries

Fig.105: Canaan III: No-built areas

G. CANAAN III LAND USE



The land use plan of Canaan III is a result of a continuous engagement with the community. The plans were examined and validated with the residents and the community leaders. The assemblies, facilitated by the UN-Habitat team in Haiti, identified the main needs of the residents of Canaan III. It responds as much as possible to their needs and proposes new ideas that can induce prosperity and sustainability.

The plan was reviewed as a whole, taking into account the neighbourhoods nearby and how they connect. It is mandatory to situate each of the individual neighbourhood plans in the whole Canaan area to achieve a coherent and rich structure.

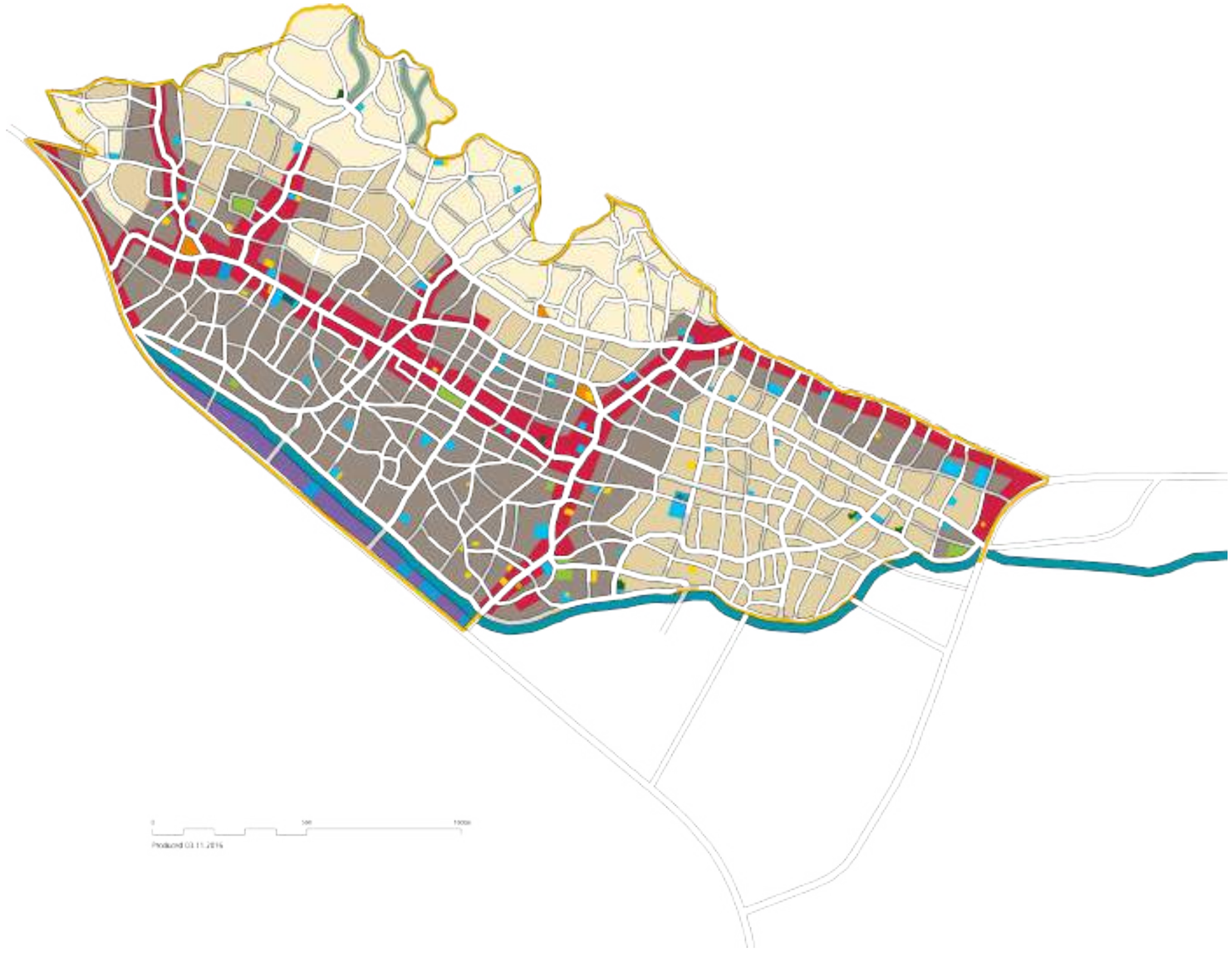
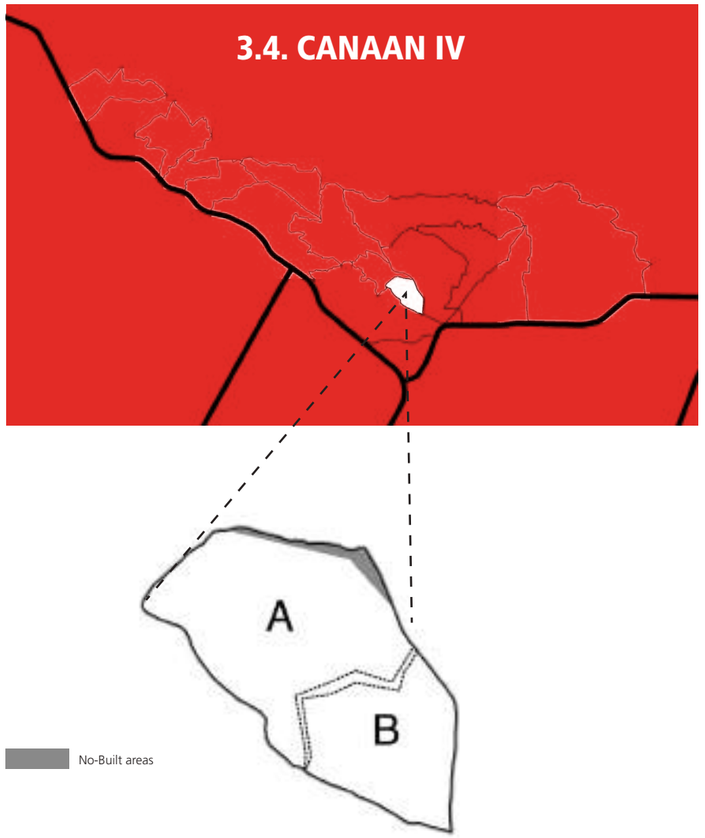


Fig.106: Canaan III: Proposed land use plan



Canaan IV, located in the central part of Canaan, is the densest and is one of the smallest neighbourhood in terms of area. In the north, the slopes are too steep, however, in the south, the presence of wide plateaus gives the potential for development.

The proposals in this section are based on a participatory process with the Canaan IV community that lasted an average of three months. The UN-Habitat team maps the existing situation and then the community validates and proposes ideas. The LAB of urban planning and design checks the proposed interventions and modifies if necessary. Then, a neighbourhood assembly is organized to present the vision and a land use plan is developed.

1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.107: Canaan IV: participatory planning process

A. STREET NETWORK

Currently, the street network occupies only 11% of the neighbourhood area. There are only secondary roads with the majority leading to a dead-end. To guarantee a good mobility and prevent any congestion, the enhancement of the street network in Canaan IV is vital. It is essential as well to preserve spaces for streets in means to ensure a fluidity of vehicular circulation.

Many arterial and main roads are proposed in the new plan. For these roads, two options (A and B, see below) are proposed, with each different width is defined for the different typed of roads. Canaan IV will witness an increase from 13% to 24.2%. The proposed street network does not only propose new streets but also looks in upgrading the existing ones.

Existing situation

Streets percentage

UN-Habitat: 30%

11%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

18.48 km/sq.km

Fig.108: Canaan IV: existing street network

Proposed street network

Streets percentage

24.27% -Option A

Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

- Option B

Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

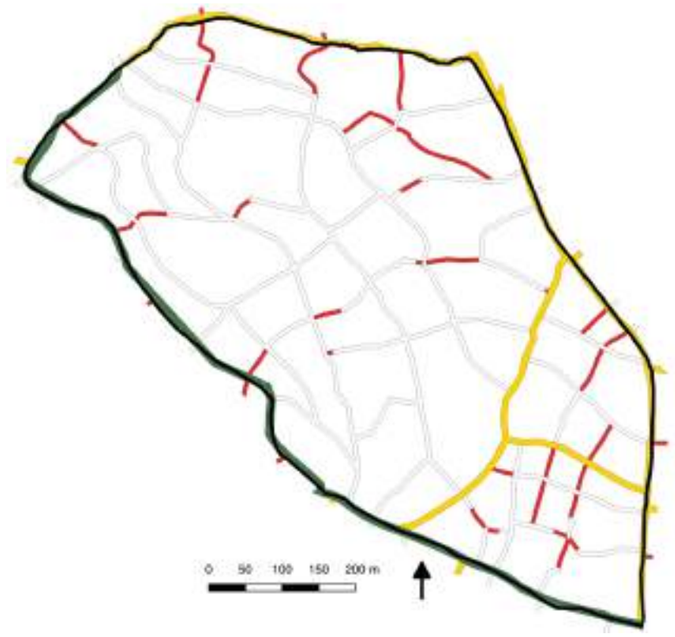


Fig.109: Canaan IV: Proposed street network

Layers of the proposed street network

National road

Arterial road

Main roads

Secondary streets

Fig.110: Canaan IV: Layers of the proposed street network

B. PUBLIC SPACES

Existing Public Spaces

Fig.111: Canaan IV: Existing Public spaces

Proposed by the community

Fig.112: Canaan IV: Public spaces proposed by the community

Proposed by UN-Habitat LAB

Fig.113: Canaan IV Public spaces proposed by UN-Habitat LAB

#	PUBLIC SPACES IN CANAAN IV	STATUS	NAME	m²	Ha	%
	Neighbourhood area			465.200	46	100%
1	Public space	Existing	Place Public Canaan IV	628	0,06	
				628	**0,06**	**0,03%**
2	Public space	Proposed by the community		730	0.073	
3	Public space	Proposed by the community	Place Preval	216	0.021	
				946	**0.09**	**0.20%**
4	Public space	Proposed by lab		833	0.083	
5	Public space	Proposed by lab		232	0.023	
6	Public space	Proposed by lab		271	0.027	
7	Public space	Proposed by lab		174	0.017	
8	Public space	Proposed by lab		291	0.0291	
9	Public space	Proposed by lab		481	0.0481	
10	Public space	Proposed by lab		134	0.0134	
11	Public space	Proposed by lab		319	0.0319	
12	Public space	Proposed by lab		352	0.0352	
				3087	**0.31**	
total:				**4667**	**0.47**	**1%**

At present, the neighbourhood has just one public square that occupies 600m2. As UN-Habitat recommends 15% coverage, it is necessary to consider vacant lands to develop new public spaces.

Following the participatory sessions, the inhabitants expressed their need to have more space allocated to public uses. The community has therefore proposed two new open public spaces. Adding the community's proposals to the existing situation, the percentage of public spaces is still low. Since the number is not yet sufficient, the LAB has suggested the establishment of nine other spaces scattered around the neighbourhood.

Table 16. Canaan IV: Percentage of public spaces

Also, the community and the LAB have proposed a reforestation project in the northern part. This area has been designed with the potential to become an open public space. If this proposal is implemented, the designated public space in the Canaan IV neighbourhood will reach 2%.

#	OPEN PUBLIC SPACE IN CANAAN IV	STATUS	NAME	m²	Ha	%
	Neighbourhood area			465.200	46	100%
	Public spaces			**4667**	**0.47**	**1%**
4	Reforestation	Proposed by the LAB		7,374	0.73	
			Total:	**7,374**	**0.73**	**1,59**
Total of open public spaces:				**12,041**	**1.20**	**2.59%**

Table 17. Canaan IV: Total percentage of open public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

Existing	Proposed public space	Proposed P.S + non-aedificandi
628 m²	4.667 m²	12.041 m²
10.315 Inhabitants	10.315 Inhabitants	10.315 Inhabitants
0,016 m²/inhabitant	**0.45 m²/inhabitans**	**1.17 m²/inhabitant**

Table 18. Canaan IV: Public space area per inhabitant diagram

Fig.114: Canaan IV: Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREAS

0.47 km²
Neighbourhood area

10,315 Inhabitants
(source ARC household survey 2016)

21,946 people/km²

Existing residential areas

Fig.115: Canaan IV: Existing settlements

With a population of 10,315 inhabitants and an area of 0.47km2, the density of this neighbourhood is considered very high. Canaan IV is one of the most densely populated areas in Canaan.

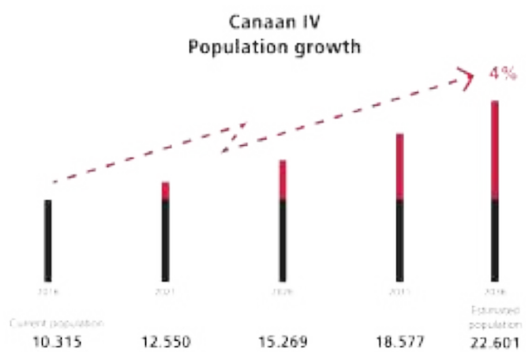


Fig.116: Canaan IV: Projected population increase

Fig.117: Canaan IV: Contours

The topography is not abrupt in the northern periphery, as to the centre and south, it is moderate.

Proposed densities

Low density

The low density dwellings are located to the north and reach the limit of Canaan IV and the steep slopes to the north. Considering that the density is 12,000 inhab. Per km2, the proposed plan is capable of accommodating about 1,259 inhabitants. Settlements in this classification are often connected by secondary streets. It is possible to have small shops in condition to provide access to the pedestrian path.

Medium density

Medium-density areas are located in the centre and near low-density zones. In the new land use plan, existing areas that are once considered as low density, are recommended to be converted to a higher density. This implies that a densification approach must be taken. It is suggested to have 18,000 inhabitants. Per km2 in the case of this neighbourhood as the density is already high. Respecting the proposed plan, the district will accommodate 1,064 inhabitants.

High density

For the classification of high-density zones, UN-Habitat recommends to have 15,000 inhab. Per km2. As Canaan IV is of high density, this classification will consider 24,000 inhabitants. Per km2 as density. These areas are located in the south with direct access to the arterial roads. It is often preferable to locate high-density dwellings near commercial areas in order to promote a more compact city. The new proposal will accommodate up to 3,000 inhabitants.

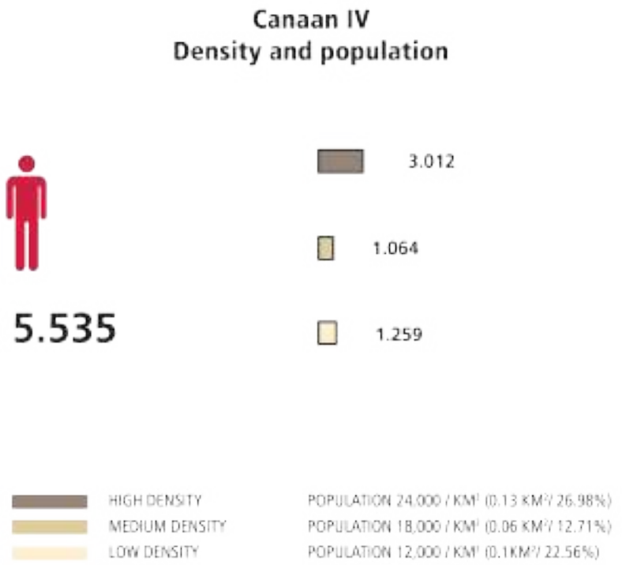


Fig.118: Canaan IV: Diagram of population in the new proposed residential areas.

If the annual growth remains of 4%, Canaan IV will not be able to accommodate its estimated population growth in the coming years. This means that the plan, as it stands, will no longer be able to adapt to the urban growth. Evacuation measures for inhabitants living in high-risk areas should be considered as well as extension strategies should be put in place.

The existence of economic activities in residential areas is encouraged provided they have direct access to the streets. The size of the commerce depends on the types of roads and the density of the houses; the higher the density, the bigger the commerce and vice versa. The compactness of cities is strongly related to the integration of different land uses into the urban fabric.

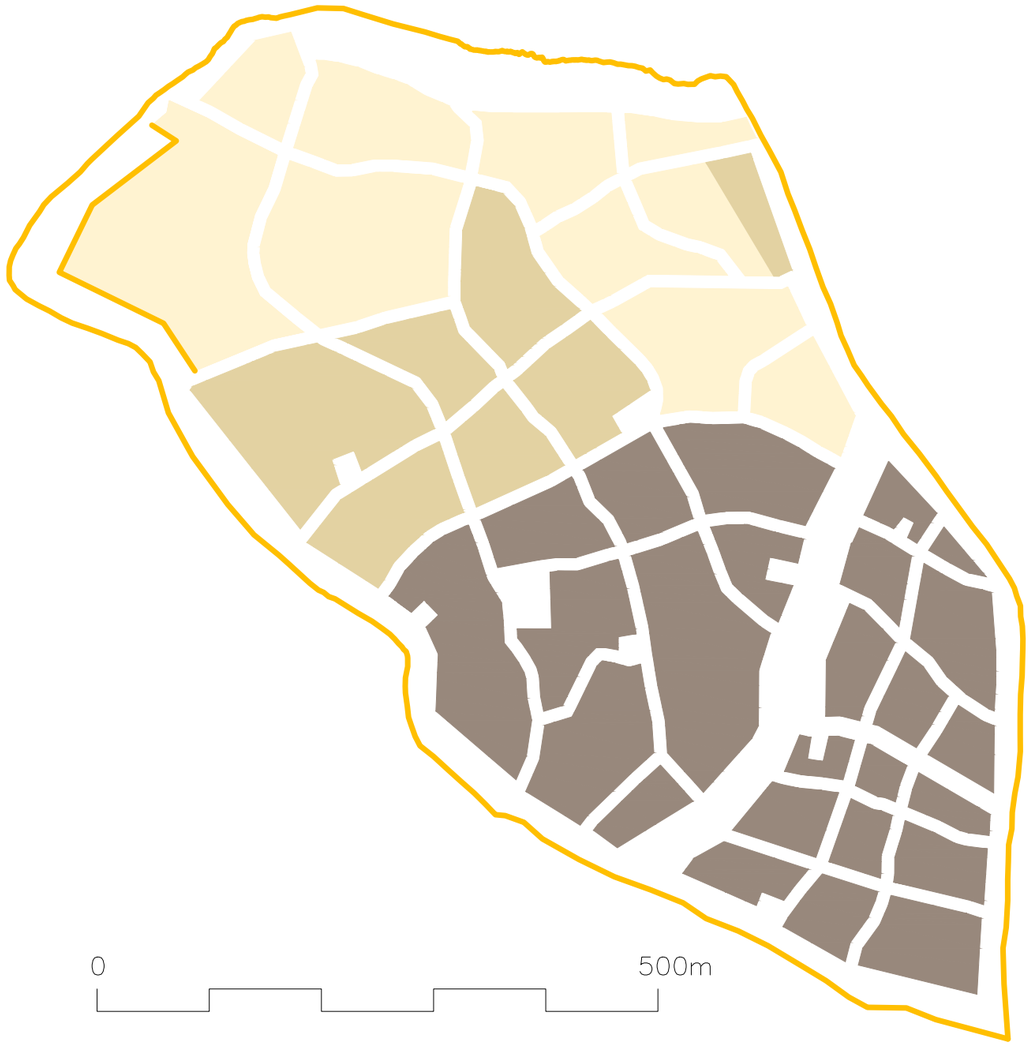


Fig.119: Canaan IV: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial

37

Existing commercial points

(source OSM)

Fig.120: Canaan IV: Existing commercial points (Source: OSM)

According to the OpenStreetMap databases, there are a total of 37 small businesses in Canaan IV. These services are located in the south-eastern part of the neighbourhood facing the new arterial road. There are several types of commerce such as grocery stores, hairdressers and vegetable markets. Canaan IV should consider the allocation of new commercial services to enhance the local economy. The location of the commercial activities in the centre with direct access to main road is encouraged in order to increase the accessibility for the inhabitants.

Proposed commercial areas (mixed-use)

10%

(of the total neighbourhood area)

Fig.121: Canaan IV: Proposed commercial areas

Following the community workshops, the needs of the residents were expressed by designating areas adjacent to the arterial road as commercial areas, as well as at the boundary of the neighbourhood. These activities have the potential to generate a new, highly diverse sector within the local economy, with opportunities for job creation. They therefore act as catalysts for initiating a structural transformation. The proposed commercial areas will occupy 10%.

E. PUBLIC FACILITIES

Fig.123: Canaan IV: Existing public facilities

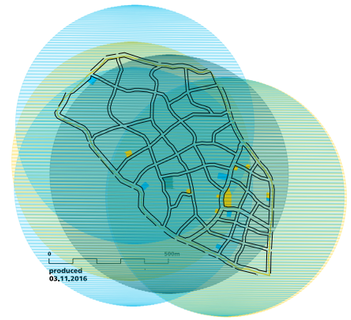


Fig.122: Canaan IV: Existing public facilities and a 500m buffer catchment area.

There are 6 schools that are well distributed in Canaan IV. The data has been validated with the community but there is still a lack of information about the types of schools (primary, secondary, etc.). It was a challenge to predict the required number of facilities for the population. Education plays a major role in reducing poverty and inequality. For that, it is always advisable to reserve certain land for the extension of existing facilities and/or for the provision of new schools.

15%	Less than 10 years
5%	Illiterate
27%	Primary school (not finished)
12%	Primary school (finished)
26%	Secondary school (not finished)
10%	Secondary school (finished)
3%	Professional school
3%	University

Table 19. Canaan IV: Participation level (Croix Rouge Americaine, Juillet 2016)

The area contains 8 places of worship that are spread out fairly. No information is available about health services, community centres, security stations and others. For planning purposes, and in order to have a long-term sustainable city, it is essential to consider the services mentioned in the new design of the neighbourhood. Generally, these services require good accessibility and therefore their location must be well studied. Normally, it is recommended to locate them within 500 metres from the settlements so that they are easily accessible.

F. NATURAL RESOURCES AND ENVIRONMENT

It is almost impossible to develop the northern part of the neighbourhood due to the complex topography and the steep slopes. The region present a high erosion risk, and for that, new reforestation projects are proposed in means to prevent any landslide.

The no-built areas occupy 1.59% of the total neighbourhood area.

#	No-built areas	m²	ha	%
	Neighbourhood area	460,000	46	100%
14	Reforestation	7,374	0.7374	
		7,374	**0.7374**	**1,59%**

Table 20. Canaan IV: Total percentage of no-built areas

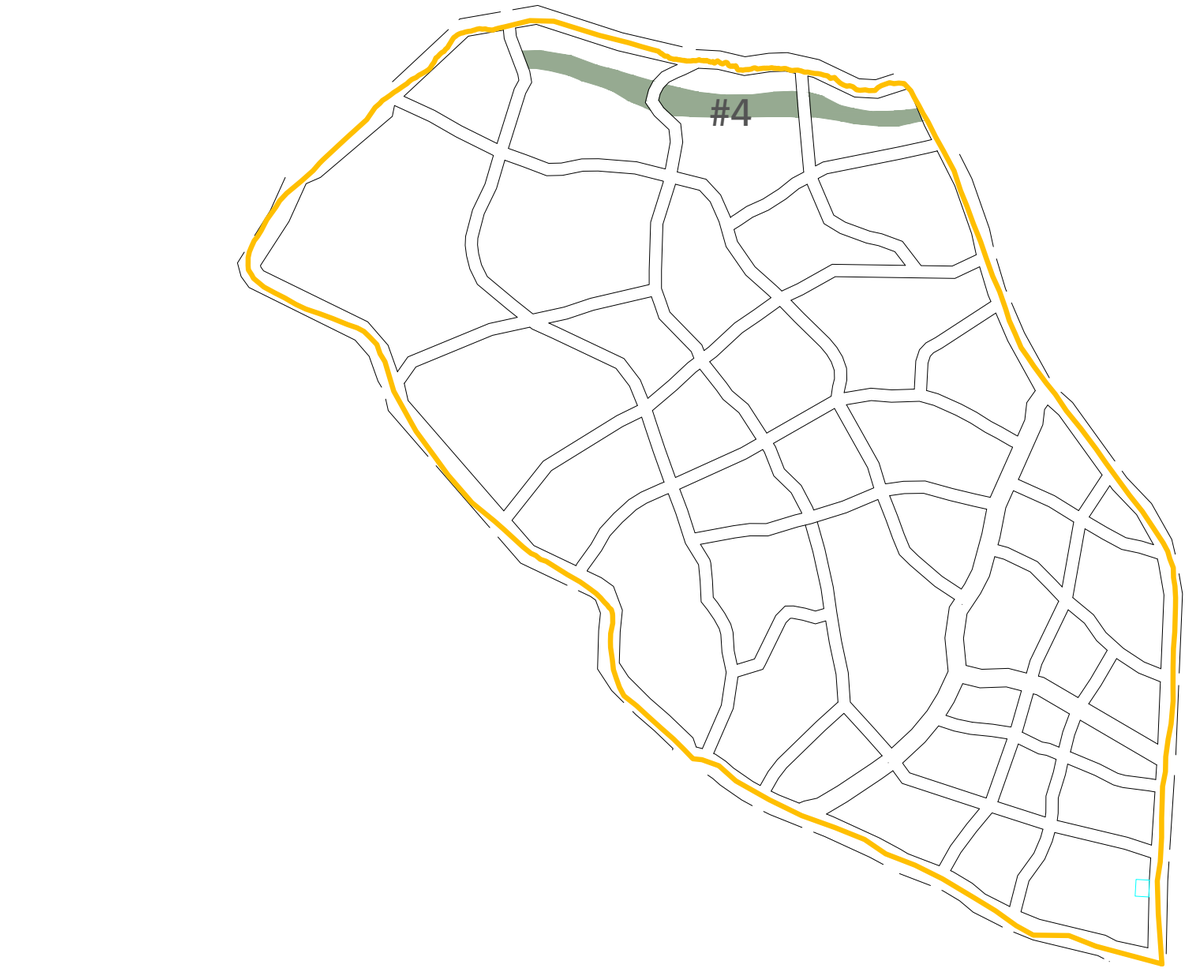
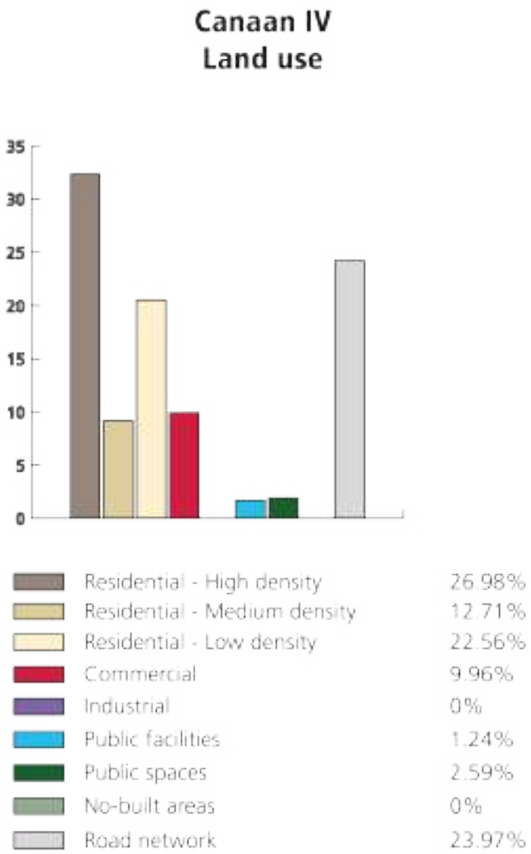


Fig.124: Canaan IV: No-built areas

G. CANAAN IV LAND USE



The assemblies, facilitated by the UN-Habitat team in Haiti, identified the main needs of the residents of Canaan IV. The proposed land-use plan is the result of the ongoing participatory process with the community. It responds as much as possible to their needs and proposes new ideas that can induce prosperity and sustainability. Even though the plan addressed the issues of land uses and increase the street network, the public spaces and commerce, public facilities however remain insufficient. An elaboration of the plan is essential once all the information are provided. To ensure Canaan IV sustainability, it is recommended not to further densify it.

The plan was reviewed as a whole, taking into account the neighbourhoods nearby and how they connect. It is mandatory to situate each of the individual neighbourhood plans in the whole Canaan area to achieve a coherent and rich structure.

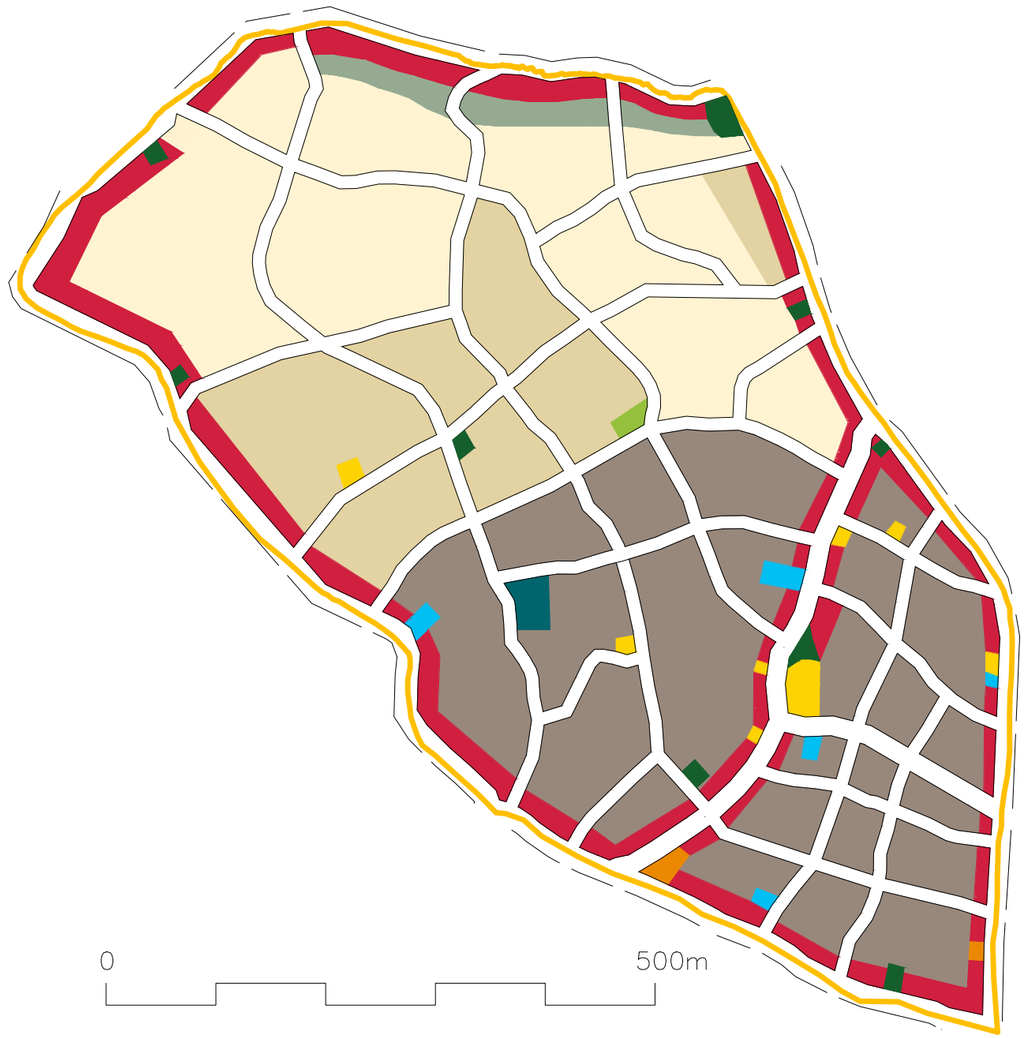
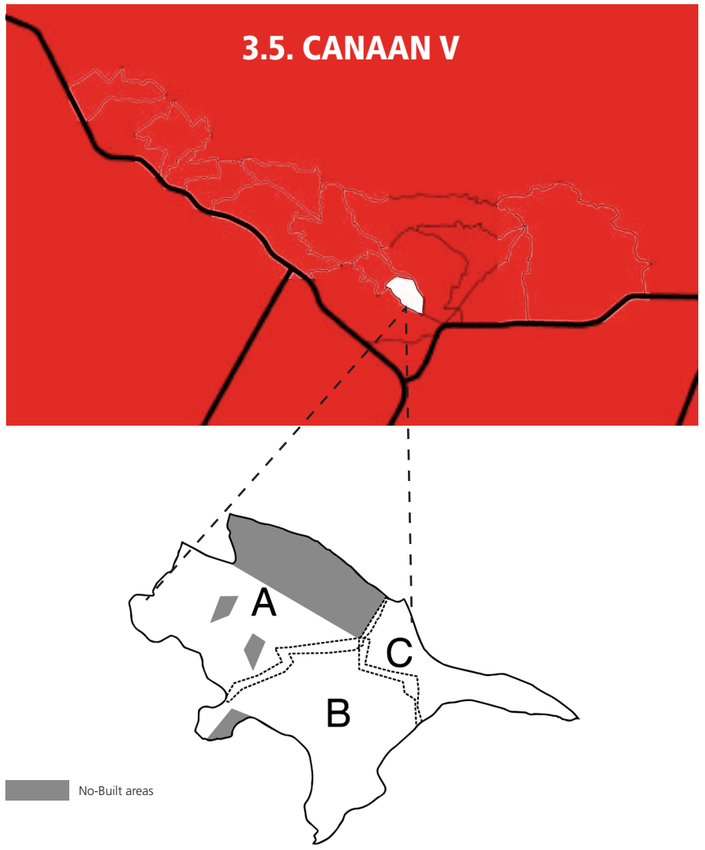


Fig.125: Canaan IV: Proposed land use plan



Canaan V is one the smallest neighbourhoods in terms of area. Located in the centre, just north to Canaan III, this neighbourhood has 7,695 inhabitants. Due to lack of information, the calculation of the population was done by multiplying the number of houses by 4 persons. The topography around the periphery is steep, and we can only see some large plateaux in the centre where possible development can actually take place.

The following land use proposals in this section are based on a participatory process within three months' time-frame. The UN-Habitat team maps the existing situation and the community validates and proposes ideas. The urban Lab rechecks the suggested interventions and modifies if necessary. After that, a neighbourhood assembly is organized to showcase the overall vision and a land use is later developed.

1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.126: Canaan V: participatory planning process

A. STREET NETWORK

The existing street network covers only the central area of the neighbourhood. At the limits, the slopes becomes very steep limiting any construction or extension of the network. For these areas, specific measures were elaborated in the mobility report giving a guidance on how to build roads in steep areas. The existing road network is not well structured and not hierarchized. If the growth stays of 4% yearly, Canaan V will be highly congested due to the lack of roads.

The new plan proposes of having an arterial road that crosses the plateau of the neighbourhood and connects Canaan IV with Canaan I. This road will induce economic potentialities and enhance accessibility to new job opportunities. The central area will be interconnected with secondary roads where the topography allows it. Different width for the different types of roads are defined (A and B, see below). It is not only suggested to propose new roads, but the upgrading of the existing ones is highly recommended. The street network of Canaan V will witness an increase of just 1.36% due to the complexity of the terrain.

Existing situation

Streets percentage

UN-Habitat: 30%

10%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

17 km/sq.km

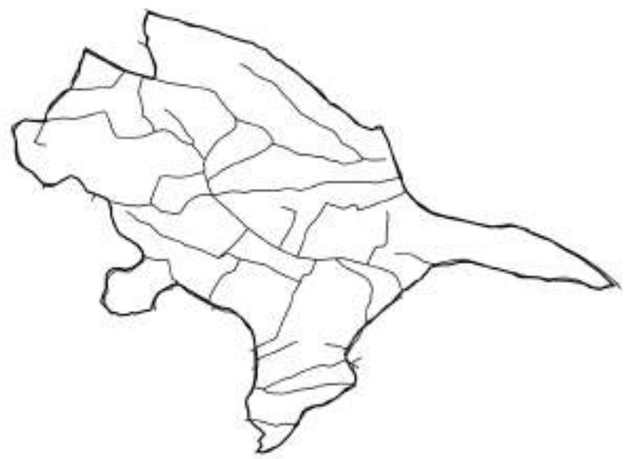


Fig.127: Canaan V: existing street network

Proposed street network

Streets percentage

11.36% -Option A

Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

- Option B

Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

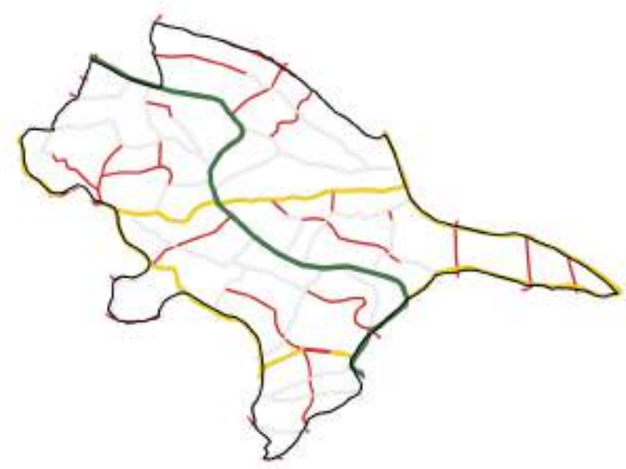
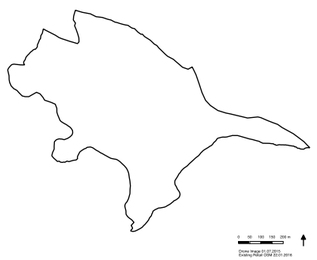


Fig.128: Canaan V: Proposed street network

Layers of the proposed street network



National road

Arterial road

Main roads

Secondary streets

Fig.129: Canaan V: Layers of the proposed street network

B. PUBLIC SPACES

Existing Public Spaces

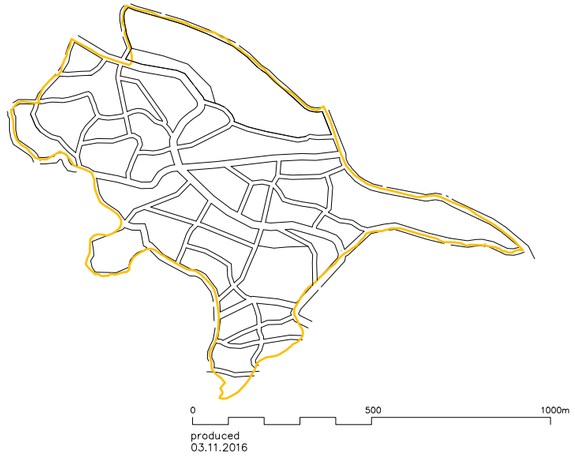


Fig.130: Canaan V: Existing Public spaces

Proposed by the community

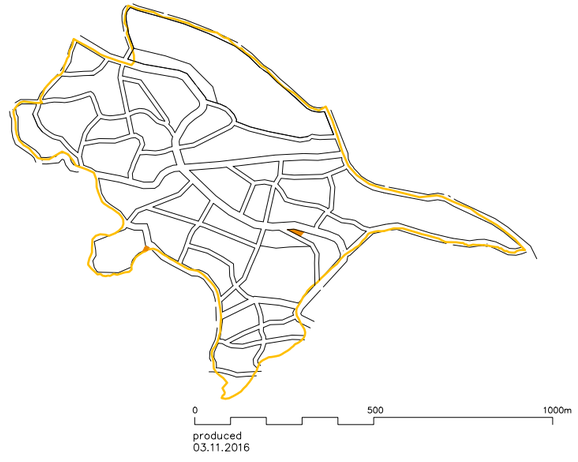


Fig.131: Canaan V: Public spaces proposed by the community

Proposed by UN-Habitat LAB

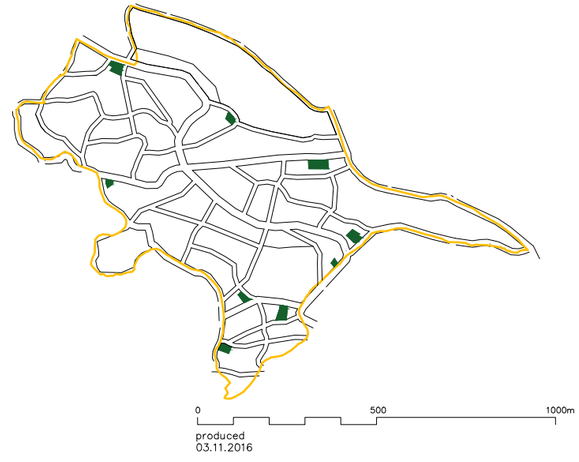


Fig.132: Canaan V: Public spaces proposed by UN-Habitat LAB

#	PUBLIC SPACE IN CANAAN V	STATUS	NAME	m²	Ha	%
	Neighbourhood area			578644	57	100%
1	Public space	Proposed by the community		135	0.0135	
2	Public space	Proposed by the community	Place Preval	408	0.0408	
				543	**0.05**	**0.09%**
3	Public space	Proposed by the Lab		673	0.0673	
4	Public space	Proposed by the Lab		984	0.0984	
5	Public space	Proposed by the Lab		464	0.0464	
6	Public space	Proposed by the Lab		246	0.0246	
7	Public space	Proposed by the Lab		875	0.0875	
8	Public space	Proposed by the Lab		1.357	0.1357	
9	Public space	Proposed by the Lab		964	0.0964	
10	Public space	Proposed by the Lab		509	0.0509	
12	Public space	Proposed by the Lab		349	0.0349	
				6.421	**0.64**	**1.11%**
				6.964	**0.7**	**1.2%**

Canaan V doesn't have any public spaces within its boundary, therefore more spaces should be allocated for the public good in the new plan in order to reach the UN-Habitat recommendations. It is essential to consider vacant lands and preserve them for the creation of new public spaces.

Two public spaces were proposed by the community during the participatory approach. These spaces only form 0.1% of the total area. Since the percentage is still low, UN-Habitat proposed the allocation of ten other spaces which are spread equitably in the neighbourhood. Adding the propositions of the community and the LAB to the current situation, the percentage only increase by 1%.

Table 21. Canaan V: Percentage of public spaces

In the new plan, the public spaces are well spread inside Canaan V. Adopting the 400 metres buffer zone recommended by UN-Habitat, the neighbourhood seems to have enough of public spaces despite the low percentage. This reflect that the number of public spaces does not have to reach 15% every time in each neighbourhood, but it has to be examined in its wider area.

#	OPEN SPACES IN CANAAN V	STATUS	NAME	m²	Ha	%
	Neighbourhood area			578644	57	100%
	Public spaces			**6964**	**0.7**	**1.2%**
-	-	-	-	-	-	-
TOTAL OPEN PUBLIC SPACE:				**6964**	**0.7**	**1.2%**

Table 22. Canaan V: Total percentage of public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

Existing	Proposed public space	Proposed P.S + non-aedificandi
0 m²	6964 m²	6964 m²
7695 Inhabitants	7695 inhabitants	7695 inhabitants
0 m²/Inhabitant	**0.9 m²/inhabitant**	**0.9 m²/inhabitans**

Table 23. Canaan V: Public space area per inhabitant diagram

Proposed public spaces with 400 metres buffer

Existing public spaces

Proposed by the community

Proposed by UN-Habitat LAB

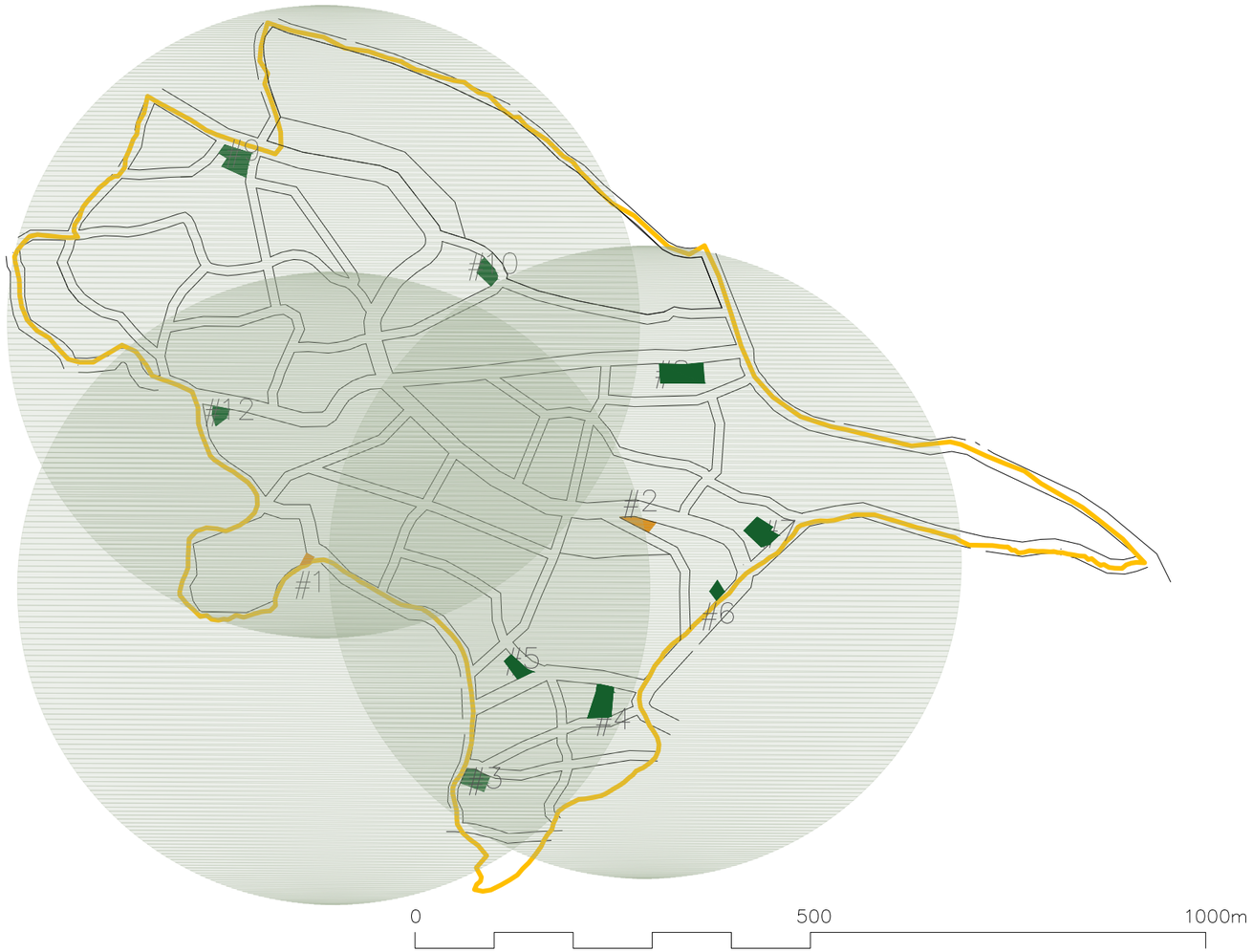


Fig.133: Canaan V: Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREAS

0.58 km²
Neighbourhood area

7,695 Inhabitants
(source ARC household survey 2016)

13,267 people/km²

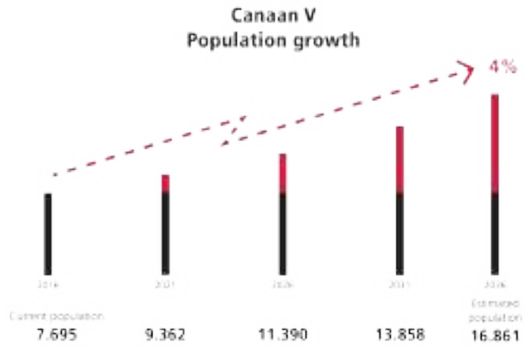


Fig.135: Canaan V: Projected population increase

Existing residential areas

Fig.134: Canaan V: Existing settlements

In relation to its area, Canaan V is considered as a neighbourhood with high density. According to the American Red Cross statistics, the population counts 21,119 inhabitants. After encountering many conflicts in the calculation, we have adopted to multiply the number of houses per 4 people to get the total population. The topography in the neighbourhood limits any development or densification process to happen due to the presence of the steep slopes on the periphery.

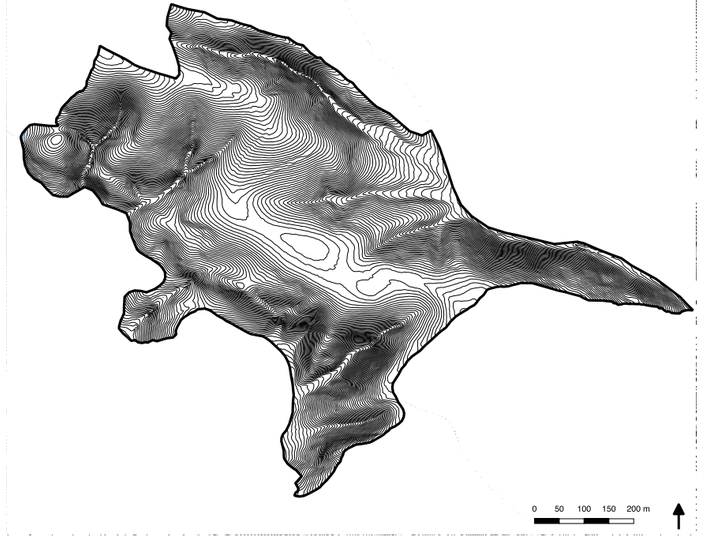


Fig.136: Canaan V: Contours

Proposed densities

Low density

Most of the low density settlements are located where the slopes are bit steep. As the density of the neighbourhood is already very high, we have adopted to have 12,000 inhabitants/km2 in the low density category. Canaan V will be able to host almost 2,525 people. The houses in this classification are usually connected via secondary roads. It is possible to have small commerce if only it they have access to pedestrian paths.

Medium density

The settlements of medium densities in the new plan are not many. They are located in proximity of high density areas and occupy only 15% of the total area. The topography in these areas is not steep and densification of previously low density areas into medium is therefore feasible. The new design proposes of having 18,000 inhabitants per km2 in low densities. Respecting the proposal, 1,379 people will be accommodated in Canaan V under this category.

High density

The location of high density settlements is concentrated where the existing large plateaux are, and in proximity to the proposed arterial road. UN-Habitat recommends a density of 15,000 inhabitants/km2 for this category, however due to the current high density status, this neighbourhood will be exceptionally densified having 24,000 inhabitants/km2. This means that a study on plots resizing and modification and densification strategies should be well conducted. Canaan V will be able to host 1,136 people. It is generally advised to locate high density housing next to commercial areas in means to have a more compact city.

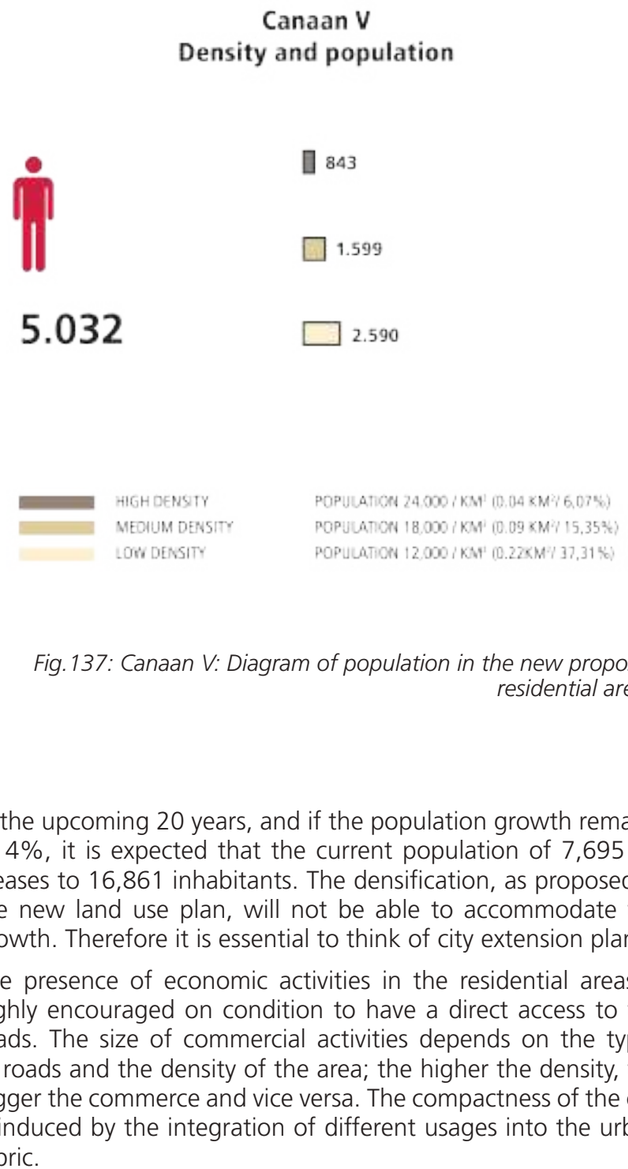


Fig.137: Canaan V: Diagram of population in the new proposed residential areas.

In the upcoming 20 years, and if the population growth remains of 4%, it is expected that the current population of 7,695 increases to 16,861 inhabitants. The densification, as proposed in the new land use plan, will not be able to accommodate the growth. Therefore it is essential to think of city extension plans.

The presence of economic activities in the residential areas is highly encouraged on condition to have a direct access to the roads. The size of commercial activities depends on the types of roads and the density of the area; the higher the density, the bigger the commerce and vice versa. The compactness of the city is induced by the integration of different usages into the urban fabric.

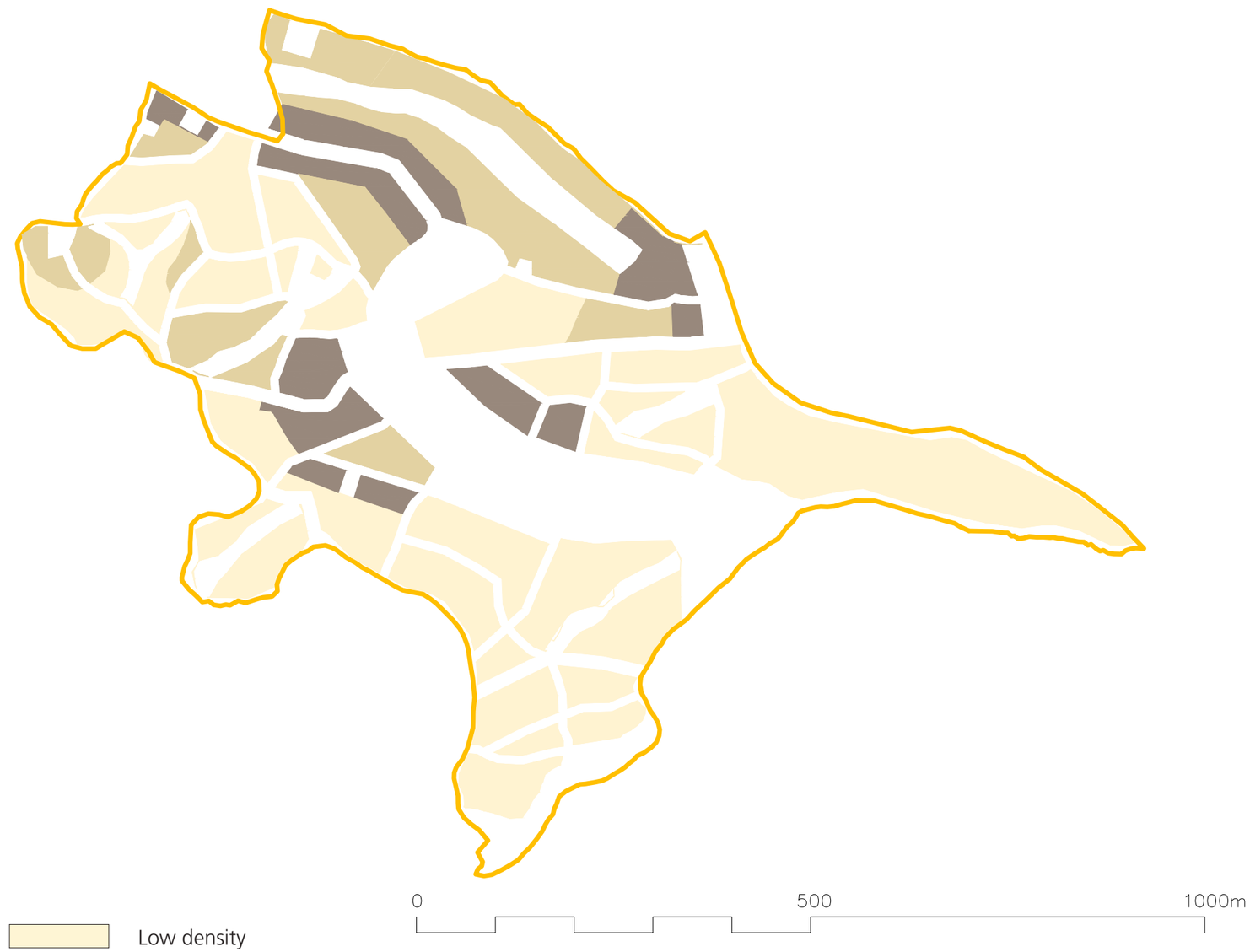
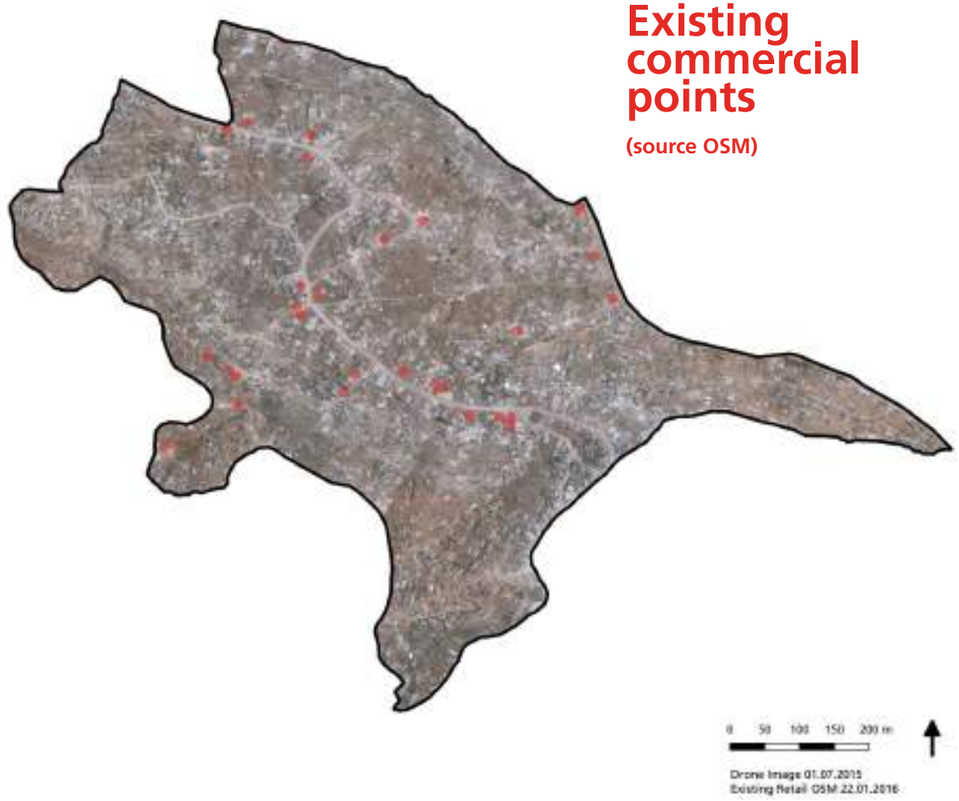


Fig.138: Canaan V: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial



29

Existing commercial points

(source OSM)

Fig.139: Canaan V: Existing commercial points (Source: OSM)

According to OpenStreetMap data, there are 29 commercial stores. The location of these services is very important as they play a big role in the economic dynamics and the employment opportunities in the neighbourhood. Placing them next to arterial and main roads is encouraged. The commercial activities has to be considered when studying the accessibility to other functions, especially to roads, public spaces and housing.

Proposed commercial areas (mixed-use)

9.5%

(of the total neighbourhood area)

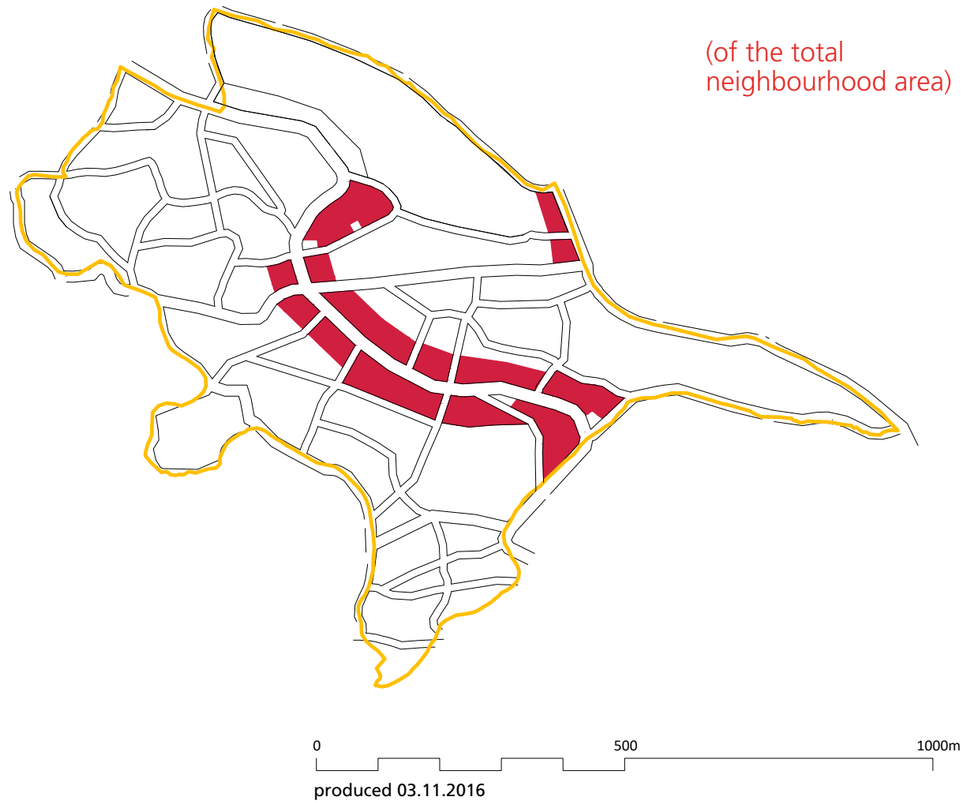


Fig.140: Canaan V: Proposed commercial areas

In the new proposal, the commercial activities will be located in the area that faces the new arterial road. They will occupy the ground floor and will have access to pedestrian paths. These activities have the potential to generate a new, highly diverse sector within the local economy, with opportunities for job creation. They therefore act as catalysts for initiating a structural transformation. The proposed commercial areas will occupy 9.5%.

E. PUBLIC FACILITIES

RELIGIOUS - EXISTING
EDUCATION - EXISTING
HEALTH - EXISTING
OTHER PUBLIC FACILITIES - EXISTING

Fig.142: Canaan V: Existing public facilities

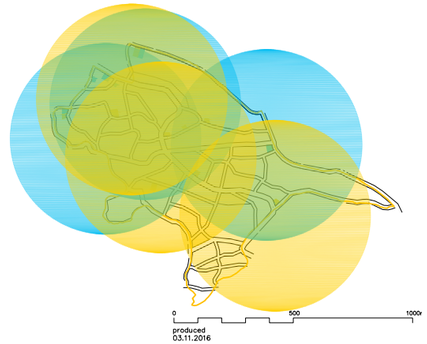


Fig.141: Canaan V: Existing public facilities and a 500m buffer catchment area.

Most of the educational facilities are located in the north of the neighbourhood. From the results of the participatory approach, most of the kids are enrolled in schools in within Canaan V. The data has been validated with the community but there is still a lack of information about the types of schools (primary, secondary, etc.). It was a challenge to predict the required number of facilities for the population. Education plays a major role in reducing poverty and inequality. For that, it is always advisable to reserve certain land for the extension of existing facilities and/or for the provision of new schools.

15%	Less than 10 years
5%	Illiterate
27%	Primary school (not finished)
12%	Primary school (finished)
26%	Secondary school (not finished)
10%	Secondary school (finished)
3%	Professional school
3%	University

Table 24. Canaan V: Participation level (Croix Rouge Americaine, Juillet 2016)

Religious facilities are concentrated in the centre. There are no information available about health services, community centres, security stations and others. For planning purposes, and in order to have a long-term sustainable city, it is essential to consider the services mentioned in the new design of the neighbourhood. Generally, these services require good accessibility and therefore their location must be well studied. Normally, it is recommended to locate them within 500 metres from the settlements so that they are easily accessible.

F. NATURAL RESOURCES AND ENVIRONMENT

The natural and non-aedificandi areas form 7.6% of the total neighbourhood area. All these spaces are prone to high environmental risks. To prevent any risk of flooding on built-up areas, these zones will be classified as no-built areas where no construction should take place. The inhabitants that are already located in these risks zones will have to be relocated to safer areas.

#	No-built areas	m²	Ha	%
	Neighbourhood area	578.644	57	100%
14	High environmental risk areas	44,063	4.4063	
		44,063	**4**	**7.61%**

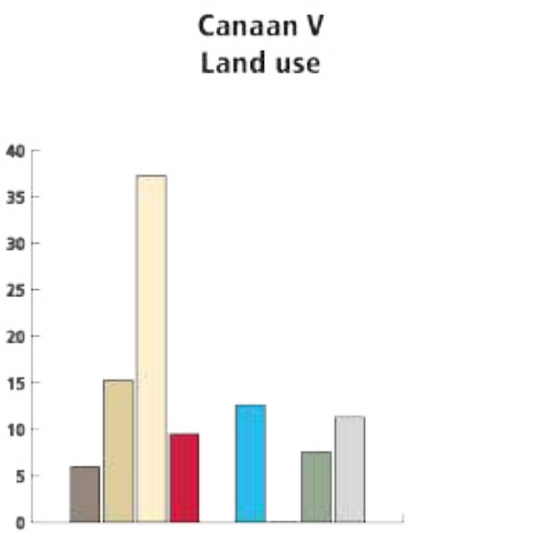
Table 25. Canaan V: Total percentage of no-built areas

Legend

- Proposed buffer zone along the rivers and ravines
- Proposed area for livestock grazing
- Proposed area for reforestation
- High environmental risk areas
- Existing rivers and ravines
- Quarries

Fig.143: Canaan IV: No-built areas

G. CANAAN V LAND USE



Residential - High density	6%
Residential - Medium density	15,35%
Residential - Low density	37,31%
Commercial	9,54%
Industrial	0%
Public facilities	12,66%
Public spaces	0,09%
No-built areas	7,61%
Road network	11,36%

The assemblies, facilitated by the UN-Habitat team in Haiti, identified the main needs of the residents of Canaan V. The proposed land-use plan is the result of the ongoing participatory process with the community. It responds as much as possible to their needs and proposes new ideas that can induce prosperity and sustainability. Even though the plan addressed the issues of land uses and increase the street network, the public spaces and commerce, public facilities however remain insufficient. An elaboration of the plan is essential once all the information are provided. To ensure Canaan V sustainability, it is recommended not to further densify it.

The plan was reviewed as a whole, taking into account the neighbourhoods nearby and how they connect. It is mandatory to situate each of the individual neighbourhood plans in the whole Canaan area to achieve a coherent and rich structure.

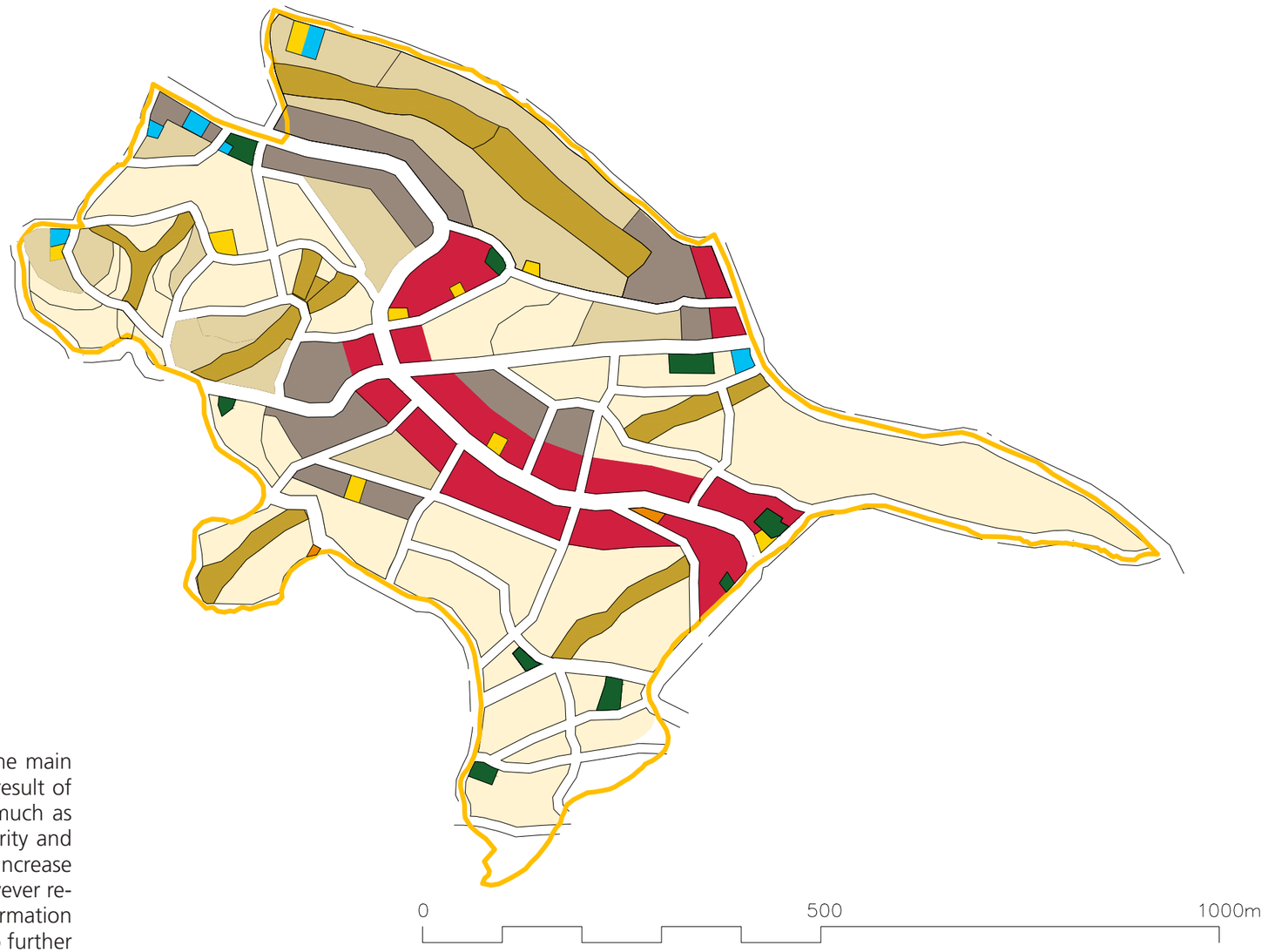
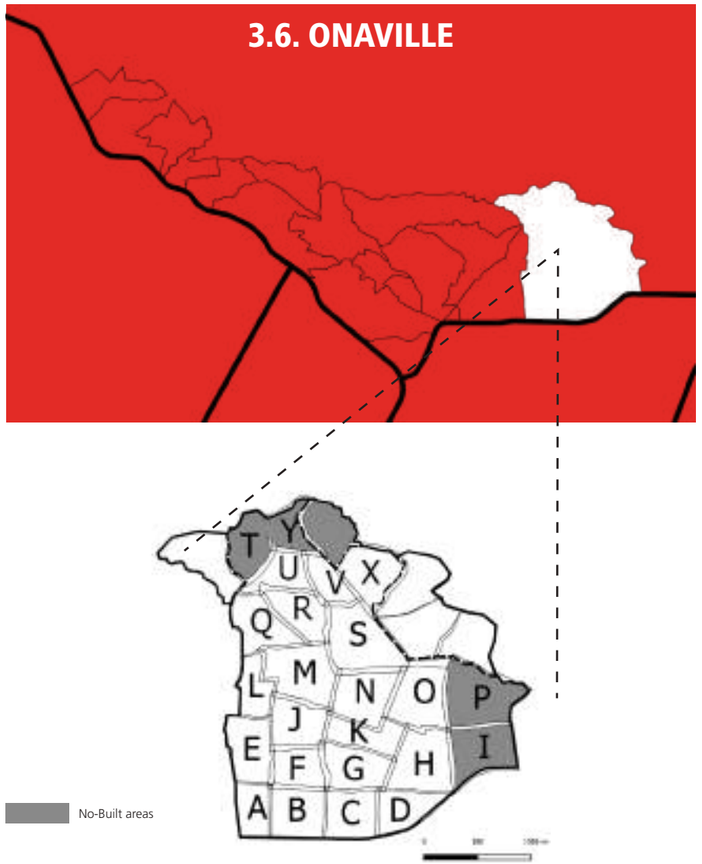


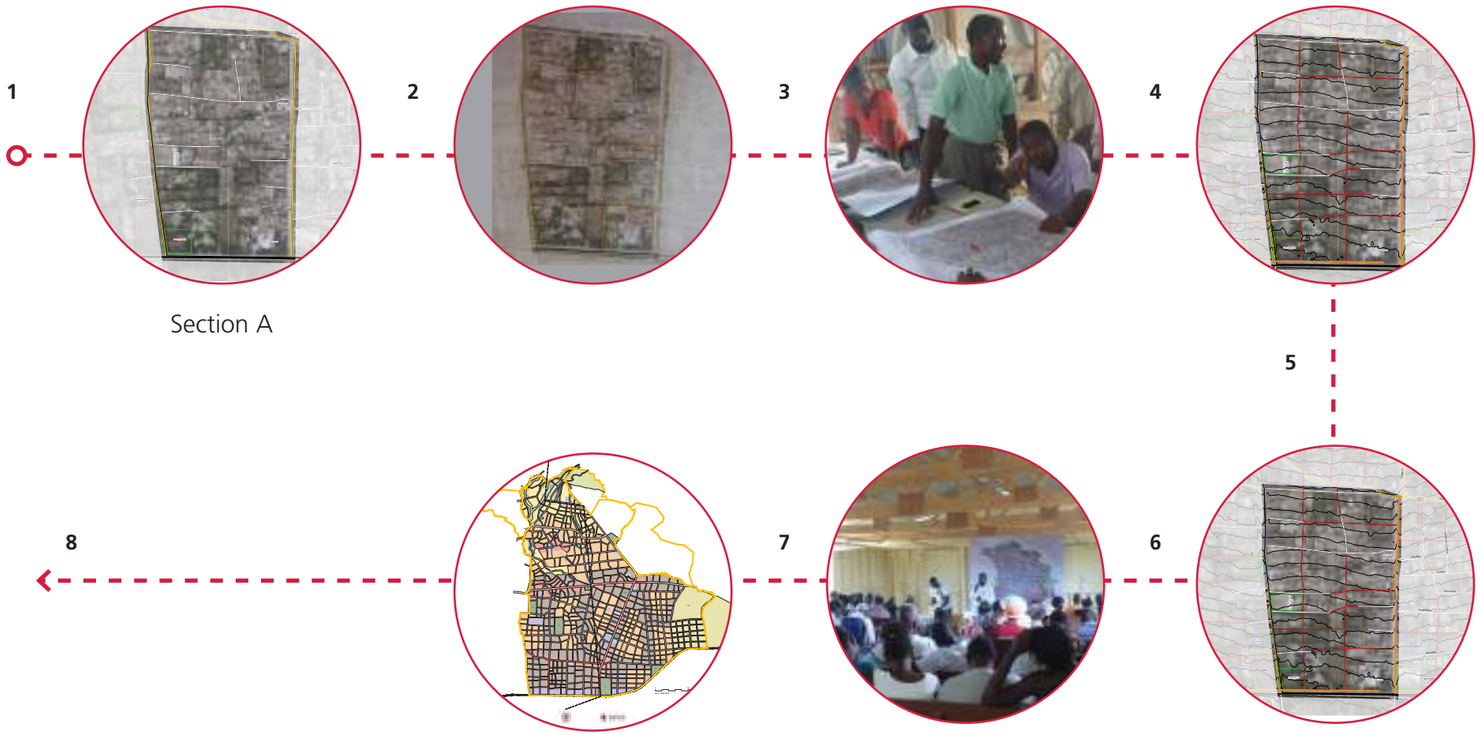
Fig.144: Canaan V: Proposed land use plan

3.6. ONAVILLE



Onaville, located on the far right of the Canaan area, is the neighbourhood with a medium population density (3.500 population per km2). The upper part is a bit hilly but still moderate and development is possible. Onaville does not face many environmental constraints and therefore has a high potential of becoming a rich area for urban development. While Onaville holds few sports facilities, public spaces and some retail services, more is needed to support the population growth of the area.

The following land use proposals in this section are based on a participatory process within three months' time-frame. The UN-Habitat team maps the existing situation and the community validates and proposes ideas. The urban Lab rechecks the suggested interventions and modifies if necessary. After that, a neighbourhood assembly is organized to showcase the overall vision and a land use is later developed.



1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.145: Onaville: participatory planning process

A. STREET NETWORK

The street network in Onaville needs to be improved in order to accommodate the vehicular flux without leading to congestion. A need to preserve enough spaces for streets is important before the area becomes urbanized. There is one arterial road that connects the national road to the upper part and about ten main roads within the neighbourhood. Secondary streets are the most abundant types of roads in Onaville with an average of 6 metres' wide. The current situation consist of 8% of space allocated to the streets while UN-Habitat recommends 30%.

Existing situation

Streets percentage

UN-Habitat: 30%

8%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

13.64 km/sq.km

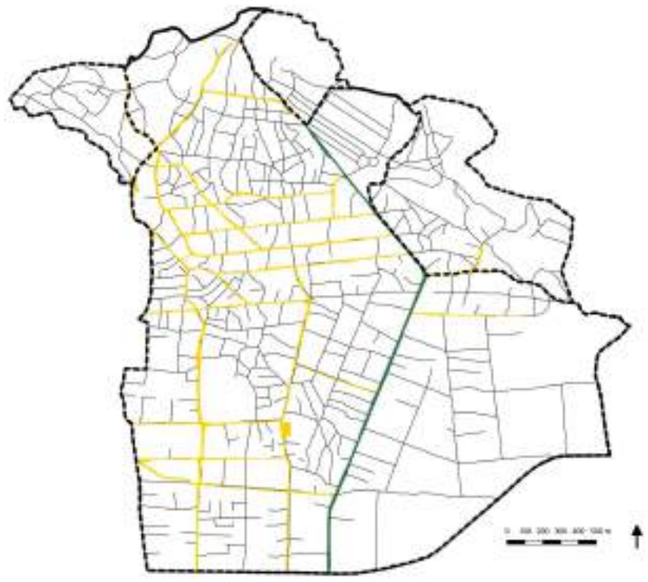


Fig.146: Onaville: existing street network

The proposed street network does not only suggests new roads but also looks into improving the current situation by widening the streets or paving them for example. Two options are offered, with each, different widths are defined to the various types of roads. The UN-habitat recommendations on street space is achieved, forming 33% of the total neighbourhood area.

Proposed street network

Streets percentage

33% -Option A

Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

24% - Option B

Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

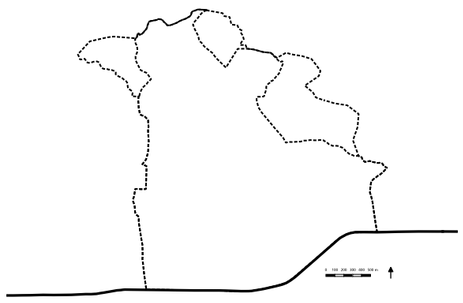
Streets km/sq.km

UN-Habitat: 18 km/sq.km

20.1 km/sq.km

Fig.147: Onaville: Proposed street network

Layers of the proposed street network



National road

Arterial road

Main roads

Secondary streets

Fig.148: Onaville: Layers of the proposed street network

B. PUBLIC SPACES

Existing Public Spaces

Fig.149: Onaville: Existing Public spaces

Proposed by the community

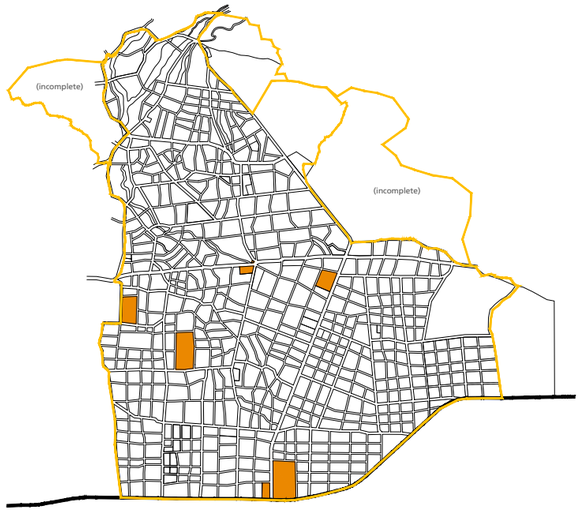


Fig.150: Onaville: Public spaces proposed by the community

Proposed by UN-Habitat LAB

Fig.151: Onaville: Public spaces proposed by UN-Habitat LAB

#	PUBLIC SPACES IN ONAVILLE	STATUS	NAME	m²	Ha	%
	Neighbourhood area			6,100,000	610	100%
1	Football field	Existing		3,600	0.36	
2	Public space	Existing		1,300	0.13	
3	Public space	Existing		3,500	0.35	
4	Public space	Existing	Horeb? (park)	6,500	0.65	
				14,900	**1.49**	**0.24%**
5	Public space	Proposed by the community		6,000	0.6	
6	Sports centre	Proposed by the community	Centre Sportif	43,200	4.32	
7	Market	Proposed by the community		33,600	3.36	
8	Public space	Proposed by the community		20,000	2	
9	Public space	Proposed by the community	Centre communautaire Onaville	4,900	0.49	
10	Public space	Proposed by the community		14,600	1.46	
11	Public space	Proposed by the community	Place Onaville	220	0.022	
					12.252	**2.01%**
12	Public space	Proposed by the LAB		16,000	1.6	
13	Public space	Proposed by the LAB		5,600	0.56	
					2.16	**0.35%**
			Total:	**159020**	**15.902**	**2.61%**

Table 26. Onaville: Percentage of public spaces

There are currently only a few existing public spaces within Onaville. Four public spaces of which one is a football field, cover 0.24 per cent of the land mass. The UN-Habitat recommended coverage of an area by public space is 15 per cent. This recommendation also implies that the public spaces are distributed equally among a neighbourhood, however the four public spaces found in Onaville are situated only in the north-eastern and central parts. In order to meet demand, build community and enhance the urban life for the inhabitants, the presence of public spaces is essential. Ideally they should be easily accessible within a distance of no more than 400m in order to reduced car dependency, facilitate availability and improve walkability. These goals of the community were voiced strongly along with improvement of the green space network during participatory processes. The results have meant an increase of 2.0 per cent of the land mass for public space in seven new areas. This also includes a market as well as another sports centre.

Non-aedificandi areas also have the potential to become public spaces. To further meet the UN-Habitat recommended land cover for public space, three public spaces are therefore proposed, one of which is a buffer zone and two that are reforestation projects. These areas have been designed with the potential to become public spaces. If these suggestions are to be implemented, designated public space in the neighbourhood of Onaville would reach 11 per cent of the total land mass. Land for public space should be encouraged to be developed in order to promote sustainable social dynamics within the new urban neighbourhood.

#	PUBLIC SPACE IN ONAVILLE	STATUS	NAME	m2	Ha	%
	Neighbourhood area			6,100,000	610	100%
	Public spaces			**159020**	**15.902**	**2.61%**
14	Reforestation	Proposed by the LAB		200,000	20	
15	Reforestation	Proposed by the LAB		230,000	23	
16	Buffer area next to ravine	Proposed by the LAB		93,000	9.3	
			Total:	**523000**	**52.3**	**8.57%**
Total open public spaces:				**682020**	**68.202**	**11.18%**

Table 27. Onaville: Total percentage of public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

Existing	Proposed public space	Proposed P.S + non-aedificandi
14,900 m²	159,000 m²	682,000 m²
22,700 inhabitants	49,000 inhabitants	49,000 inhabitants
0.65 m²/inhabitant	**3.2 m²/inhabitant**	**13.9 m²/inhabitant**

Table 28. Onaville: Public space area per inhabitant diagram

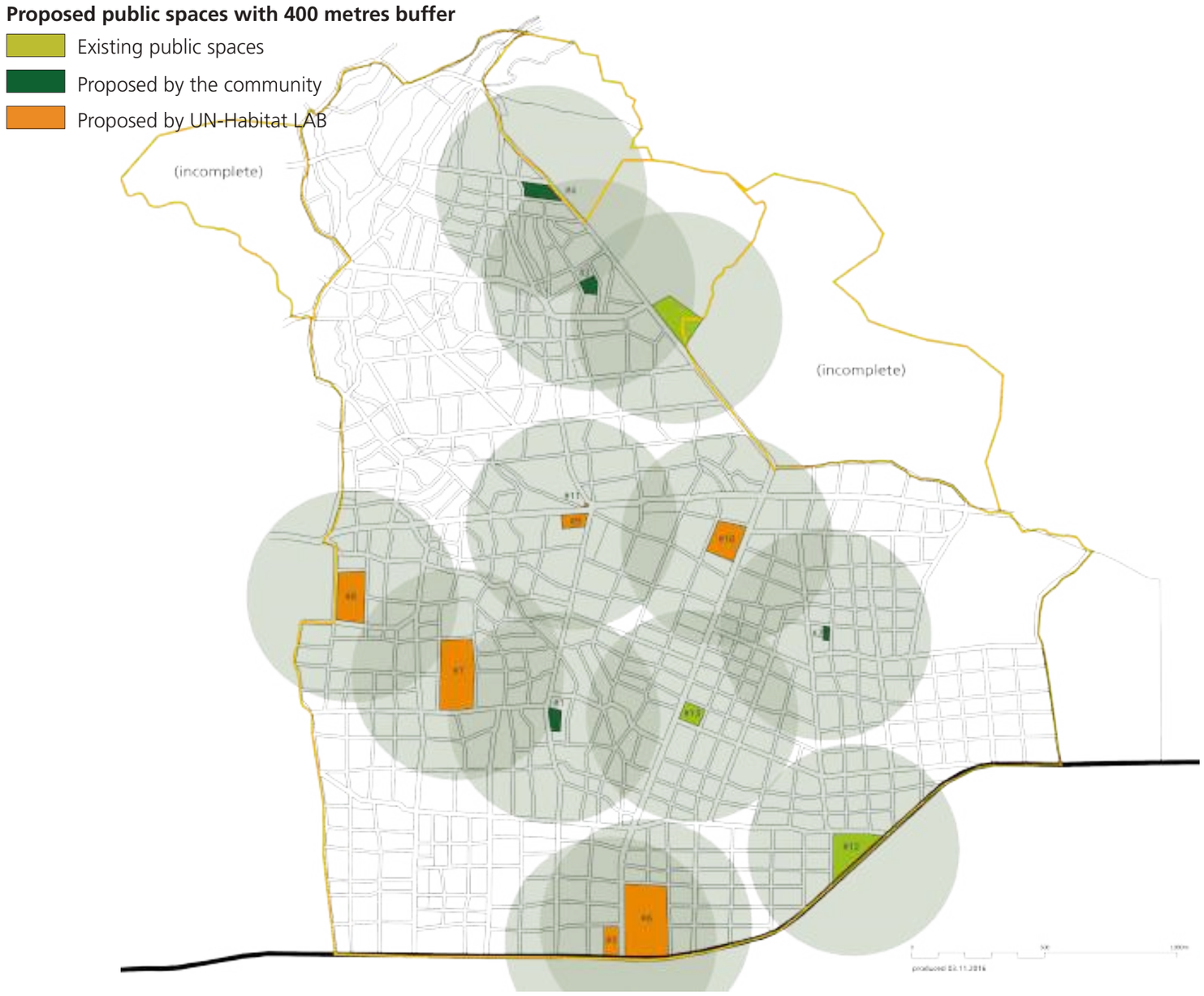


Fig.152: Onaville: Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREAS

6.43 km²
Neighbourhood area

22,663 Inhabitants
(source ARC household survey 2016)

3,524 people/km²

Existing residential areas

Fig.153: Onaville: Existing settlements

Onaville is a neighborhood with medium density. This is due to it being situated far from the more urbanized areas of Port-au-Prince as well as factors of a very challenging terrain.

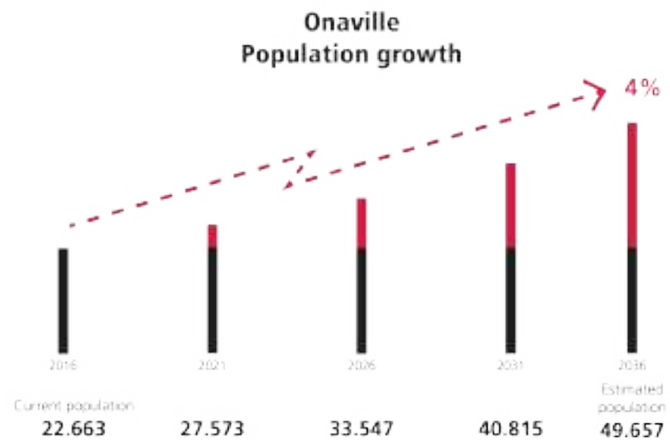


Fig.154: Onaville: Projected population increase

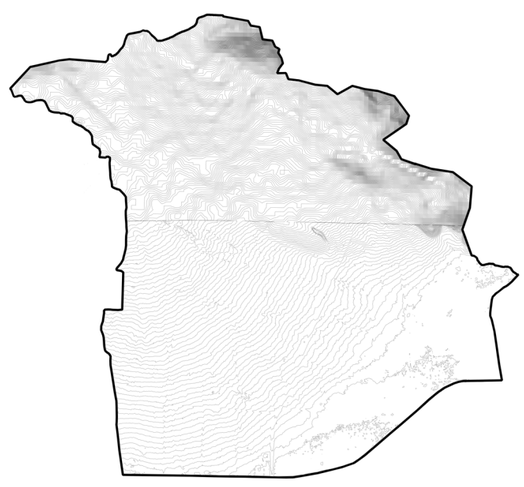


Fig.155: Onaville: Contours

The expected growth of Onaville is 4 per cent annually.

Proposed densities

Low density

Low density housing are suggested where topography is too challenging to be built or where flooding is likely to occur proving challenging for sustainable construction. As seen on the above plan, most of the northern part of Onaville have been designated as such. For low-density settlements, it is proposed that the density be 8 000 people per square kilometre, mainly in the northern area. The existing dwellings may remain although it is recommended that the site not be built further resulting in a low density portion of the neighborhood. In the future, as technology availability and improves and emerges, these areas have the potential to become higher density.

Medium density

The topography, where medium density housing is proposed, is fairly steep but still considered suitable for settlements. The level of densification also depends on proximity to arterial roads and main streets as well as commercial and service-oriented areas. The areas in between these important connections and the more urbanized areas is therefore suggested as medium density housing. A density of 12 000 people per square kilometre is suggested in these areas to encourage social mixing and better opportunities for interaction of more vulnerable populations.

High density

For high density areas, a density of 15 000 people per square kilometre is suggested. This type of neighborhood profile is suggested mostly along arterial roads, main streets and at junctions. High density areas are preferably combined with commercial and service facilities in order to promote a mixed used. In Onaville this has been proposed in the southern and central parts of the neighborhood. Encouraging a compact urban form aims to increase the built area and residential population densities. It also has the goal of intensifying urban economic, social and cultural activities while manipulating urban size, form and structure with larger goals of improving environmental, social and global sustainability benefits.

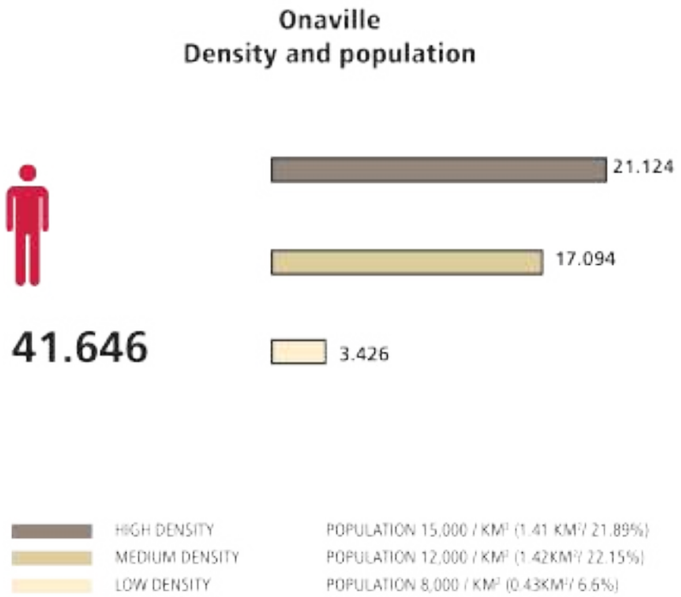


Fig.156: Onaville: Diagram of population in the new proposed residential areas.

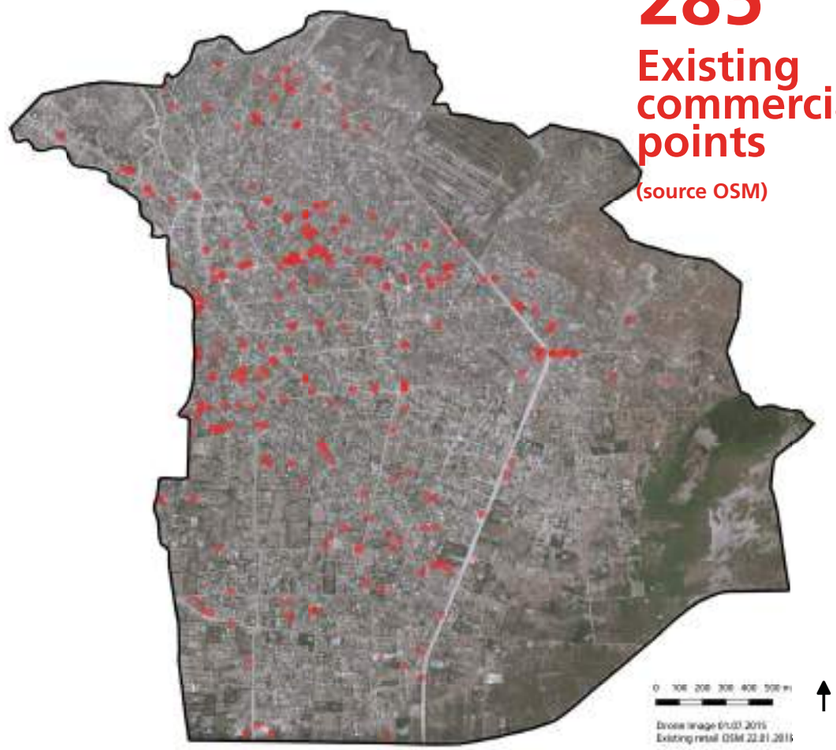
Throughout Onaville, not all areas for residential land-use are to be purely monofunctional; integration of mixed-use land types into the residential urban fabric is key to encouraging walkability, promoting inclusion of vulnerable populations and maintaining social cohesion. These areas are distributed equally throughout the neighborhood with the goal of incubating small local businesses, artisan workspaces, eateries and government service centres. Mixed-use nodes in the neighborhood are designed to augment the existing commercial areas providing ease of access and possibilities for new urban form.

The expected annual growth of Onaville is 4 per cent. This means that the current population of 22,663 will grow to approximately 49,657 people within 20 years. The densification of Onaville, as proposed in numbers seen above, will be able to accommodate 41,646 people.

Fig.157: Onaville: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial



285

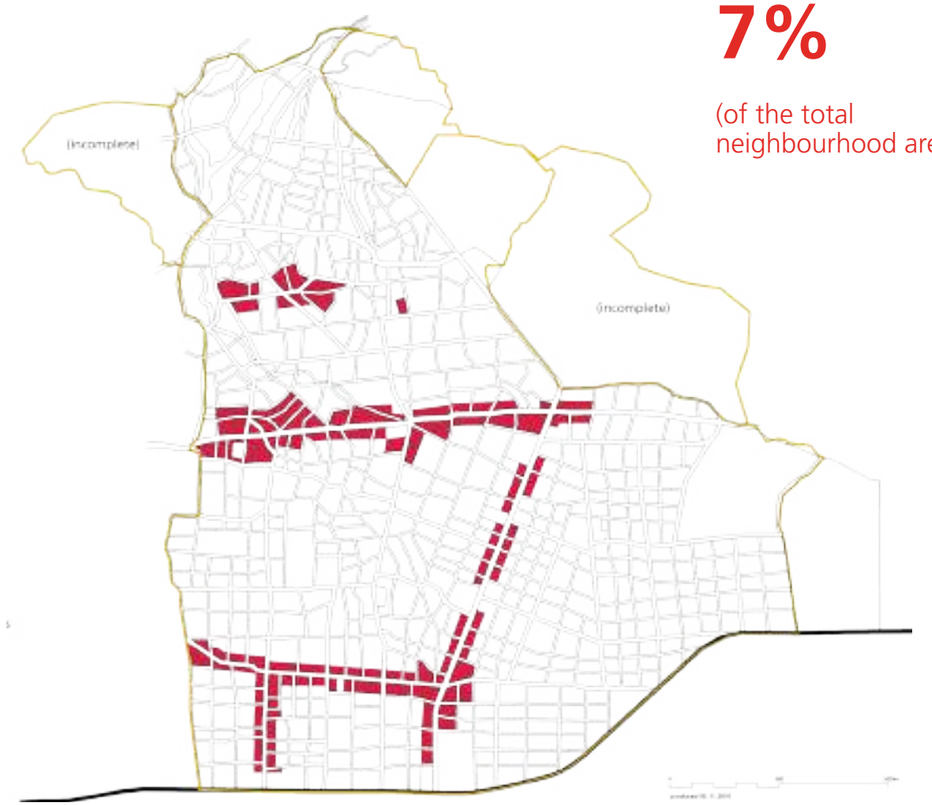
Existing commercial points

(source OSM)

Fig.158: Onaville: Existing commercial points (Source: OSM)

According to OpenStreetmap, there are 285 retail points in Onaville. There is no concentration of commercial activities, the retail shops are dispersed within the neighbourhood and mainly found in the northern area. These shops are a combination of different uses like vegetable shop, merchandise, hairdressers and so on. In order to keep pace with the 4% urban growth, more commercial facilities are needed. With the provision of more centralised commerce facilities and the planning of an adequate street network, Onaville will also induce job opportunities for its residents.

Proposed commercial areas (mixed-use)



7%

(of the total neighbourhood area)

Fig.159: Onaville: Proposed commercial areas

Following the workshop with the communities, different commercial streets where identified. The location of the new commercial shops will be highly concentrated on the arterial roads, as well as on the main roads. This will enable the residents to access those facilities easily. The centres of activities are a booster of employment opportunities and therefore a catalyst for local economy.

It is important to note that the commercial centres are not mono-functional and are not limited to retail activities. These areas are encouraged to be mixed-use where different functions can exist at once. Usually, they have commercial and public facilities on the street level and high residential on the upper level.

E. PUBLIC FACILITIES

RELIGIOUS - EXISTING
EDUCATION - EXISTING
HEALTH - EXISTING
OTHER PUBLIC FACILITIES - EXISTING

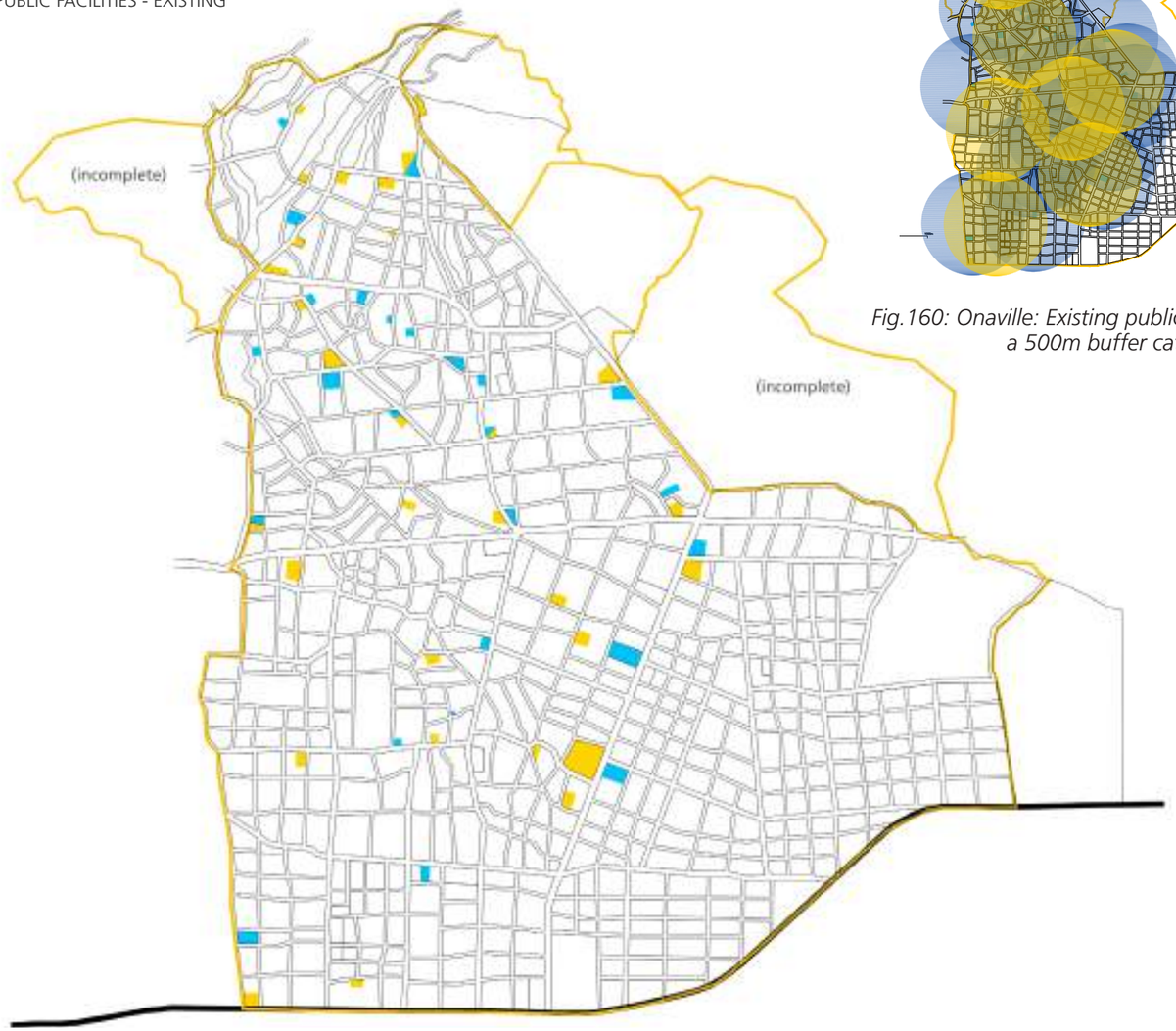


Fig.161: Onaville: Existing public facilities

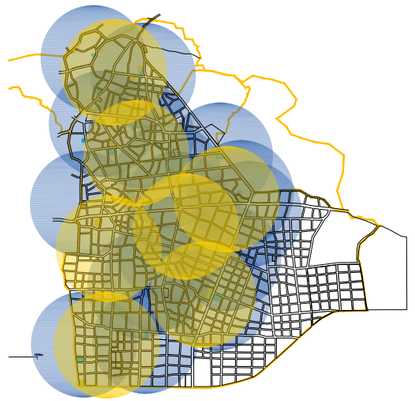


Fig.160: Onaville: Existing public facilities and a 500m buffer catchment area.

There are 25 existing schools within the Onaville area, including kindergartens. These schools are well distributed throughout the neighborhood and are on track to support the growth in population. Therefore no new schools are suggested, however improvement to facilities and quality of education programs are recommended in the SDF.

There are 30 places dedicated for worship in the neighborhood of Onaville. The frequency of worship centres currently follows closely with the density of the population. Where the density is high, more or perhaps larger religious centres can be provided and vice versa in areas considered as low density.

11%	Less than 10 years
4%	Illiterate
29%	Primary school (not finished)
11%	Primary school (finished)
29%	Secondary school (not finished)
8%	Secondary school (finished)
2%	Professional school
5%	University

Table 29. Onaville: Participation level (Croix Rouge Americaine, Juillet 2016)

There are no information available about health services, community centres, security stations and others. For planning purposes, and in order to have a long-term sustainable city, it is essential to consider the services mentioned in the new design of the neighbourhood. Generally, these services require good accessibility and therefore their location must be well studied. Normally, it is recommended to locate them within 500 metres from the settlements so that they are easily accessible.

F. NATURAL RESOURCES AND ENVIRONMENT

Eight percent of the Onaville region is suggested to be non-aedificandi areas. These zones are for the purposes of environmental protection and public engagement in environmental issues, and must be coupled with educational programs to encourage civic and environmental responsibility among civil society. Buffer zones are suggested along rivers that run in the north-eastern part of Onaville. These green corridors are preserved in order to mitigate flood risk and to protect the natural environment. A width of 30 metres on either side is recommended as a minimum width for the buffer zone although the topography of a certain areas may not always allow that recommendation to be enacted. Currently the river passes through several settlements targeted for low density housing, so these areas are not recommended for further expansion.

The north-eastern parts of Onaville are preserved for reforestation projects. Further south, an area is suggested either for reforestation, agricultural or livestock grazing zones. These areas are to be developed according to the Tree Planting Strategy. The Strategy implores the use of certain native species of trees in certain areas. For example, trees and plants that have a large amount of water uptake are recommended for floodplains. This includes fruits, vegetables and grains that can be grown in these contexts for the purposes of agriculture.

#	No-built areas	m2	Ha	%
	Neighbourhood area	6,100,000	610	100%
14	Reforestation	200,000	20	
15	Reforestation	230,000	23	
16	Buffer areas next to ravine	93,000	9.3	
	Total:	**523000**	**52.3**	**8.13%**

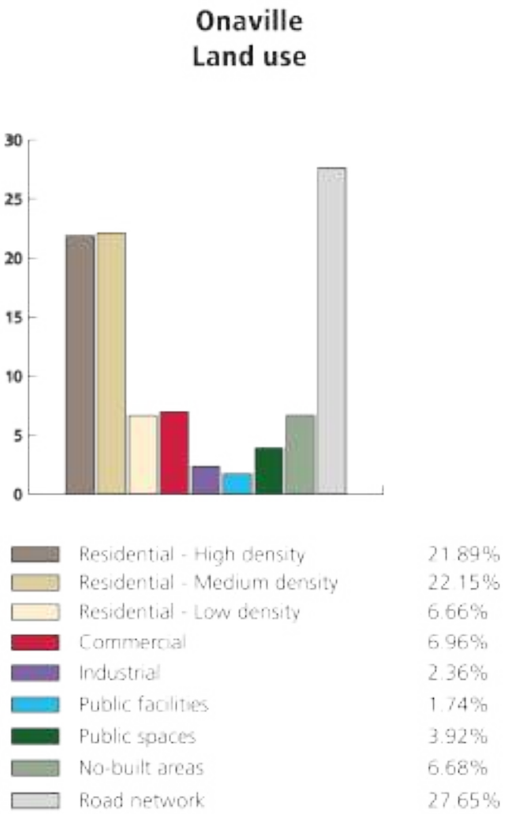
Table 30. Onaville: Total percentage of no-built areas

Legend

- Proposed buffer zone along the rivers and ravines
- Proposed area for livestock grazing
- Proposed area for reforestation
- High environmental risk areas
- Existing rivers and ravines
- Quarries

Fig.162: Onaville: No-built areas

G. ONAVILLE LAND USE

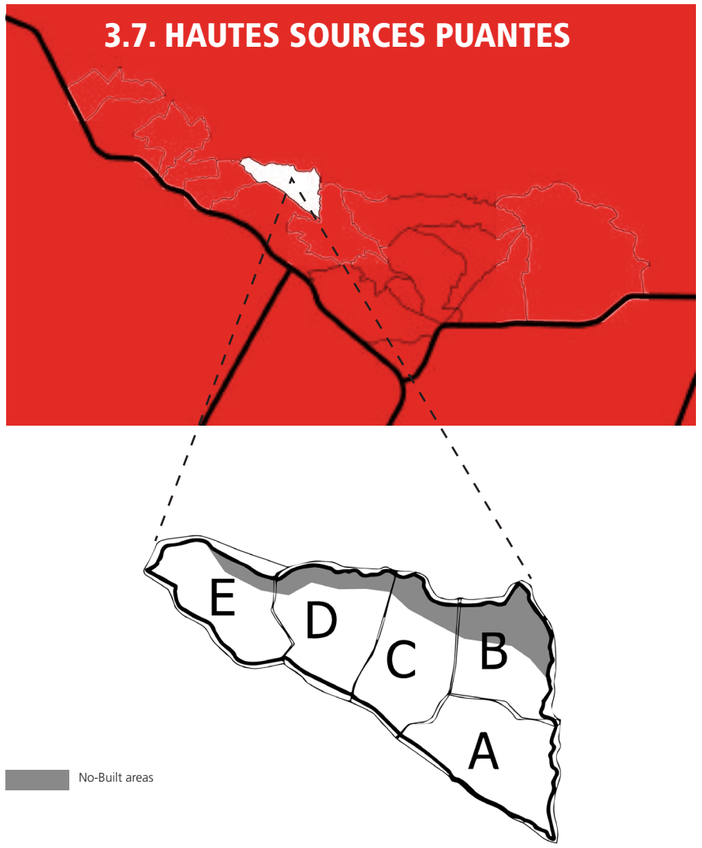


The overall land use of Onaville is a result of ongoing engagement with the community. The plans reviewed by the residents and the neighbourhood leaders were the basis of UN-Habitat's land use proposal. Streets forms 27.6% of the total land in the new proposal, whereas public space and non-aedificandi areas takes 10.6% of Onaville.

Onaville's land use was also reviewed in its wider area, taking into consideration the neighbourhoods nearby and how they interlink. It is mandatory to situate the individual neighbourhood plans within the overall Canaan area in means to reach a consistent and rich structure.

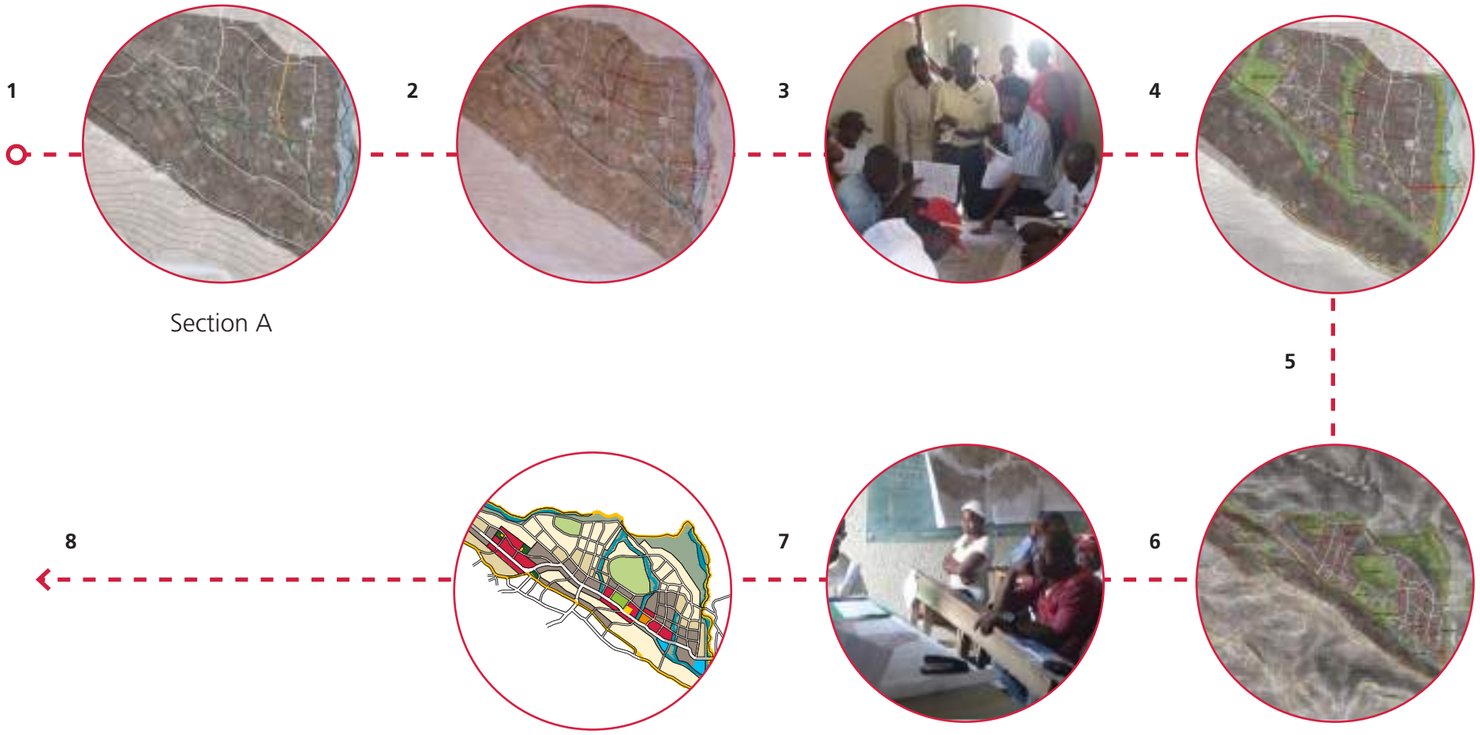
Fig.163: Onaville: Proposed land use plan

3.7. HAUTES SOURCES PUANTES



Hautes Sources Puantes lies in the northern part of the central area of Canaan land. The neighbourhood is one of the less dense in the area where just 3,000 people live there. The houses are spread all over Sources Puantes and are interconnected through secondary streets. The open spaces are abandoned and open the possibility for further development in the neighbourhood.

UN-Habitat followed the similar participatory approach as for the rest of the neighborhoods. The process begins with mapping the existing reality of the neighborhood. The proposal for each neighbourhood, is based on the input of the community, stake-holders and residents which is involved in the different phases of the evolving planning and design process.



1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.164: Hautes Sources Puantes: participatory planning process

A. STREET NETWORK

The street network is not well structure and does not have a hierarchy. The number of secondary streets is really low leading to congestion in the future if the growth remains the same. Most of the existing roads lead to a dead-end. Appropriate measures for the roads in steep areas were been elaborated in the mobility report.

The new street network suggest in having an arterial road that crosses the neighbourhood from the South-East to the North-west of Sources Puantes. This road holds economic potentialities and will increase the accessibility to new employment opportunities. The steep slopes limit the construction of roads, and therefore only one main road is proposed in the South where the topography is moderate. Inside the neighbourhood, the area will be interconnected by secondary roads. Different width for the different types of roads are defined (A and B, see below). It is not only suggested to propose new roads, but the upgrading of the existing ones is highly recommended. The street network of Sources Puantes will witness an increase of 17.5%.

Existing situation

Streets percentage

UN-Habitat: 30%

6%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

9.4 km/sq.km

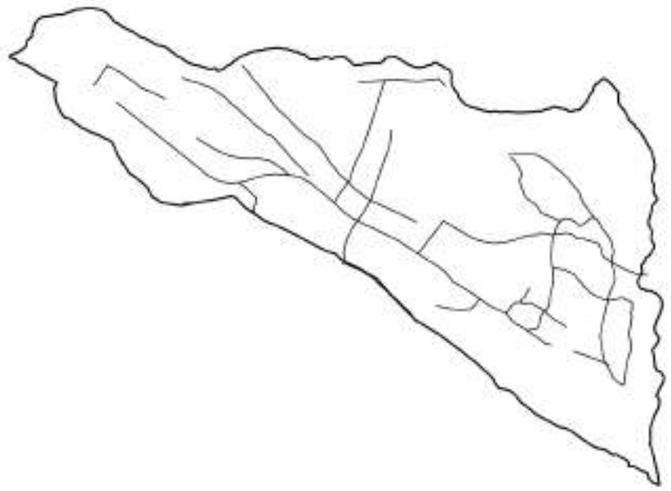


Fig.165: Sources puantes: existing street network

Proposed street network

Streets percentage

23.3% -Option A

Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

- Option B

Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

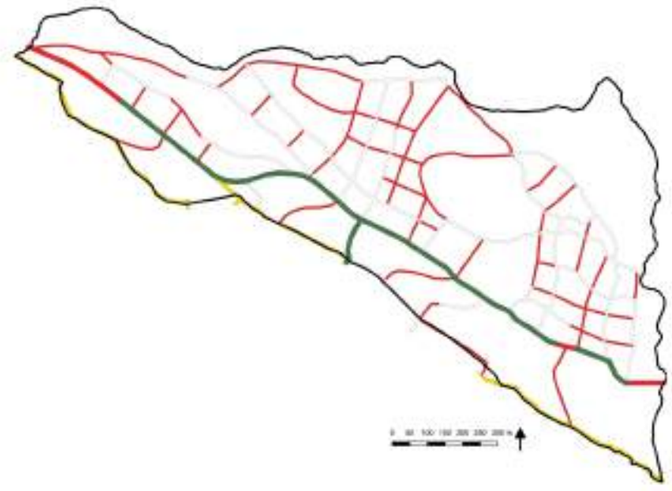
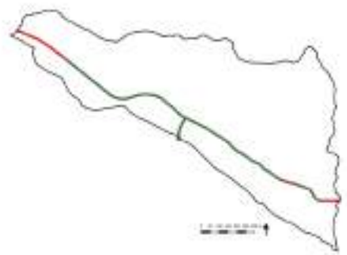


Fig.166: Sources puantes Proposed street network

Layers of the proposed street network

National road



Arterial road

Main roads

Secondary streets

Fig.167: Sources puantes: Layers of the proposed street network

B. PUBLIC SPACES

Existing Public Spaces

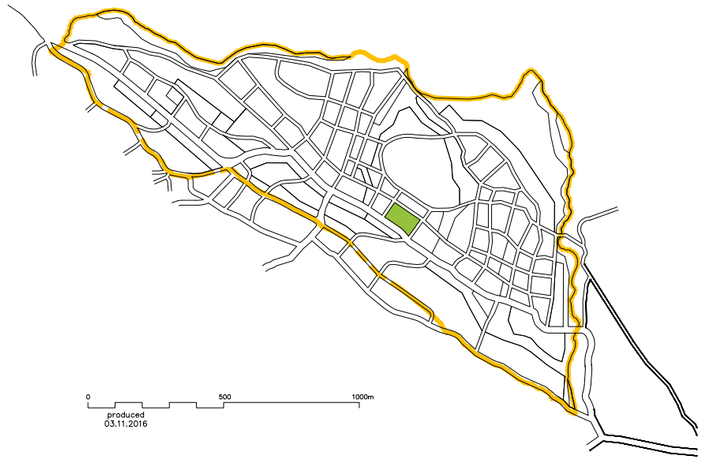


Fig.168: Sources Puantes: Existing Public spaces

Proposed by the community

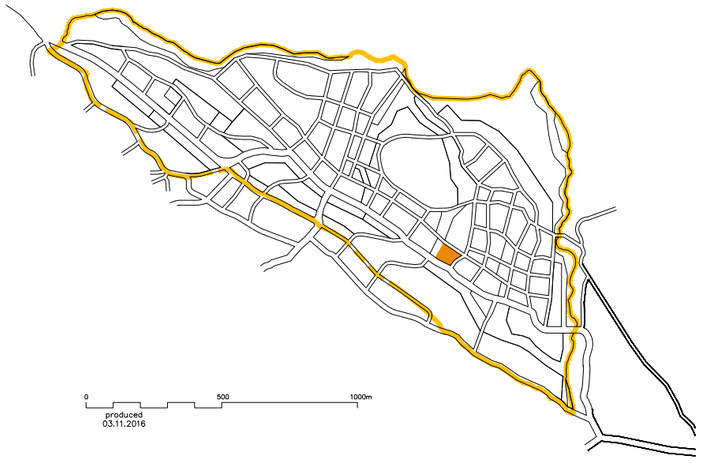


Fig.169: Sources puantes: Public spaces proposed by the community

Proposed by UN-Habitat LAB

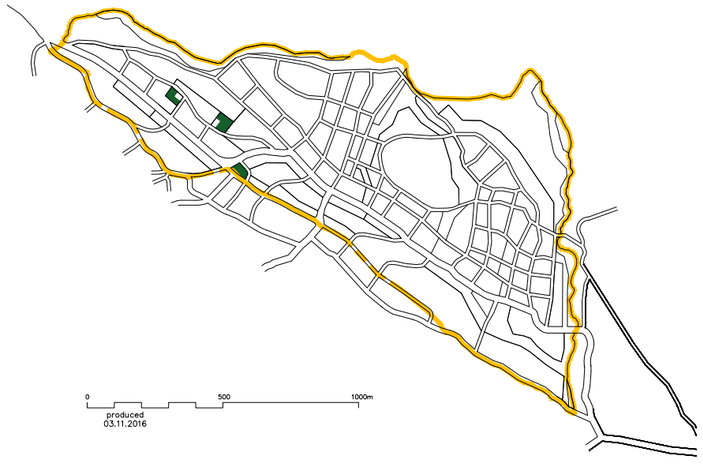


Fig.170: Sources puantes: Public spaces proposed by UN-Habitat LAB

#	PUBLIC SPACE IN HAUTES SOURCES PUANTES	STATUS	NAME	m2	%
	Neighbourhood area			1,230,994	100%
1	Soccer field	Existing		7,500	
				7,500	**0,61**
2	Public space	Proposed by the community		3,900	
				3,900	**0,32**
3	Public space	Proposed by the LAB		1,835	
4	Public space	Proposed by the LAB		2,700	
5	Public space	Proposed by the LAB		1,684	
				6,219	**0,51**
			TOTAL:	**17,619**	**1.43%**

Table 31. Sources puantes: Percentage of public spaces

There is only one existing public space in Sources Puantes. Since the current football court only occupy 0.61%, more public spaces should be considered in the new plan in order to reach UN-Habitat's recommendations. It is then essential to preserve vacant lands for the purpose of developing public usages.

During the neighbourhood assemblies, a new space of 3,900 m2 was designated as a public space but the total percentage remained low. UN-Habitat therefore allocated three other spaces in the northern part to ensure an equitable repartition. Adding the proposals of the community to the Lab's ones, the percentage of public spaces will increase of 1HA.

The area on both side of the ravines presents a high environmental risks. The risk of flooding is very high and therefore a distance of 30 metres from both sides will be designated as a protection buffer zone. These areas were designed with the potential of becoming public spaces in off-rainy seasons. If the proposals are put in place, the total number of open spaces will reach 17.6%.

#	PUBLIC SPACE IN SOURCES PUANTES	STATUS	NAME	m²	Ha	%
	Neighbourhood area			1,230,994	123	100%
	Public spaces			**17.619**	**0,018**	**1,43%**
8	Buffer areas next to ravine	Proposed by the LAB		27,300	0.027	
9	Buffer areas next to ravine	Proposed by the LAB		42,592	0.042	
10	Buffer areas next to ravine	Proposed by the LAB		130,210	0.13	
			Total:	**200,102**	**0.2**	**16,26%**
Total open public spaces:				**217,721**	**21,7**	**17,69%**

Table 32. Sources puantes: Total percentage of public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

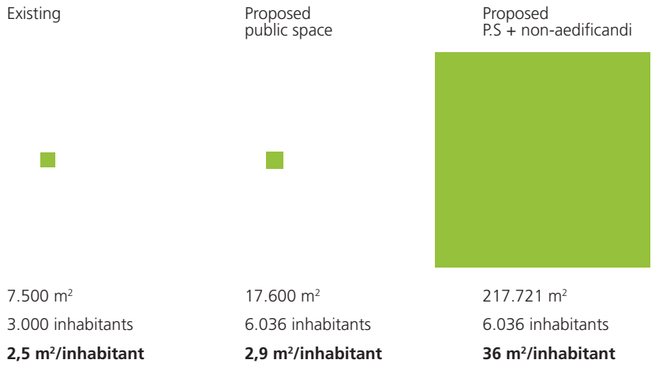


Table 33. Sources Puantes: Public space area per inhabitant diagram

Proposed public spaces with 400 metres buffer

Existing public spaces

Proposed by the community

Proposed by UN-Habitat LAB

Fig.171: Sources Puantes: Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREAS

1.23 km²
Neighbourhood area

3,000 Inhabitants
(source ARC household survey 2016)

2,440 people/km²

Existing residential areas

Fig.172: Sources Puantes: Existing settlements

Hautes Source Puantes is a neighbourhood with low density. Having a population of 3,000 people and an area of 1.23km2, the density of the neighbourhood is of 2.440 inhabitants per km2. The settlements are anarchically repatriated. They are found

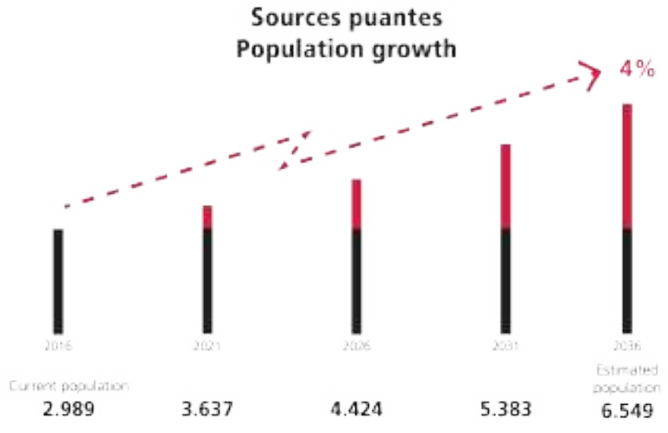


Fig.173: Sources puantes: Projected population increase

Fig.174: Sources Puantes: Contours

mostly next to accessible roads. The topography is complex in the north where the slopes becomes steep leaving no possibility for development to happen.

Proposed densities

Low density

Most of the low density areas are found in the north of the neighbourhood where the slopes becomes challenging. Considering a density of 8,000 inhabitants per km2 for this category, Hautes Sources Puantes will be able to host 2,616 people. The houses in this classification are often connected to secondary streets. It is possible to have small commerce provided their connection to pedestrian paths.

Medium density

The medium density areas in the new plan are not many. They are in proximity of high density areas and from just 11HA of the total neighbourhood's area. The topography is moderate and densification of existing low density zones into medium ones is therefore feasible. The plan proposes in having 12,000 people per km2 in this category which means 1,332 inhabitants will be able to live in Source Puantes.

High density

The location of high density areas is concentrated in the centre of the neighbourhood and in proximity of the proposed arterial road. UN-Habitat recommends to have 15,000 people per km2 in this category. This means that a study of plot resizing and modification needs to be carefully conducted. Noting that the high density areas form 33Ha, Hautes Sources Puantes will be able to accommodate 2,097 people.

In the upcoming 20 years, and if the population growth remains

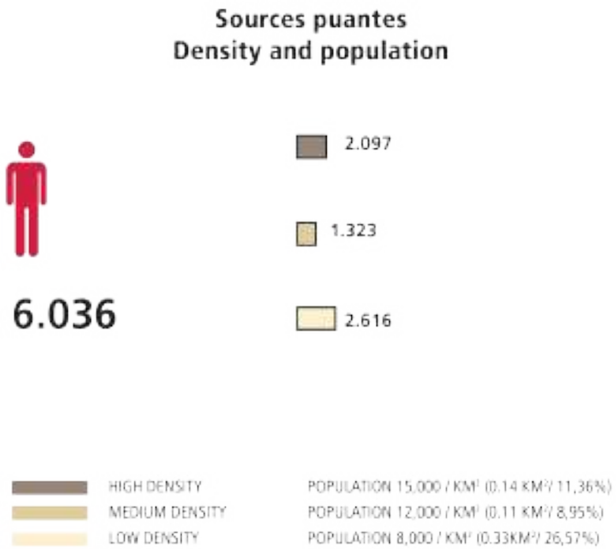


Fig.175: Sources Puantes: Diagram of population in the new proposed residential areas.

of 4%, it is expected that the current population of 2,989 will reach 6,549 inhabitants. The densification, as proposed in the new plan, will be able to host 6,036 people which is not sufficient. One saturated, the medium density areas will need to be more densified in order to respond to the population growth demand.

The presence of economic activities in the residential areas is highly encouraged on condition to have a direct access to the roads. The size of commercial activities depends on the types of roads and the density of the area; the higher the density, the bigger the commerce and vice versa. The compactness of the city is induced by the integration of different usages into the urban fabric.

Fig.176: Sources puantes: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial

1

Existing commercial point

(source OSM)

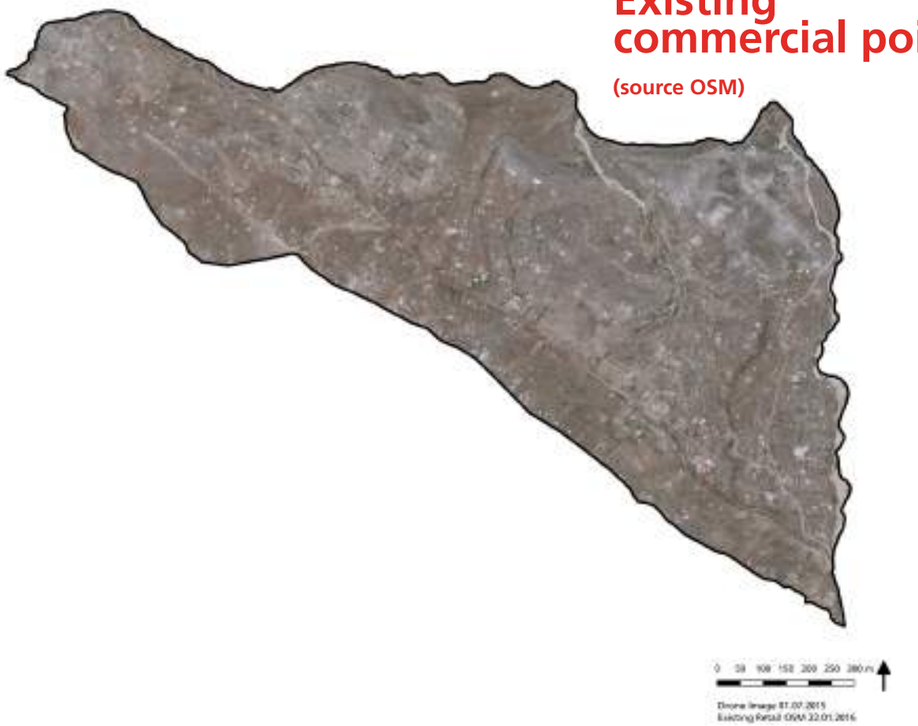


Fig.177: Sources Puantes: Existing commercial points (Source: OSM)

According to OpenStreetMap, there is only one shop in Hautes Sources Puantes. In order to enhance the local economy, it is essential to provide further commercial activities and encourage commercial streets. The location of these services is very important; the decentralization of these services and the good planning of street network will increase employment opportunities for the residents.

Proposed commercial areas (mixed-use)

5%

(of the total neighbourhood area)

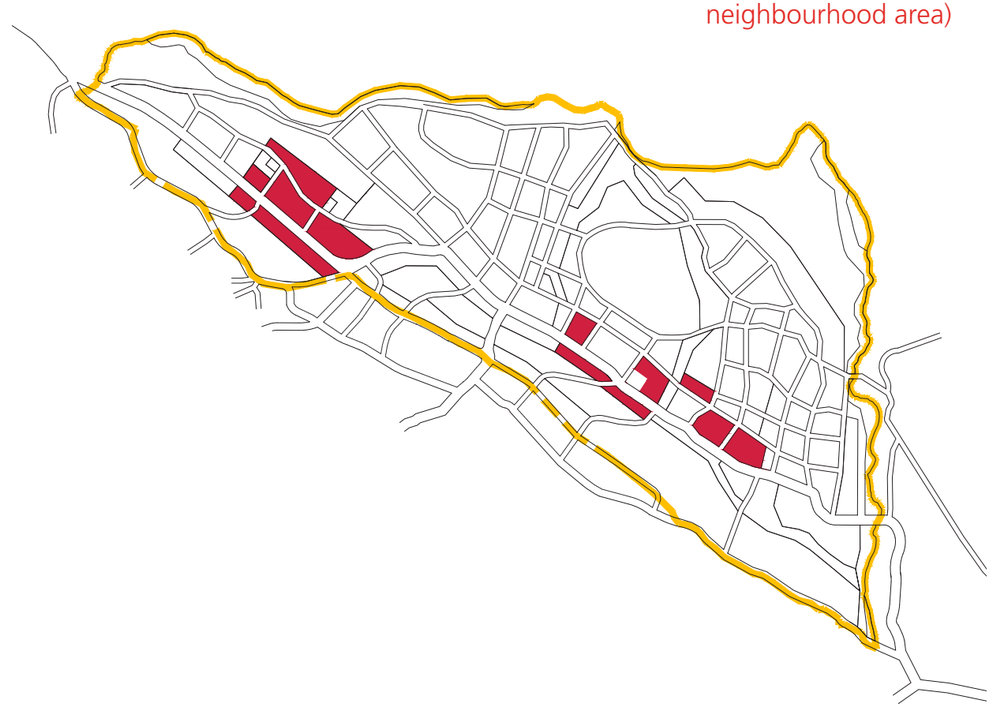


Fig.178: Sources Puantes: Proposed commercial areas

In the new plan, the commercial areas will be facing the proposed arterial road. They will occupy the ground floor and will have direct access to pedestrian paths. These activities have the potential to generate a new, highly diverse sector within the local economy, with opportunities for job creation. They therefore act as catalysts for initiating a structural transformation. The proposed commercial areas will occupy 5%.

E. PUBLIC FACILITIES

RELIGIOUS - EXISTING
EDUCATION - EXISTING
HEALTH - EXISTING
OTHER PUBLIC FACILITIES - EXISTING

Fig.180: Sources Puantes: Existing public facilities

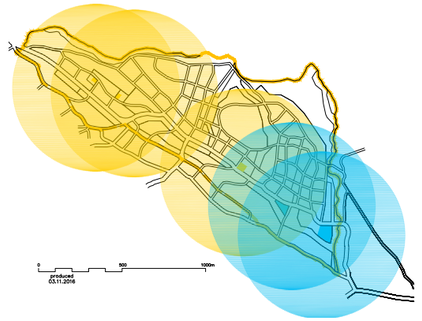


Fig.179: Sources Puantes: Existing public facilities and a 500m buffer catchment area.

There is only one educational facility in Hautes Sources Puantes which is located in the south. The data has been validated with the community but there is still a lack of information about the types of schools (primary, secondary, etc.). It was a challenge to predict the required number of facilities for the population. Education plays a major role in reducing poverty and inequality. For that, it is always advisable to reserve certain land for the extension of existing facilities and/or for the provision of new schools.

The area contains 2 places of worship situated in the north. No information is available about health services, community centres, security stations and others. For planning purposes, and in order to have a long-term sustainable city, it is essential to consider the services mentioned in the new design of the neighbourhood. Generally, these services require good accessibility and therefore their location must be well studied. Normally, it is recommended to locate them within 500 metres from the settlements so that they are easily accessible.

Once the information is updates, the plan should be reconsidered and more public facilities should be added.

22%	Less than 10 years
6%	Illiterate
30%	Primary school (not finished)
11%	Primary school (finished)
22%	Secondary school (not finished)
5%	Secondary school (finished)
1%	Professional school
3%	University

Table 34. Sources Puantes: Participation level (Croix Rouge Americaine, Juillet 2016)

F. NATURAL RESOURCES AND ENVIRONMENT

The no-built areas and natural zones form 22% of the total neighbourhood's area. Two spaces in north (see map #6 and 7) are to be defined as reforestation area. Considering their location near the ravines, this will help in decreasing the risk of flooding and landslides. A 50 metres' buffer area from both sides of the ravine will be designated as a protection area in means to prevent all risks. These buffer areas were designed with the potential of becoming public spaces in off-rainy seasons.

The no-built areas will occupy 22% of the total neighbourhood area.

#	No-built areas	m²	Ha	%
	Neighbourhood area	1,200,000	120	100%
6	Reforestation	17,070	1,7	
7	Reforestation	54,330	5,43	
8	Buffer areas next to ravine	27,300	0.027	
9	Buffer areas next to ravine	42,592	0.042	
10	Buffer areas next to ravine	130,210	0.13	
	Total:	**271,502**	**0.27**	**22.06%**

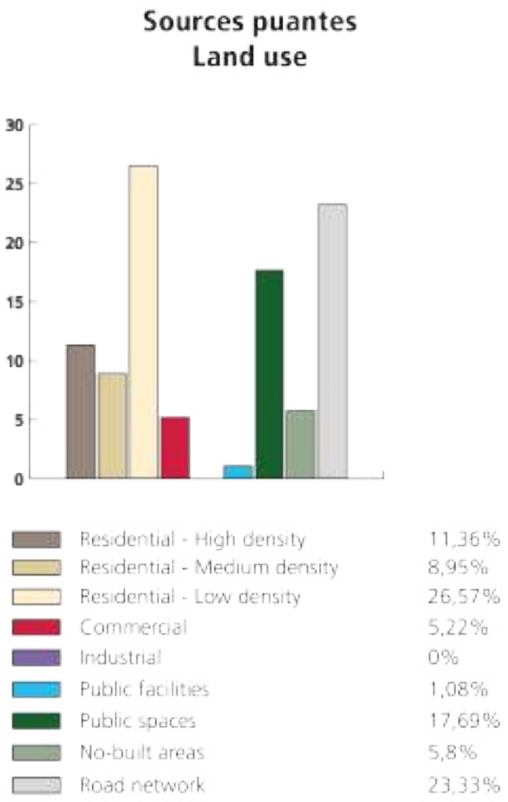
Table 35. Sources Puantes: Total percentage of no-built areas

Legend

- Proposed buffer zone along the rivers and ravines
- Proposed area for livestock grazing
- Proposed area for reforestation
- High environmental risk areas
- Existing rivers and ravines
- Quarries

Fig.181: Sources Puantes: No-built areas

G. SOURCES PUANTES LAND USE



The assemblies, facilitated by the UN-Habitat team in Haiti, identified the main needs of the residents of Source Puantes. The proposed land-use plan is the result of the ongoing participatory process with the community. It responds as much as possible to their needs and proposes new ideas that can induce prosperity and sustainability. Even though the plan addressed the issues of land uses and increase the street network, the public spaces and commerce, public facilities however remain insufficient. An elaboration of the plan is essential once all the information are provided. To ensure Sources Puantes' sustainability, it is recommended not to further densify it.

The plan was reviewed as a whole, taking into account the neighbourhoods nearby and how they connect. It is mandatory to situate each of the individual neighbourhood plans in the whole Canaan area to achieve a coherent and rich structure.

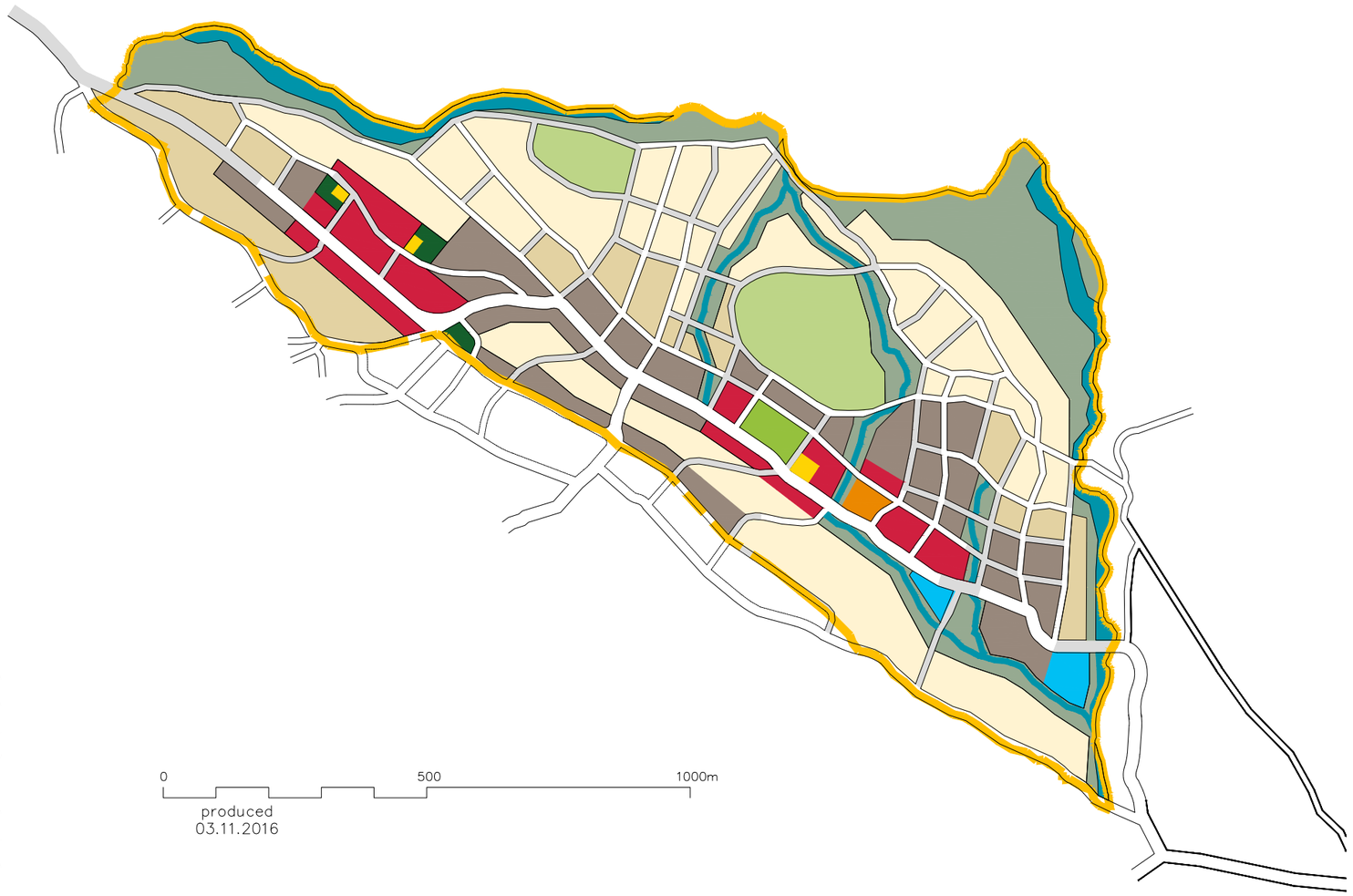
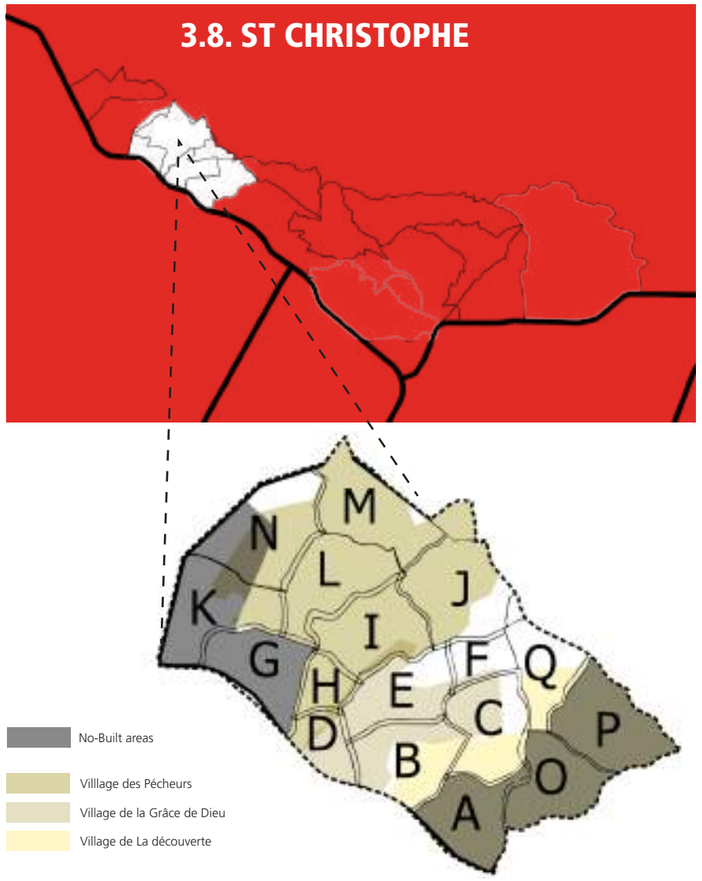


Fig.182: Sources Puantes: Proposed land use plan



St Christophe is a neighbourhood located on the Western side and consists of the three villages; Village Des Pecheurs, Village de la Grâce de Dieu and Village a Decouverte. For the purpose of these studies, and since the neighbourhoods' assemblies were not separately done, the three villages will be considered under one neighbourhood with the name of St.Christophe.

The following land use proposals in this section are based on a participatory process within three months' time-frame. The UN-Habitat team maps the existing situation and the community validates and proposes ideas. The urban Lab rechecks the suggested interventions and modifies if necessary. After that, a neighbourhood assembly is organized to showcase the overall vision and a land use is later developed.

1. Mapping the existing situation
2. Mapping proposed interventions
3. Community workshops
4. New proposals draft
5. Selected interventions map
6. Neighbourhood assemblies
7. Draft of land use plan
8. Charrette and implementation

Fig.183: St.Christophe: participatory planning process

A. STREET NETWORK

Currently, the street network in St.Christophe occupies only 8%. The neighbourhood borders the national road 1 from the south and has only secondary streets inside. The lack of street hierarchy leads to congested areas. For that, it is necessary to preserve enough spaces for roads in order to have a good connectivity and prevent any traffic. The majority of the roads lead to a dead-end. It is thus fundamental to think of a road grid while providing an interconnected set of roads that are safe.

Existing situation

Streets percentage

UN-Habitat: 30%

8%

Streets km/sq.km

UN-Habitat: 18 km/sq.km

14 km/sq.km

Fig.184: St.Christophe: Existing street network

The new plan proposes a new arterial road that connects the national road 2 with the northern part of the neighbourhood. Where the topography is moderate, main roads are suggested to improve the connectivity. Appropriate measures were elaborated in the mobility report giving a guidance on how to build roads in steep areas. Different widths are defined for the different types of roads (Option A and B, see below). The plan does not only propose new roads, but also looks into ways to improve and upgrade the current situation. The new St.Christophe's road network plan shows an increase of 3.5% which is still insufficient.

Proposed street network

Streets percentage

11.5%-Option A

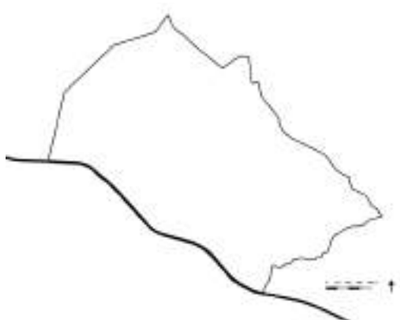
Arterial road: 24m
Main roads: 18m
Secondary streets: 12m

- Option B

Arterial road: 18m
Main roads: 12m
Secondary streets: 9m

Fig.185: St.Christophe: Proposed street network

Layers of the proposed street network



National road

Arterial road

Main roads

Secondary streets

Fig.186: St.Christophe: Layers of the proposed street network

B. PUBLIC SPACES

Existing Public Spaces

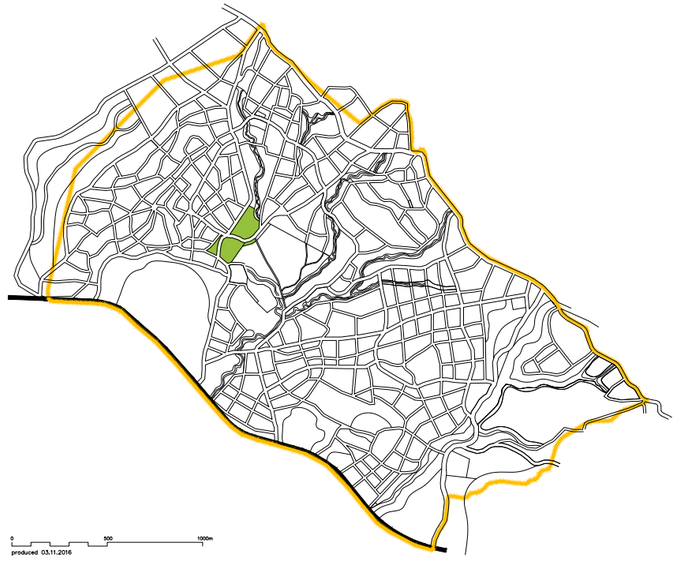


Fig.187: St.Christophe: Existing Public spaces

There are only two public spaces in St.Christophe; one market and one park. The total area of the existing public spaces is 0.68%. They are mostly located in the centre in proximity of the main road. To reach the recommendation of Habitat, it is essential to consider vacant lands for the development of new public spaces.

Proposed by the community

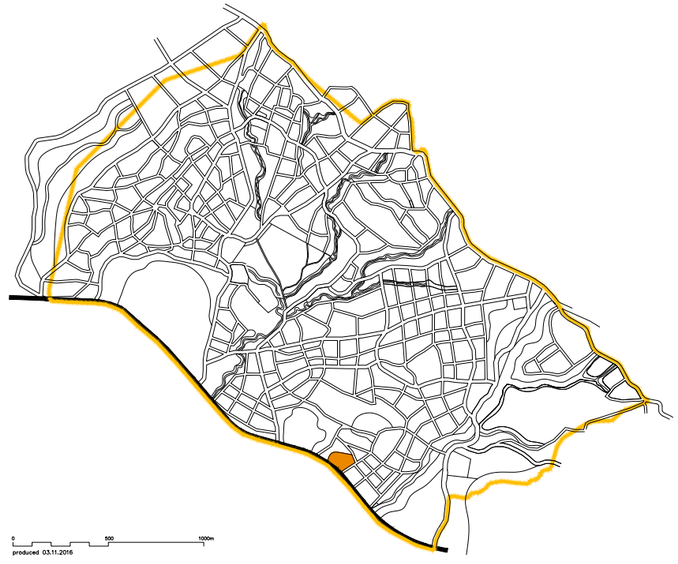


Fig.188: St.Christophe: Public spaces proposed by the community

Following the neighbourhood's assembly, a new park next to the national road 1 in the South was proposed. Adding this to the existing situation, the percentage is still not sufficient.

Proposed by UN-Habitat LAB

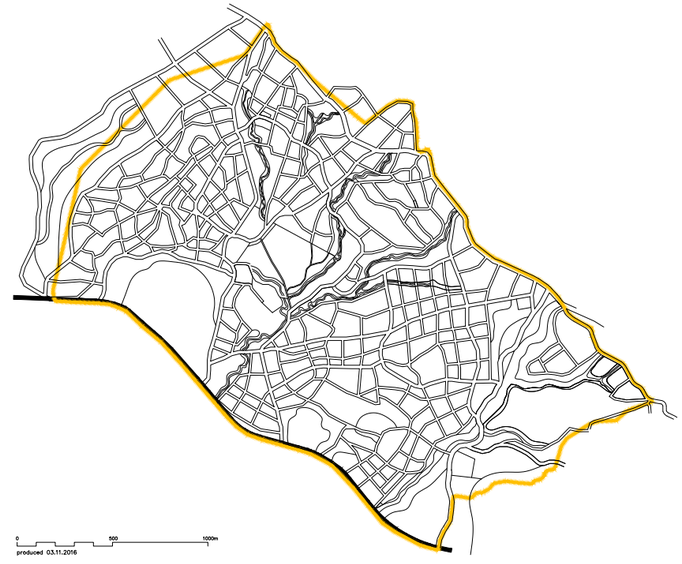


Fig.189: St.Christophe: Public spaces proposed by UN-Habitat LAB

Abandoned quarries which occupy large spaces are found in the neighbourhood. The Lab has found a great potential in them by converting these dead spaces into public ones.

In St.Christophe, some ravines crosses the neighbourhood and induce as such a high flooding risk. For that, a buffer area of 50 metres from both side is to be defined as a protection zone. The riparian zones were designed with the opportunity of becoming of public usages during no-rain season. If the proposals are put into place, the public spaces will reach 21.8 m2/inhabitant. The no-built areas are not seen only as functional public spaces, but also as urban open spaces providing respiration areas for the inhabitants.

#	PUBLIC SPACE IN ST.CHRISTOPHE	STATUS	NAME	m²	Ha	%
	Neighbourhood area			4,270,862	427	100%
1	Public space	Existing	marché	26,420	2.642	
2	Public space	Existing	parc	2,541	0.2541	
				28,961	**2.90**	**0.68%**
3	Public space	Proposed by the community	parc	10,015	1	
				10,015	**1**	**0,23%**
Total:				**38,976**	**3.90**	**0,91%**

Table 36. St.Christophe: Percentage of public spaces

#	OPEN PUBLIC SPACE IN ST.CHRISTOPHE	STATUS	m²	Ha	%
	Neighbourhood area		4,270,862	427	100%
	Public spaces		**38,976**	**3.91**	**0,91%**
4	Reforestation	Proposed by the community	26,700	2.67	
5	Quarry > Reforestation or open public project	Proposed by the community	186,800	18.68	
6	Quarry > Reforestation or open public project	Proposed by the community	36,200	3.62	
7	Quarry > Reforestation or open public project	Proposed by the community	15,263	1.5263	
8	Quarry > Reforestation or open public project	Proposed by the community	19,787	1.9787	
9	Buffer areas next to ravine	Proposed by the LAB	120,291	12.0291	
10	Buffer areas next to ravine	Proposed by the LAB	26,076	2.6076	
11	Buffer areas next to ravine	Proposed by the LAB	125,922	12.5922	
12	Buffer areas next to ravine	Proposed by the LAB	72,600	7.26	
13	Buffer areas next to ravine	Proposed by the LAB	8,800	0.88	
14	Buffer areas next to ravine	Proposed by the LAB	14,200	1.42	
			652.639	**65.82**	**15,28%**
Total open public spaces:			**691.615**	**69.1**	**16.20%**

Table 37. St.Christophe: Total percentage of public spaces

The World Health Organization (WHO) recommends 9m²/inhabitant

Existing	Proposed public space	Proposed P.S + non-aedificandi
28,961 m²	38,976 m²	691.615 m²
17.596 inhabitants	31.670 inhabitants	31.670 inhabitants
1.27 m²/inhabitant	**1.23 m²/inhabitant**	**21.8 m²/inhabitant**

Table 38. St.Christophe: Public space area per inhabitant diagram

Proposed public spaces with 400 metres buffer

Existing public spaces

Proposed by the community

Proposed by UN-Habitat LAB

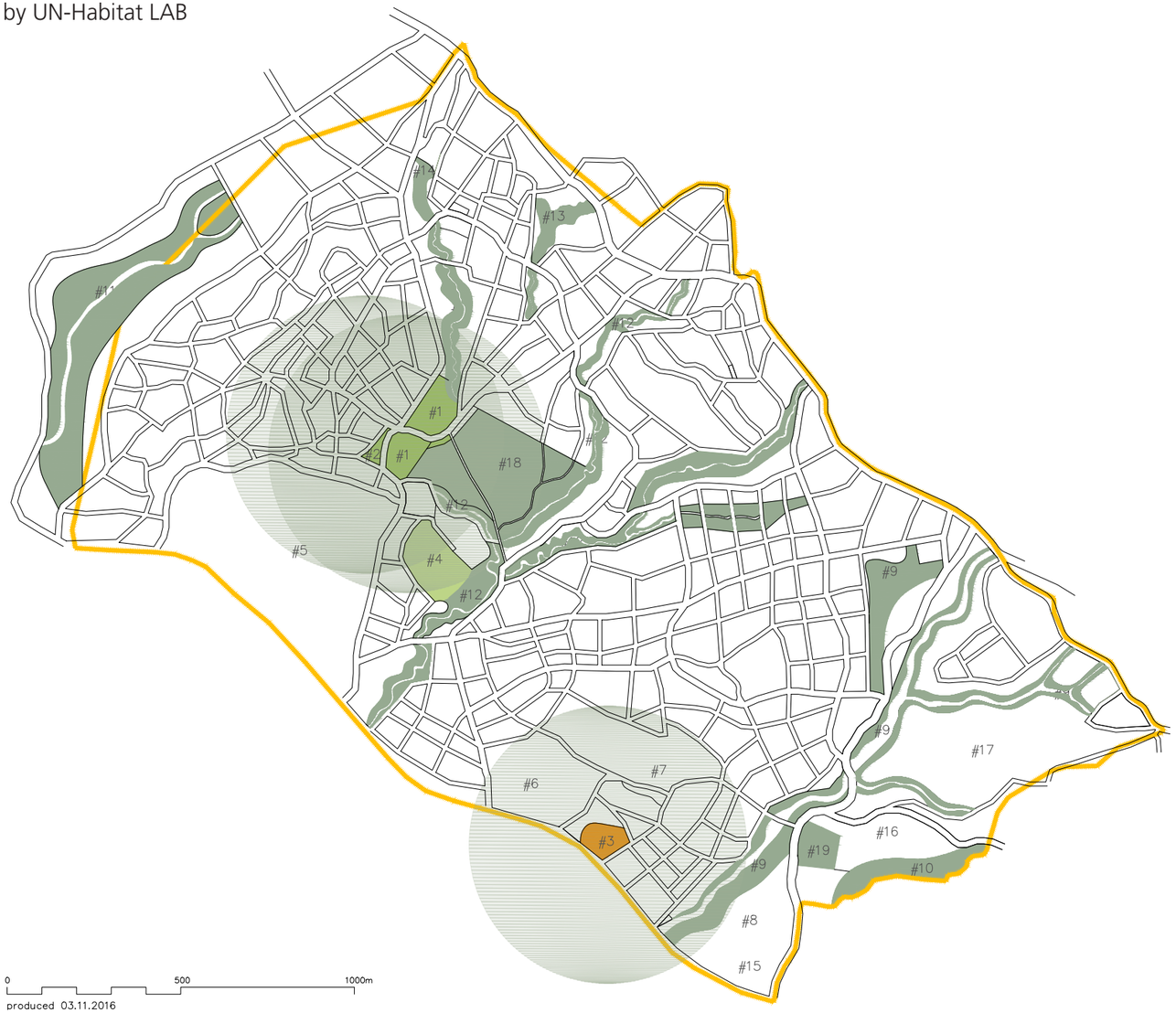


Fig.190: St.Christophe: Overall public spaces' land use and buffer area (400m)

C. RESIDENTIAL AREAS

4.27 km²
Neighbourhood area

17,600 Inhabitants
(source ARC household survey 2016)

4,120 people/km²

Existing residential areas

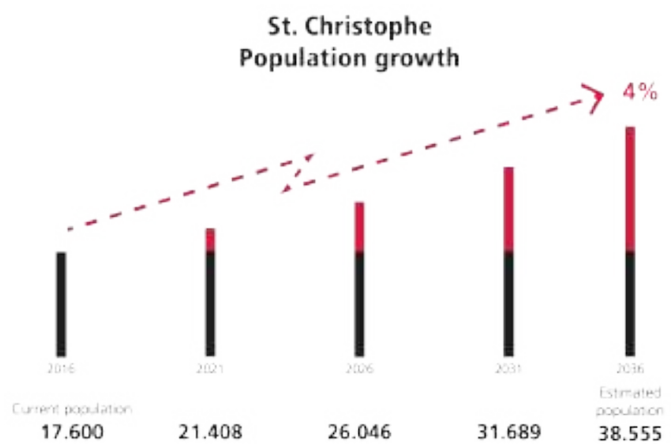


Fig.192: St.Christophe: Projected population increase

Fig.191: St.Christophe: Existing settlements

St.Christophe is considered as a low density neighbourhood with 4,120 inhabitant per km2. The concentration of the settlements is mostly in the north of Village des pécheurs where there are more road connections and where the topography is moderate.

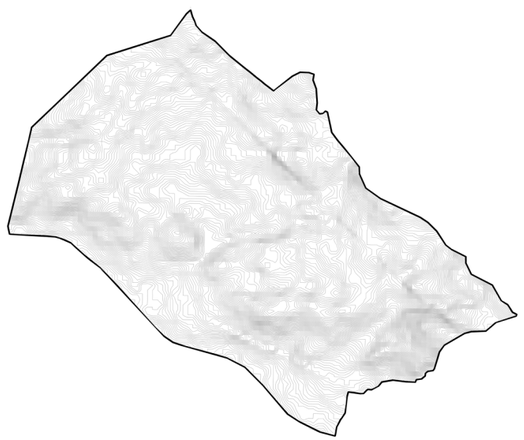


Fig.193: St.Christophe: Contours

In the south, the houses are dispersed with access to secondary streets. The neighbourhood could be further densified so it can accommodate the population growth.

Proposed densities

Low density

The new proposal for the distribution of the densities in St.Christophe suggests in having the low density areas where the morphology of the site is challenging. Adopting a density of 8,000 inhabitants per km2 for this category, St.Christophe will be able to host 3,200 inhabitants. The houses in this classification are often connected to secondary streets. It is possible to have small commerce provided their connection to pedestrian paths.

Medium density

The medium density settlements in the new plan are located all over the neighbourhood but mostly in the centre. The slope in the area are not steep and therefore densification strategies to existing low density area can be feasible. Respecting the proposed density, 16,000 people can live in St.Christophe under the density of 12,000 inhab./km2.

High density

For the high density areas, UN-Habitat recommends to have 15,000 people per km2. This means a study on plots modifications and resizing must be well conducted. Following the study of the terrain, the high density areas will be located near the main roads where the topography is almost flat. The houses will be in proximity of commercial areas which will reinforce the compactness and improve walkability. The new plan can host 12,000 people.

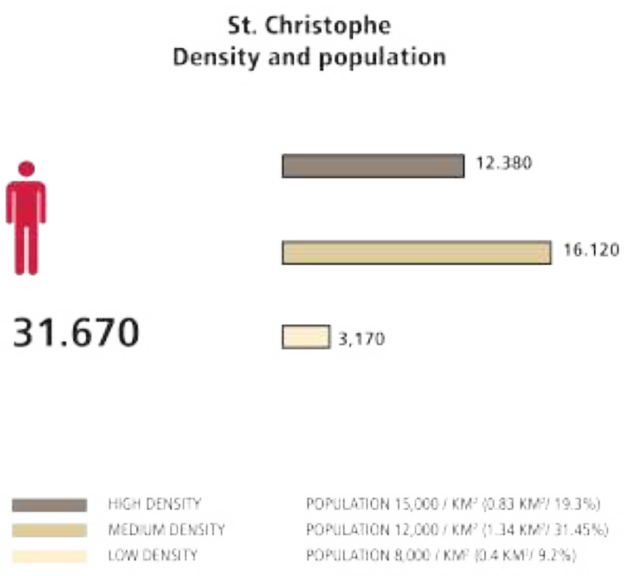


Fig.194: St.Christophe: Diagram of population in the new proposed residential areas.

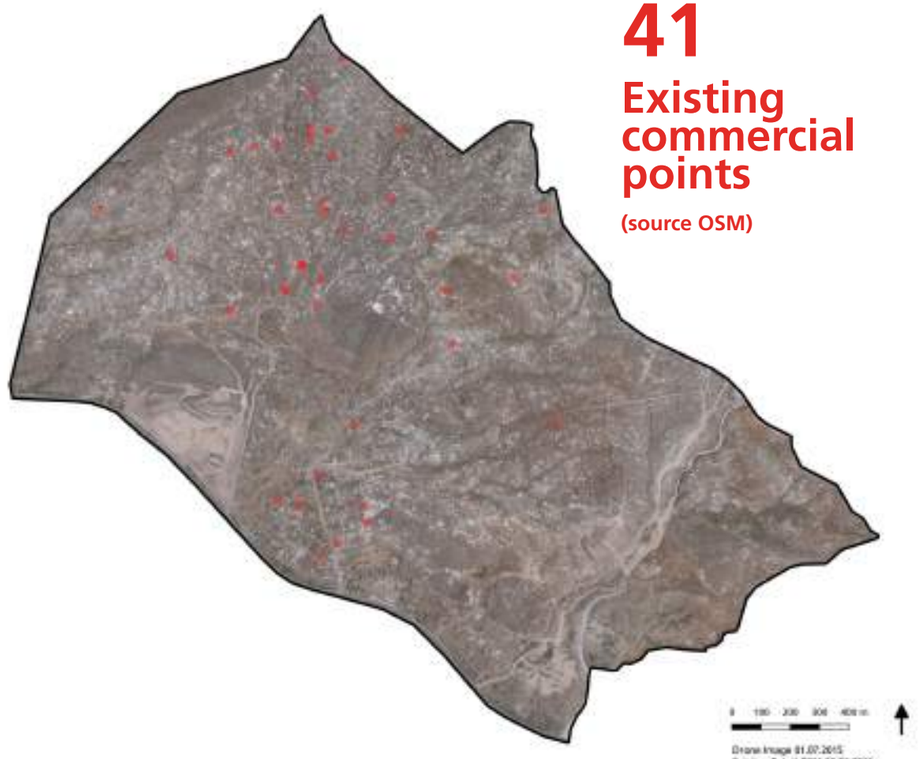
It is expected that the current population of 17,600 will increase to reach 38,555 people in the next 20 years; if the growth remains of 4%. Following the densification of certain areas, St.Christophe is able to host 31,670 inhabitants. This means that the plan, as it is, is eligible for the upcoming 16 years. After that, medium and low density areas will need to be further densified in order to respond to the growing demand.

The presence of economic activities in the residential areas is highly encouraged on condition to have a direct access to the roads. The size of commercial activities depends on the types of roads and the density of the area; the higher the density, the bigger the commerce and vice versa. The compactness of the city is induced by the integration of different usages into the urban fabric.

Fig.195: St.Christophe: Residential areas and proposed densities

D. COMMERCIAL AREAS

Existing commercial



41

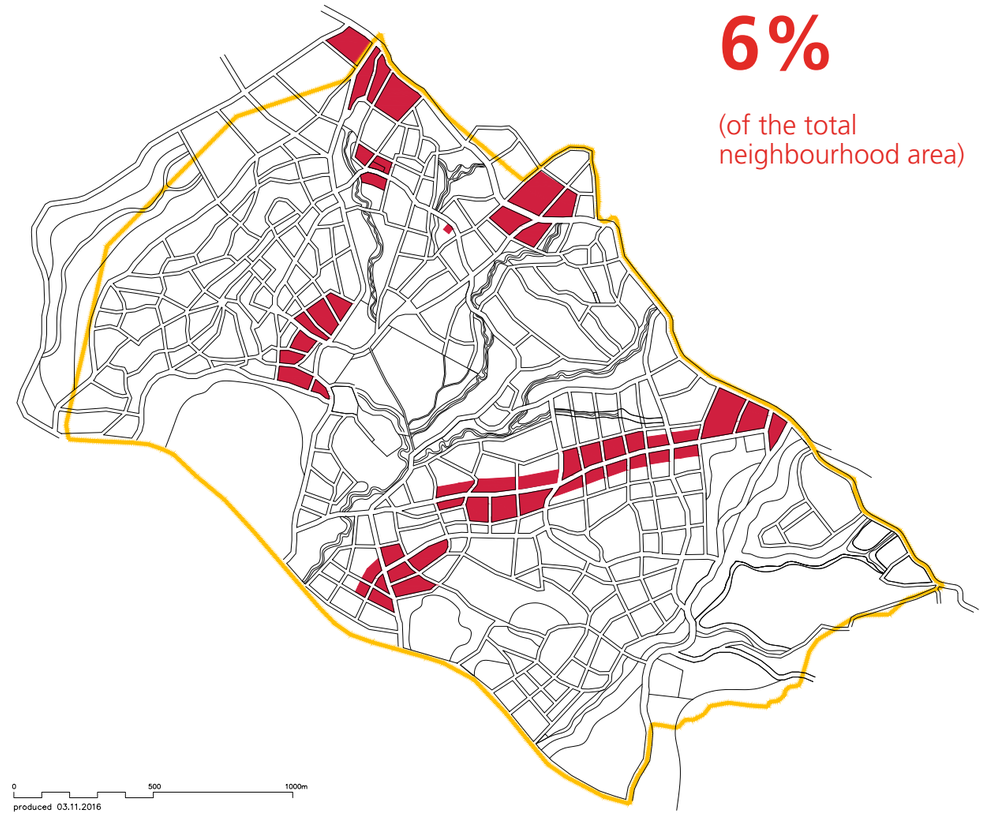
Existing commercial points

(source OSM)

Fig.196: St.Christophe: Existing commercial points (Source: OSM)

According to the OpenStreetMap data, there are 41 commerce shops in the neighbourhood. They are more abundant in the north in the Village des Pecheurs rather than in the south. The information on the types of these retails is absent. To reinforce the local economy, new commercial activities should be considered and strategically located.

Proposed commercial areas (mixed-use)



6%

(of the total neighbourhood area)

Fig.197: St.Christophe: Proposed commercial areas

The area facing the arterial road is proposed to be converted into a commercial street. The commerce will take place on the ground floor with a direct access to pedestrian path and public transport.

These activities have the potential to generate a new, highly diverse sector within the local economy, with opportunities for job creation. They therefore act as catalysts for initiating a structural transformation. The proposed commercial areas in the new land use plan will occupy 10%.

E. PUBLIC FACILITIES

RELIGIOUS - EXISTING
EDUCATION - EXISTING
HEALTH - EXISTING
OTHER PUBLIC FACILITIES - EXISTING

Fig.199: St.Christophe: Existing public facilities

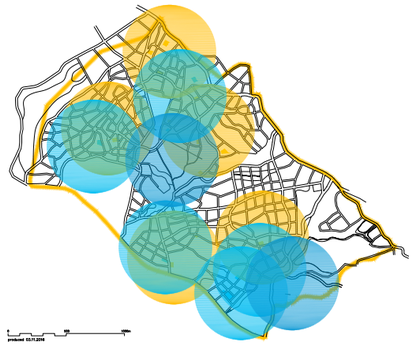


Fig.198: St.Christophe: Existing public facilities and a 500m buffer catchment area.

There are many educational facilities in the southern part of village de la decouverte. According to OSM, the number of schools is seven, however there are no further information of their type (primary, secondary, etc.). It was a challenge to predict the required number of facilities for the population. Education plays a major role in reducing poverty and inequality. For that, it is always advisable to reserve certain land for the extension of existing facilities and/or for the provision of new schools.

18%	Less than 10 years
6%	Illiterate
29%	Primary school (not finished)
10%	Primary school (finished)
27%	Secondary school (not finished)
5%	Secondary school (finished)
2%	Professional school
3%	University

Table 39. St.Christophe: Participation level (Croix Rouge Americaine, Juillet 2016)

St.Christophe has fifteen religious services however, there are no information available about health services, community centres, security stations and others. For planning purposes, and in order to have a long-term sustainable city, it is essential to consider the services mentioned in the new design of the neighbourhood. Generally, these services require good accessibility and therefore their location must be well studied. Normally, it is recommended to locate them within 500 metres from the settlements so that they are easily accessible

The public facilities occupy 0.45% which really poor. Once more information are provided, the plan must reconsider the allocation of these services in the land use plan.

F. NATURAL RESOURCES AND ENVIRONMENT

Given the topography, the presence of quarries and ravines, certain areas are to be considered as no-built areas for environment protection reasons. The buffer areas of 50 metres on both side of the ravines are highly encouraged to prevent flooding risks. These zones were designed with the potential of becoming public spaces. Also, the abandoned quarries are advised to be converted into recreational projects in order to benefit from dead spaces. Three spaces in the south will be allocated for livestock.

The no-built areas occupy 20.8% of the total neighbourhood area.

#	No-built areas	m2	Ha	%
	Neighbourhood area	4.270.862	427	100%
4	Reforestation	26.700	2,67	
5	Quarry > Reforestation or open public project	186.800	18,68	
6	Quarry > Reforestation or open public project	36.200	3,62	
7	Quarry > Reforestation or open public project	15.263	1,52	
8	Quarry > Reforestation or open public project	19.787	1,97	
9	Buffer areas next to ravine	120.291	12,02	
10	Buffer areas next to ravine	26.076	2,60	
11	Buffer areas next to ravine	125.922	12,59	
12	Buffer areas next to ravine	72.600	7,26	
13	Buffer areas next to ravine	8.800	0,88	
14	Buffer areas next to ravine	14.200	1,42	
15	Livestock	48.100	4,81	
16	Livestock	48.500	4,85	
17	Livestock	139.600	13,96	
	Total:	**888.839**	**89**	**20,81%**

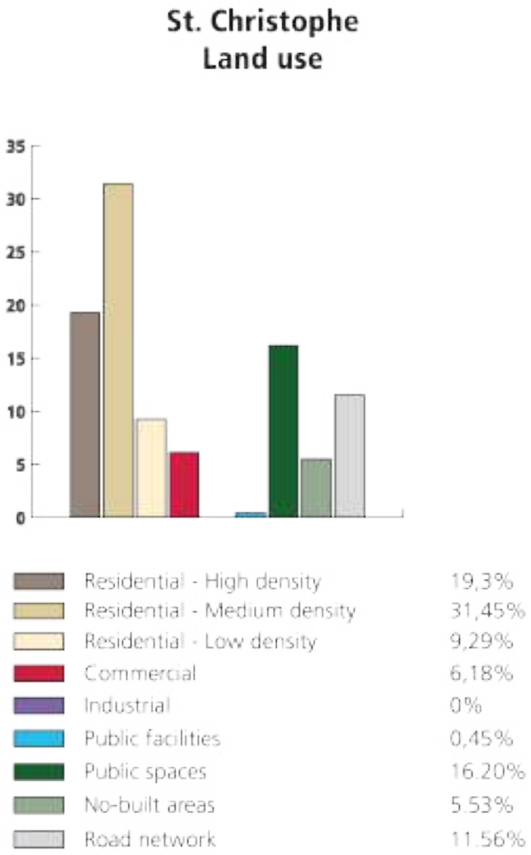
Table 40. St.Christophe: Total percentage of no-built areas

Legend

- Proposed buffer zone along the rivers and ravines
- Proposed area for livestock grazing
- Proposed area for reforestation
- High environmental risk areas
- Existing rivers and ravines
- Quarries

Fig.200: St.Christophe: No-built areas

G. ST.CHRISTOPHE LAND USE



The assemblies, facilitated by the UN-Habitat team in Haiti, identified the main needs of the residents of St.Christophe. The proposed land-use plan is the result of the ongoing participatory process with the community. It responds as much as possible to their needs and proposes new ideas that can induce prosperity and sustainability. Even though the plan addressed the issues of land uses and increase the street network, the public spaces and commerce, public facilities however remain insufficient. An elaboration of the plan is essential once all the information are provided. To ensure St.Christophe' sustainability, it is recommended not to further densify it.

The plan was reviewed as a whole, taking into account the neighbourhoods nearby and how they connect. It is mandatory to situate each of the individual neighbourhood plans in the whole Canaan area to achieve a coherent and rich structure.

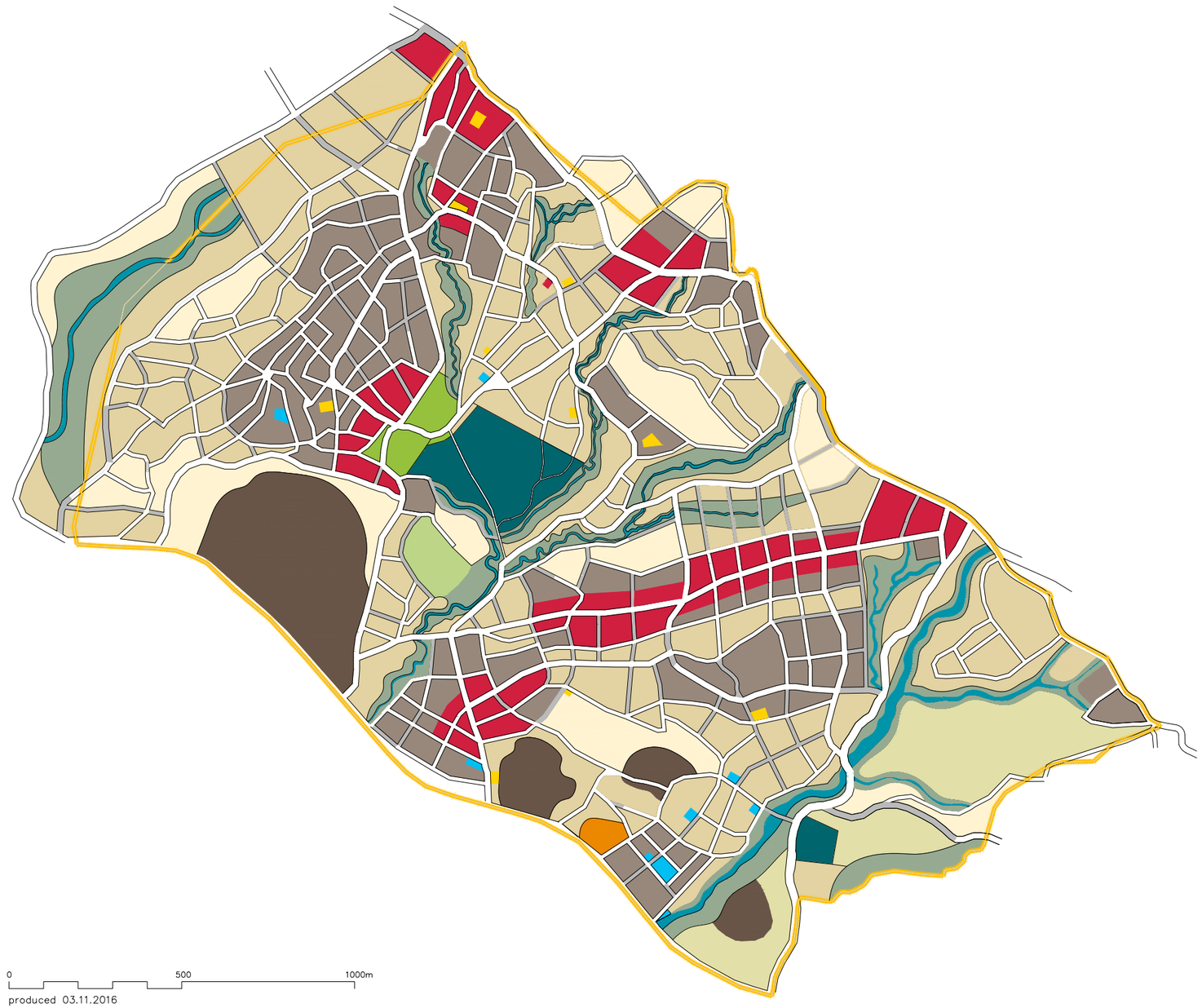


Fig.201: St.Christophe: Proposed land use plan

THE URBAN DEVELOPMENT INITIATIVE

The urban development initiative is a holistic approach that uncovers different strata of studies on many levels. It has been developed as a collaborative effort between international and local stakeholders under the supervision and guidance of the Unité de Construction de Logements et de Bâtiments Publics (UCLBP). Financial and human resources provided by the American Red Cross, USAID, Haitian Red Cross and the UN-Habitat country team office in Haiti, have been instrumental in the development of the project as well as in the mobilization of different community groups engaged in the planning exercise.

The project has brought together, through a series of charrettes, participants from the national government, municipal government, international and local organizations, academia, community groups and planning experts to discuss these three key components of sustainable urbanization in the reconstruction of Haiti.

The current report "Urban Structure Plan" falls under the city-wide scale where a precedent analysis and diagnostic were delivered in the comprehensive analysis and diagnostic report. A set of recommendations and propositions are delivered in this documents to shape up and provide a new structure for the Canaan area of Port-au-Prince.

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