

**analysis and reconversion of  
riverfront slums in Asunción -  
from the old Asunción port area to the  
neighbourhood of Itá Pytã Punta**

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## abstract

The report contains an overview of the research conducted during our internship at the Universidad Nacional de Asunción. Within the existing project we examined the spatial environment including social, economic and ecological conditions at the shoreline of Asunción. The two focus areas are Itá Pytã Punta and Calle Kanonikoff. The neighbourhoods were investigated through historical research, mapping analyses and risk assessments, after which a short proposal for a possible future outcome was formulated. Despite their relative proximity, each focus area has a distinct relationship with the riverfront, and therefore requested a different approach. While Itá Pytã Punta is located near a cliffside where erosion forms a factor of risk, the neighbourhood of Calle Kanonikoff is more prone to floodings. This results in substantial research that touches upon varying aspects of the two sites and a comprehensive analysis concluded with a preliminary urban proposal.

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I introduction

## I.1 project and goals

Due to urban growth in Paraguay, the number of urban residents doubled from two to four million between 1990 and 2010. Local identity and ecological conditions are often overlooked in rapid urban development. The metropolitan area of Asunción is characterised by a pattern of low-density. Urban sprawl led to the expansion of the urbanised area and the abandonment of the historic centre. Simultaneously, massive new infrastructure projects, such as Avenida Costanera Sur, private harbours and gated communities are negatively impacting the natural wetlands that surround the city. These wetlands are important ecological buffers which are being hardened for governmental and private developments. All these dynamics take place in a context of rapid economic growth, governmental neglect and limited technical capacity. In such circumstances, academic research is relevant and required to understand the processes of transformation taking place, but also to make progress in the formulation of public policies that contribute to sustainability and equity.

The aim of the project "Infrastructure and Territorial transformations in Paraguay" within CIDI is to create a better understanding of urban processes and environmental dynamics in contemporary Paraguay. Special attention is paid to sustainability, resilience and social cohesion in fragile urban areas of the metropolitan region of Asunción. This internship focused on a specific part of the Asunción Riverfront, stretching from the old Asunción port area to the neighbourhood of Itá Pytã Punta, and concentrates on several issues on the riverfront: the slum upgrading and urban integration initiatives, precarious settlements on the riverfront, abandoned or underutilised old industrial infrastructure, and public access to the riverfront through repurposing these aforementioned industrial facilities.



The project begins with collecting relevant data and making a risk analysis. Acquiring the knowledge from the first phase is essential to proceed to the next, where design strategies for urban redevelopment are investigated. The goal is to reduce the risk exposure of the precarious settlements within the researched neighbourhoods. Additionally, the project aims to create a cohesive urban fabric, where residents enjoy equal opportunities as the rest of the city.

The urban proposals for both areas explore ways to open access to the waterfront and create public spaces in vacant industrial plots, while reconnecting the neighbourhoods with the dynamics of the city.

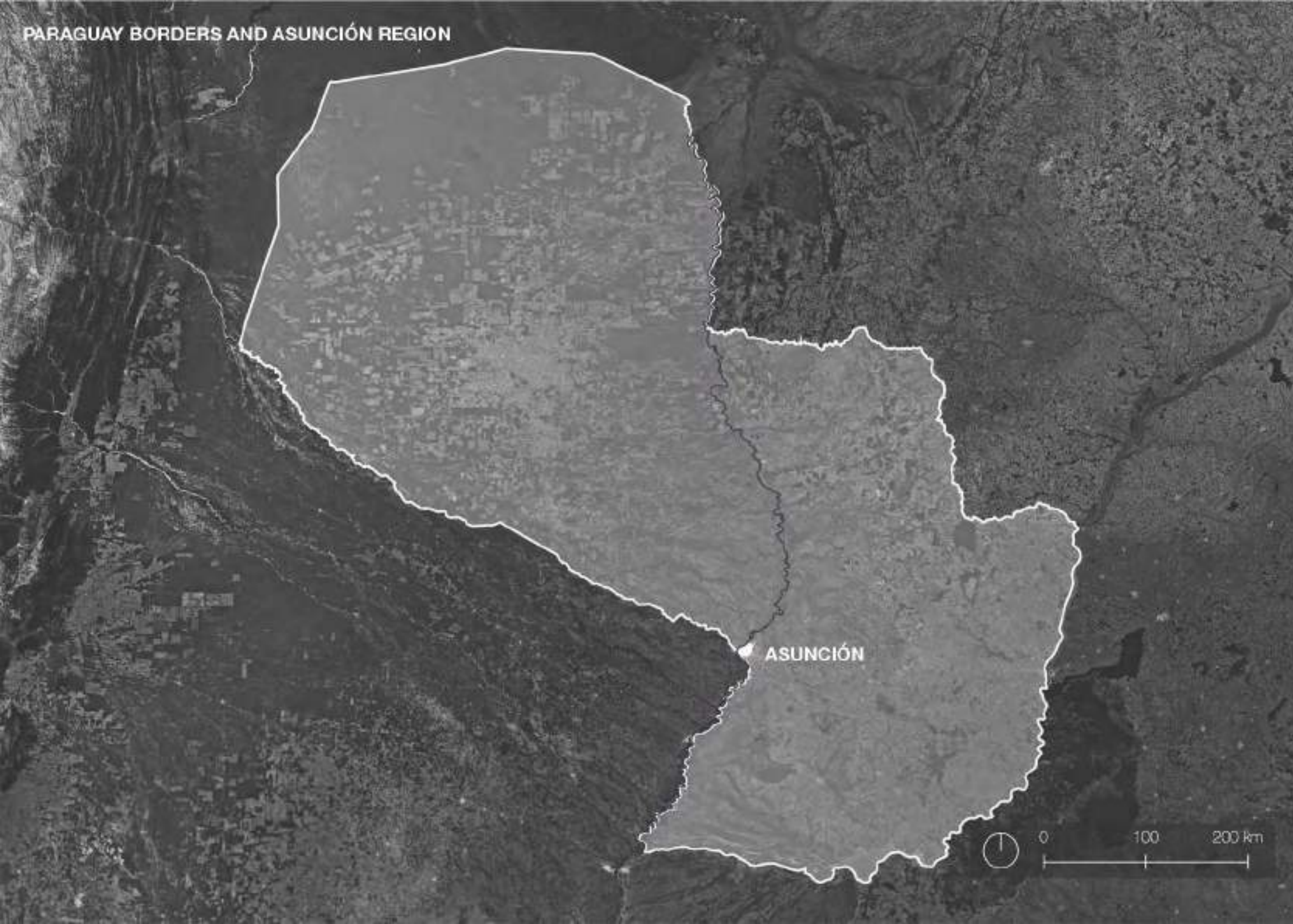


## I.II methodology

Developing strategies for the research started with extensive data collection. Following CIDI's intention, we based our analysis on open-source data and software, contributing to the available spatial information of Paraguay. Drone and satellite images were used for collecting quantitative and spatial data. Specifying the data into maps using software programs like JOSM and QGIS provided a foundation for further analysis and calculations. After photomapping by foot and car, as well as by boat, the pictures were uploaded on the open-source platform Mapillary. Based on these pictures, certain properties could be attributed to the houses in the neighbourhoods. The properties provide information about the number of floors, the materiality of the walls and roof, the function of the building and the overall material state of the house.

The fieldwork consisted of guided visits, where local guides provided us with information on the sense of community that exists within these neighbourhoods, the activities they organise and their system of looking out for each other. They also mentioned the existence of some basic facilities, or rather the lack thereof, and the scarce communication with the municipality. During the visit, we were shown varying degrees of accessibility to the different neighbourhoods and limited access to the river.

## PARAGUAY BORDERS AND ASUNCIÓN REGION



## I.III Paraguay



Paraguay is situated in the heart of Latin-America, landlocked between Argentina, Brazil and Bolivia. The cultural heritage exists of a mixture of nineteen different indigenous peoples and Spanish settlers. As of today, both Spanish and Guaraní are official languages, with more than eighty percent speaking the indigenous Guaraní next to Spanish. (Cristaldo and Silvero, 2023) The country is rich in nature, harbouring a diverse range of vegetation, swamps and plains.

The land is divided in an eastern and western region by the Río Paraguay. Western Paraguay, or Gran Chaco, an area consisting of sixty percent of the country, is home to less than five percent of the population. Paraguay has almost seven million residents in total. Approximately a third lives in the capital of Asunción, which is the largest city of the country. Asunción is located on the eastern bank of the Río Paraguay and is one of the oldest cities in South America, therefore also being referred to as 'the mother of cities'.



## ASUNCIÓN WITH NEIGHBOURHOODS



## Asunción

The northeast of Asunción marks our area of research. Distinctive features are in the proximity to the riverfront as well as in the presence of many industrial facilities, either occupied or vacant. Due to the topography along the riveredge, influences of natural threats often occur. The areas that are situated on the cliffside are prone to erosion, while the lower regions suffer from floodings. The presence of informal settlements near the river makes them sensitive to natural dynamics. Further investigation is done for the neighbourhood of Itá Pytã Punta and the plots at the Calle Kanonikoff, each focusing on different risks specific for the area.



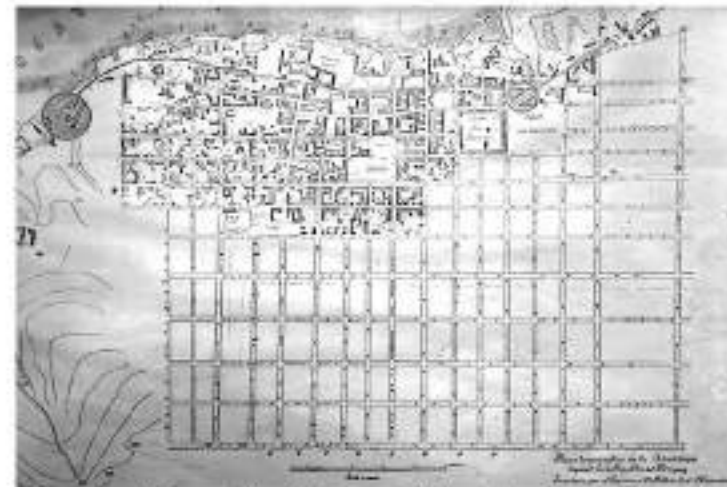
## history

This chapter contains the historic events that had an influence on Asunción's spatial development. The recorded history of Paraguay, before the arrival of European settlers, describes the semi-nomadic living of indigenous populations throughout what is now considered the territory of Paraguay. (Gutierrez, 1983) The current land borders were non-existent and linguistic differences distinguished separate communities. (Centro Cultural) In this form of living, communal houses and spaces had a prominent place in daily life and therefore the morphology of settlements (Gutierrez, 1983).

From **1516** onwards, Spanish explorers organised expeditions to this region. In a reported search for the Inca Empire, Spanish conquerors travelled through Brazil along the Río Paraguay to plunder the Inca treasures of silver. The settling of Spanish explorers at the Río Paraguay triggered an expansion of shoreline activity and settlements at the riverfront. The indigenous use of communal houses translated itself into a morphology of ranches in Spanish settlements. Eventually, the fort of Asunción was built in **1537** (Gutierrez, 1983).

*"The river was recognized by every form of civilization for its strategic, natural and/or cultural importance."*

The young colony Paraguay consisted of scattered living arrangements of the Spanish located in valleys, along with existing indigenous settlements (Gutierrez, 1983). From **1537** onwards, the area of Asunción became more and more populated, forming a city. Due to political battles in Europe, Spain's attention wandered from its colonies. After fighting the Argentine army, Paraguay was considered a breakaway state with Asunción as its capital in **1811**. Two years later, in **1813**, the Paraguayan Republic was proclaimed (BBC, 2023). Under the rule of Gaspar Rodríguez de Francia, the layout of Asunción changed as he considered the existing layout as a possible military threat against his regime. In **1821**, he rectified the city by imposing a grid of parallel lines and destroyed private houses that overlapped the grid (Gutierrez, 1983).



1.5 grid of Asunción by Francia (Municipality of Asunción, 1869)

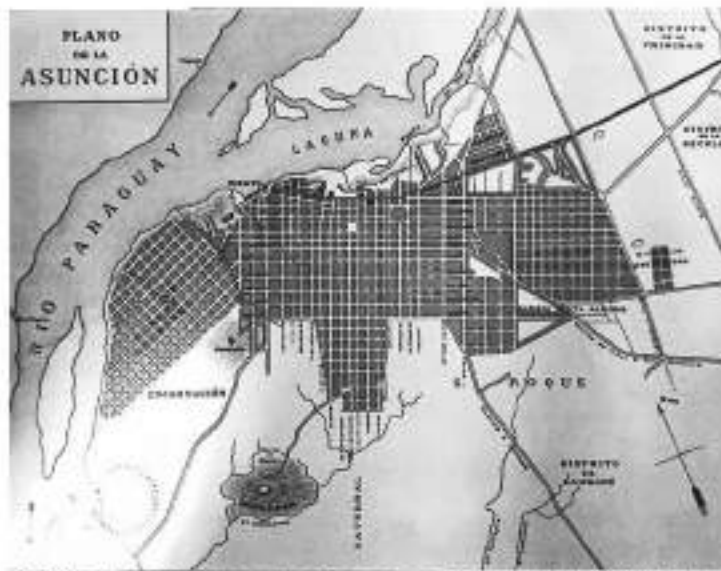
By **1841**, during the reign of Carlos Antonio López, Asunción had partly recovered from some grave infrastructural works, although it still looked, according to texts, unkept and uncomfortable. López continued the public works by repairing and levelling streets, forming stone ramps and establishing a nomenclature. He established the Registry of Urban Properties and initiated a Building Cadastre.

Argentina, Brazil and Uruguay formed an alliance against Paraguay in the Tripple Alliance War. This resulted in a loss of 90% of the male population of Paraguay. The bombing of the Government Palace took place when the Allied forces entered Asunción. Many of the houses in the capital had to be rebuilt after the effects of war and looting. In an effort to repopulate the city, plots were redistributed under the law of **1872** and the paving of the city began. After the Brazilian and Argentinian occupation in **1876**, Asunción was in full expansion. In **1884** straight-line trams were extended.

A map from **1929** shows that the orthogonal logic of the city centre is continued, although rotated, in the western part of the city. This rotation forms the border of our study area. The orthogonal grid denied spontaneous urban growth of non-built space in prominent places. After many political leaders during the '40s and a large immigration influx, urban population and economic activity rose in Asunción during the '50s. With rising

industry comes a growing population, and higher need for housing and land. This can be seen in an uncontrolled urban sprawl, starting from the riverbanks and spreading west. The installation of sewers was carried out at the beginning of the twentieth century, and thus gradually the urban equipment and the infrastructure of services facilitated the growing urban economic potential. The first Sanitary sewage works were made, followed by a Sewage Master Plan in 1986. (Gutierrez, 1983)

Nowadays, governmental organisations and private companies are actively urbanising the riverfront, regardless of existing biodiversity or communities. This can be seen in the case of the San Jerónimo neighbourhood. Once overlooking the river from the Loma San Jerónimo or the San Jerónimo hill, the sight is currently obstructed by governmental buildings that are not in use because of a lack of urban mobility (Guide San Geronimo, 2023). Additionally, the urban sprawl causes slums to move to the margins of the city, while draining and solidifying wetlands of biological importance at the shores of the Río Paraguay. Recent developments, such as the Costanera Linear Park by Ecosistema Urbano, deeply influenced the urban and non-urban region along the rivers, often representing only a few goals or private agendas. Research practices such as CIDI look with a critical approach into the ongoing developments and aim to include various stakeholders in their proposals.



1.6 the expansion of an orthogonal urban system (Municipality of Asunción, 1929)



1.7 render of ecosistema urbano (Ecosistema Urbano, 2014)



Il Itá Pytä Punta

## II.1 study area

The study area overlaps with the administrative boundaries of the districts of Itá Pytã Punta and San Antonio. During the analysis and in accordance with Professor Juan Carlos Cristaldo, we made a distinction between the general study area and a smaller focus area located along the northern edge that, because of its proximity to the cliff and unfavourable housing conditions, required our specific attention.

Itá Pytã Punta is a historical neighbourhood located in the west of Asunción. Its Guaraní name, meaning "point of red stone", refers to the protruding red rock that looks over the river Paraguay. The viewpoint that was built on it is an important social space for the residents and an attraction pole for visitors (Guide Itá Pytã Punta, 2023). It is also the only (visual) connection with the river, as the topography is abruptly cut off by a cliff of approximately 20 metres, making it hard to reach the river.



II.II context

Although the area was known and populated before, population density increased in the 30's and 50's because of the work possibilities that the arrival of industrial companies like Molinos Harineros and Itasa S.A. offered. The growth and history of Itá Pytã Punta is therefore closely related to the history of the factories in the area. Three different types of urban fabric define Itá Pytã Punta. The formal and industrial zone that follows the 12x30 metre urban grid pattern makes up for most of the fabric. It is disrupted by larger plots with an industrial or communal purpose, as the neighbourhood houses the Faculty of Philosophy (UNA), the Paraguay-Brasil Experimental School, and the Escuela Molinos Harineros. (Cristaldo, 2023)



Along the riveredge, the formal pattern makes place for informal, organically grown settlements. The area is densely populated and connected through small streets and staircases, bridging the height difference towards the river. This results in staggered corridors with unexpected views of the river. The discrepancy between these consolidated and informal areas reflects the social and economic situation of the residents, and the way in which they live next to each other.

Companies located their industries on the riverbanks, facilitating the traffic of goods by water, while simultaneously cutting off any access to the waterfront to anyone else. When the companies closed due to financial hardship in the 90's and at the beginning of the 00's, a major job provider disappeared. The people who stayed were the ones with structurally consolidated houses. Additionally, these vacant industrial plots, no longer in use but still property of private companies, are rapidly deteriorating, generating unmaintained and polluted areas where illegal activities can flourish without disturbance (Guide Itá Pytã Punta, 2023).

Today, Itá Pytã Punta is a predominantly residential area that is isolated from the rest of the city, enclosed on the one hand by large industrial facilities, and on the other by the Río Paraguay as a natural boundary (Blanes-González, 2013). This relative isolation, caused by topographical characteristics of the site and the urban fabric, is reinforced by a bad connection to the rest of the urban infrastructure.

In addition, the lack of attention from the government results in neglected neighbourhoods having to organise themselves. An example of that is trash collection, now organised by the neighbourhood commission as a response to lacking management by the municipality. Inhabitants of Itá Pytã Punta used to throw their trash into the river or in front of the industrial plots. The commission tries to maintain public areas and establish an identity for the neighbourhood, to upgrade its reputation. Indeed, because of recent accidents related to organised crime, Itá Pytã Punta has been stigmatised and avoided. The bad image of the area does not do the neighbourhood justice. Locals report that crime levels equal to those in the rest of the city. They strive for safe spaces, recreation and a renewed connection to the river. Public and urban spaces are needed to strengthen social bonds and create communal safety. Still, for infrastructural works and large-scale urban interventions as well as the connection with the rest of the city, the role of the municipality is fundamental and undeniable. (Guide Itá Pytã Punta, 2023)



- water 
- main road 
- secondary road 
- public transport 
- 25m buffer 

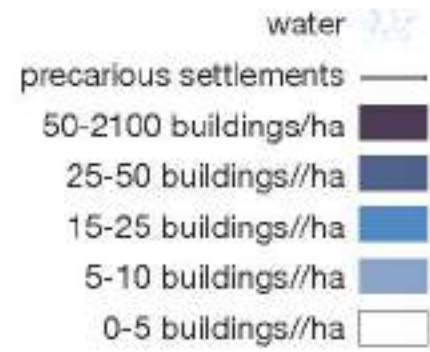


main road -----

**urban infrastructure**

Only one main road connects the neighbourhood to the inner city. The public transport does not reach the inner area of Itá Pytã Punta, let alone the houses near the river. The 25 metre buffer highlights the houses within a 25 metre range of public transportation. The informal settlements are clearly left out of reach.<sup>2</sup>









precarious settlements

### block density and precarious settlements

This map shows the density per separate building block. The different colours differentiate the number of buildings per hectare (b/ha) in each block. The precarious settlements, mapped by the government in 2015, overlap with the blocks with the highest number of buildings per hectare. The industries at the edges of Itá Pytã Punta form low-density boundaries.

- water 
- focus area 
- study area 
- buildings 

## FOCUS AREA



focus area-----

study area -----

0 100 200 m

### zooming in

When we zoom in to our focus area, a higher concentration of precarious settlements is found near the shoreline. The focus of the risk assessment will take place in this highlighted area, researching topographical, material and sanitary risks as well as the connection with the riverfront.

Because of spontaneous sprawl, the focus zone does not follow the grid that characterizes the rest of the neighbourhood. Houses in varying degrees of consolidation are built along the edge of the cliff. Compared to the formal housing blocks, this zone is more densely built. These spatial conditions and its possible consequences require further analysis.



### II.III risk assessment

Due to their peculiar location, many of the houses along the cliff find themselves in some kind of unfavourable condition. Both the risk by contamination and unsteady grounds are parameters taken into account. Floods and heavy rainfalls erode the already unstable grounds and can cause landslides and the formation of cracks, a phenomenon exasperated by the absence of drainage systems. As these informal settlements were built on the edge of the city, they do not form part of the urban infrastructure. As a result, houses are in direct proximity to the ends of sewage systems and domestic trash belts.

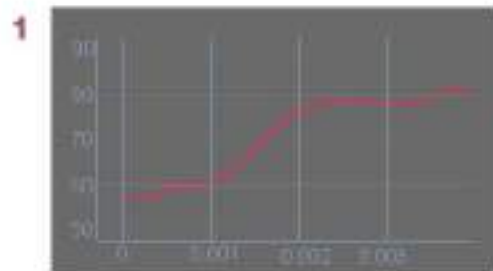
Because of the diversity of potential risks, we defined 4 subsets to assess the level of risk exposure. This helped us to take conclusions when considering proposals like on-site consolidation, risk reduction, house improvement and relocation.

-  water
-  trash
-  sewers
-  cracks

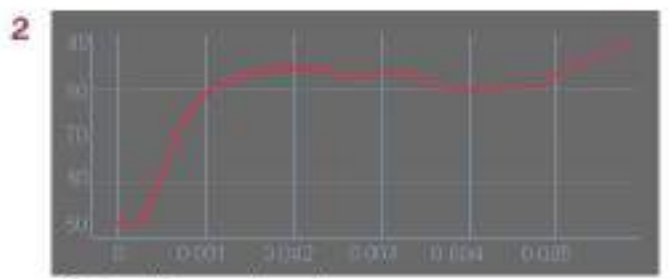
TOPOGRAPHY IN FOCUS AREA



critical cliffline .....



2.3 section north-south



2.4 section east-west

- water
- critical cliffline with 20m buffer
- sectionline



#### **connection to the river**

The area is characterized by a big topography difference. Cliffs mark the boundary between land and water. This creates a peculiar relationship with the riverfront, which can only be accessed visually or, in a few places, through a steep staircase.



**subset I**

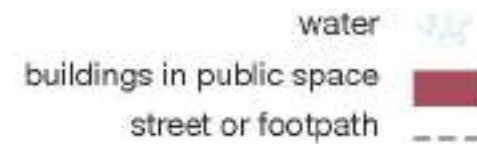
The first subset relates risk exposure to housing quality. The research focuses on the houses that are in either average or poor condition and are also exposed to the parameters mentioned above.

Findings: by projecting the risk exposure parameters on the houses within a 20 metre range of the cliff, the calculations show that almost 7% of houses are affected by either one of the parameters. Within these houses exposed to one of the parameters, 29 houses are in poor condition; 21 houses are in average condition. 17 houses are affected by both parameters and are in poor condition.

-  water
-  buildings
-  risk by trash/sewers/cracks
-  risk by vicinity of cliff
-  risk by trash/sewer/cracks & vicinity of cliff
-  average condition
-  poor condition

### subset II

Both the second and third subset deal with private domain taking over public space, threatening accessibility. In this case, we observed how houses on the Calle Dr. Justo Pastor Candia were built or how they extended their property on the footpath. This comprises 10% of the houses in Itá Pytã Punta.



### subset III

Whereas the previous subset has the private domain taking over the public space, such as the streets, the third subset includes houses that block access to the riverfront because of building on public space. 16 houses block this access at points where the edge is closer to the river. When reflecting upon qualitative public spaces for the residents, improving the accessibility of the riverfront is key. Therefore, these houses could eventually require relocation.








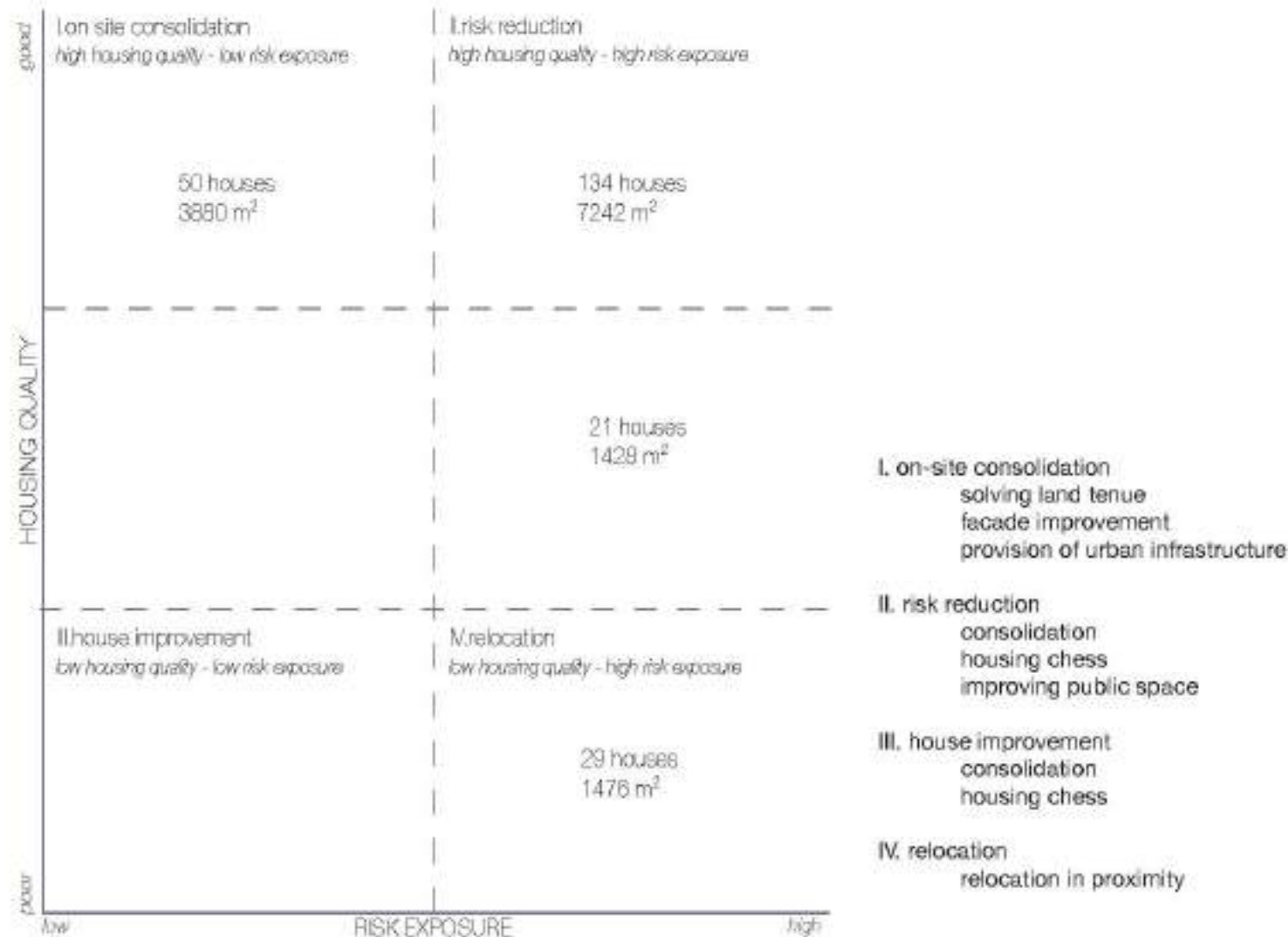
#### subset IV

Subset four looks at the wider study area, rather than solely the focus area alongside the cliff. Relating back to the block density, the densest blocks also become subject to certain risks. Taking a 10 metre buffer from the street<sup>3</sup>, the remaining dwellings that do not fall within this area form crowded centre blocks. Being more secluded from the street, these houses are more prone to unfavourable conditions, such as bad ventilation and less daylight.

Rather than focusing on the material condition of the houses or a direct proximity to risks, the last subset correlates living conditions with the distance to the street. We took an offset of 10 metre, which showed us the 85 houses within the core of the blocks that probably have no direct sunlight nor natural ventilation.

-  water
-  buffer of 10m
-  buildings in isolated core





2.6 risk exposure and housing quality

## II.IV conclusion

The graph gives an overview of the future scenarios for the residents in our study area. The x-axis describes exposure to risk, while the y-axis shows the housing quality. The combination of exposure and quality shows the situation of the house and determines how it could be handled.

When the housing quality is high and the risk exposure low, on-site consolidation is possible and preferred. From all the houses considered, 50 houses fall under this category. In this case, solving the issue of land tenure is the main problem and of great importance to provide the residents with the stability of ownership. To be the owner of a house and therefore having an official address provides a sense of identity as well as offering more security relating to job opportunities. Connecting these houses to the existing urban infrastructure will enhance the integration into Asunción. Furthermore, small improvements on the housing from this category will improve the living conditions and propose realistic interventions that people often can do themselves. This includes improving the facade, solving sanitary issues and upgrading the kitchen.

When both housing quality and risk exposure are high, risk reduction is needed. 134 houses fall within this category. Because the housing is still in good condition, relocation is not necessary or wanted by the residents, even though the risks are high. Reducing these risks will be crucial, such as through waste management or solving the sewer issues.

In the long term, relocation could be needed for the houses where the risk exposures cannot be solved. This is the case with housing along the cliff, who are in danger of falling due to erosion.

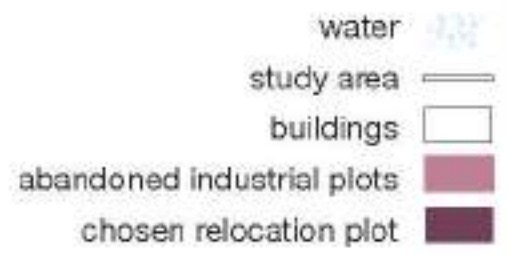
Category 3 describes the houses with low housing quality and a low risk exposure. Because the risks are low, consolidation of the housing is opted. Solving sanitary issues and improving the facade will be the main resolutions for this group.

In the fourth category, 29 houses have a low housing quality and high risk exposures. These houses are generally in the most precarious conditions. A possible scenario can be to play a game of 'chess'. Often, even though residents live in unfavourable circumstances and relocation is recommended, they prefer not to move because they feel socially connected to the neighbourhood. Social chess starts by proposing relocation to the people who would be willing to move away from the neighbourhood but are not necessarily living in precarious conditions. Often, the younger generation from the neighbourhood or workers from the city who are not socially tied to their surroundings. After they move, a household from category 4, who live in poor conditions but does not want to move away from the community, can relocate to a less risky location or higher quality housing.

## II.V urban proposal

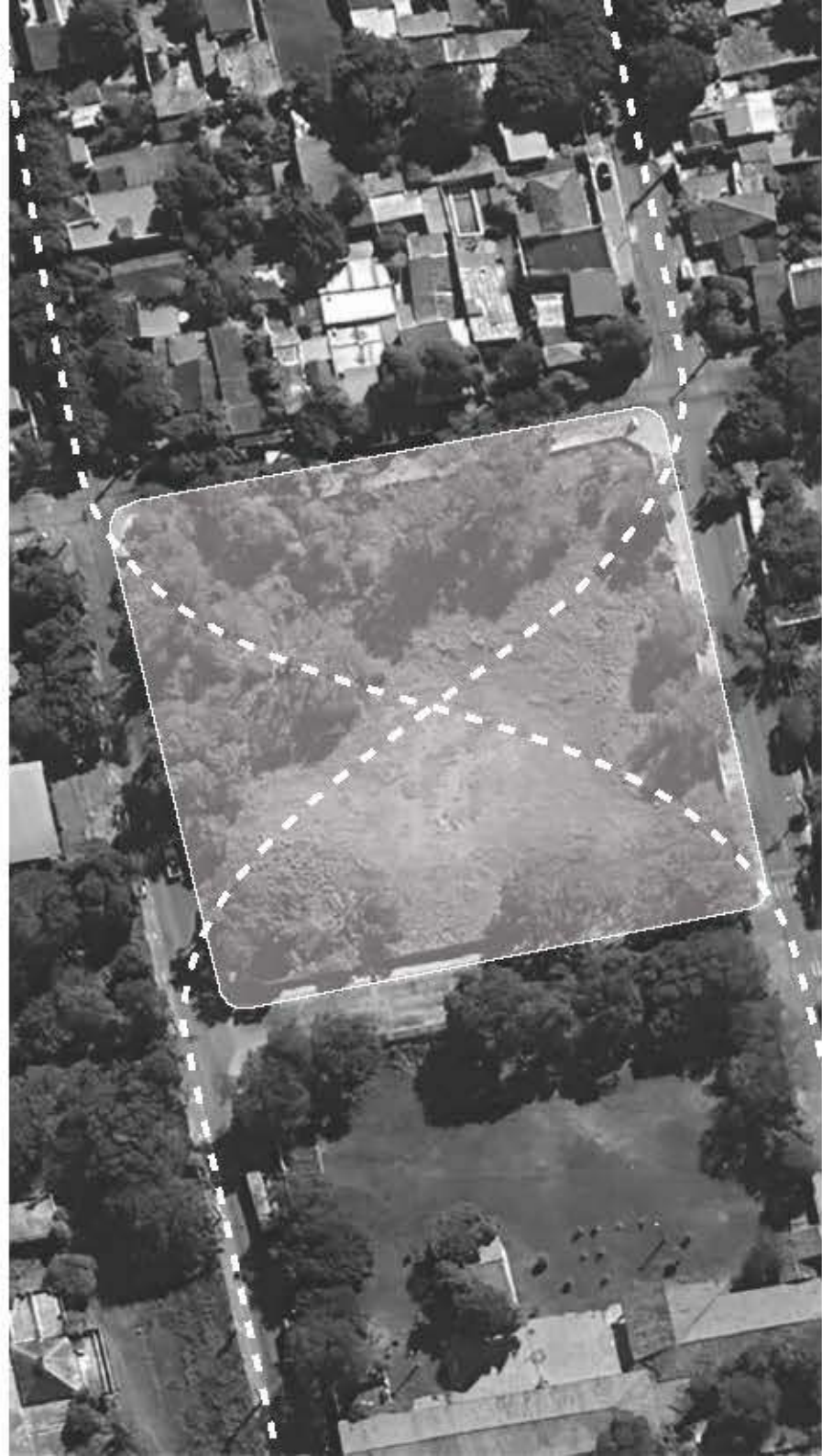
Looking into possible plots for future scenarios, several abandoned industrial facilities offer an opportunity for relocation or redevelopment. The government proposed linear parks along the river and punctual interventions within the neighbourhood. These public spaces can improve the living conditions for the residents in addition to the development of new housing.

The aim is to relocate close to the neighbourhood to maintain social bonds. The ground in front of Molinos Harineros, a formerly industrial plot, is close to a public bus route that connects to the city and on the edge of Itá Pytã Punta. Furthermore, this location is strategically situated in a strip of several schools and industry plots that form the separating element between the area and the rest of Asunción's urban fabric. Incorporating housing here would contribute to perforating the low-density borders of the neighbourhood.

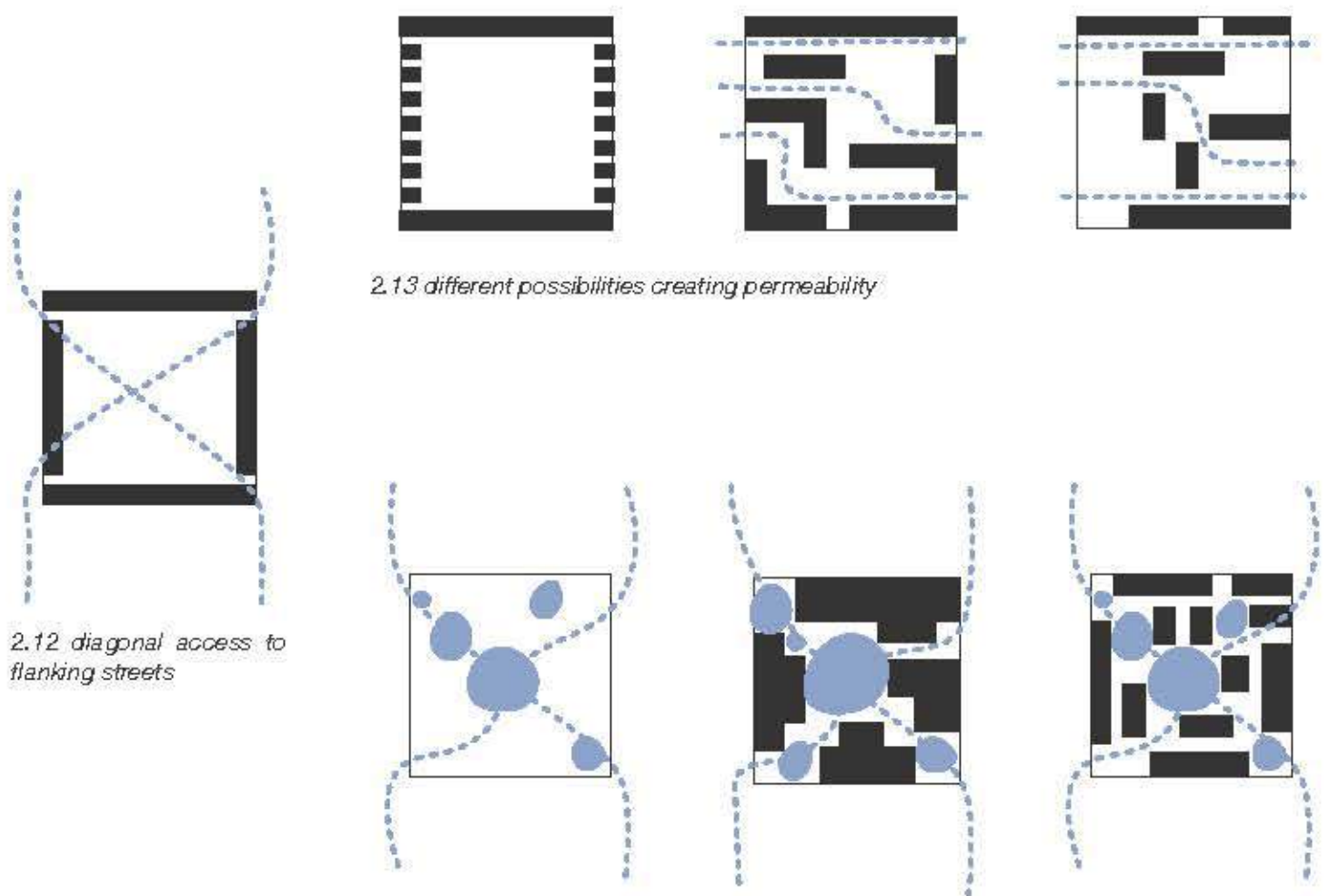


### connection to streets

The proposal aims to maintain the highest level of accessibility by connecting housing to the flanking streets through the plot. This is done through increasing the permeability within the new housing blocks. Chains of open spaces will form the connecting factors between the plot, breaking the built environment and bringing people together.



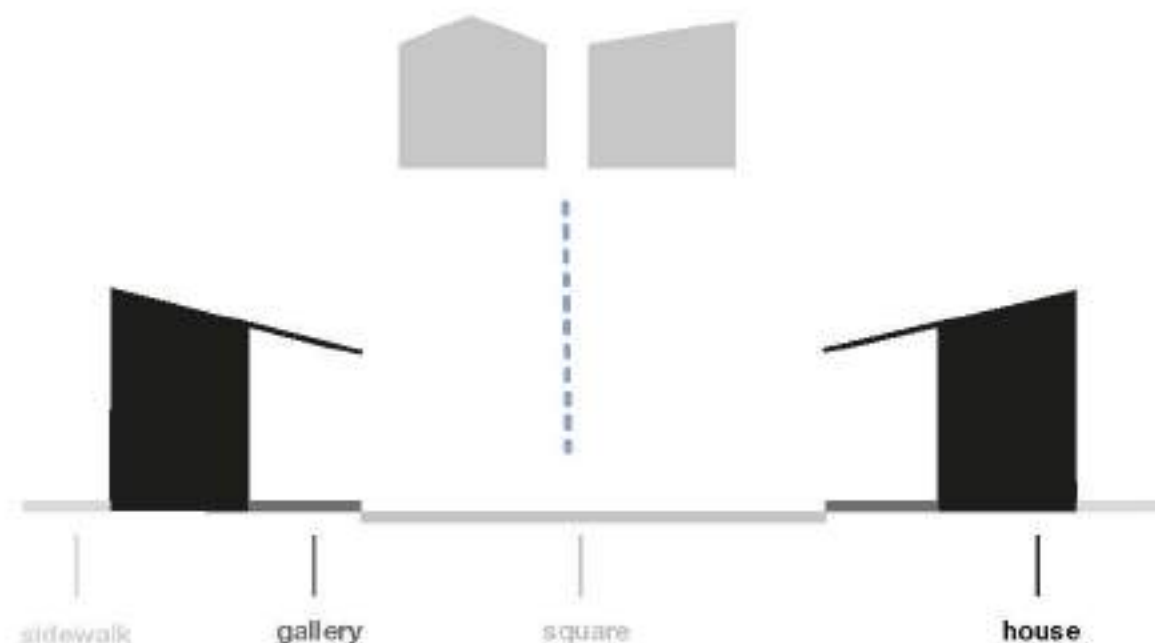
### permeability within building block



2.13 different possibilities creating permeability

2.12 diagonal access to flanking streets

2.14 open spaces function as communal places in between the housing blocks



2.15 section of housing block

## approach

Bringing the concept of permeability into our plot, we propose transitions in privacy from the street to the house. We find these gradients of privacy, for the block as well as for the house, crucial to create a healthy living environment for the residents.

Through our proposal, we want to reconnect with Paraguay's pre- and post-Columbian history through the concept of communal houses and spaces. In both periods of history, communal practices played a central part of daily life (Guterriez, 2023). These communal areas will be central within the block and ensure the integration of new residents and promote community activities. These spaces can facilitate shared functions or infrastructures that can be left out individual housing.

The 'culáta yováí' is an example of a vernacular typology of a communal building. The name is derived from the Guaraní language, meaning 'rooms facing each other' and mainly built in the broader Guaraní area. The building is symmetrical and divided in a central space, which connects to a room on either side. This central space is sheltered but has no walls and acts like a covered gallery. (Herreros, 1984)

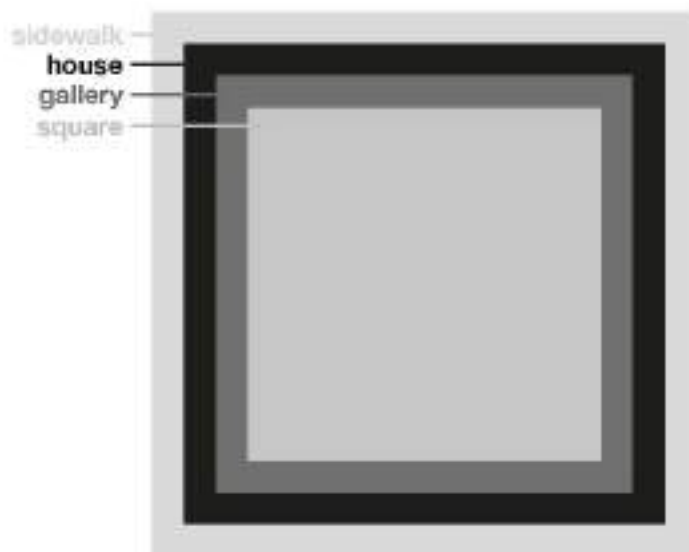
Using the 'culáta yováí' typology for communal functions gives possibilities to create linked spaces within the building block. The galleries are a continuation of public space while the adjacent rooms offer space for shared functions such as washrooms and recreational spaces.



2.16 typical round culáta yováí from Guaryá (Guterriez, 1983)



2.17 Culáta yováí typology (Wikipedia, 2023)



2.18 plan of housing block

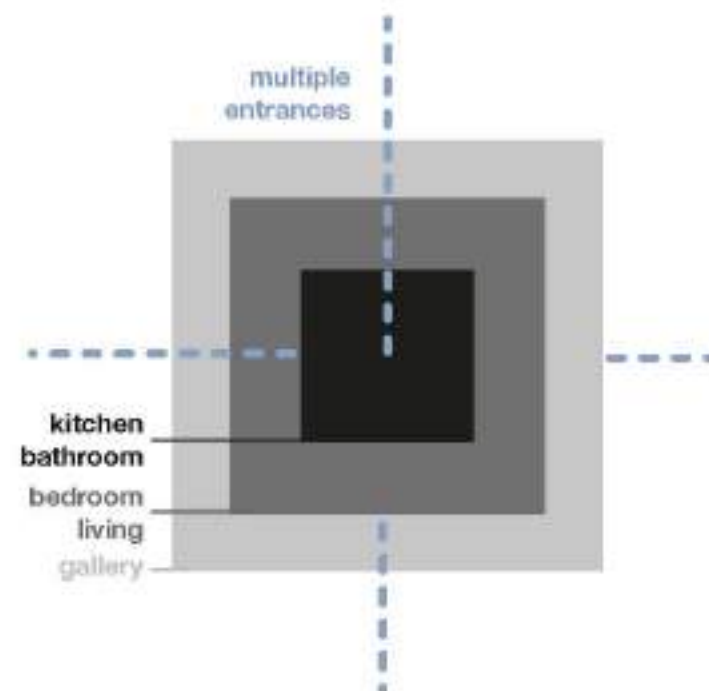
### the block

Open spaces will play an essential role on the plot. Within each block, there are multiple transitions of privacy that offer different atmospheres and functions. The block is divided into a private, semi-private, and public open space. In the private sphere, open space that is connected to the house serves as a transition zone from the inside to the outside. It becomes an extension of the living room. Next, the semi-private spaces are the courtyards and alleyways. They connect the dwellings within the block and give gradients in privacy between the residents. Jane Jacobs' concept of 'eyes on the street'<sup>4</sup> is applicable here to create a collective sense of safety (Jacobs, 1961). Lastly, the public space connects the block to the neighbourhood and bigger city. Designing pockets of open public spaces on the plot offers a well-connected place for everyone of the neighbourhood.

### the house

Creating new housing on an empty plot gives many opportunities to improve the diversity in urban infrastructure. Looking into different typologies offers a larger range of households that will be able to live there. Besides just offering single family housing, typologies for multiple households are beneficial, as many current houses exist of more than one family. When looking into multi-generational households, having inclusive housing is of importance to provide for the needs of the older generation. Mixed-use typologies are taken into consideration, since they can play a crucial role in strengthening the local economy, providing work possibilities in the neighbourhood.

One main structure is provided for every house, the interior composition can change according to the households needs. The house itself has a permanent core where the most private rooms are situated, such as the bathroom and kitchen. The bedroom(s) and living room are at the outside, receiving more daylight. The living room is extendable to the open private space outside or can be converted to another bedroom. This flexibility allows for the house to adapt with a growing family.

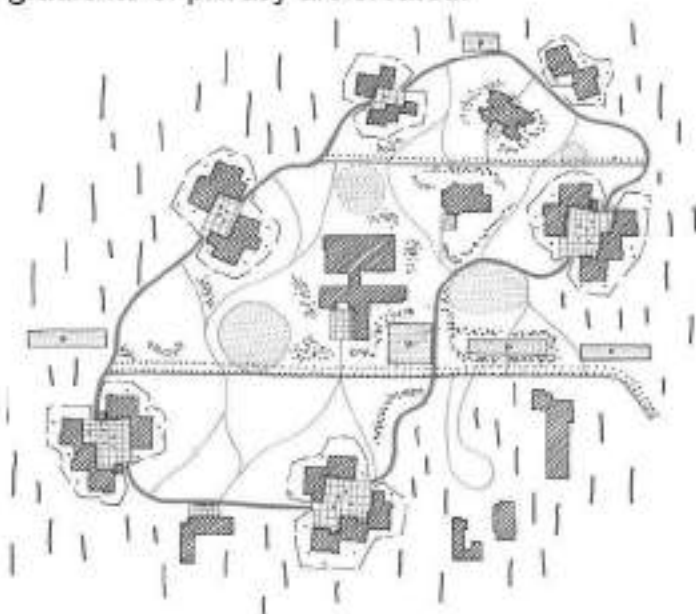


2.19 plan of housing unit



## references

'Het Gielsbos', by Dierendonckblancke architects, is a project located in Belgium and ongoing since 2009. The design consists of a masterplan and dwellings for people with disabilities. This reference is relevant because of the idea to have interconnectivity between open spaces, creating different atmospheres. A loop road connects six residential clusters with communal functions in between. Each 'home' has a central courtyard where the road can pass through, promoting communal living for the residents. Furthermore, more private inner courtyards connect each building of the residential cluster to the more central public courtyard. In this way, different gradients of privacy are created.



2.20 connected residential clusters (Dierendonckblancke architecten, 2009)



2.21 circulation and visual relations (Dierendonckblancke architecten, 2009)

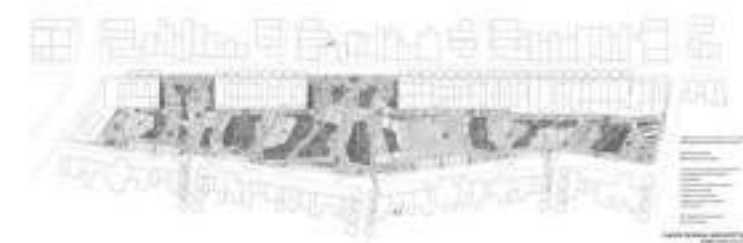


2.22 plan of a residential cluster (Dierendonckblancke architecten, 2009)

'Parque Esmeralda' is a community garden project designed by CAW Arquitectos in 2021. Located on a former landfill in Chile, it became a lively public space for the neighbourhood. The aim was to design a green public area with urban gardens. The neighbourhood is connected to the plot through the use of green visual perspectives as groves are strategically placed at the intersections where the street meets the park. The plot itself is alternately divided in zones of vegetation and paved areas. The permeability of the design connected its neighbours but also the opposing neighbourhoods to each other and to the park. The urban gardens offer places for gatherings where communal activities are possible.



2.23 aerial image of the park (Archdaily, 2021)



2.24 plan of green areas in the park (Archdaily, 2021)



2.25 plan of surrounding passages (Archdaily, 2021)



III calle kanonikoff

### III.1 Asunción districts and focus area



San Antonio  
Dr. Gaspar Rodríguez de Francia

- water Asuncion
- Asuncion district
- neighborhoods of Asuncion
- Kanoninoff area of study
- focus area

0 1 2 km



### III.I calle kanonikoff study area

The Kanonikoff area is situated along the Calle Kanonikoff at the shoreline of the Río Paraguay, located in the districts San Antonio and Dr. Gaspar Rodríguez Francia of Asunción. It is a mainly residential neighbourhood with a prominent industrial shoreline and no more than two kilometres away from the core of the city.

Informal settlements started to form here since the 1950s, a process that still continues today. The area became occupied because of the employment possibilities that the position at the water gave. The residents exchanged goods with the Argentinian city Clorinda, only a forty to fifty minute boat ride from here. Now most residents either fish or work for PAKSA, a naval company. Gradually the population settled in private properties or on public streets. Until today they do not have the legal right to own their houses. This is not considered as a favourable condition because either the government or the private companies could remove them.

Additionally, their position at the shoreline puts them at risk of flooding, which already happened in 1983 and 1992, and then again in 2019 and 2021. This will increasingly occur due to climate change.

The analysis is therefore developed following two main topics: the flooding risk and the risk of living in a space without having the legal right to. The communication between the neighbourhoods and the municipality is almost non-existent. The government does not seem to be interested to redevelop this area soon. This is why, in a next step, a design proposal explores ideas for urban redevelopment and reconnection with the city centre.<sup>5</sup>



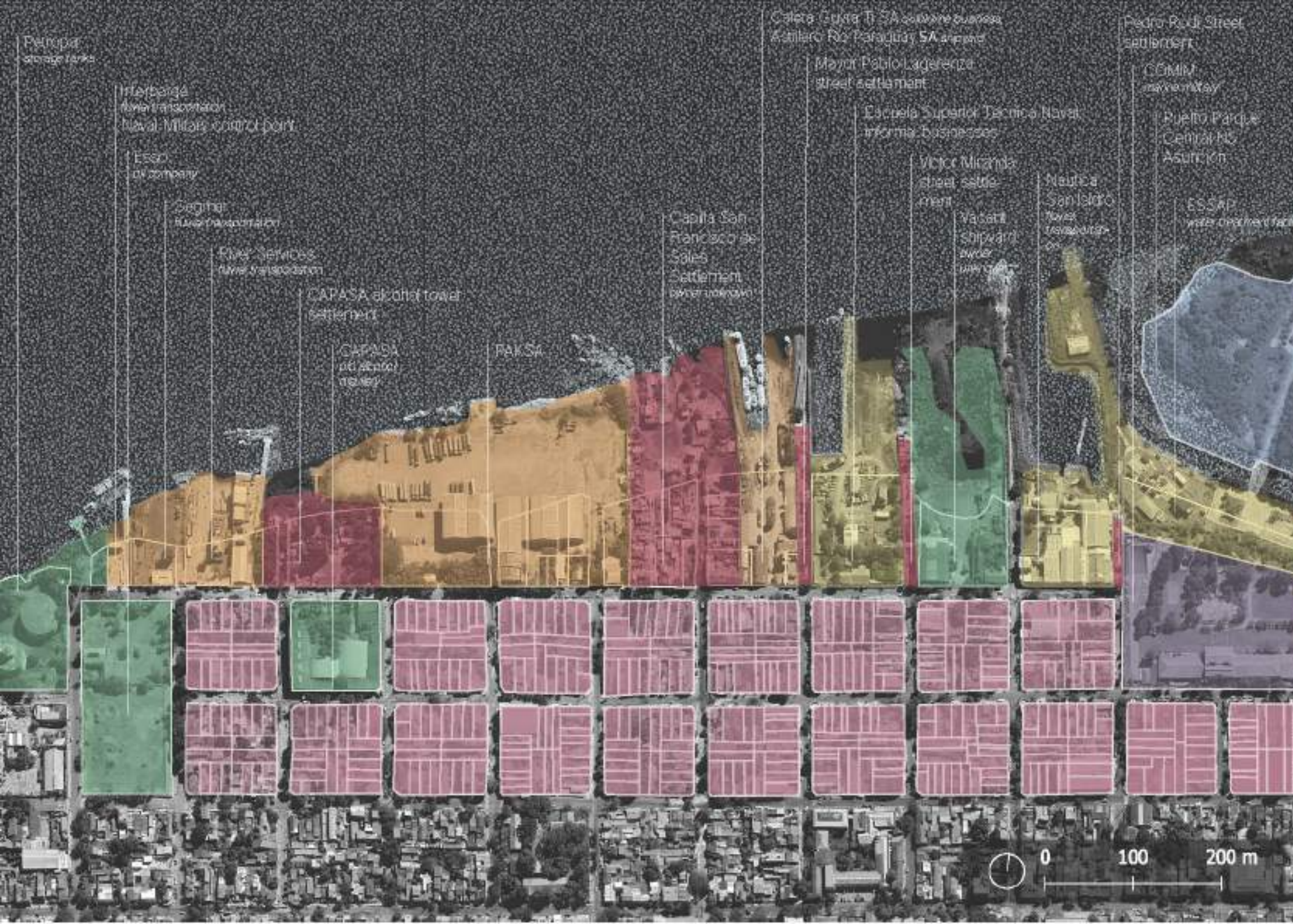
### III.I surroundings of study area

The circles on this map investigate the immediate surroundings of Calle Kanonikoff.<sup>6</sup> The first circle with a 250 metre radius encloses university and hospital functions. The 500 metre circle includes a lot of industry. Commercial and other educational structures appear at the 750 metre mark. The last circle with a 1000 metre radius takes in additional industrial and educational functions. The centre of Asunción begins at the east side of this circle.

Calle Kanonikoff. This gives rise to an idea to house staff, workers and students in the preliminary design proposal.<sup>7</sup>



- water
- university
- college
- school
- religious
- industry
- commercial
- hospital
- services
- park
- gas station



### III.II plot use

At Calle Kanonikoff there is a diversity of functions similar to those seen in the surrounding area. This map shows the different plot uses and goes a step further to distinguish industrial plots in a gradient of activity. There are industries with a high use of the shoreline: this means that they use the access to the water as a part of their company's daily activities. The industries with a low use of the shoreline do not need this location at the waterfront to function. Therefore, they could be relocated in the redevelopment proposal, in the grand scheme of creating access to the shore for residents of the neighbourhood and a larger part of Asunción. The vacant plots have potential for redevelopment. This map also shows the big public Parque Solidaridad behind the naval military base.

The cadastre plans from the government show that the industries expanded beyond their legal plots (Servicio Nacional de Catastro, n.d.). We will see later that both informal settlements and industries benefit when the river is at low tide, because they can occupy more land. Because the river overflows at times, this uncontrolled expanding of both players needs direct attention.

#### legend

- industrial site: not in use
- industrial site: low use of shoreline
- industrial site: high use of shoreline
- informal settlements
- residential buildings
- parks
- military base
- cadastral lines



### III.III.I timeline of artificial changes of the shoreline

The timeline of the artificial changes of the shoreline spans 20 years, from 2003 to 2023.<sup>6</sup> These changes are defined here as long-term changes made in the topography due to human intervention, for example by filling land or by building concrete docks.

In 2003 it is visible that a lot of land already underwent some artificial changes at Calle Kanonikoff. The big plot of the industry PAKSA is the most noticeable, and different shipping docks are recognizable.

2011 marks the first year when big changes are visible on the satellite images. The wetland is being filled as well as prepared for construction works. Especially the site of the Parque Solidaridad is changing.

In 2015 there is a big filling of land close to the park and at another side of it the land is being prepared for the construction of a water treatment facility. In 2021, further east, two concrete docks emerge.

To conclude, the riverside along the Calle Kanonikoff seems to attract a lot of businesses. The riverside gets increasingly privatised which means there is less public access to the waterfront for the inhabitants of the neighbourhood.

legend  
 artificial changes of the shoreline

### III.III.II timeline of settlements

The timeline of the settlements spans 20 years as well.<sup>3</sup> Visible is that 5 out of 6 informal settlements were already there before 2003.

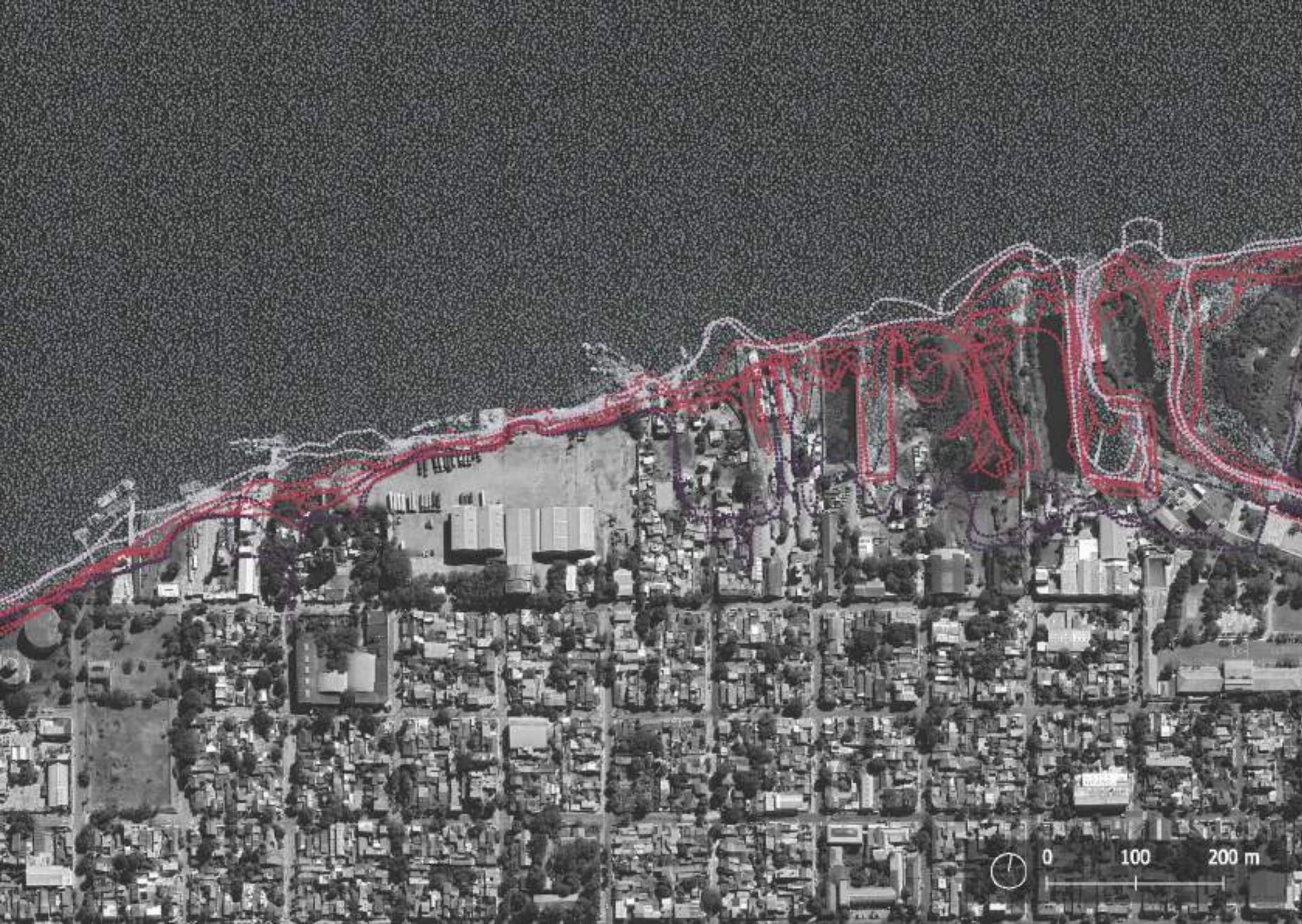
They can be split into 2 categories: those which occupy public ground along streets and those which occupy private property. Over the years the numbers of buildings rise in the existing settlements, especially extending towards the water.

In 2014 a new settlement forms after the deconstruction of the former plot of the alcohol distillery CAPSA.



legend  
settlements ■





### III.III.III timeline of shoreline

The shoreline currently has no official definition. This means that there is no clear border between land and the Río Paraguay.

By creating a timeline, a better understanding of the impacts of drought and flood can be gained. This in turn allows for a tentative definition of the shoreline for further analysis and a design proposal.

The shorelines of the 10 most intense drought and floods of the last 20 years were recorded and overlapped.<sup>10</sup> 2015 saw the greatest flood and 2020 the greatest drought. They are respectively used as a minimum and maximum shoreline reference.<sup>11</sup>

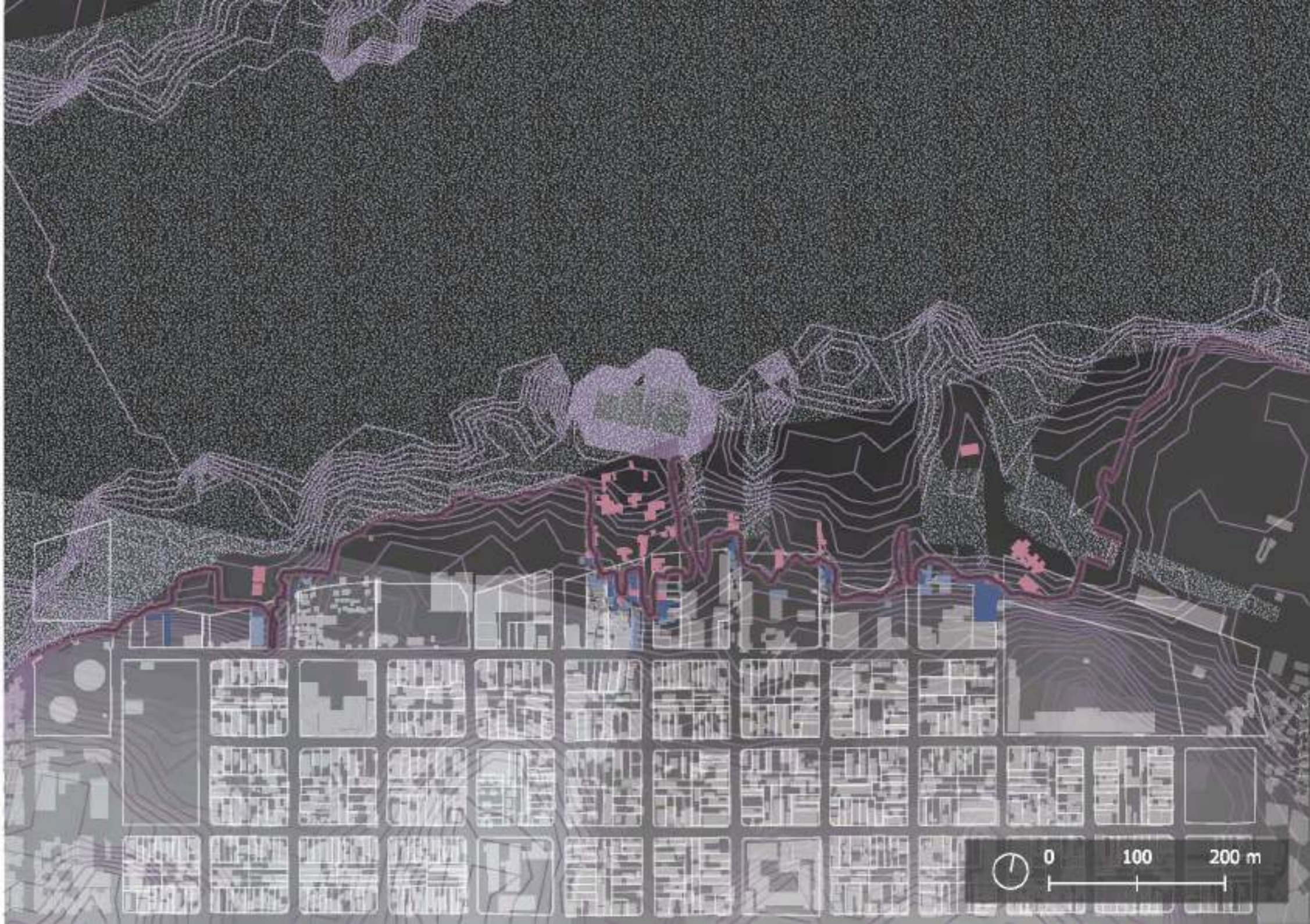
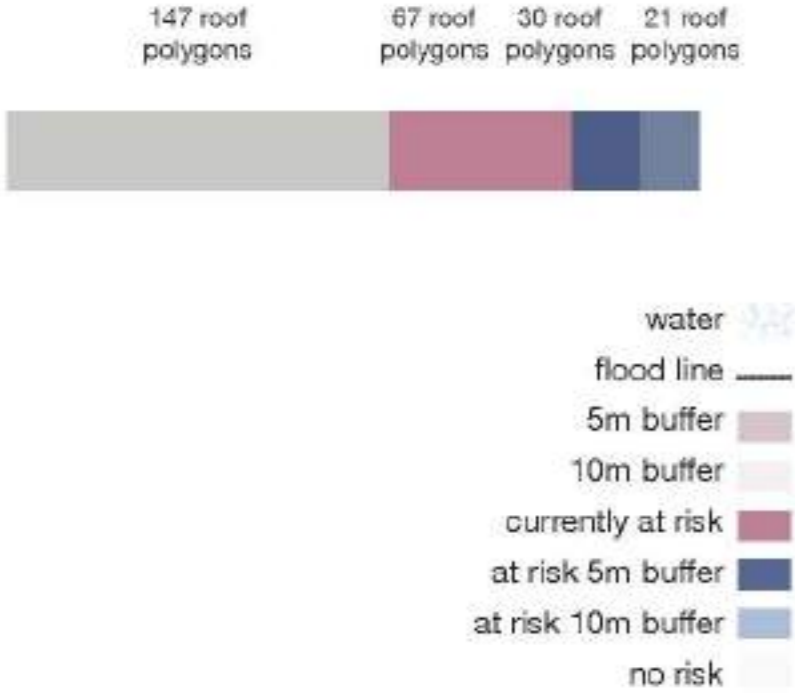
#### legend

- water
- low floodline
- high floodline
- typical floodline

### III.IV.I shoreline risk assessment with buffers

Overlaying the flood lines with the topography, the shoreline seems to follow the topography lines. As such, using the minimum shoreline of 2015 as base, buffers of zero metre, 5 metre and 10 metre are created to generate a gradient of risk.<sup>18</sup> This shows how many buildings could be affected by increased floods due to climate change.<sup>19</sup>

Currently many buildings are at risk (see diagram), especially the informal settlements. The industrial buildings are sometimes reinforced with concrete docks or are mostly far away enough from the riverside. Only a few of them would be at risk with increased floods. This step also helps establish a gradient of urgency relocation for the design proposal.



### III.IV.II shoreline risk assessment

The previous map and the roof polygon diagram show that a lot of the buildings are at flooding risk now and in the near future (44.5% of all the buildings in the area). Because of the different characteristics at play, each neighbourhood needs to be investigated separately to finetune the different necessary interventions. The aspect of time is also taken into account when looking at the necessary order of certain interventions.

The categories I, II, III and IV show a difference in flood risk. Therefore we made a conclusion about the difference in urgency of relocation. We defined variable possible solutions for the different areas.

#### Conclusions

##### I. on site consolidation:

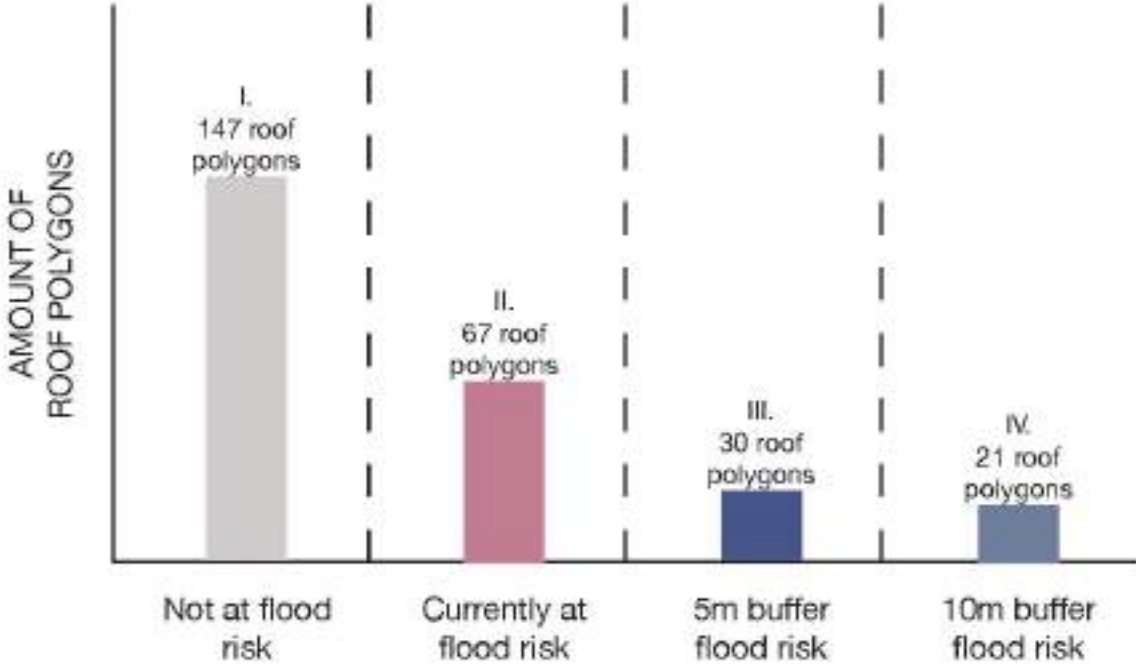
- solving land tenure
- renovations for existing average or good condition buildings
- increased built density for relocation of at risk residents
- relocation of poor condition buildings for consolidation of residential density on site

##### II. in need of urgent relocation:

- first relocation stage

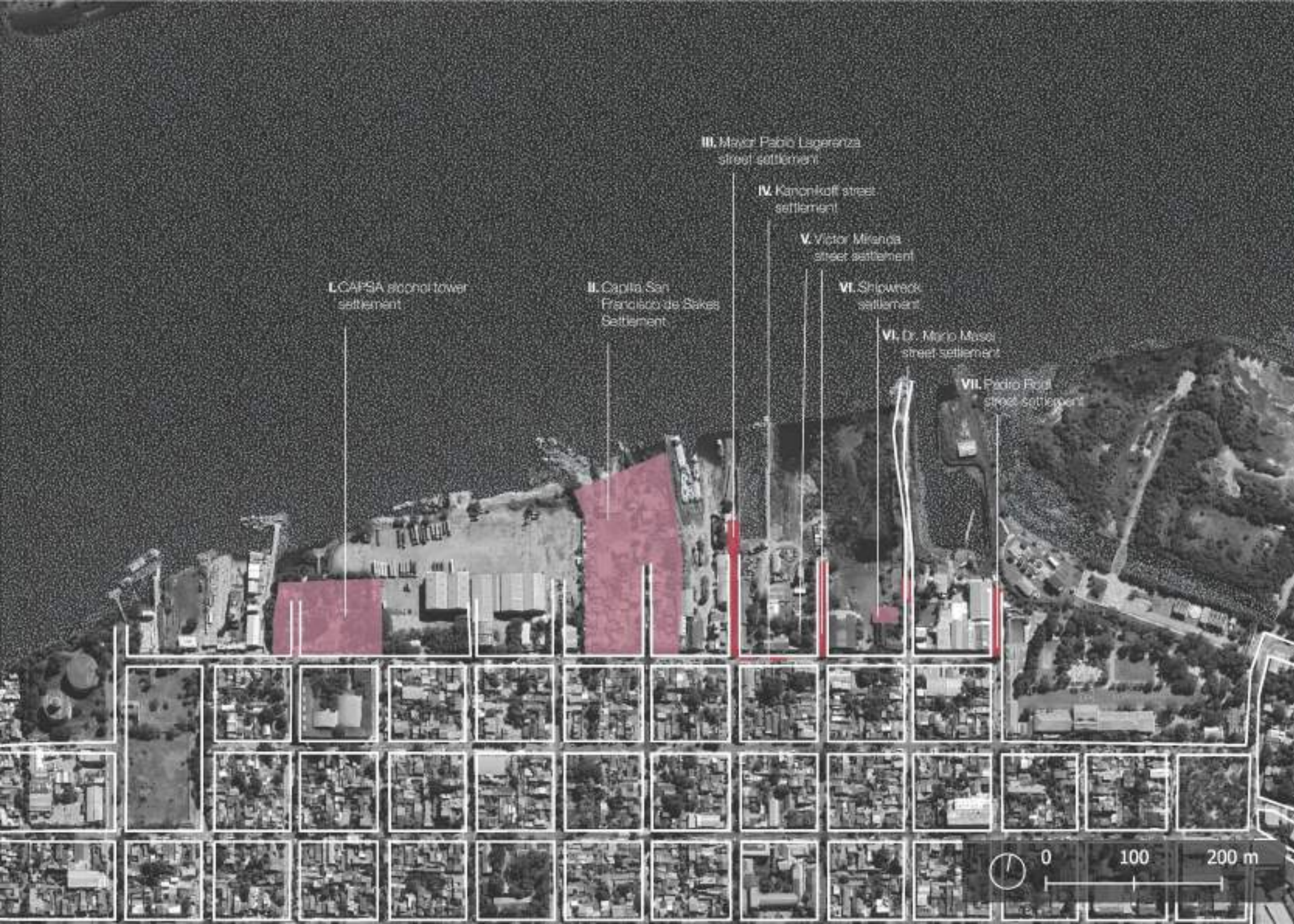
##### III. and IV in need of relocation:

- second relocation stage



ROOF POLYGONS refer to the amount of roofs drawn using satellite image and are estimated to be individual properties while they might not be





### III.V.I settlement occupation

On this map we see the informal settlements either occupying private land or public streets. This distinction is made because while private land can be repurchased and redeveloped, this is less likely for public property and streets. For example, the waterfront could potentially be opened up, which means that the informal settlements on the streets are blocking access and are at risk of expulsion. This aim to generate a bigger access to the water comes from a belief that public space benefits the living quality of people in cities in general.

- legend
- occupation on street
  - occupation on private land
  - cadastral lines



### III.V.II capsa alcohol tower settlement

Appeared in 2014

Ownership CAPSA, an alcohol producing business, partially owned by the Paraguayan state

Characterized by industrial alcohol tower, no longer in use.

Flooding Risk Low (7.94%)  
 Housing Quality Poor (92.06%)  
 Accessibility Low (no entry)

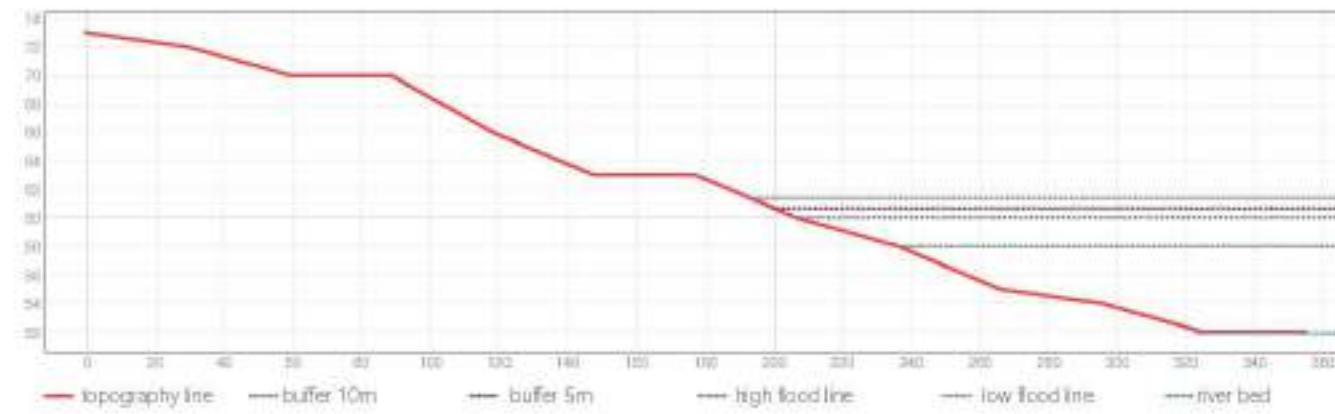
Possible Future plot for redevelopment  
 relocation



3.2



3.3





3.4



3.5

### III.V.II capilla san francisco de sales settlement

Appeared in before 2003

Ownership Unknown

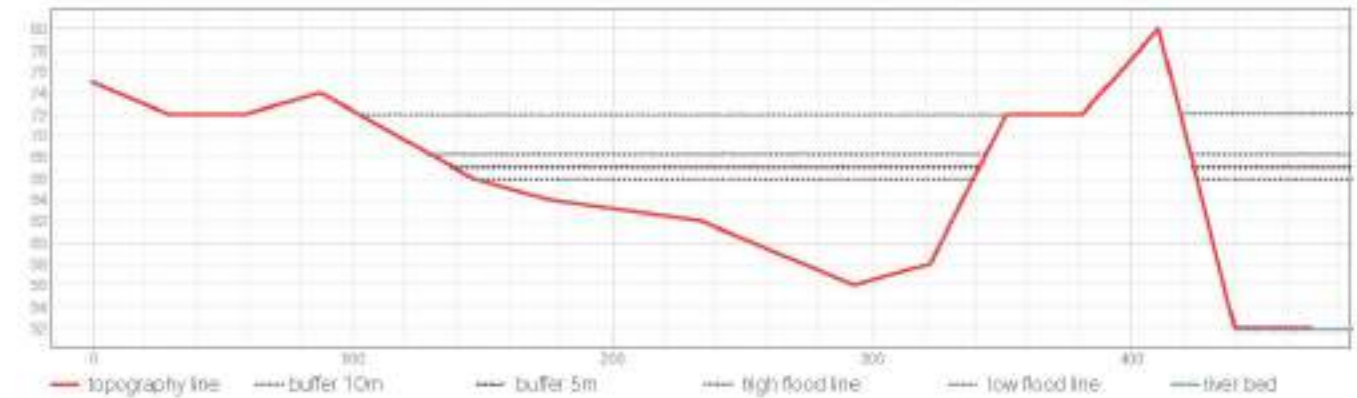
Characterized by chapel San Francisco de Sales

Flooding Risk High (63.28%)

Housing Quality Average (50.78%)

Accessibility Medium (guided entrance and informal port)

Possible Future partial relocation  
partial consolidation





3.6



3.7

### III.V.II mayor pablo lagerenza street settlement

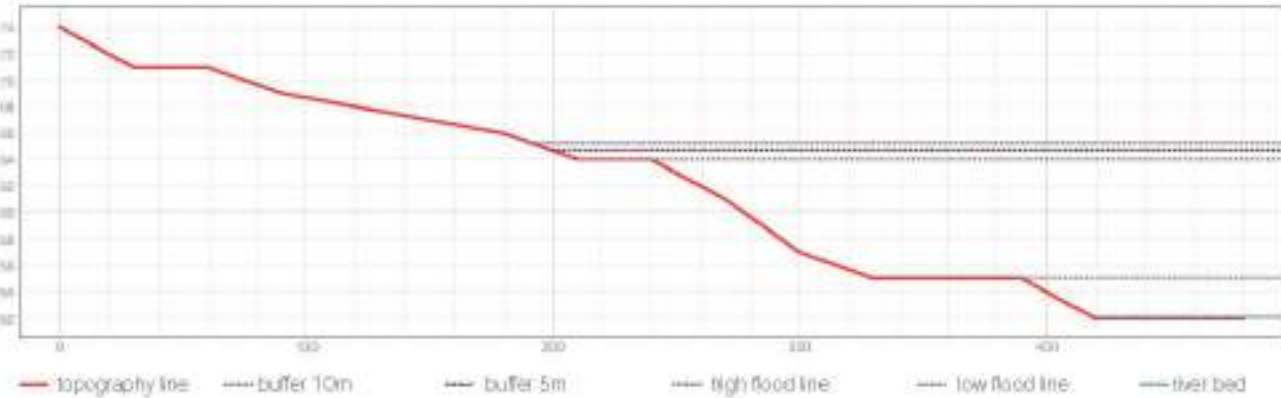
Appeared in 2014

Ownership Paraguayan State, Mayor Pablo Lagerenza street

Characterized by -

Flooding Risk High (45.45%)  
 Housing Quality unknown  
 Accessibility Low (no entry)

Possible Future relocation





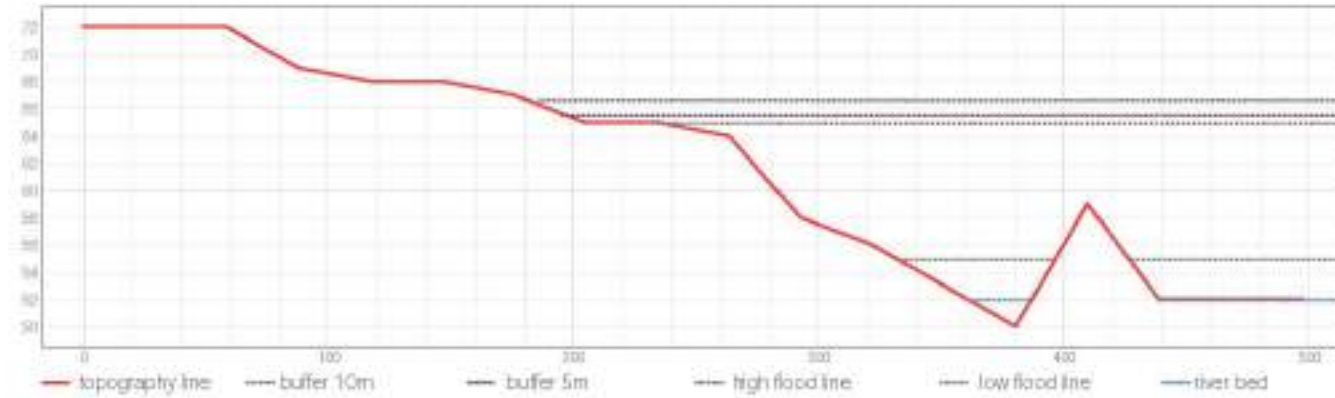
3.8



3.9

**III.V.II kanonikoff street settlement**

Appeared in -  
 Ownership - Paraguayan State, Kanonikoff Street  
 Characterized by -  
 Flooding Risk - Low (0%)  
 Housing Quality - Poor (100%)  
 Accessibility - High  
 Possible Future - relocation





### III.V.II victor miranda street settlement

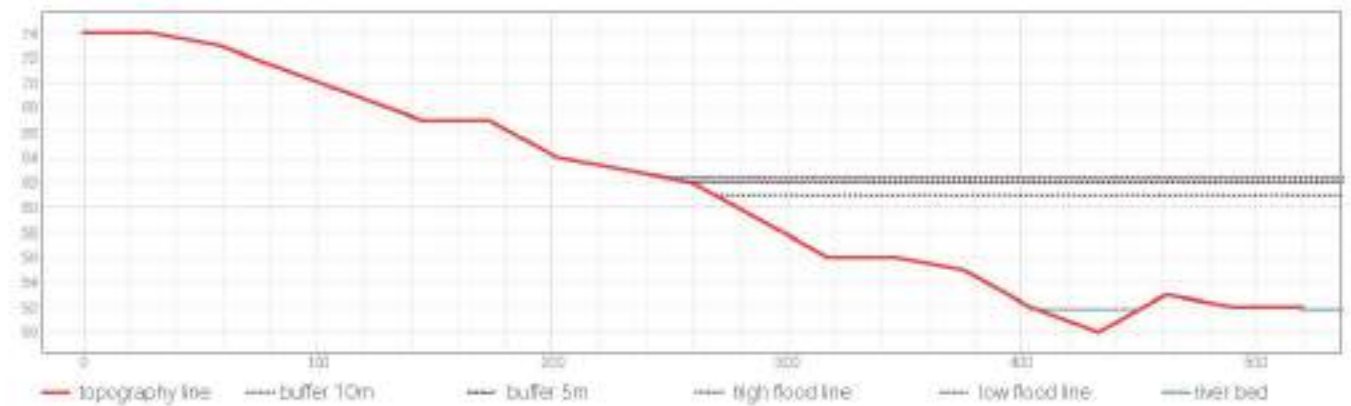
Appeared in before 2003

Ownership Paraguayan State, Victor Miranda Street

Characterized by Shipwreck

Flooding Risk High (46.88%)  
 Housing Quality Poor (84.38%)  
 Accessibility Poor (walking through living spaces)

Possible Future relocation





3.12



3.13

### III.V.II shipwreck and dr. mario masei street settlement

Appeared in 2022 and 2014

Ownership Vacant Plot (owner Unknown) and Paraguayan State, Dr. Mario Masei Street

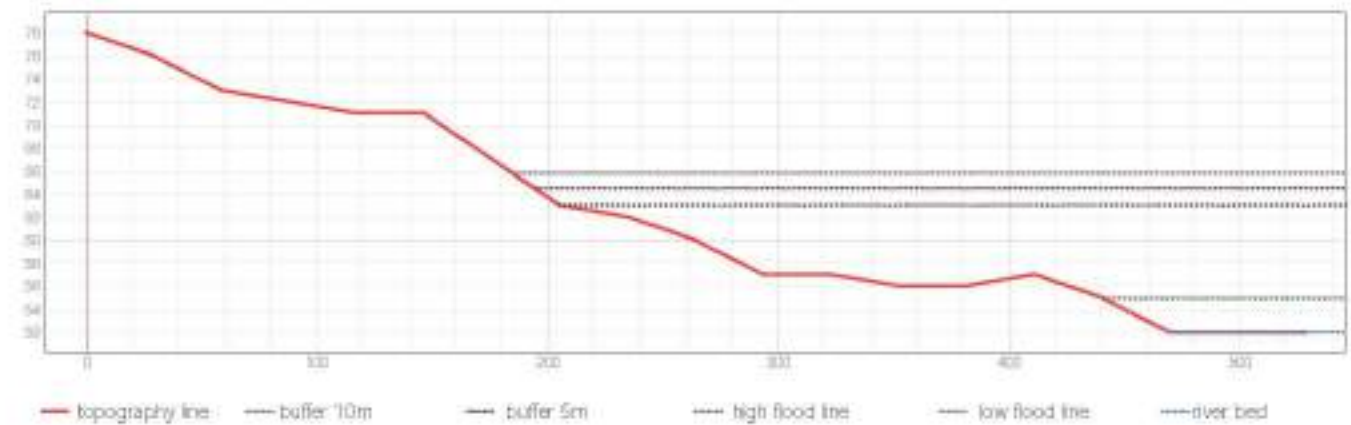
Characterized by Shipwreck and Villa

Flooding Risk Low and High (0% and 100%)

Housing Quality Poor (100%)

Accessibility Poor (through another settlement) and High

Possible Future relocation





3.14



3.15

### III.V.II pedro rodi street settlement

Appeared in before 2003

Ownership Paraguayan State, Pedro Rodi Street

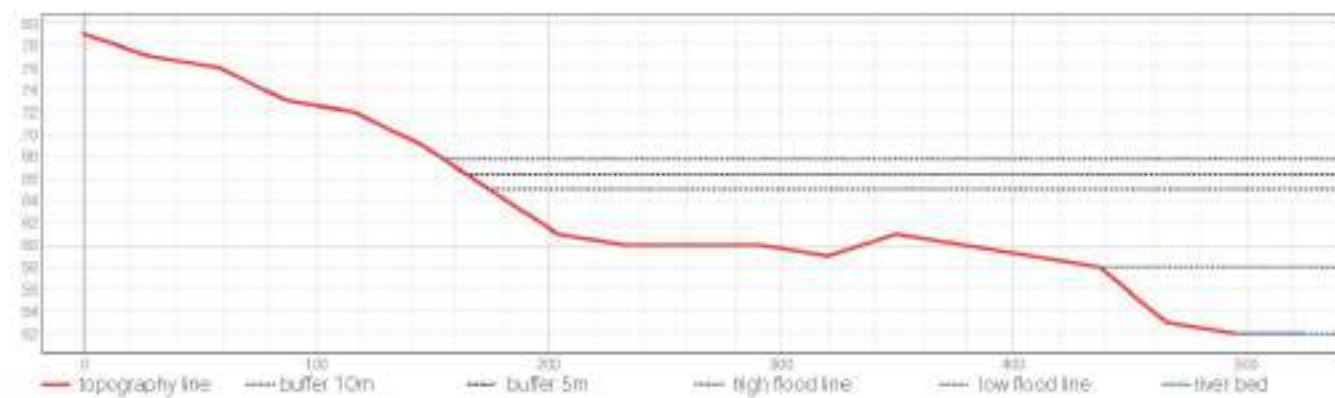
Characterized by -

Flooding Risk High (41.67%)

Housing Quality unknown

Accessibility Low (no entry)

Possible Future relocation



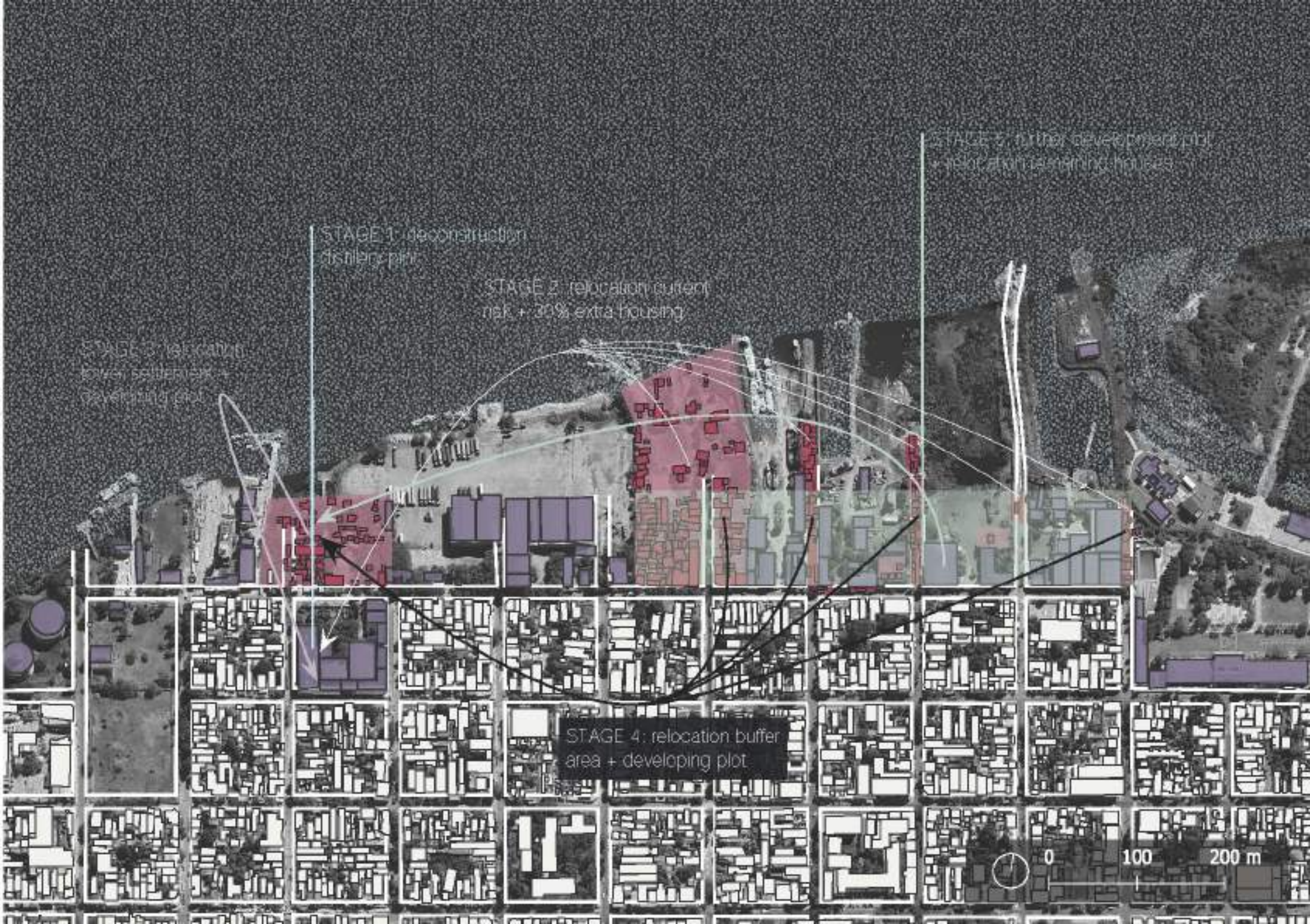


### III.VI.I relocation stages

Based on our data it is clear that the risk of flooding is at such level that many buildings can not stay in that area. The approach is to consolidate the buildings where possible. However, the risk analysis shows that only a small part of the Francisco de Sales neighbourhood can stay in place. The next step is then to relocate as close as possible to the existing site, keeping the social ties within neighbourhoods in mind. In the hopes of maintaining a sense of community we encourage integration with the networks of the city such as public transport, work opportunities and mix of classes.

The big number of houses at risk of flooding means we have to think about a sense of time and progression in the needed relocation and development of the area.

We create 5 stages in total which consider the different levels of urgency in the different neighbourhoods. The level of flood risk is playing the dominant factor, while we also looked at the levels of housing condition and the accessibility of the existing neighbourhoods.





### III.VI.II proposal ownership

Our design proposal has 2 overarching themes and scales. In one area we provide relocated mixed housing at a neighbourhood scale. The other area becomes a floodable public park on a bigger, urban public scale.

#### Relocated mixed housing

The mix of housing includes social housing mainly intended for people at flooding risk, standard housing for people outside these neighbourhoods, for example staff and workers of the surrounding businesses, and housing for university students.

We are aware of the fact that inviting residents of a different social class can destroy a sense of community, so it is necessary to be very sensitive of the existing social network. An important aspect of that could be to make sure that every activity (whether commerce, industry, social or housing) benefits the neighbourhood so we can constitute a new sense of community.

The project would be located on two of the plots of the former operating alcohol company CAPSA. In the first place we provide housing for the Kanonikoff people to live safely without flood hazard. In second place, these 2 plots can still offer space for a natural growth process of other people, from outside the informal settlements, wanting to move here.

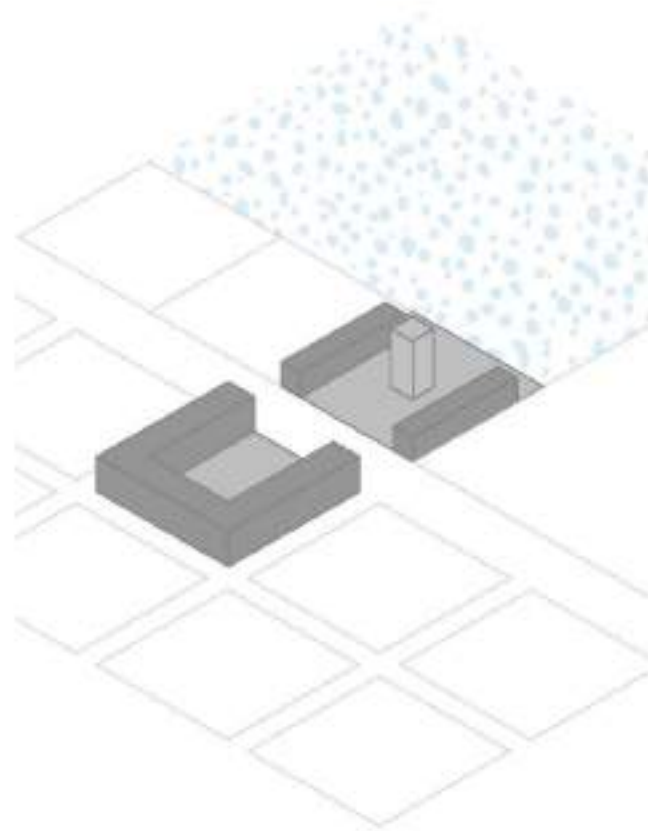
The design proposal wants to move away from the momentary separateness of these communities, because it keeps them away from participating in society, and small and 'weak' against municipalities. Therefore, by providing certain improvements of the general living quality in the area, we aspire to invite people from outside the neighbourhood as well, to revive the area.

This natural growth that we speak of would be generated because public space, work and commerce possibilities are provided and social inclusion is improved. This could be interesting for other stakeholders who benefit from relatively cheap housing, public space and a sense of community.

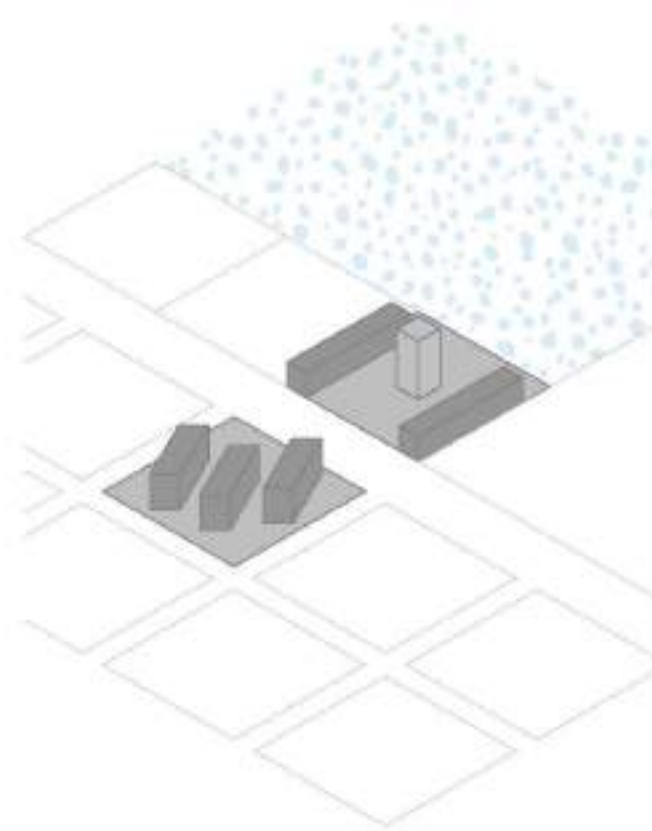
### III.VI.III potential housing typologies

Our first approach is to consider the building block typology since the urban fabric has a similar organisation. The building blocks of the area, however, are very large and the typology very rigid so there would be a lot of wasteful space in its centre and little permeability. A few streets away from the Calle Kanonikoff there is the Centro Urbano San Antonio – IPVU Monoblock which has been in use since 1969 and seems to be a successful social housing solution (Color, 2019). It is composed of several linear building blocks with lush green spaces. We have learned from local guides and people, that there is a strong value of owning your own land with an outdoor space. The ideal is to have a mango tree in your courtyard, a famous saying which points at the cultural importance of the outdoor space in Paraguay.

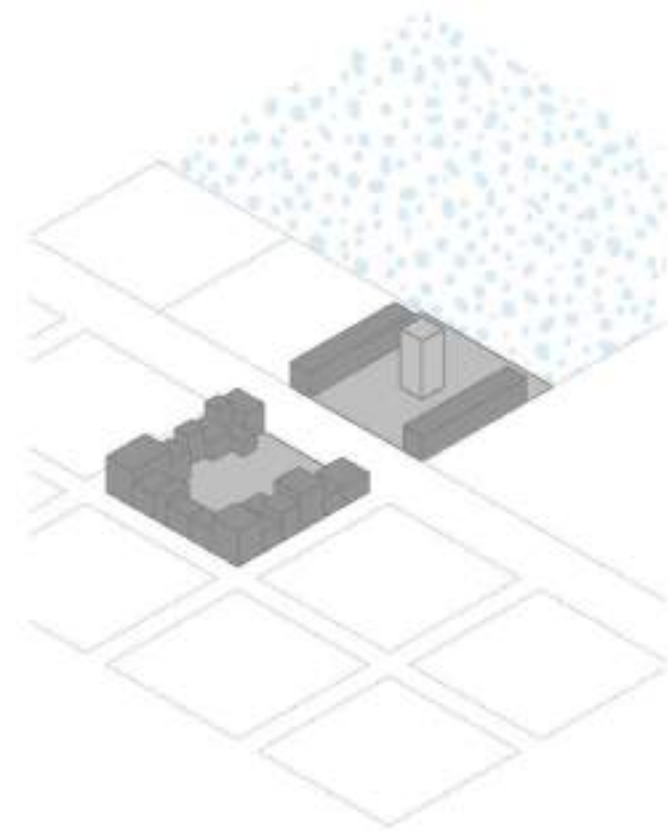
We presume then, that a housing block of the sort of IPVU can feel restrictive and unwanted to informal settlement residents, who now occupy their own space and have control of its development. Instead, we suggest a pixel typology which can give a sense of independent living units. Adding to this, a pixel typology can create varied open spaces for private gardens with mango trees or community spaces. Finally, the pixel typology can allow a degree of agency to expand such as the example of Half-A-House by Elemental in Chile which can be an important feature for informal settlement residents (Carrasco & O'Brian, 2021).



3.16 building block typology



3.17 apartment block typology



3.18 „Pixel“ block typology

### III.VI.IV the bigger urban public scale

Due to the high flood risk in this area, a residential function is not feasible. We decided to look for a different function, that of an urban floodable public park. By leaving this space for the river to flood at certain times, the design makes the change of land visible. This shows that this land is not stable and appropriate for housing, which might prevent informal settlements from occupying this land.

In our proposal we make some area public, and some area we keep industrial. We preserve industries that offer added value at Calle Kanonikoff itself. They can or already provide work for the community and benefit highly from their position at the water for their daily activities. We can use the economic value of these industries to redevelop other areas. This could be for example with rent paid by the industries and businesses. The use of these sort of monetary models to redevelop urban places is seen in the redevelopment of El frente costero del Río Paraná, Rosario, Argentina.<sup>14</sup>

Our project is not about generating a high economic value but about creating enough economic opportunities and income for the neighbourhood to sustain itself and develop their own interests in the future. The light green rectangle is an area in the public park that we want to consolidate, protecting it from possibly more extreme floods in the future, due to climate change. The rest of the park is floodable, which can be used for cultural activities in times of low tide. Supporting these cultural activities, we could have some cultural buildings: the alcohol tower in the CAPSA alcohol tower settlement as a viewpoint and a cultural centre, or the old villa in the street Dr. Mario Masei as a cultural center. The area has an industrial identity and history. To connect this past and present meaning, the park will integrate remnants of old industrial heritage, for example the shipwreck, or the old warehouses, etc.

Connections in the form of wooden bridges, docks or even floats are small scale interventions that are open to free use. The possibility to appropriate the park by hosting cultural activities and sports would give the people a sense of being responsible for this area. This can strengthen the meaning of the place and therefore tie people together.

Either on the neighbourhood or public urban scale, there is space for commercial buildings. They can occupy the ground level of the mixed housing plots, build in the consolidated area, or re-use old warehouses. The main goal of this design proposal, either on the neighbourhood or bigger public urban scale, is to make the spatial conditions at Calle Kanonikoff from a separate, privately owned or occupied space to a place with common interests and a sense of responsibility, where every factor adds to the greater good of the neighbourhood.

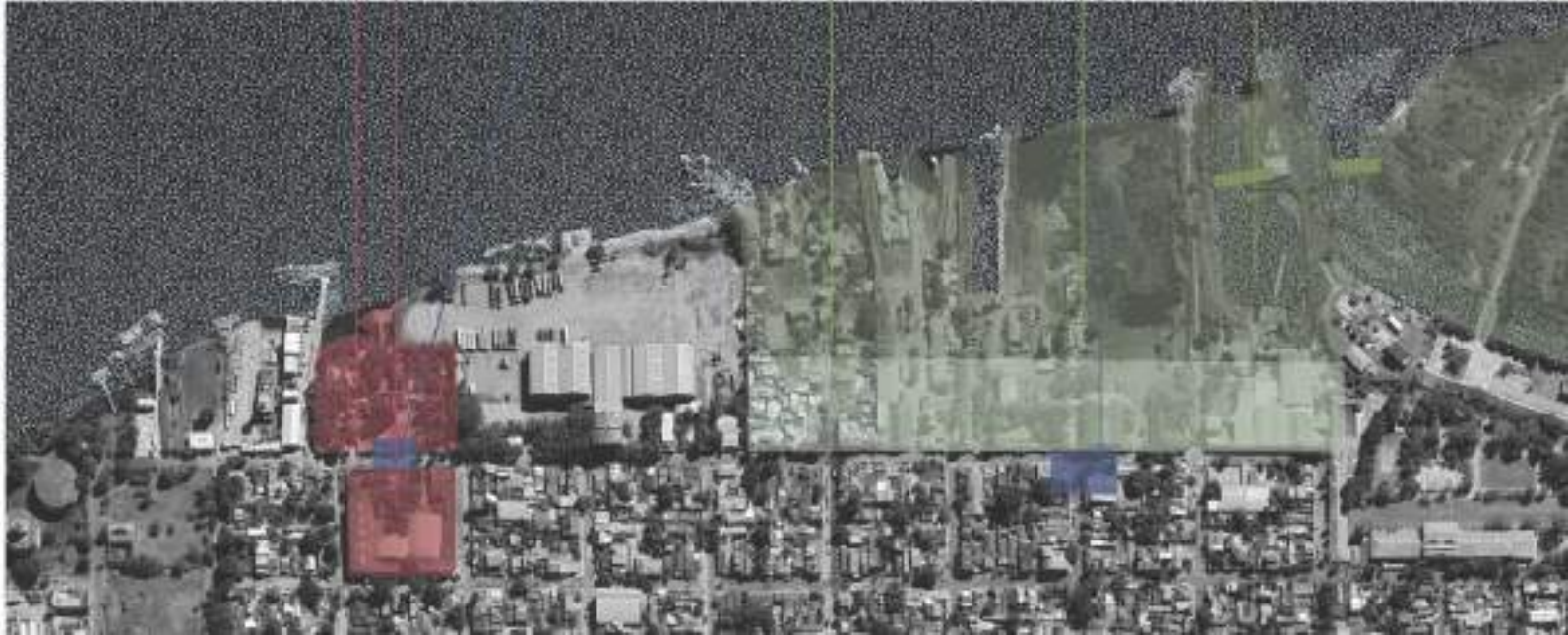
HOUSING



CULTURAL CENTER



FLOOD ADAPTIVE PUBLIC SPACE



III.VII references



At the local level in Asunción:

The shoreline in the east of Asunción is now used as a beach and a place where small boat companies operate. This place is actively used by Asunción residents, illustrating the need for public access to the waterfront.



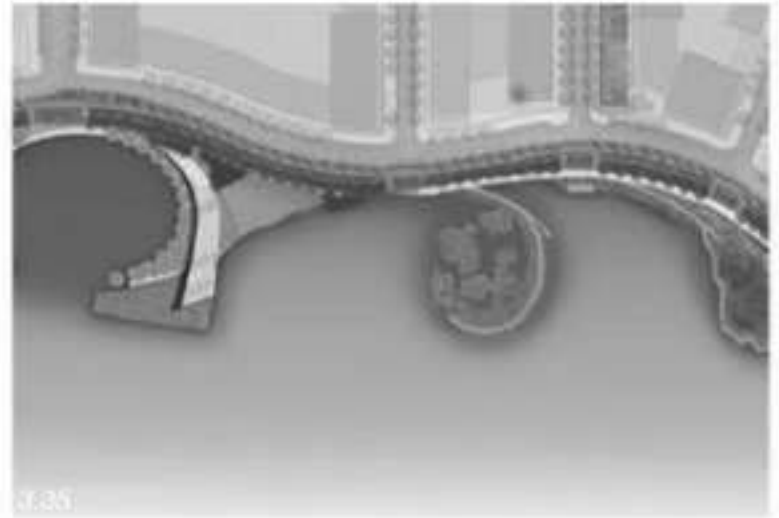
2.26-2.28, crissy field park, San Francisco

2.29-2.32, shoreline, Asunción

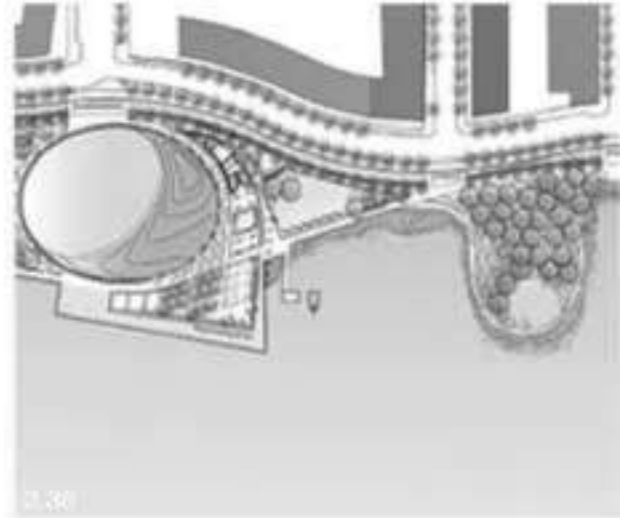
III.VII references

Western references:

Due to a lack of time and knowledge from our side, we used Western references to explain our ideas for a design proposal. In the examples of Waterplein Benthemplein and Hunter's Point South Park, we illustrate the notion of public spaces which can flood and become different landscapes depending on water levels. This would allow for maximum use of land during drought and have a buffer where the river can flood into the land without disabling the public spaces entirely. In the example of Crissy Field Park, we illustrate a notion of accessibility over flooded areas to keep the areas connected within the neighbourhood and with the adjacent park. In the example of the Renewal of Sea Front Promenade, Vlore, we see the combination of sport fields and the shore and the use of a circular concrete dock in the water, that disappears during high tide, to activate the river as a public space.



2.35-2.36, hunter's point south park, New York, USA



2.33-2.34, waterplein benthemplein, Rotterdam, Netherlands

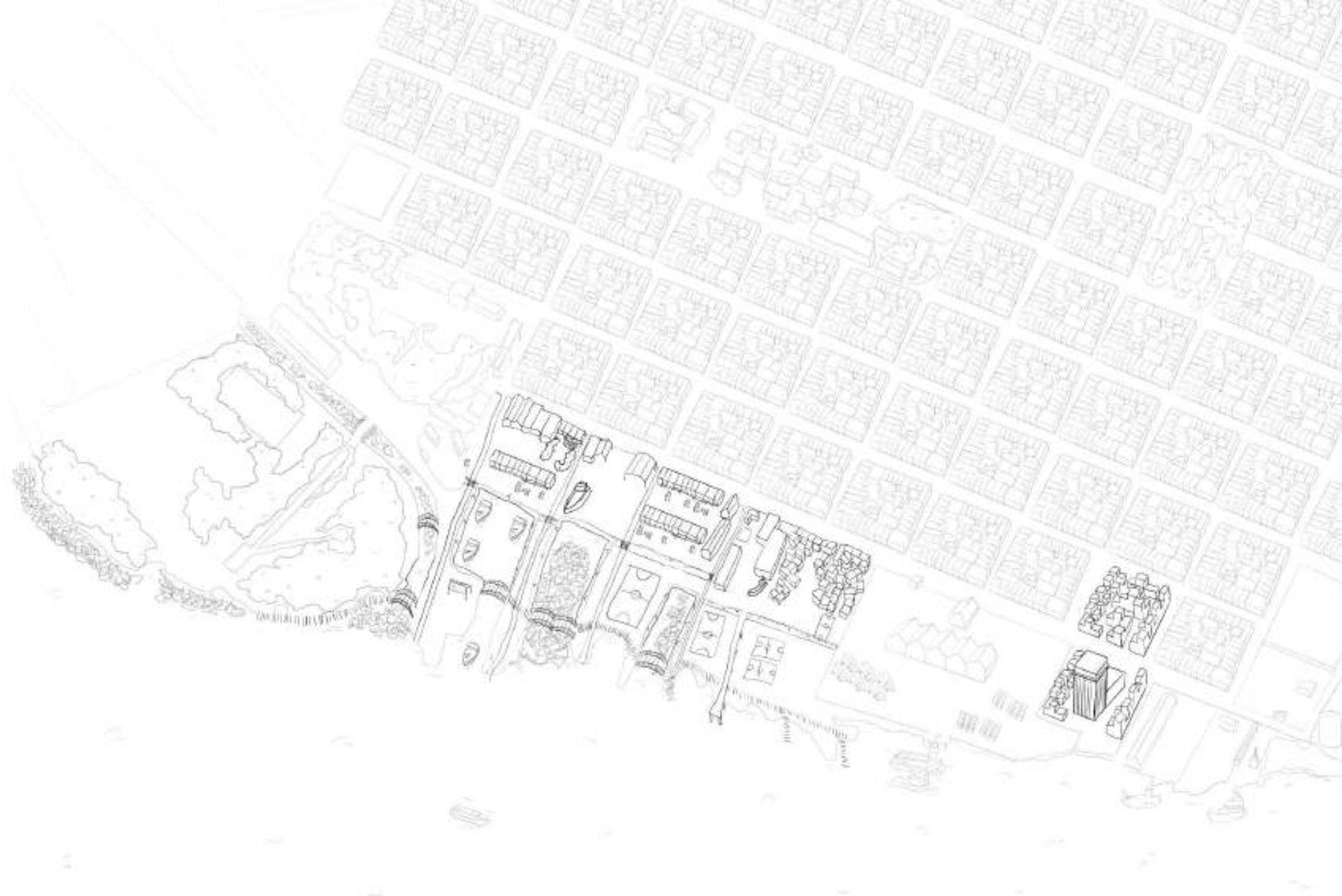


2.37-2.38, renewal of sea front promenade, Vlore, Albania



### III.VIII conclusion

This design proposal was made in the hopes of providing safer and more qualitative living conditions for the residents at Calle Kanonikoff, a place now neglected by the municipality of Asunción. This was done while paying respect to the existing social networks and with the motivation to include different social statuses, constituting a new sense of community.



**IV. sources**



#### IV.I bibliography maps

All the maps are produced by the KU Leuven internship team, made and exported with QGIS.

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2.20-2.22

2.23-2.25

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3.1

3.2-3.3

3.4-3.5

3.6-3.7

3.8-3.9

3.10-3.11

3.12-3.13

3.14-3.15

3.16-3.18

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## IV.II notes

- 1 Asunción is sometimes referred to as 'Mother of Cities', because after the Spaniards arrived in South-America, the city became the centre location to start expeditions to found and conquer other neighbouring cities.
- 2 The 25 metre buffer was decided in accordance with professor Juan Carlos Cristaldo. This number seems adequate to show the houses that are situated within the proximity of public transport.
- 3 The 10 metre buffer was decided in accordance with professor Juan Carlos Cristaldo. This number seems adequate to show the houses that fall within the limit of receiving direct sunlight and ventilation. (2023)
- 4 The concept of 'eyes on the street' is mentioned in Jane Jacobs' The Death and Life of Great American Cities, published in 1961. According to Jacobs, safer neighbourhoods are created when more people are in the streets. Activity on the street provides an atmosphere of security, knowing that there are people walking around looking out for each other.
- 5 The map shows some buildings in white with no tag, this is because of the limited available information of this area in JOSM.
- 6 The data of the different functions comes from OSM, google drive and google maps.
- 7 A potential highlighted by Professor Juan Carlos Cristaldo.
- 8/9 It is drawn and analysed with the help of google satellite images.
- 10 Using historical images of Google Earth from 2003-2023. This data was limited, because the intervals between months, seasons or years were not consistent.
- 11 A local guide of the Francisco de Sales neighbourhood mentioned however, that in 1983 the flood reached up until the Kanonikoff Street.
- 12 A limitation of the 5m and 10m buffers is that they are drawn on the plan level and don't take into account more accurate information about the topography.  
  
This makes the prediction of the rise of water levels to reach this shape less accurate.  
  
However, because of the time limit of the internship and the observation that the shoreline seems to follow the topography, this level of accuracy was accepted between our team and professor Juan Carlos Cristaldo.
- 13 Buildings are defined with the drawing of roof polygons on satellite and drone images in JOSM. Each roof polygon is estimated to be an individual property, which might not everywhere be the case.
- 14 In the redevelopment of El frente costero del río Paraná, Rosario, Argentina, two types of administrative concessions in the public space are used. The municipality, by obtaining the investment amounts and land necessary for the interventions by entering into a monetary agreement with private players, converts the new facilities and recovered spaces into municipal heritage for public use

