FIGURE 7.1: FISHING HARBOUR 2 (DEVENISH, 2011)

CHAPTER 7_
CURRENT KNOWLEDGE:
CONTEXT AND ANALYSIS: SITE CHOICE & ANALYSIS

FIGURE 7.2: NEW DEVELOPMENTS TOWARD THE EAST (AUTHOR, 2011)

7.1 THE CURRENT DAY CONTEXT

For a complete context analysis on the city's growth, important dates and buildings, refer to *The Framework* in *Appendix A*. It illustrates an in-depth analysis done on general issues affecting the Baixa, which include movement patterns, open spaces, general functions and the different student intentions.

The chosen site is the open area to the north of the train station (Figure 7.3) on the corner of *Avenida 25 de Setembro* and *Guerra Popular*. Since the open site is the main location of the project intervention, a section of the *Avenida 25 de Setembro* will also be analysed and discussed. This is because it has a direct influence on water entering the site through the street water channel. The site could thus be divided into two smaller interzones, namely:

- The street (*Avenida 25 de Setembro*) and the intervention taking place to create a water channel (parking bays to transport water to the site.)
- The main open site located on the open site, north of the station.

The site of the main design intervention is located adjacent, north of the Maputo Central Railway Station and designed by architect Gustave Eiffel who also designed the Eiffel Tower in Paris, France (The Framework, 2011).

FIGURE 7.3: THE SITE (AUTHOR, 2011)

FIGURE 7.4: STUDY AREA, CITY SCALE AND SITE (AUTHOR, 2011)

FIGURE 7.5: ZONES IN THE STUDY AREA (AUTHOR 2011)

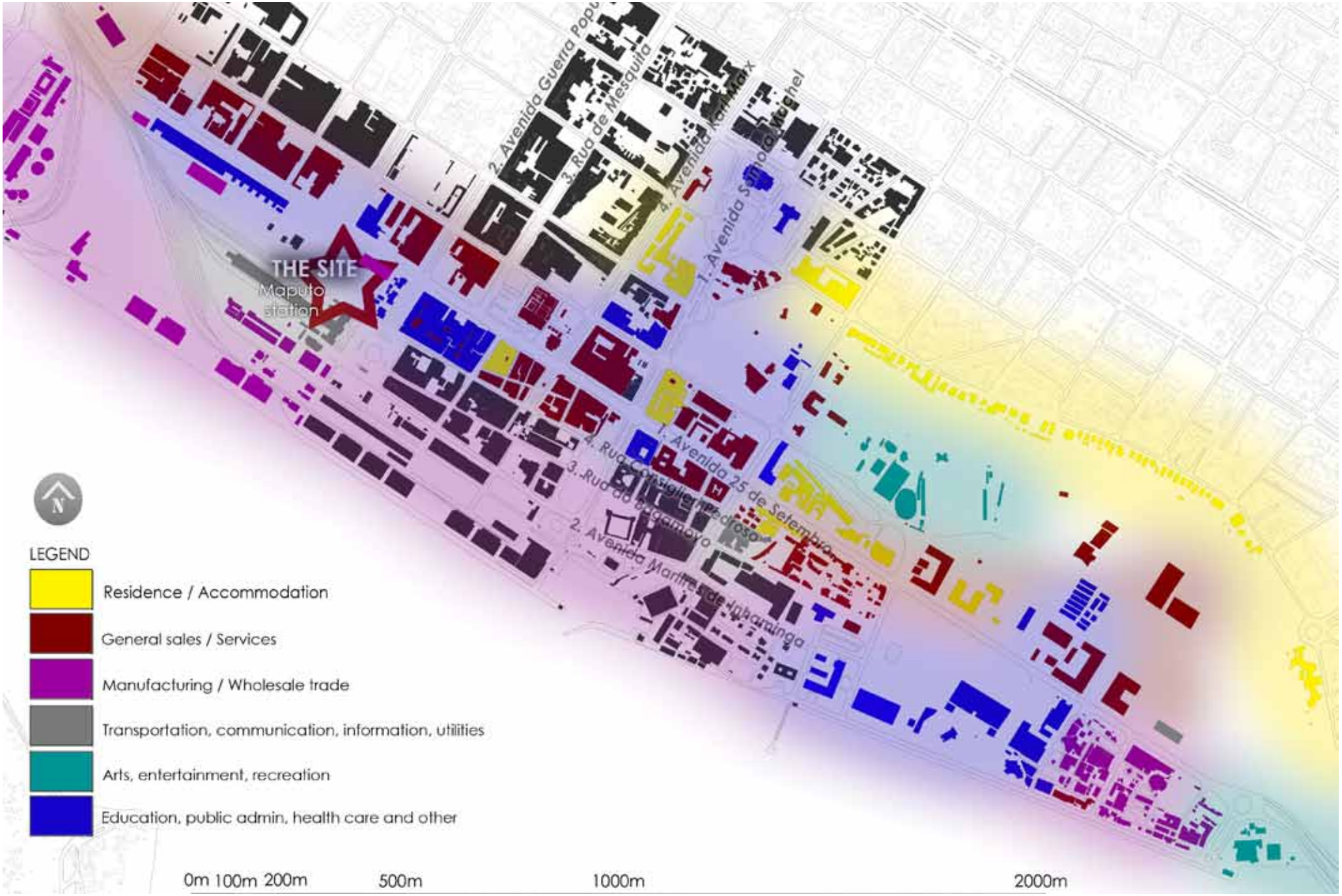

FIGURE 7.6: BUILDING OCCUPANCY IN STUDY AREA (not to scale) (AUTHOR 2011)

7.2 SITE ZONING

Figure 7.7 illustrates the zoning on-site (a section of *Avenida 25 de Setembro* and the open site to the north of the station).

The immediate zoning along the site includes the following uses in regard to:

Business (Private):

- Motor services
- Institutions
- Council/Government
- Offices
- Warehouses
- Industrial
- Parking
- Offices
- Residential
- Sales
- Ruins
- Banks and services
- Retail
- Vehicle retail
- Café and refreshments
- Privately owned space

Public space zoning:

- Public square
- Street and side streets
- Central station
- Informal vendor stands
- Central market

The proposed site will be zoned as a "public space".

FIGURE 7.7: ZONING DIAGRAM WITHIN THE SITE(AUTHOR, 2011)

7.3 RESTRICTIONS AND SERVICES

Figure 7.8 indicates a summary of the site services and restrictions (Figures 7.9-7.11), acting on the site and its environment. It shows the current storm-water network (pipe system) that discharges into Maputo Bay. The sewage lines (also a piped system), leads toward the north of the city for treatment, although a certain amount exists into the bay (Cassimo, 2011).

Mozambique, Maputo is the only city with a central sewage system for collection and treatment of domestic sewage. However, it is estimated that only 50% of Maputo's sewage is treated. The rest of the population use septic tanks and pit latrines. Maputo area produces 71% of the total domestic sewage.

The sewage is emptied into rivers that flow into Maputo Bay. Studies in the bay have revealed that faecal coliforms, faecal streptococci and Escherichia coli were detected in marine water and shellfish tissues. Pathogens causing severe gastro-intestinal illness were also isolated from clams collected in different areas of the bay. An increase on the levels of total and faecal coliforms was reported from 1968 to 1996 in the Maputo Bay. As a result some areas are not safe for swimming. The city of Maputo produces about 4,3 million tonnes of solid waste per year (Mmochi & Francis, n.d).

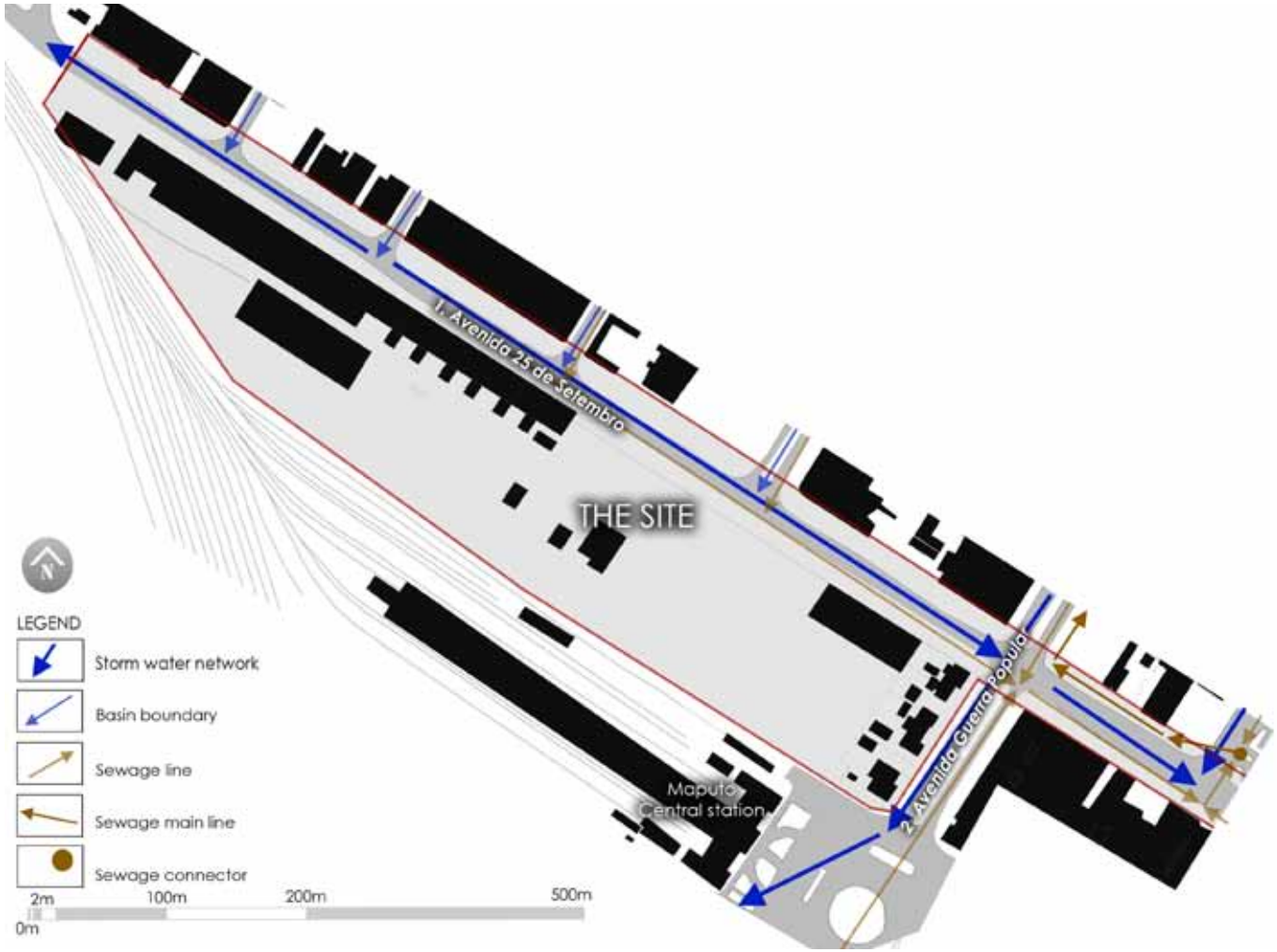

FIGURE 7.8: SITE SERVICES AND RESTRICTIONS ON PROPOSED SITE (AUTHOR, 2011)

FIGURE 7.9: *BAIXA* CITY SCALE SEWAGE & STORM-WATER MAP (CASSIMO, 2011)

FIGURE 7.10: *BAIXA* SEWAGE MANAGEMENT MAP (CASSIMO, 2011)

FIGURE 7.11: *BAIXA* STORM-WATER MANAGEMENT MAP (CASSIMO, 2011)

7.4 SITE EXPLORATION

Figure 7.12 (imagery) shows a collection of images and photographs of textures and colours in the study area. It illustrates the relevant experience, characteristics and impressions of the site and its environment. It is felt to express a layer of its rich colonial history and brings forth the rich cultural elements of the time.

Additionally, it adds to the character and unique identity of the *Baixa*, and seems to have joined well with the current social environment. All these layers joined, creates a strong contrast in perspective of what there was, and what there is now. All additions add to the current vibrant, *Baixa* identity.

FIGURE 7.12: SITE EXPLORATION (THE FRAMEWORK)

FIGURE 7.13: CORNER OF *AVENIDA GUERRA POPULAR (a)* AND CORNER OF *AVENIDA 25 DE SETEMBRO* - THE SITE (ZONDERLAND, 2011) (a) ON FIGURE 7.15

7.5 SLOPE ANALYSIS

In general, the proposed site is extremely flat (Figure 7.15). According to the historical layer, the reason for the flatness is due to the fillings done in the early nineteenth century. The soil type is alluvial deposit (Vicente et. al, 2006).

According to analysis done, it is calculated that the entire site has a slope ranging from 0% to 0.3%. In a study on the contour map, as measured by the author and the other students, it becomes clear that the street has its lowest points at intersections along *Avenida 25 de Setembro*.

To conclude, the situation causes a "water-bowl effect", in which water will accumulate at these points. Water will collect at these points, before "spilling" to surrounding areas (see Chapter 4).

Some of the contours in the study area (especially towards the west), are estimated due to a lack of accessibility. Estimation was done via a continuation of the relative known contour height and then adjusted accordingly. The 4,000 mm contour (i.e. > 4 m above sea level) in Figure 7.14 was measured to be the absolute lowest point in the *Baixa* and for that reason it is an important role player in site selection.

From the site, the site slopes:

- Gradually upward towards the west.
- Steep upward toward the north.
- No slope to the east(*Avenida 25 de Setembro)*.
- Gradual upward to the west (*Avenida 25 de Setembro)*.

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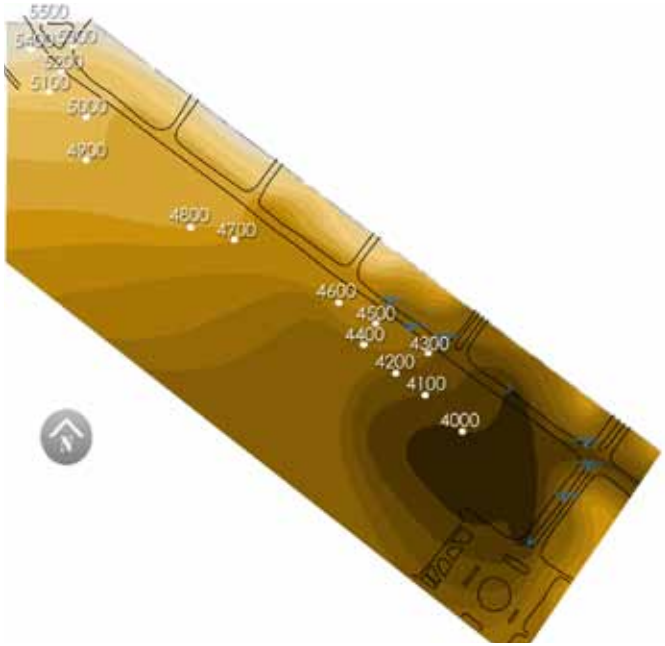

FIGURE 7.14: CONTOURS AND HEIGHTS IN COLOUR (AUTHOR, 2011)

FIGURE 7.15: CONTOURS AND SLOPE GRADIENT ON THE SITE (AUTHOR, 2011)

FIGURE 7.16: INTERSECTION OF *AVENIDA 25 DE SETEMBRO* AND *AVENIDA GUERRA POPULAR* (b) (AUTHOR, 2011) (b) ON FIGURE 7.17

7.6 VEGETATION ON SITE

The streetscape is general hard urban-surfaced area and consists of paved sidewalks, tarred streets and high-rise buildings. Patches of tree planting occur along the street (Figure 7.17). The original tree selection, being exotic species, was probably done in colonial times.

Generally the streets have the largest percentage of trees, in relation to other parts in the *Baixa*. Some private stores and services introduced neatly kept planter boxes, or planting around existing trees. Trees allow valuable shade for pedestrians and informal traders along the street.

In the framework analysis it was evident that *Avenida 25 de Setembro* is the street with the most pedestrian and vehicular movement. For this reason, the formal and informal sidewalks are more neatly kept.

The negative is that there is a minimum of new trees being planted and the existing trees are maintained and trimmed incorrectly. The project would thus allow for further introduction of trees along the street, as well as an introduction of a management plan.

It is interesting to note that in the vicinity there are no tree grids installed around tree bases. This might be introduced, if managed, but will lead to litter accumulation. It is felt that grids (in whichever case), should be used to the minimum. As another option, a layer of gravel can be introduced to allow for sufficient water and air filtration. The project site, on the contrary, is completely covered and consists mainly of wild grass with a scattering of fig trees. It is decided that this site allows for the introduction of new trees in the projected scheme.

The private *CFM offices* (to the east of the site, facing *Avenida Guerra Popular*) consist of neatly kept gardens. This is due to the fact that it is fenced off and under private care.

In general terms, it seems that exotic plants (with bright flowers and coloured leaves), thrive well in the subtropical climate of Maputo and add to the unique city character.

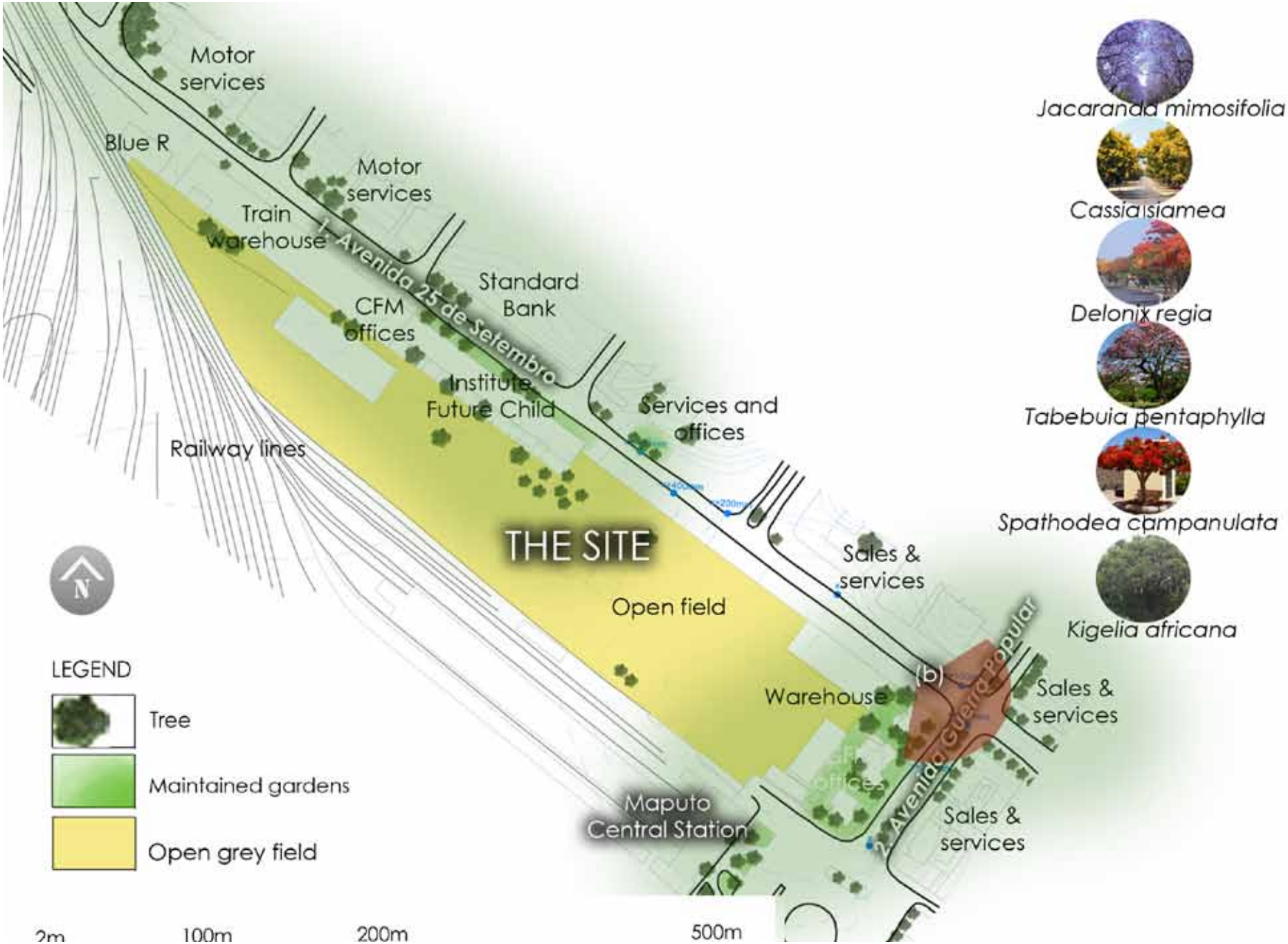

FIGURE 7.17: CURRENT TREES AND GREEN SPACES ON SITE (AUTHOR, 2011)

FIGURE 7.18: VIEW OF THE SITE FROM *AVENIDA 25 DE SETEMBRO*(c) (AUTHOR, 2011) (c) ON FIGURE 7.20

7.7 USE AND SURFACES

As mentioned previously, there is a strong contrast between the two zones within the site in terms of use and surface cover *(Heading 7.6: Vegetation on site)*.

Avenida 25 de Setembro is in general a continuation of the *Baixa's* hard urban surface and impermeable land cover (Figure 7.20). This results in a high run-off coefficient, which causes a larger amount of water to flow faster upon surfaces within the catchment. The street is characterised by the functionality of buildings with mixed use. The project site, which is allocated to form the largest part of the design, is characterised by an open grass field with scattered ruins within. This area, which is under private use by CFM, is inaccessible to the public.

It is important to develop these sites to encourage green space development and enhance ecological, social and economic aspects within the *Baixa*. It could immediately become a possible area of retreat, relieving the visitor of the hustle and bustle of the hard, historic, fine fabric of the *Baixa*.

Given the context of Maputo and the analysis, it becomes clear to the author that the allocation of a specific function or programme within the site would not always be accepted or be successful within the public realm. Especially proposing a new kind of intervention in a city like Maputo, could possibly be rejected by the community or intended users.

Failing to attend to this important issue, the project could fall in the same state of decay, similar to that of the city's Botanical Garden. The gardens, although appealing to the author, doesn't seem to receive the same amount of respect form local city users and become another "white-elephant" (Townshend, 2011), as the city's character changed. The social hierarchy in Maputo allows different social classes and different areas to adapt accordingly and this landscape should rather allow for interaction and cultural interchange.

By taking this approach, valuable insight and understanding could possibly become clear, as future landscape interventions are planned. This should serve as criteria for future designs and keep the city's unique, vibrant character and usage patterns.

Open sites and sidewalks are important pedestrian linkages and valuable to everyday functioning. Existing trees and shrubs are not only used for shade, but also used to display items such as selling and cleaning of material. In the *Baixa*, sidewalks are not only used for pedestrian movement, but also for vehicle washing and parking. Expensive trading stores, together with informal vendors, contribute to the mixed use identity of the area.

Finally, the opportunity should be used to enhance the city life of the daily *Baixa* users. It should not only serve as an urban regeneration and local upgrading agent, but also as a social, economic and environmental mediator. The site should not aim to change or introduce a new way of living in the *Baixa*, but to enhance and find alternative ways of dealing with the issues and to keep the "vibe" intact.

FIGURE 7.19: SAND AND DEBRIS IN *AVENIDA 25 DE SETEMBRO* (AUTHOR, 2011)

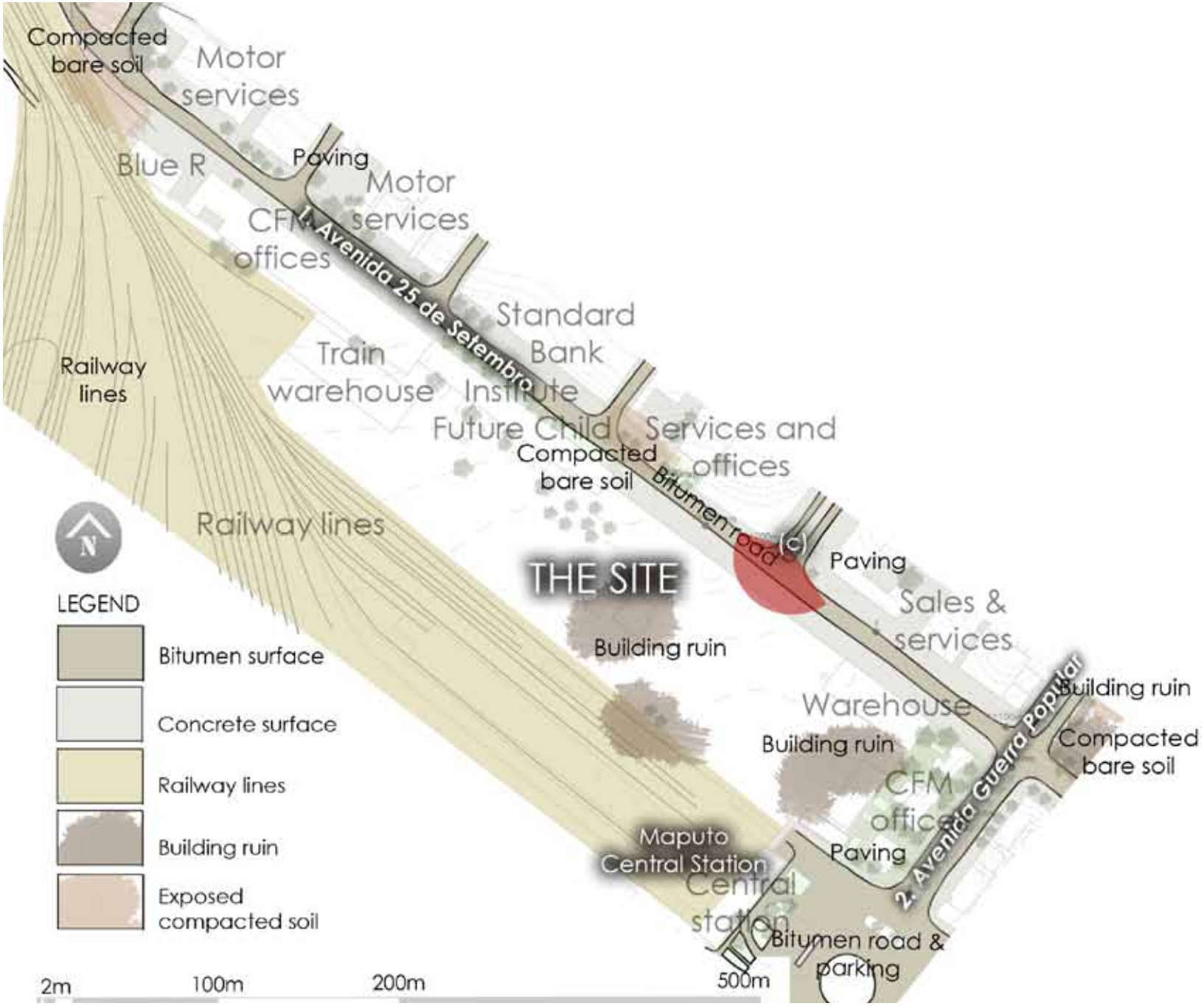

FIGURE 7.20: CURRENT USES AND SURFACES ON THE SITE WITH MAIN MATERIAL COMPOSITION (AUTHOR, 2011)

FIGURE 7.21: AERIAL PHOTOGRAPH OF *AVENIDA 25 DE SETEMBRO* LEADING TO THE WEST (DEVENISH, 2011)

7.8 NOISE, LIMITATIONS AND DANGERS

Identified uses (Noise, limitations and dangers) are illustrated in Figure 7.22.

7.9 SUMMARY

The city of Maputo, like many other African cities, has a lack of sufficient green spaces. The city of Libreville, Gabon, is an example of a city experiencing uncontrolled urban development as a result of a shortage of serviced plots, an absence of planning tools and instruments, and a lack of urban space control. The demand for housing in Libreville stands at approximately 6,000 units per year (with a population of 500,000), and available land for development is minimal (there are 14 hectares of "green spaces" per 10,000 hectares) (UNCHS , 2001).

One of the most important environmental impacts of uncontrolled urbanisation in Central Africa is its spread into fragile ecosystems, including delicate or highly erodible slopes, natural drainage waterways or valleys, and areas that are subject to flooding. Due to the intense competition for space in urban areas, green spaces are rapidly disappearing and areas usually deemed unsuitable for housing are the only refuges available for the urban poor, who are then vulnerable to flooding, landslides, and outbreaks of pests and diseases. Although planning regulations are in place, they are poorly monitored and enforced. Development in, and modification of, green areas results in changes in biodiversity, risks of pollution of soil and water, changes to soil fertility and stability and, especially in wetland areas or areas where there is standing water due to lack of sanitation, high risk of disease transmission. Dense, unstable, and poorly sited settlements are also vulnerable to the impacts of floods, landslides, and fires (UNEP , 2011).

The proposed system, of which the designed park forms part of, should not only attend to the flooding situation, but also introduce more green spaces and green networks. It is thus ideal to use the system of flood management and in-

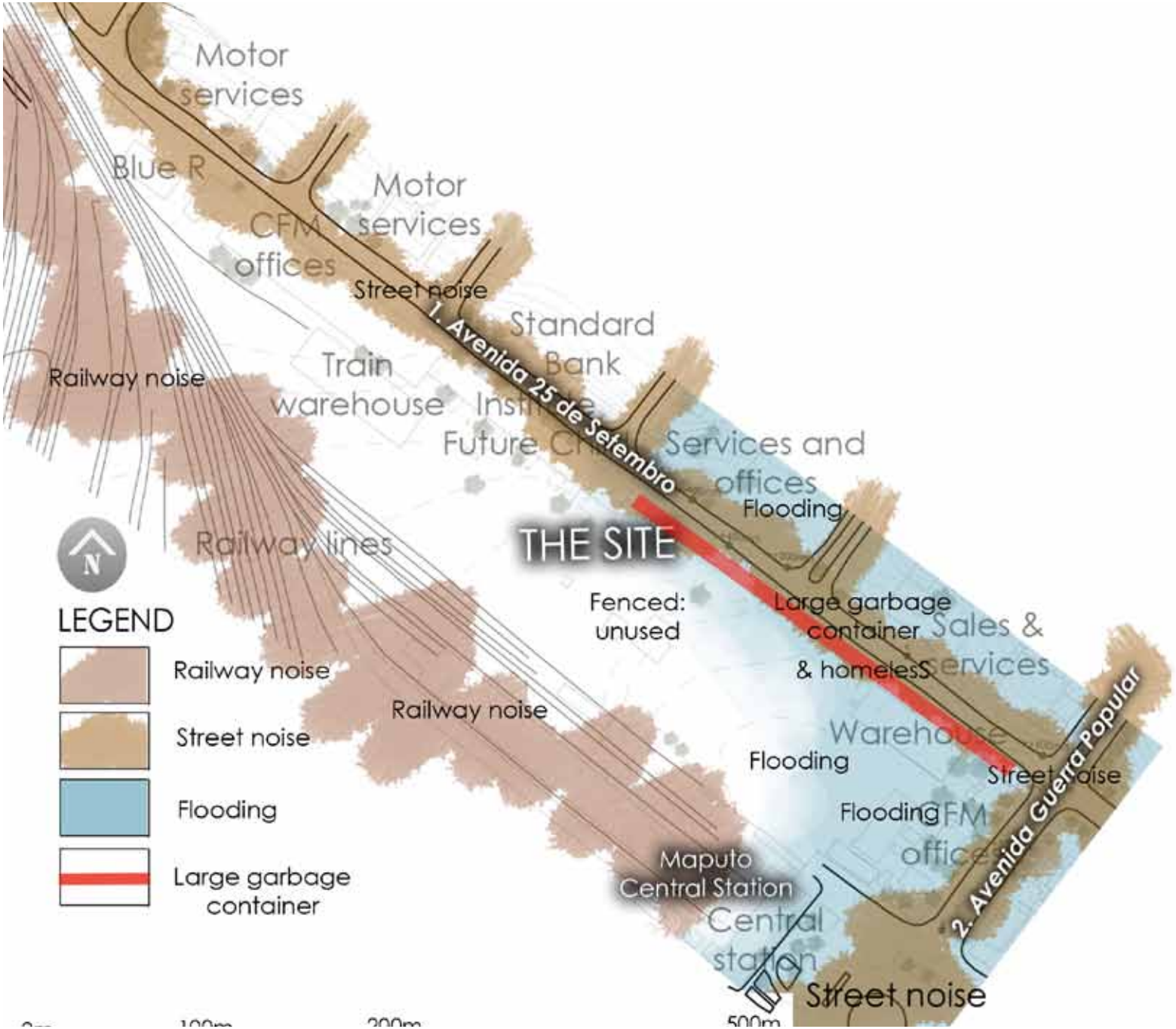

FIGURE 7.22: CURRENT NOISES AND LIMITATIONS ON AND AROUND THE SITE (AUTHOR, 2011)

corporate it with a system of parks in which water can be harvested, and then at the same time be used as a human retreat within the city.

More green spaces can be used to solve these issues and the same time introduce people to the systems of natural function. Through the project, people can be made aware of the ecological, social and economic aspects affecting their city and that sufficient planning need to be implemented by future generations.

Currently, the projected site is not used at all. The initial plan is to expose the important elements acting on the site and make the site an important node within the city. These elements include movement patterns, making use of existing historical buildings, keeping endemic planting and use of materials. The project could possibly become a place of orientation or a landmark within the city. At the same time the visitor should subsequently be made aware of his or her surroundings on both macro and micro scale. These include the smells from the harbour and bay to the sounds of drums and hooting traffic.

The main focus of *Avenida 25 de Setembro* will be to channel water and act as a threshold to the site. The street would be introduced as a green spine, flowing throughout the *Baixa*. Within this framework, new greens spaces and development would be able to "plug" in.

7.10 CONCLUSION

The proposed system, which the designed park forms part of, should not only adress to the flooding situation, but should also introduce more green spaces. It is thus ideal to use the system of flood management and incorporate it with a system of parks in which water can be harvested, and then at the same time be used for human retreat within the city.

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FIGURE 8.1: *PRAÇA 25 DE JUNHO* (25 JUNE SQUARE) (DEVENISH, 2011)

CHAPTER 8_
THEORY APPLICATION: DESIGN DEVELOPMENT

FIGURE 8.2: VIEW OF MAPUTO FROM THE BAY (AUTHOR, 2011)

8.1 INTRODUCTION TO SITE SELECTION

In context of the design procedure, a whole range of options and alternatives was tested and analysed during the design process.

8.1.1 CITY SCALE STRATEGY: A

As first option, the site at the waterfront illustrated as "Area a" in Figure 8.3 was investigated. The site, currently the existing harbour storage area, consists mainly of warehouses, offices and a large open, hard surface.

The original idea was to create an urban park for the *Baixa* which would act as the "Central Park" of Maputo (similar to Central Park in New York, United States of America by designer, *Olmstead*). It was planned that the site would make use of the proposed *Rambla's* system to catch storm and flood water. Water would then be cleaned and discharged into the Ma-

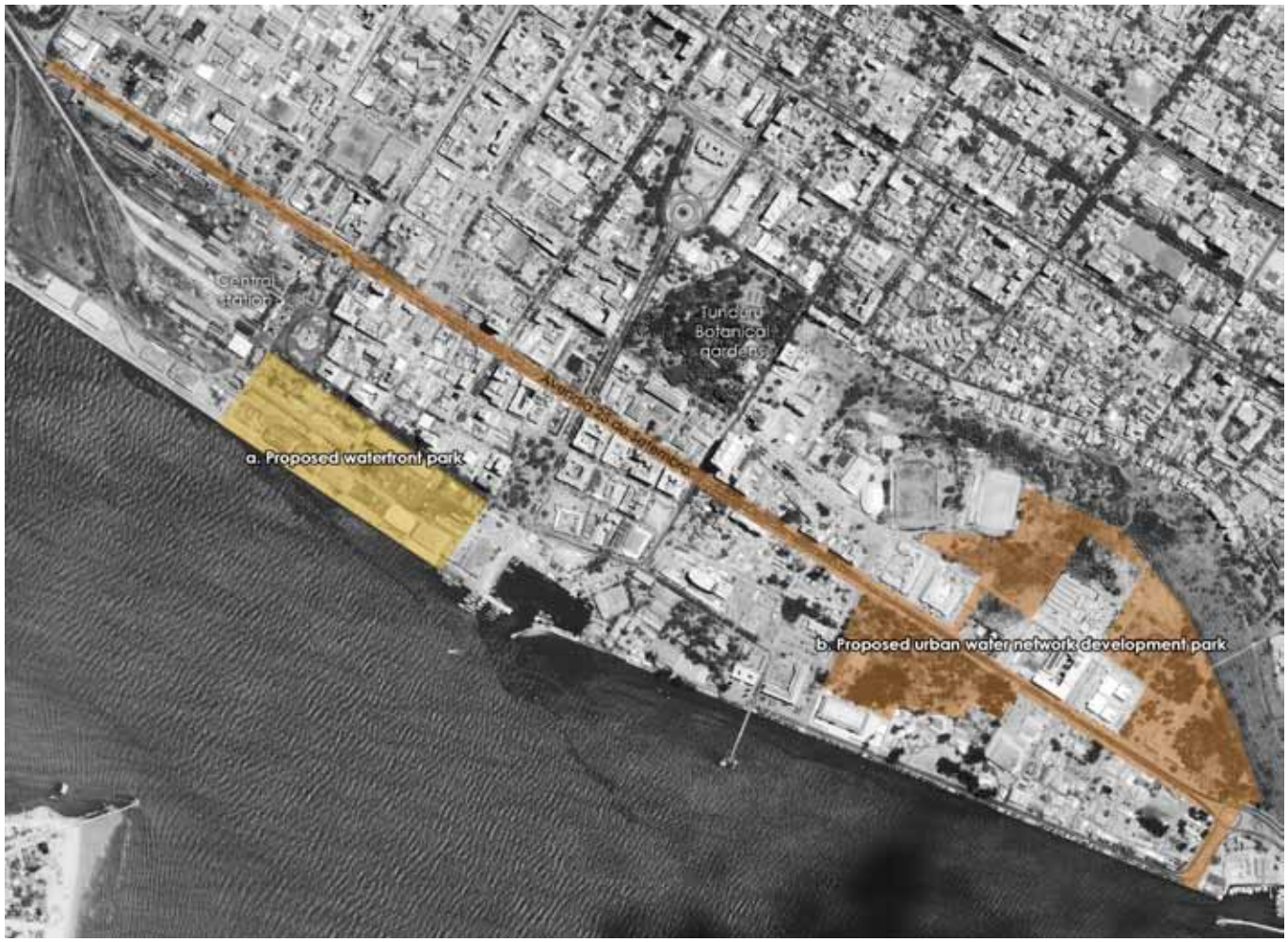


FIGURE 8.3: PREVIOUS SITES CONSIDERED (AUTHOR, 2011)

puto Bay area and simultaneously serve as a recreational and aesthetic element within the inner city. It was later decided to add an ecological layer (Figure 8.5) by creating an intertidal zone and wetland. A layer to introduce a ecological biodiversity into the park and mimic natural processes. The project was reconsidered. Important aspects learned and carried over from this specific intervention were:

- Project should deal with flooding and storm water and utilise it (Figures 8.4 and 8.6).
- Determined that flooding is caused by blocked and insufficient infrastructure.
- The introduction of an ecological layer by making use of elements such as wetlands.
- Keeping the historic layer.
- Addressing the issue of mosquitos by encouraging water movement.
- Adaptive use such as seasonal change and specific programme requirements (Figures 8.7, 8.9 and 8.10).
- Options available in addressing the relative high mean sea-water level (Figure 8.8) which is proposed through pumping water and making use of solar energy.

Figures 8.11 and 8.12 (see following pages) show the related presentation done on this scheme, earlier in 2011. Although presented earlier in the year, it was a valuable process generator and final design contributor.

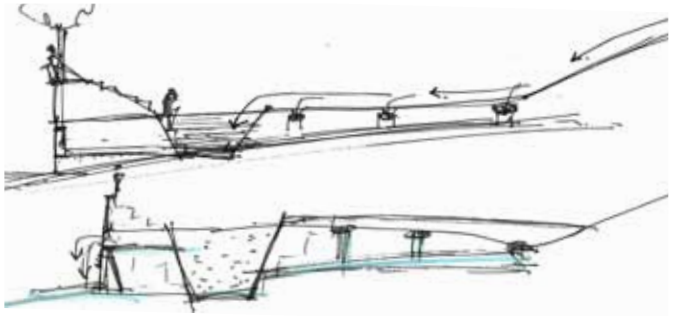


FIGURE 8.4: INITIAL CONCEPTUAL SECTION OF PIPING SYSTEM (AUTHOR, 2011)

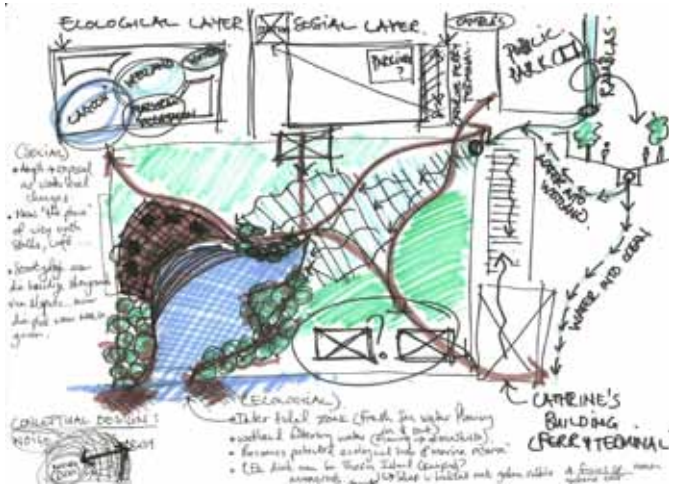


FIGURE 8.5: LAYER DEVELOPMENT AT HARBOUR (AUTHOR, 2011)

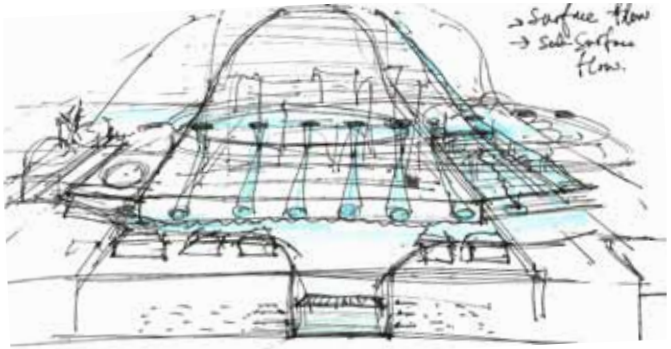


FIGURE 8.6: STORM-WATER MANAGEMENT CONCEPT (AUTHOR, 2011)

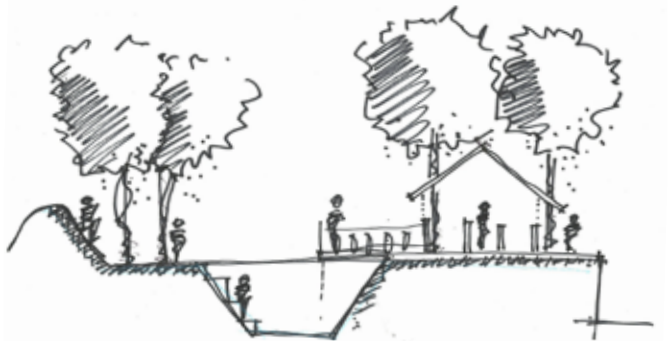


FIGURE 8.7: CONCEPTUAL SECTION OF WATER-HOLDING PARK (AUTHOR, 2011)

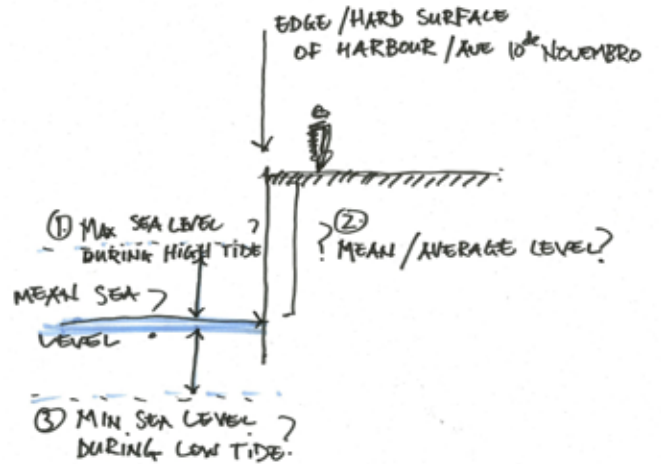


FIGURE 8.8: MEAN SEA WATER LEVEL (AUTHOR, 2011)

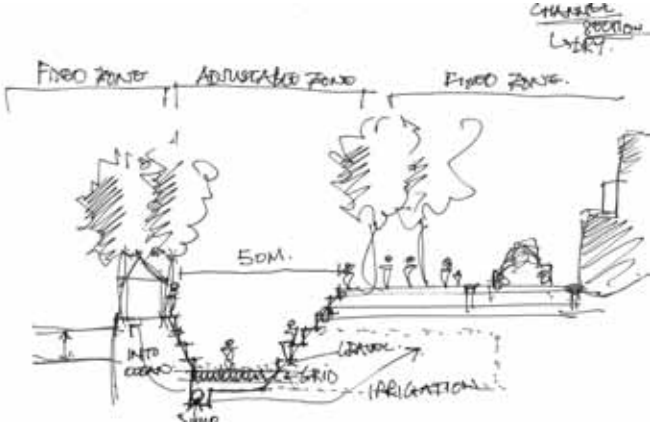


FIGURE 8.9: DRY SEASON PARK USE (AUTHOR, 2011)

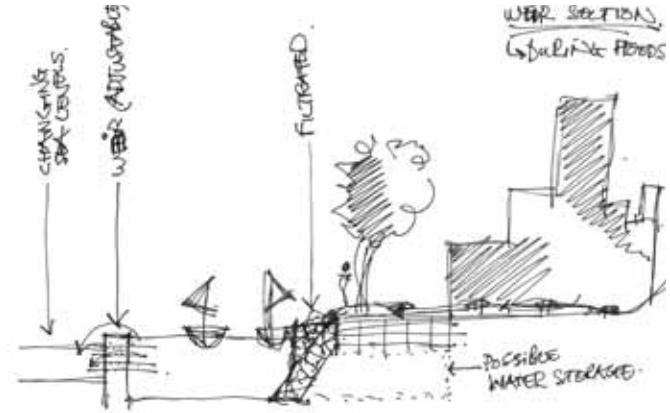
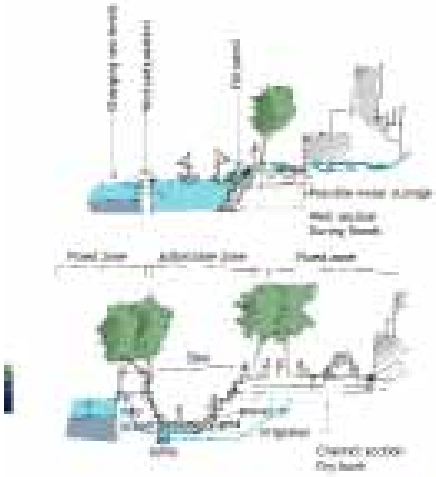


FIGURE 8.10: WET SEASON PARK USE (AUTHOR, 2011)

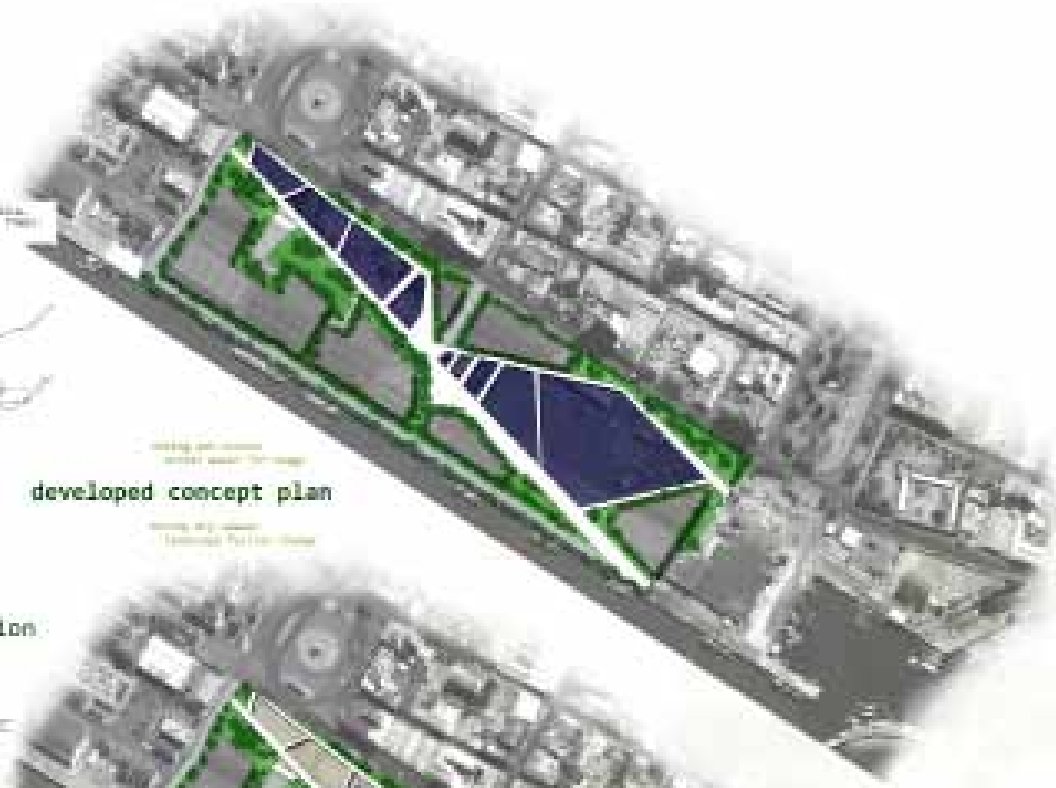
FIGURE 8.11: DESIGN PRESENTATION 1, MILESTONE 2 (AUTHOR, 2011)


site & context
landscape map
Wessel Oosthuysen

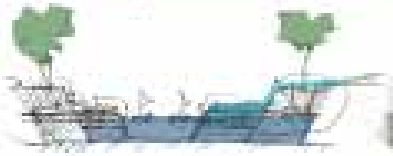
FIGURE 8.12: DESIGN PRESENTATION 2, MILESTONE 2 (AUTHOR, 2011)

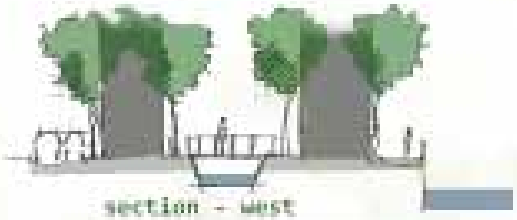


developed concept plan



enough capacity for water section





section - west

section - east

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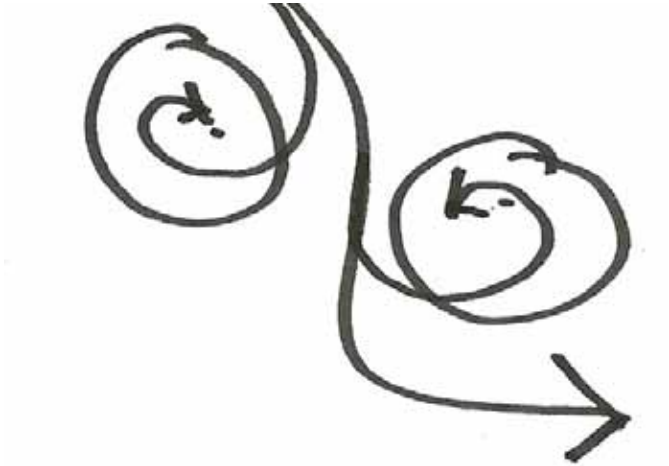


FIGURE 8.13: INITIAL CONCEPT OF REVISION 2 (AUTHOR, 2011)

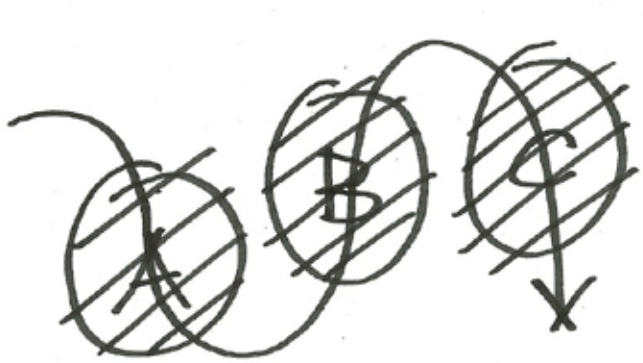


FIGURE 8.14: SECOND INITIAL CONCEPT OF REVISION 2 (AUTHOR, 2011)

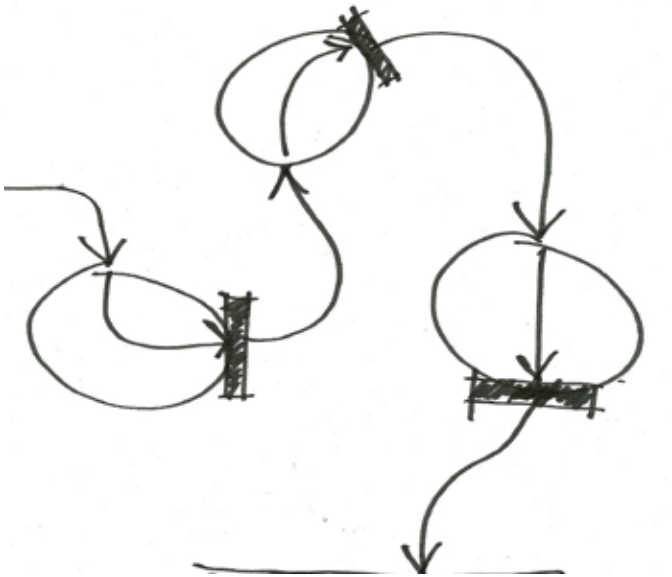


FIGURE 8.15: FINAL CONCEPT OF REVISION 2 (AUTHOR, 2011)

8.1.2 CITY SCALE STRATEGY: B

After further investigation it was decided that a better solution to the flooding should be found. The possibility of introducing a larger scaled solution was considered (Figure 8.23).

This proposal derived the possibility of a larger scaled water-retention system and allowed for the originally planned green network to infiltrate. In this intervention proposal, it is planned that water will flow into *Avenida 25 de Setembro* and then be diverted towards the east. Water is proposed to flow through a series of channels, wetlands and retention ponds and the then finally, discharged (Figures 8.13 to 8.15 & 8.22).

The main issue of this approach was height. Height, or the lack thereof, posed the biggest threat to a landscape intervention of this scale. The irregular height difference of the street, the long distance water had to travel and the high water table, served as the biggest issues.

It was estimated that the *Baixa* only had a depth of 3 to 4 meters to work with, given the mean sea level. In addition, the author had the following issues to deal with: ground water pressure, filtration, the area's flatness, soil fertility and structurally sound soil.

The end result of this revision resulted in the decision to make use of the larger system, but to dissipate the whole into smaller satellite interventions. The concept was kept.

Important aspects that was learned and carried over, was:

- Working on a larger scale to address or lower the flooding problem in the *Baixa*.
- Systematic approach rather than a single intervention.
- Water channels (from streets) should enter sites at a reasonable height below surface. Inlet levels, entering too deep, will make sufficient park and water use difficult.
- Water needs to be cleaned (Figure 8.19 & 8.20).
- The use of an open, fast flowing, water channel that could easily be cleaned and maintained. Minimum use of grids or pipes should be encouraged (Figure 8.18 & 8.21).
- The system should be able to accommodate large water amounts. For that reason, it was decided to rather make use of the city scale (Figure 8.16 & 8.17).
- A larger scaled water system would introduce the ideal opportunity to encourage green infiltration and allow for new developments to take place around it.

Figure 8.23 (on the following page) shows the presentations done on this relevant proposal.

8.1.3 CITY SCALE STRATEGY: C

Figure 8.24 illustrates the next strategy's presentation that was considered. It shows the utilisation of the open site, that later became the final site of intervention.

FIGURE 8.16: REVISED WATER PARK SECTION (AUTHOR, 2011)

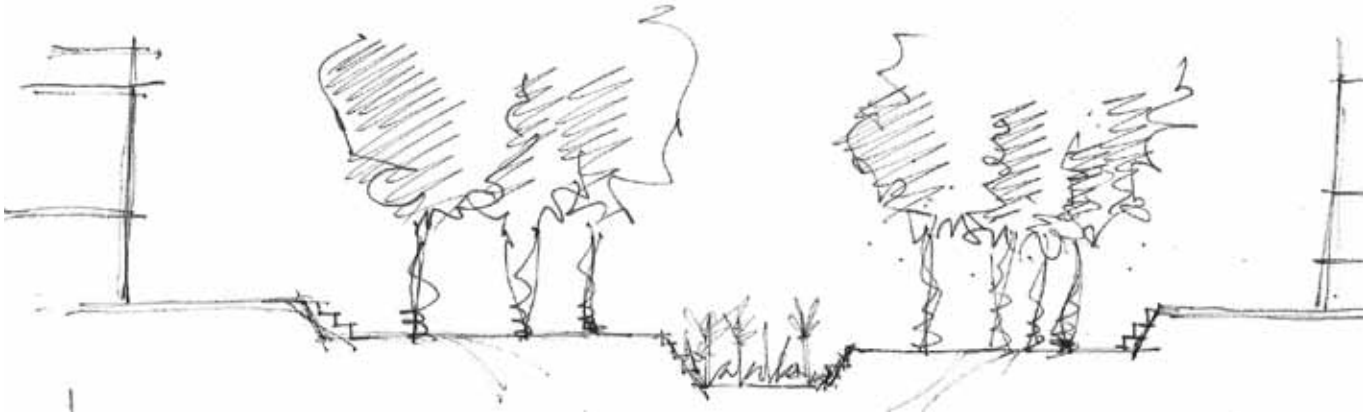


FIGURE 8.17: SECTION OF REVISED WATER PARK - WETLAND (AUTHOR, 2011)

FIGURE 8.18: PROPOSED STREET SECTION OF *AVENIDA 25 DE SETEMBRO* (AUTHOR, 2011)

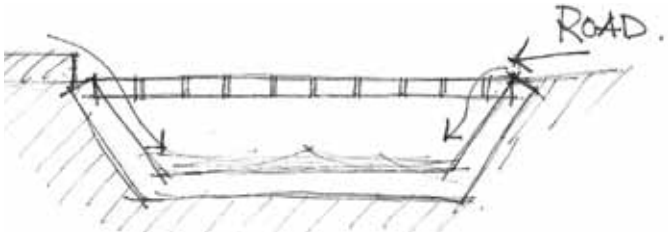


FIGURE 8.19: GRID SYSTEM CURRENTLY IN THE STREET (AUTHOR, 2011)

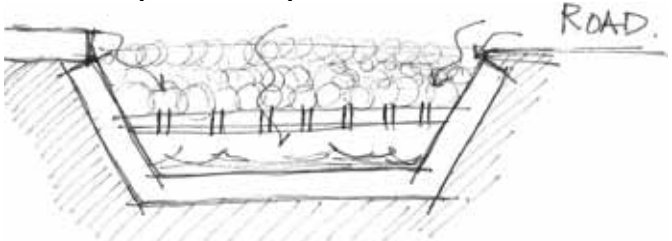


FIGURE 8.20: POSSIBLE CLEANING GRID SYSTEM IN THE STREET (AUTHOR, 2011)

FIGURE 8.21: PROPOSED WATER CHANNEL IN THE STREET (AUTHOR, 2011)

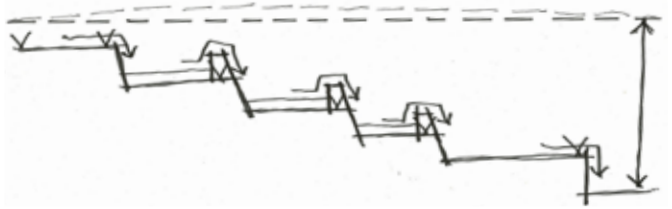


FIGURE 8.22: INITIAL CONCEPTUAL WATER SYSTEM (AUTHOR, 2011)

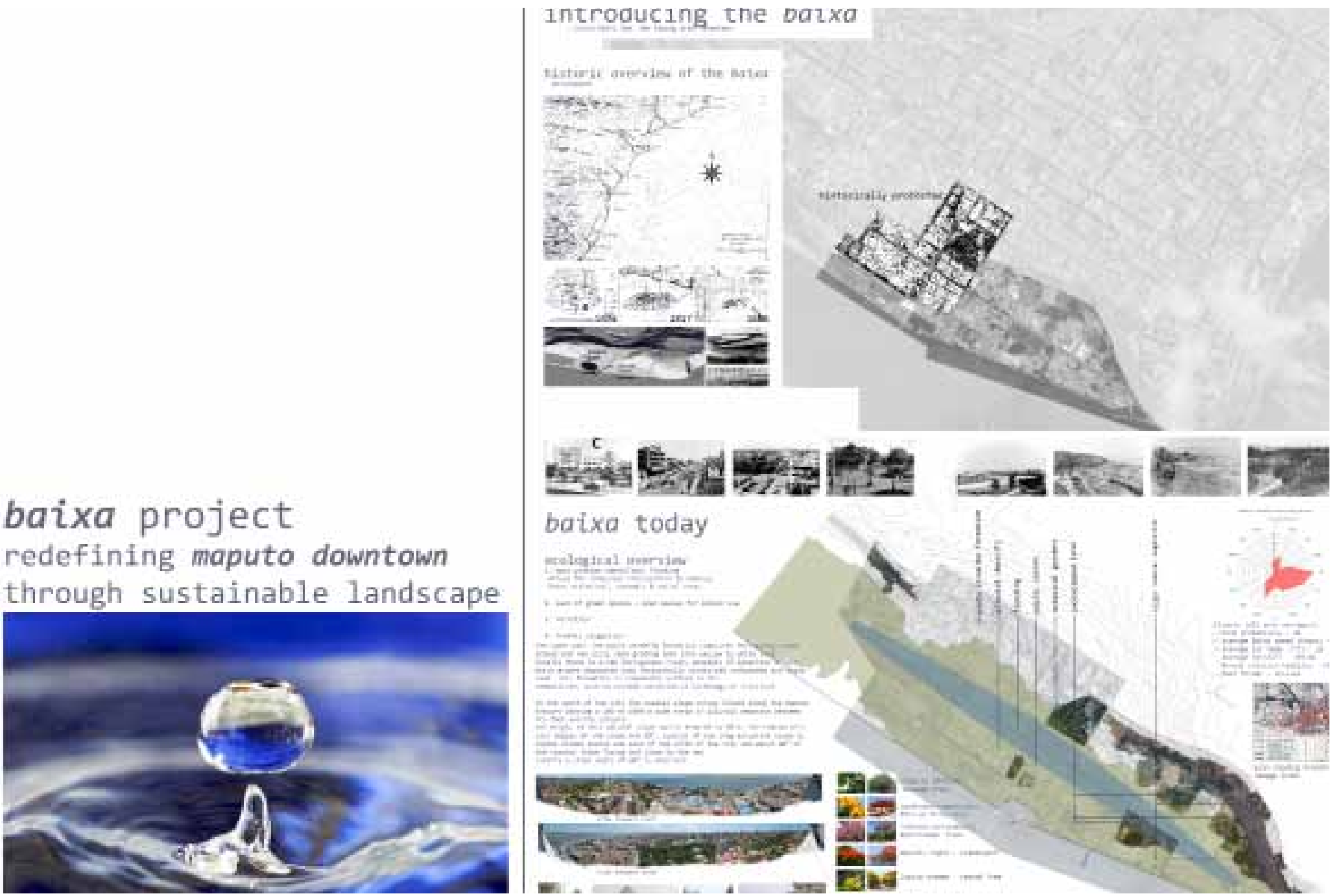
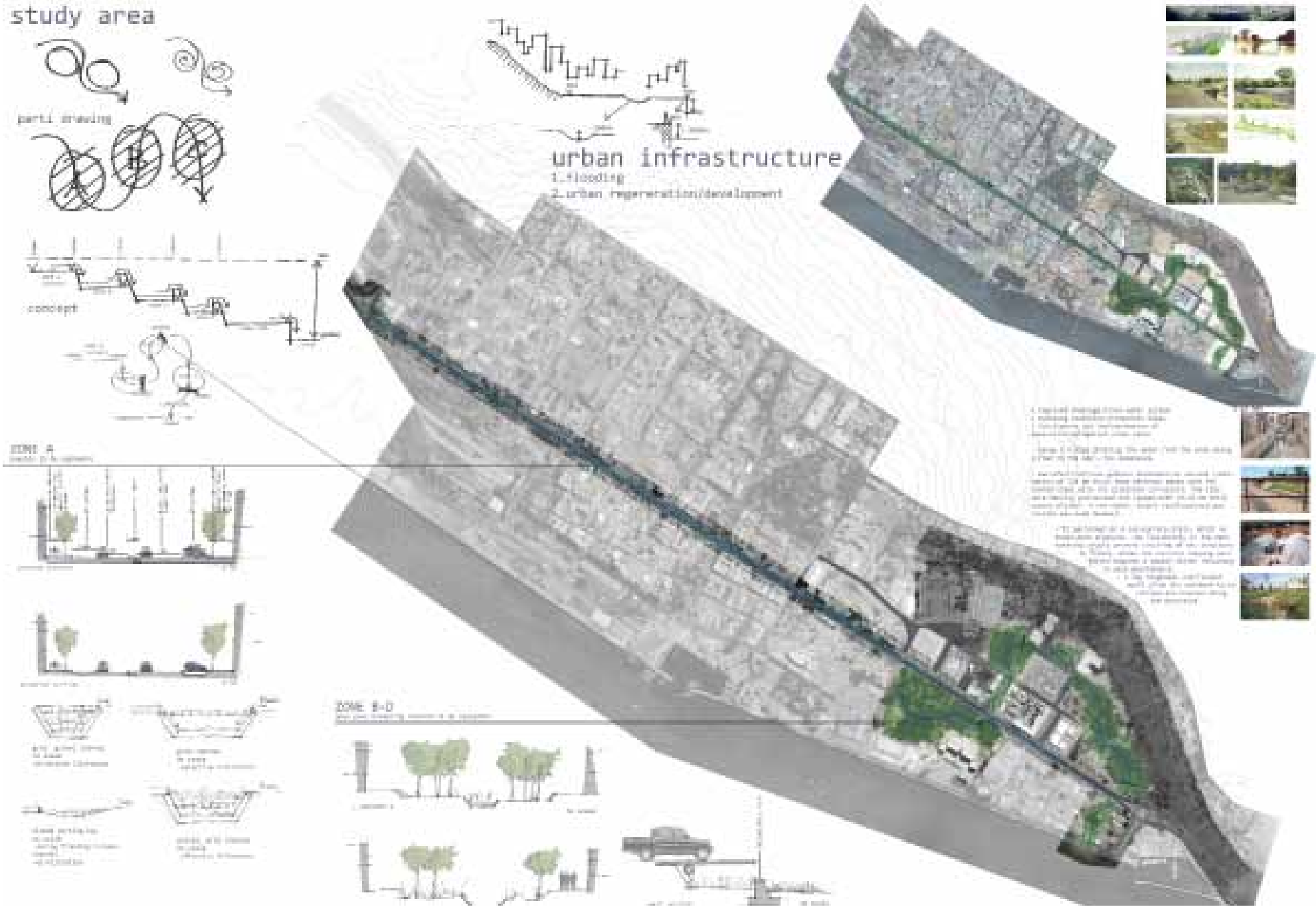


FIGURE 8.23: DESIGN PRESENTATION 1, MILESTONE 3 (AUTHOR, 2011)


study area
parti drawing
concept
urban infrastructure
1.flooding
2.urban regeneration/development
ZONE A
ZONE B-D

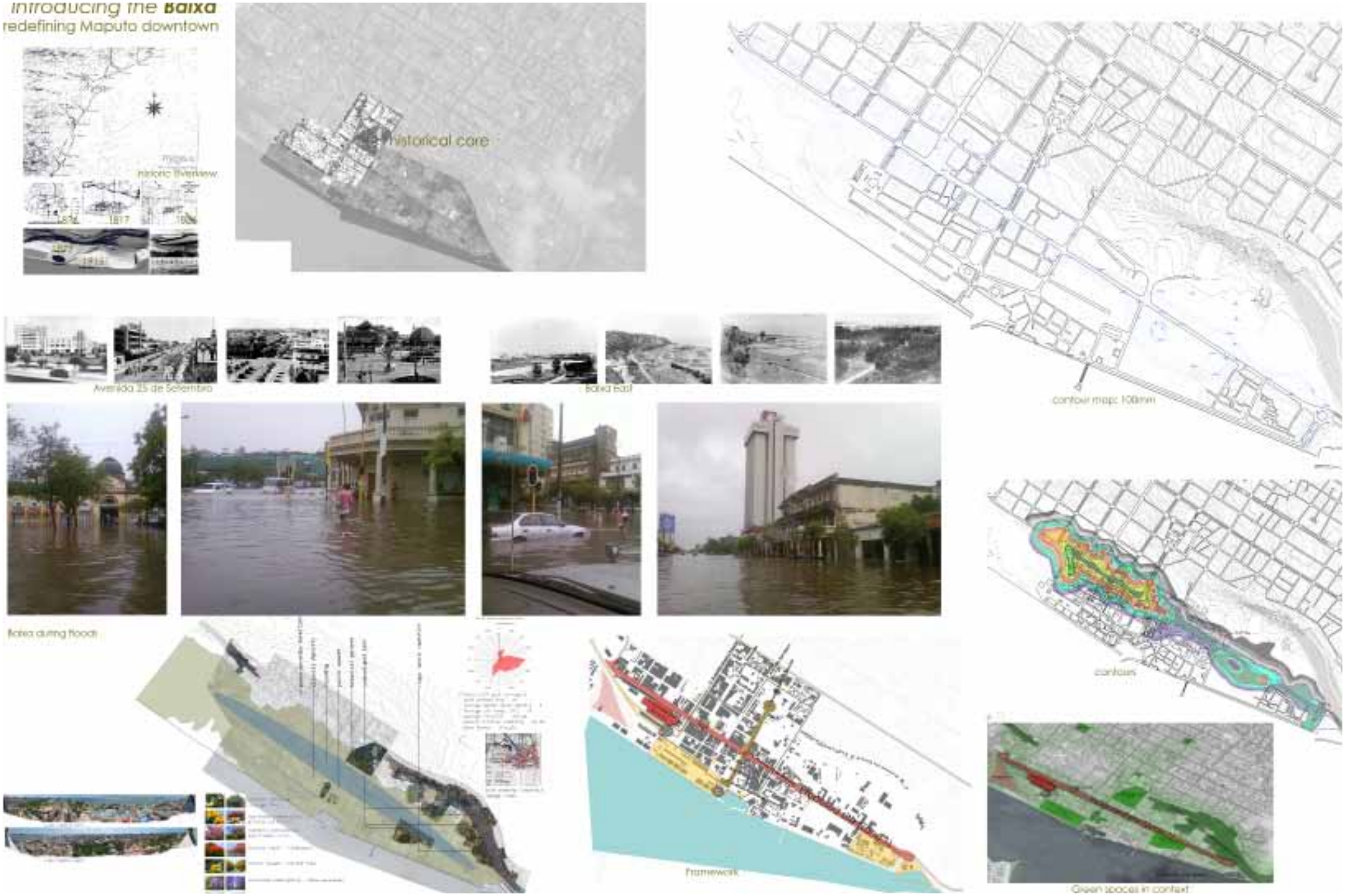


FIGURE 8.24: DESIGN PRESENTATION 1, MILESTONE 4 (AUTHOR, 2011)


urban infrastructure
1.Flooding
2.urban regeneration/development
AVENIDA 25 DE SETEMBRO
urban sketch plan
1 : 1 500

8.2 CITY-WIDE SCALE PROCESS

The area of catchment and quantities of water, made it compulsory to add more water-holding sites to the system (Figure 8.25). Due to time and technical constraints a single, proposed site was chosen. This site would then act as a precedent to the other sites identified.

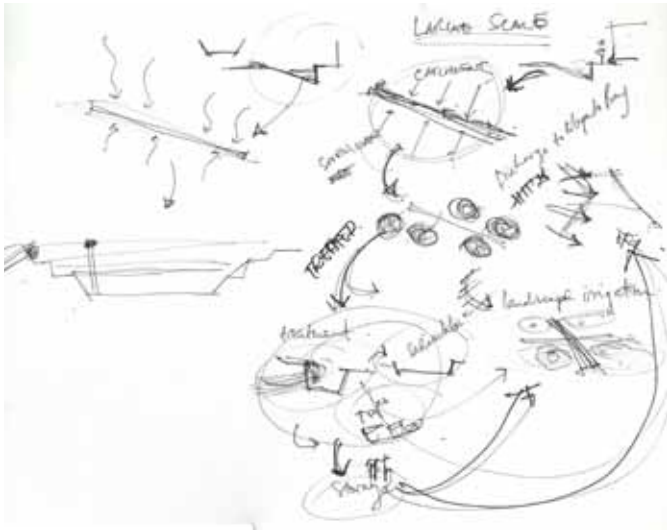


FIGURE 8.25: CITY SCALE INITIAL *PARTI* DIAGRAM (AUTHOR, 2011)

8.3 CITY-WIDE SCALE DESIGN GENERATORS

The following elements shaped the design:

- The storage of water and the systematic approach flooded street water and the treatment of it.
- Its location on the *Baixa* edge, centrally located between the central train station and the developing West.
- Contemporary, innovative and regenerative qualities adding to the upliftment of the region.
- Versatility and adaptive properties.

Now that a more defined problem was identified and design-specific solution was in progress, a city scale intervention could be weighed and tested.

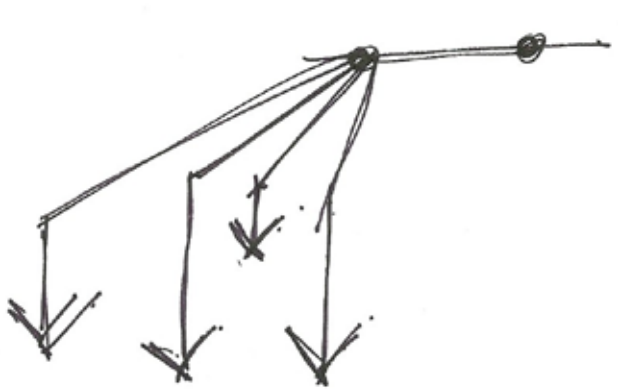


FIGURE 8.26: CITY SCALE INITIAL *PARTI* DIAGRAM (2), (AUTHOR, 2011)

8.4 CITY-WIDE SCALE *PARTI* DIAGRAM

The original *parti* diagram illustrated in Figure 8.26 conceptually shows the original intention of a green spine that originates at the ridge to the east and flows and dissipates into the *Baixa*.

The revised and final *parti* diagram, as illustrated in Figure 8.27 shows the developed thinking into the current situation and what possibly could be achieved. It illustrates the current situation that was identified and how the city separated the natural elements, which include greenery and public spaces. It is proposed that nature should rather interchange with the urban elements, than be divided.

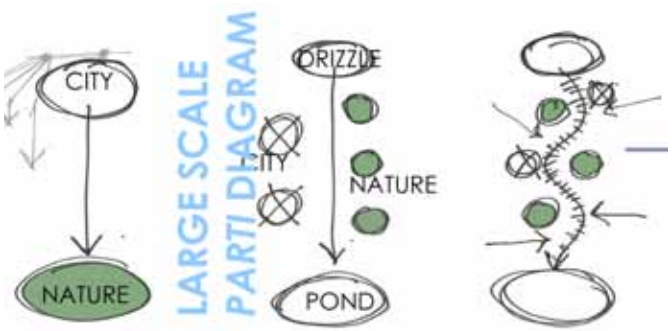


FIGURE 8.27: CITY SCALE FINAL *PARTI* DIAGRAM (AUTHOR, 2011)

8.5 FINAL CITY-WIDE SCALE PLAN

Figure 8.28 illustrates the finalised water strategy plan.

Problems solved:

- Large amounts of water to be allocated to different locations.
- Water not travelling unrealistic, long distances. Shorter travelling distances between the different water-holding sites, will allow for more accurate water accumulation and a lower gradient water channel.
- Larger system to introduce a green network.
- Interventions can be interlinked to allow for overflow of water into other sites. Excess will be discharged into the ocean after us age.
- Different sites will have different individual identities and characteristics, according to their surrounding environment. The proposed site will consist of a wetland, while other interventions might not require one as sediment could be used for agricultural purposes.

In summary, the images presented in Figures 8.29, 8.30 and 8.31 show the city scale, design process that lead to the final city scale strategy.

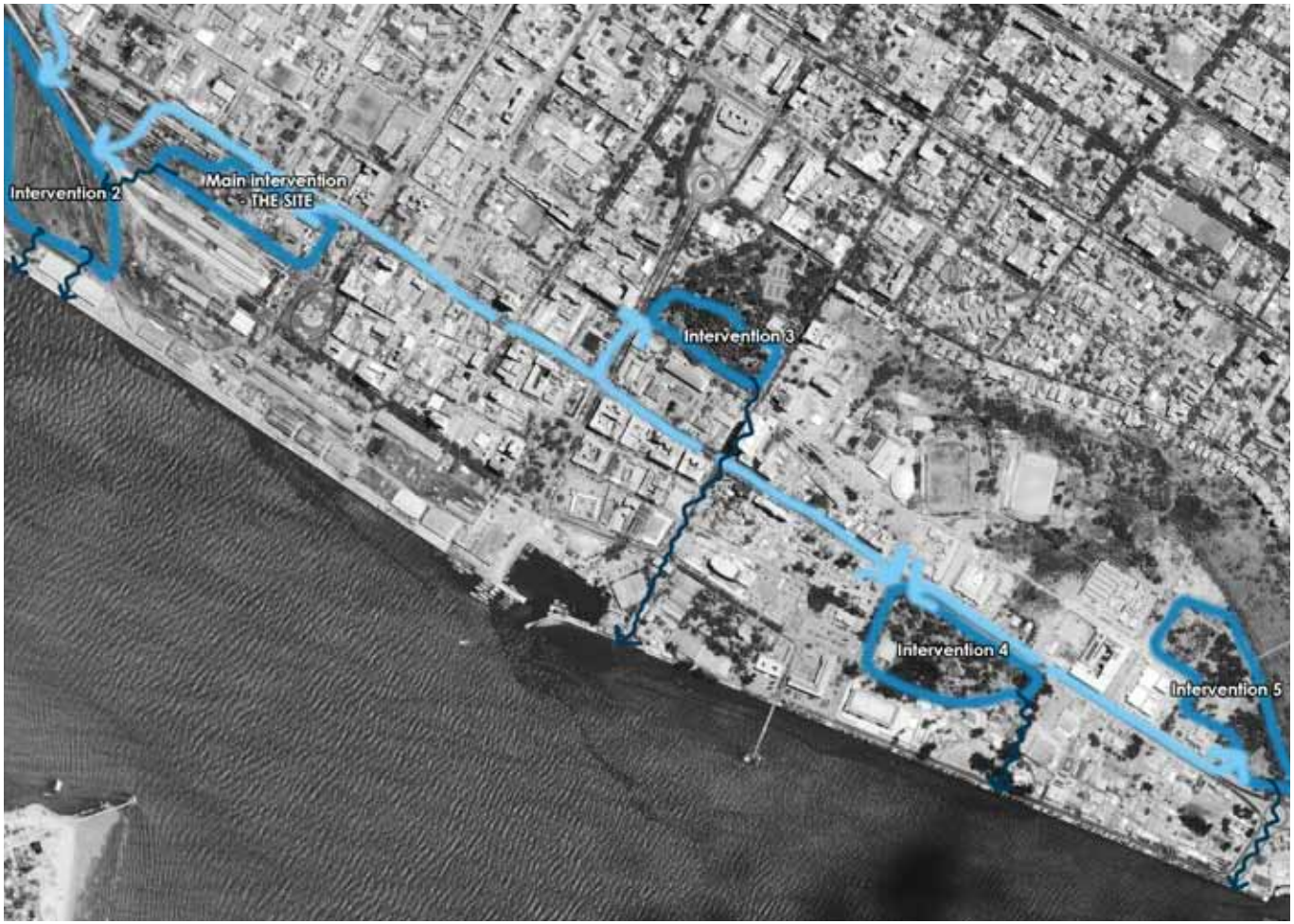


FIGURE 8.28: CITY SCALE FINAL REVISION (not to scale) (AUTHOR, 2011)

8.5.1 CITY-WIDE SCALE REVISION 1

Figure 8.29 depicts Revision 1. The proposed *Rambla* project along *Avenida Samora Machel* could be revised to transport water via a surfaced or sub-surfaced system. Water would then enter the proposed intervention at the harbour, be cleaned, utilised and discharged.

The problems that were encountered:

- Not addressing the water problem.
- Inadequate location for water harvesting.
- Insufficient subsurface (section of site is built on poles).

8.5.2 CITY-WIDE SCALE REVISION 2

A systematic approach was taken to reach Revision 2 (depicted in Figure 8.30). Water along *Avenida 25 de Setembro* will be channelled along the street. The parking along the street area would be alternated to become water channels, but will also keep its function as parking bays. The sidewalks and streets will be kept as is currently, but a sloped channel will allow water to flow through a series of dams. Water would be cleaned, harvested and discharged.

Problems that were encountered:

- The steep slope along the north-eastern boundary of Intervention 2 will cause the channel to enter the site at a too deep level.
- Water has to travel too long a distance still using a flat gradient, water will enter the sites at a level too deep. It was calculated that water will enter the site at the main intervention at 3 meters below surface.
- One channel would be insufficient for the water volumes.

8.5.3 CITY-WIDE SCALE REVISION 3

The change in site selection came from the June 2011 site visit. It was now clear where the lowest points of water allocation was and also where water would flow. Figure 8.31 illustrates that the intervention location, would be ideal for water collection by still making use of the parking-channel system.

Problems that were encountered:

- Too much water for a single, but larger site.
- Water to travel a long distance Slope of 1:500, will enter the site at too deep level.
- One channel would be insufficient to accommodate and transport water.

FIGURE 8.29: CITY SCALE REVISION 1 (AUTHOR, 2011)

FIGURE 8.30: CITY SCALE REVISION 2 (AUTHOR, 2011)

FIGURE 8.31: CITY SCALE REVISION 3 (AUTHOR, 2011)

8.6 SITE SCALE *PARTI* DIAGRAM

The final *parti* diagram abstraction (Figure 8.34) is derived from the irregular street layout (Figure 8.32 & 8.33) in the *Baixa* core. The reason was to create a relation between the historical core and the new proposed site and act as an intangible, metaphysical and historical layer.

It was decided to keep the *parti* diagram and approach throughout the whole of the design process as is evident in the earlier design proposals.

The *parti* is applied to every level of design in a simplified form. Thus it is aimed to keep certain aspects of history (through physical design), but simultaneously develop the innovative, urban regenerative design concept.

FIGURE 8.32: *BAIXA* STREET CONCEPTUALISING (AUTHOR, 2011)

8.7 SITE SCALE DESIGN GENERATORS

As mentioned, the final site selection was based on the author's contour measurements, completed in June 2011 once the lowest point in the *Baixa* was known.

The chosen site, currently fenced off and unused, acts as an ideal location for one of these urban water parks and longed for unification and use. According to the author, its openness should to be protected, enhanced and celebrated. After these two trial-and-error presentations a final proposal could be synthesised.

The main (on-site) design generators are:

- Need for a water-holding area.
- Need for a wetland and other water-cleansing elements.
- Estimated pedestrian movement patterns.

The main (off-site) design generators are:

- Baixa road layout.
- Street water-channel heights and inlet levels.
- External influences from nearby institutions, such as the central train station, the need for public open space and proposed new developments.

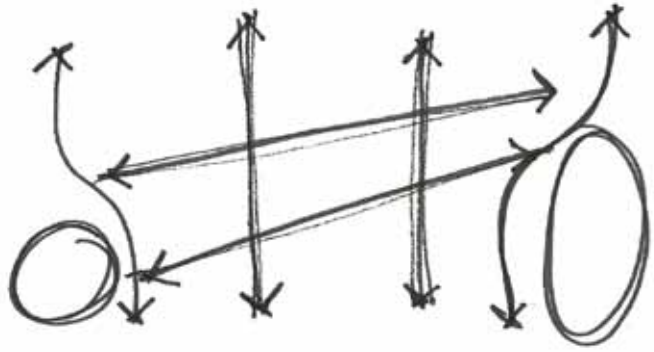


FIGURE 8.33: INITIAL PROJECT *PARTI* DIAGRAM (AUTHOR, 2011)

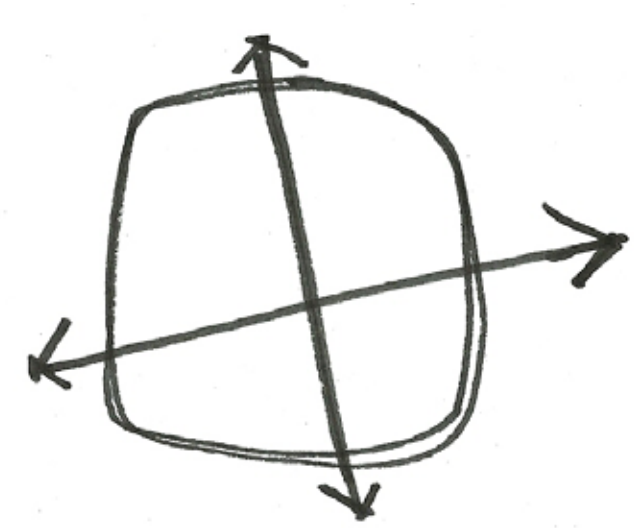


FIGURE 8.34: FINAL PROJECT *PARTI* DIAGRAM (AUTHOR, 2011)

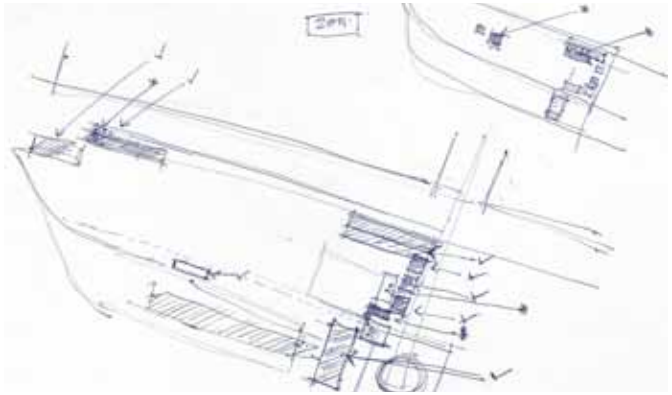


FIGURE 8.35: CURRENT SITE PLAN (AUTHOR, 2011)

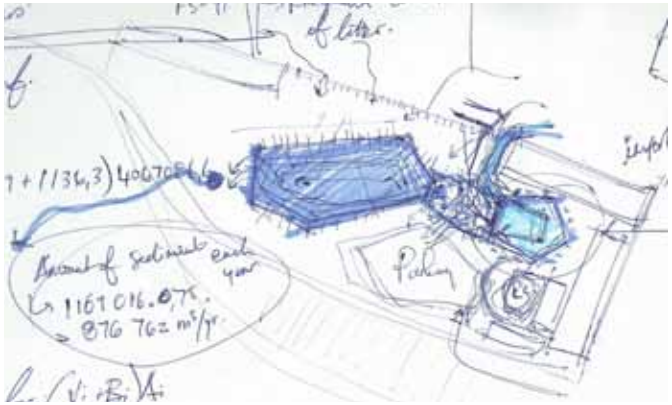


FIGURE 8.36: CONCEPT PLAN (AUTHOR, 2011)

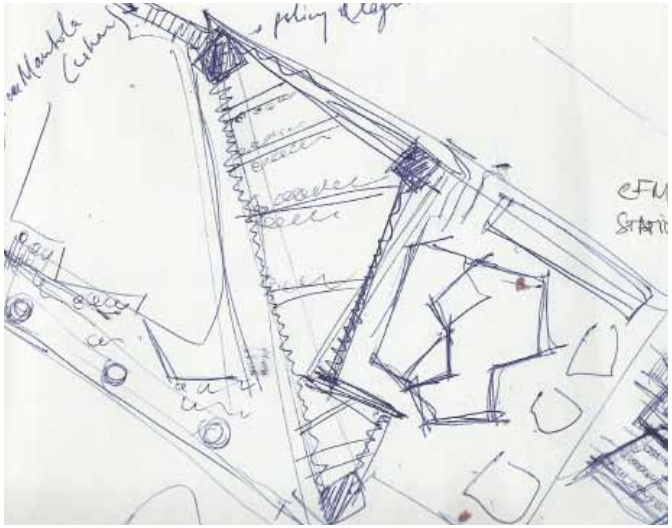


FIGURE 8.37: SITE PLAN REVISION 1 (AUTHOR, 2011)

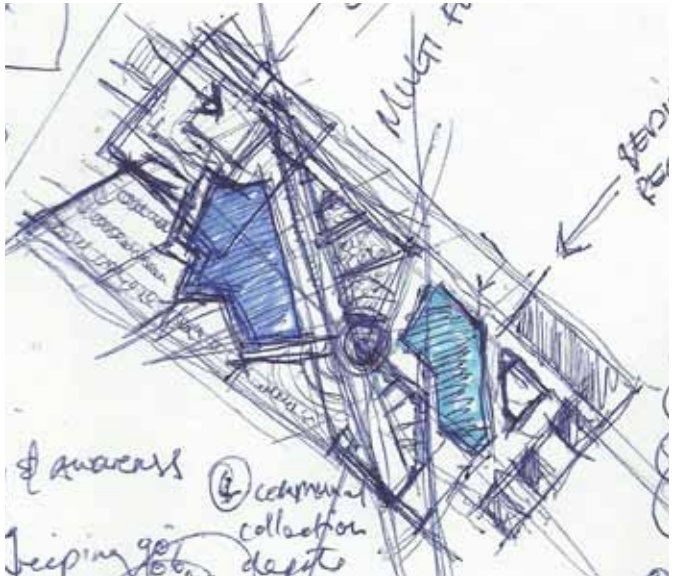


FIGURE 8.38: SITE PLAN REVISION 2 (AUTHOR, 2011)

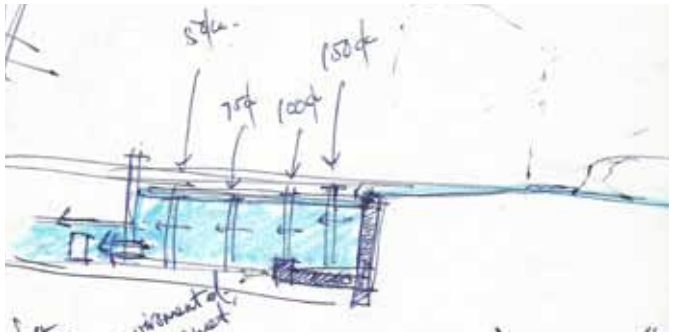


FIGURE 8.39: INITIAL LITTER TRAP SYSTEM (AUTHOR, 2011)

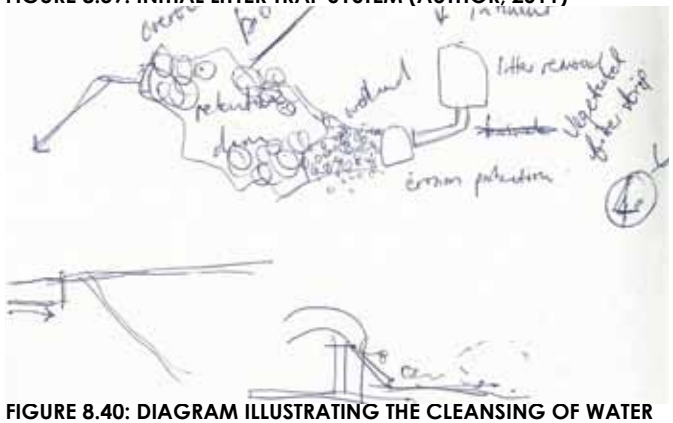


FIGURE 8.40: DIAGRAM ILLUSTRATING THE CLEANSING OF WATER (AUTHOR, 2011)

8.8 SITE PLAN (SITE SCALE) PROCESS

The current site plan (Figure 8.35) shows a hand-drawn sketch of the site and how the space was identified. The specific figure shows notes made by the author, as to which buildings were to be kept and which buildings were to be demolished.

Figure 8.36, the original concept plan, shows the water body and wetland as initially placed by the author. A parking area was proposed to the south-east of the site and the existing CFM offices unchanged.

Figure 8.37 is a revised plan on the previous. It shows a defined pathway as derived from the *parti* diagram. It was decided that a preliminary sediment pond or wetland should strategically be placed in front of the CFM offices to the right of the site. It was also designed that the pathways should end in nodes to better define the area.

Figure 8.38 refines the plan from the previous version. The design was made "stronger" by articulating lines by repeating and widening paths. Structure was given to all elements to blend. A proposed parking area was moved to the north-west of the site, together with a proposed new building complex at the back of it.

In Figure 8.39 & 8.40 the author calculated the amount of litter that will be accumulate in the litter traps. It was initially believed that a single litter trap would be efficient for all street residue removal. After further analysis and investigation it became clear that the system should include a sediment, litter and grease trap (and wetland, depending on aesthetic requirements and use of water).

Figure 8.41 introduced a natural element of curvilinear lines into the project, as "relief" from the straight lines, used throughout. The water channel entering the site posed to be the ideal opportunity.

Figure 8.42 and 8.43 shows the investigation

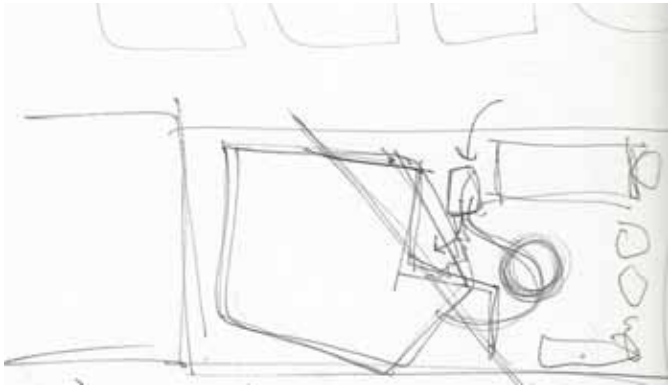


FIGURE 8.41: SITE PLAN REVISION 3 (AUTHOR, 2011)

FIGURE 8.42: VERTICAL WETLAND (AUTHOR, 2011)

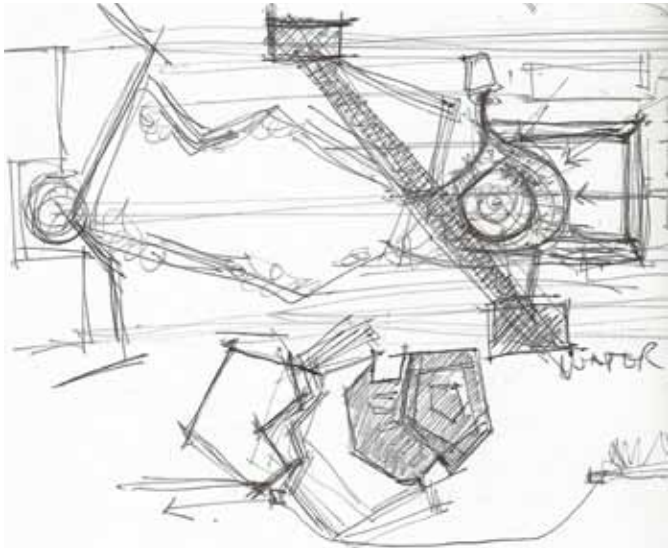


FIGURE 8.43: SITE PLAN REVISION 4 (AUTHOR, 2011)

and implementing of a "vertical wetland", innovated by the author. The wetland would have water entering it from the channel and then in circular formation, flowing downward. Clean water would flow into the water-holding area.

The developed design thus far was presented (Figure 8.44) for Milestone 3 (From Figure 8.24). It shows a clearer design and structure, set out by the author in terms of pathways, parking, on-site programming and surrounding buildings.

A recycling centre is proposed to encourage recycling of trapped litter. The building (empty warehouse to the north-east of the site), would allow for sustainable reuse and encourage public square usage. The building surrounding the square has now been proposed as small restaurants.

There exists no strong link with the station from which most pedestrians would enter the site.

In Figures 8.45 and 8.46 the vertical wetland has been discarded. This is due to height limitations (high mean ground water level) and too high water volumes entering the site. Parking was also moved further back towards the west, to allow new office buildings to reside directly on the "waterfront" area.

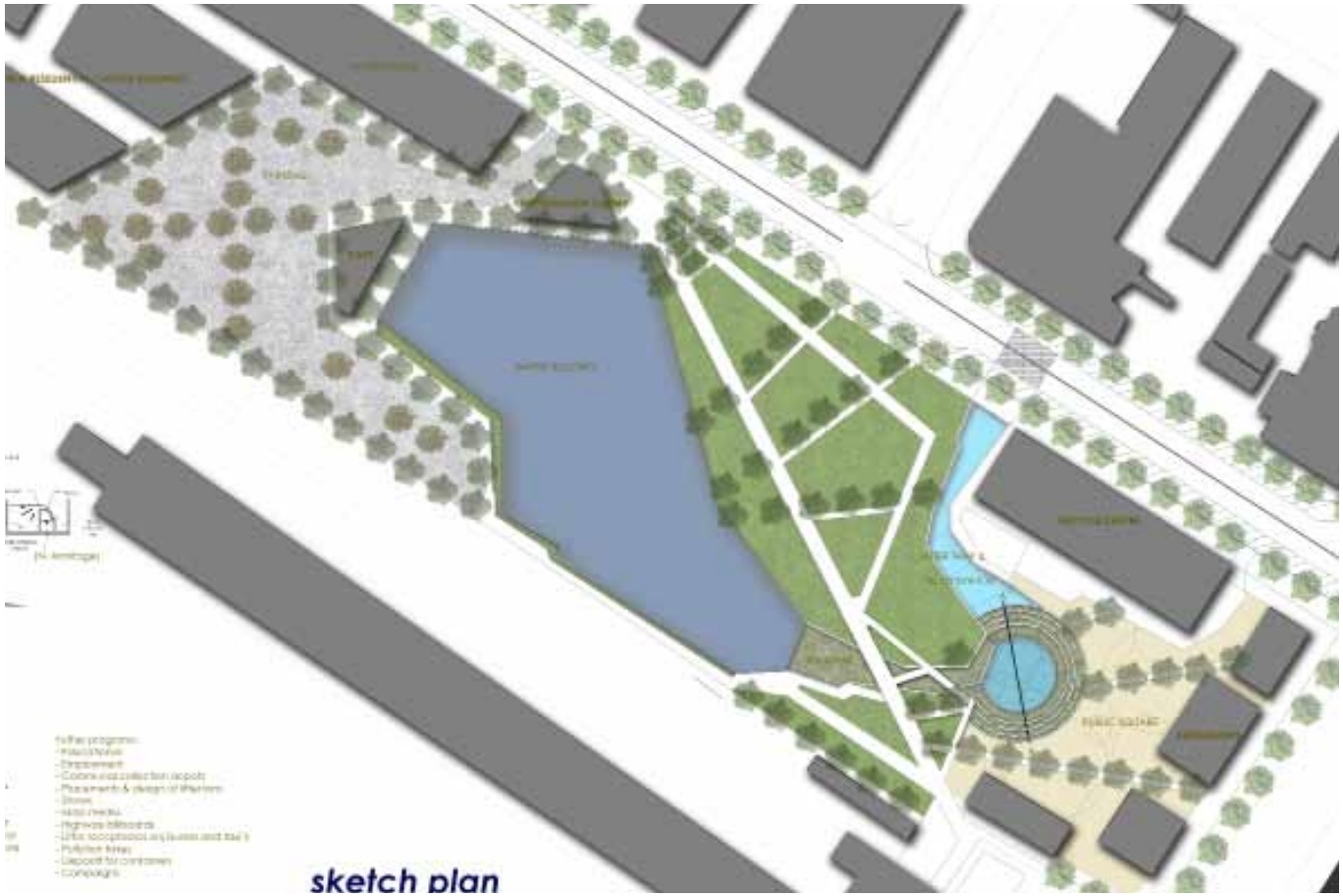


FIGURE 8.44: SITE PLAN REVISION 5,MILESTONE 4 (AUTHOR, 2011)

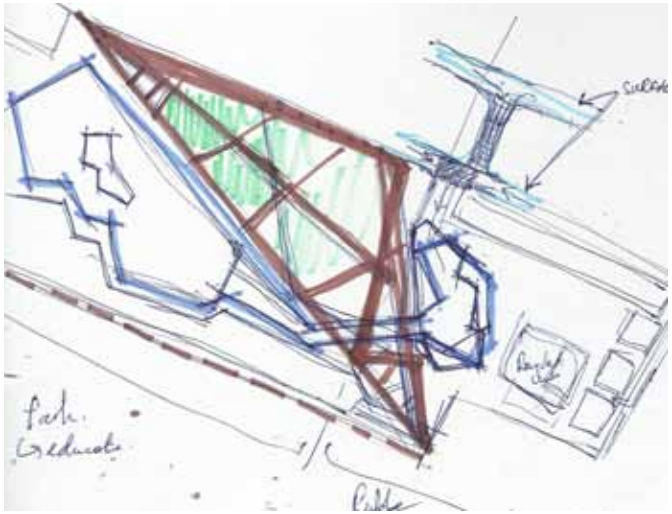


FIGURE 8.45: SITE PLAN REVISION 6 (AUTHOR, 2011)

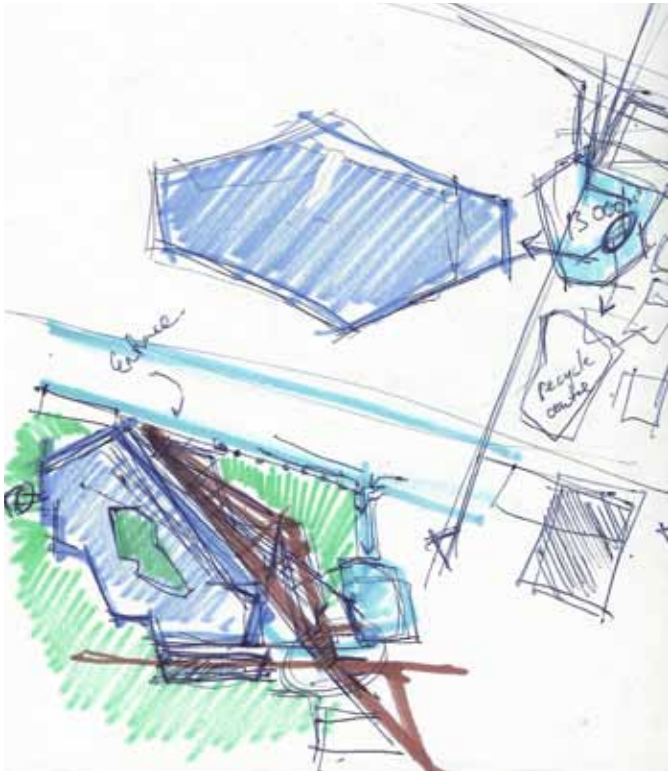


FIGURE 8.46: SITE PLAN REVISION 7 (AUTHOR, 2011)

The final revision as depicted in Figure 8.47 illustrates the near final design for the site-specific designed intervention. The author now had a better understanding of the designated layout in terms of heights, water retention, lighting, materials and planting strategies to follow.

The recycling centre was discarded and a more height- and cleaning-efficient wetland was introduced. The public square, still undeveloped, now had a proposed information centre, allowing visitors from the station to fully utilise the area before entering the *Baixa*.

Elements that changed (to be illustrated in Chapter 9), was:

- The raised stage area in the square was changed to a wetland, viewing and eating area.
- Restaurants living outwards onto public square.
- Restaurant delivery area.
- Establishment of a better connection with the station and the site.
- The water channel (wetland) was widened to allow for more water to flow in.
- A revised water system to allow for more

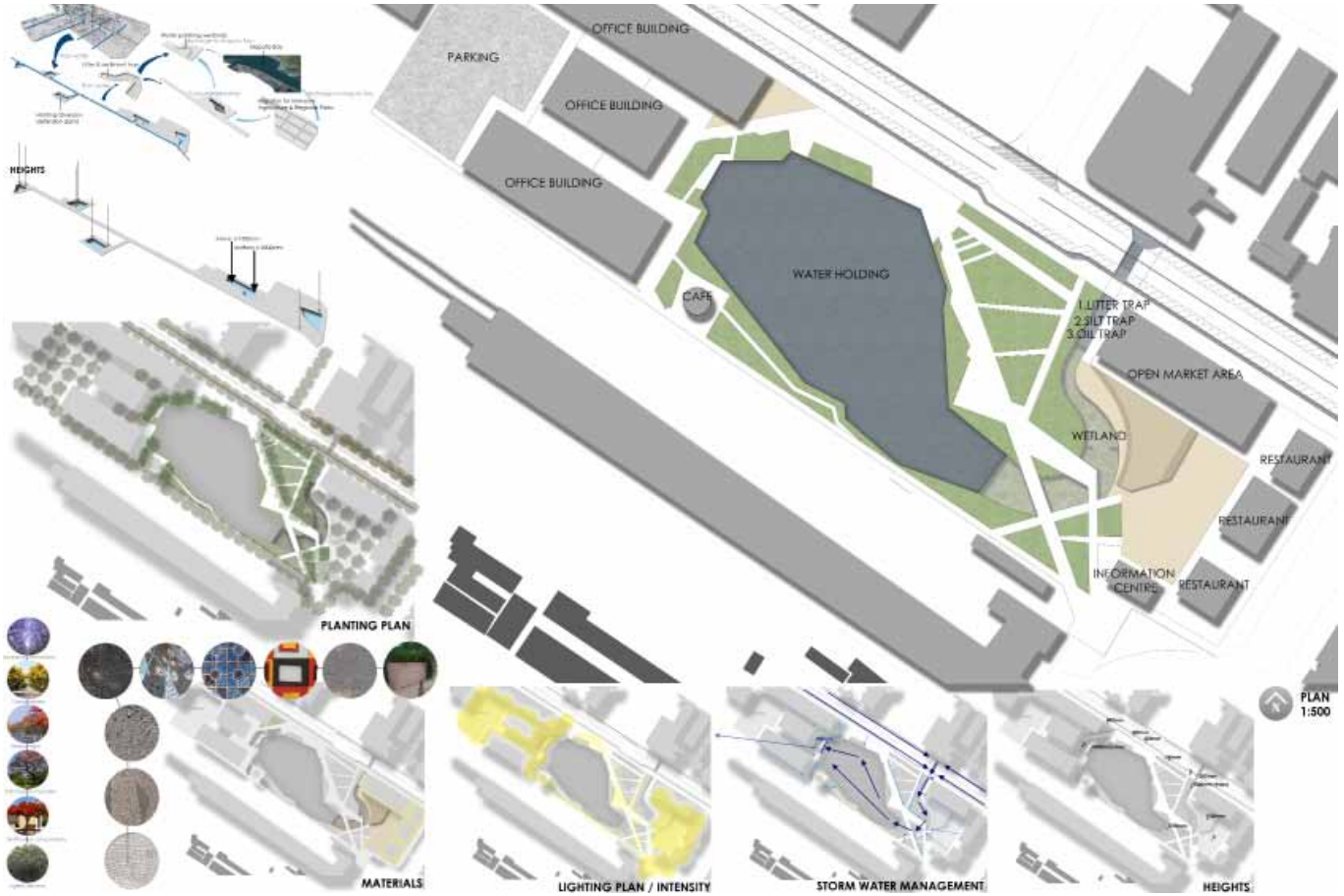


FIGURE 8.47: SITE PLAN REVISION 8, MILESTONE 5 (AUTHOR, 2011)

sufficient water management.

- Waterfront to the west (lowered to allow user/ water connection).
- New office building parking area was changed to grass parking.