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# When a City Embraces its Paradox;

The Exploration of Incremental Waste Mining of a  
Decommissioned Landfill Site and Its Gradual Transformation Into a Productive Public Space.

MLA 2  
**[2011]**  
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**With Special thanks to.....**

My sister Felicity Gopolang for her unfailing faith in me. To the rest of the family for their support. Liana Muller, my supervisor, and Clinton Hinds for their timeless guidance. Tarna Klitzner and Adam van Nieuwenhuizen, for all their support and direction through out this thesis.

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## Glossary of Primary Terms

- **Aquifer:** an underground layer of permeable rock that can contain and transmit groundwater. It also refers to (silt, gravel and sand from which groundwater can be extracted using a water well.
- **Brownfields:** are properties that are underutilized or abandoned due to environmental contamination associated with past industrial or waste-disposal use.
- **Cape Flats:** the cape flats (afrikaans: die kaapse vlakke) is an expansive, low-lying, flat area situated to the southeast of the central business district of cape town. to many people in cape town, the area is known simply as 'the flats'. wikipedia
- **Derelict Site:** derelict land is land that has become damaged by industrial or other development and beyond beneficial use without treatment. treatment may include demolition and levelling..(<http://www.lawsonfairbank.co.uk/derelict-land.asp>)
- **Excavation:** the act of excavating, or of making hollow, by cutting, scooping, or digging out a part of a solid mass. <http://www.brainyquote.com/words/ex/excavation162339.html>
- **Impermanence:** The property of not existing for indefinitely long durations
- **Landscape:** Narrowly defined, the amount of countryside and/or city that can be taken in at a glance. Also, an area of land or water taken in the aggregate.
- **Landscape Architecture:** The science and art of design, planning, management and stewardship of the land. Landscape architecture involves natural and built elements, cultural and scientific knowledge, and concern for resource conservation to the end that the resulting environment serves a useful and enjoyable purpose. Successful landscape architecture maximizes use of the land, adds value to a project and minimizes costs, all with minimum disruption to nature. American Society of Landscape Architects (ASLA).
- **Landfill reclamation:** means the excavation of a portion or all of a landfill to create new disposal capacity for disposal of waste generated off-site.
- **Landfill mining,** also addressed as landfill reclamation, is a process of excavating a landfill using conventional surface mining technology to recover e.g. metals, glass, plastics, soils, and the land resource itself. In addition to reclaiming valuable resources, the recovered site can then be either upgraded into a state-of-the-art landfill, closed, or redeveloped for some other suitable purpose (Morelli 1990)
- **Place making':** The degrees to which a 'place' can be created in architectural design independently of the people who eventually use it. Journal of Environmental Psychology Volume 6, Issue 1, March 1986, Pages 49-63
- **Waste Relocate:** means the excavation of a portion of the landfill to relocate solid waste within the footprint of the landfill for the purpose of reducing the cost of capping the landfill.

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# Introduction

- 1.1 Abstract
- 1.2 Hypothesis
- 1.3 Project Introduction
- 1.4 Thesis intent

## CHAPTER [1]

*As Michael Michalko writes; "Genius often comes from finding a new perspective" (2001, 19). It is possible to avoid repeating the same treatment and creating a monotonous public space by applying a new methodology to the designer of the spaces based on a different set of values and ideas.*

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## 1.1 Abstract

Today, with the majority of the world's population now living in urban areas, the possibility and urgent need to provide them with adequate public spaces has never been greater for the planet. Where public places and space itself are lacking, many cities across the world are today investing in projects of reclaiming valuable land to create livable public spaces that respond to and improve social, economic, and environmental values. Such projects include reclaiming of derelict sites which are characterized mainly by poor environmental and physical conditions.

The redevelopment of these types of sites has received a lot of attention in the past few years. Their transformation into public spaces represents a significant enhancement to the quality of life and land use, and at the same time, marks new commitment to the transformation of once-condemned sites, to new cultural and environmental uses. Landscape architects such as Peter Latz, James Corner and Bruce Mau have shown how to create culturally stimulating landscapes with a large variety of uses and activities arising out of the derelict remains of past industry. (Loures and Panagopoulos, 2006)

Derelict or lost spaces such as the ones created by closed landfills and closed down industrial sites provide possibilities of generating productive public spaces that could serve to address the needs of the growing population. Contemporary approaches to these sites are mostly driven by the idea of reclaiming space for a variety of uses, from the reuse of an industrial area, to conversion into housing or a park.

It is the assumption that these types of sites, because of their high degree of complexity and contestation, are particularly suited to test and develop different theoretical and practical approaches to the redesign of public or mixed-use open spaces. (Longhorst, 2009).



Source: [www.archdaily.com](http://www.archdaily.com)

**Fig 1, High line, New York**

The recycling of the railway into an urban park. By James Corner



Source: [landscapearchitectureintelligence.blogspot.com](http://landscapearchitectureintelligence.blogspot.com)

**Fig 2, Landschaftspark, Duisburg Nord**

A celebration of the area's industrial past by integrating vegetation and industry, into a public Park. By Peter Latz

## 1.2 Hypothesis

*Through incremental waste mining of a decommissioned uncapped landfill and allowing for the rehabilitation of the reclaimed landscape, the landscape is gradually transformed over time, and productive public spaces are introduced as adaptable places used by the broader community for multiple activities, and programmed to respond to shifting community needs.*

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## 1.3 Project Introduction

I prefer to use the term 'productive' because it indicates a positive incremental change. Productive public space should be thought of as an integration of production through waste mining and landscape design. Productive public space hence, in this context, is not only about how the integration of space can generate multi-purpose program in an urban fabric, but also at the same time, the potential of how, through working the landscape by waste mining, the production of employment to support a community is realized.

Therefore, as argued by Comer (1999), when designing a public space as a landscape and as an open space, one needs to acknowledge that both are a complex construct, and a process that includes naturalistic, phenomenological experience, diverse and often with competing forces, such as social constituencies and interests, political desires, ecological processes, and program demands. Hence, there is a need for allowing for the interpretation of the landscape, not only as a product of cultural activity, but explicitly as an agent of social, cultural, ecological and technological change. (Comer, 1999)

Taking into context what Comer refers to as competing forces in designing public spaces, this lead us to the study site: Barcelona Europe precinct in Gugulethu, Cape Town, which is a decommissioned uncapped landfill site, with distinct environmental and social challenges and questions surrounding it.

What is interesting about the Barcelona Europe site compared to other landfill sites is that, firstly, during their operations, landfills are monitored closed systems which go beyond their closure. Secondly, after their closure, just like other derelict or Brownfield's sites decommissioned capped, landfill sites are seen as a sore eye to those who live in their vicinity and people avoid them, despite the environmental measures put in place.

However, as argued, with today's population migration into urban areas, space is becoming scarce. As a result, a need for access to adequate livable space has resulted in an informal settlement established on the decommissioned Barcelona Europe landfill site. The community has thus developed means and measures to survive, despite the physical and health hazards that come with an uncapped old landfill.

## 1.4 Thesis Intent

This thesis will explore ways to rehabilitate the decommissioned Barcelona Europe uncapped landfill precinct in Gugulethu, Cape Town into a useable, productive public space. The incremental landfill waste mining and rehabilitation is proposed, in order to reduce further environmental contamination and improve environmental and public health of the broader community.

The proposal to mine the waste is based on the fact that, due to lack of proper management and monitoring of the landfill during its operation and after its closure, the use of conventional rehabilitating of closed decommissioned landfill site will be costly and the problem of further environmental contamination will still continue. Moreover, the potential value to use the site as a productive public space will be limited to a single monotonous use.

In addition, the argument to incrementally mine waste and transforming the reclaimed land into a productive public space will also explore methods of not only recycling space through waste mining, but also harvesting the buried waste and recycling and reusing it in the design of the spaces. It will analyze the attitudes and values we place upon waste and examine integrative approaches for readapting this degraded landscape into a productive public space.

Due to the magnitude of the site, the waste mining and transformation of the reclaimed land into a productive space shall be gradually phased. A once off relocation of residents to the identified adequate livable spaces is proposed. Hence, the site carries a metaphorical meaning to be a working landscape in the literary sense that, during the mining there will be creation of jobs for the broader community, and at the same time, a productive public space that will serve them will be created.

Hence the incremental waste mining of the landfill and transforming it into a productive public space will support the following principles, according to my observation: **Identity, productivity and connection.**

Sense of identity, refers to the personal connection that people will develop as they participate in the production of their own public space.

This thesis demonstrates how sites such as landfills and informal settlements are actually landscape rich with meaning. Viewing these kinds of places with a more holistic perspective can lead to more innovative and integrative approaches when rehabilitating them.

Hence, in the proposal for adaptive reuse of the recycled waste for production, as well as in the design of the proposed productive spaces, the traditional/existing activities and technologies that people can relate to should be incorporated.

Productivity is central to the purpose of the whole production of public space. Hence, the production takes place within the site, that is, the recycling and sorting of the waste. It is then proposed that the landscape produces spaces that can accommodate all kinds of work. Therefore productivity requires a certain amount of labour, hence, the landscape can provide job opportunities.

Lastly, the principle of connection: the gradual transformation will enhance both the social/cultural connection and the physical connection to the site. The physical connection that benefit from the slow gradual transformation is because the social connection will create a new active hub that calls for traffic connection.

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## Background information of the site

- 2.1 Broader background context issues and realities, South Africa, Cape Town
- 2.2 Site Introduction, location, history and Context
- 2.3 Characteristics and nature of the landfill

## CHAPTER [2]

This sections aims to give an overview of the site, its location, and a discussion on the issues and realities surrounding the site.

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## 2.1 Broader background context issues and realities

In his State of the Nation address in 2009 President Jacob Zuma stated:

*"As part of social infrastructure development we will provide suitably located and affordable housing and a decent human settlement... a human settlement is not just about building houses. It is about transforming our cities and towns and building cohesive, sustainable and caring communities with closer access to work and social amenities, including sports and recreation facilities." (www.info.gov.za)*

The reality is that the search for solutions to address human settlements and social problems, especially in urban areas, has been gaining importance in the development agenda of most large cities in developing countries. The significance of the issue is emphasized by the inclusion of an objective in the Millennium Development Goals, which is to reduce the number of people living in poor urban areas by 100 million by 2025 (UN, 2000).

Evidence suggests that as more and more people are drawn to cities in search of a better life and economic opportunities, the trend towards the urbanisation of poverty and informality continues to rise across cities around the world (Garland et al, 2007). Cities are seen as areas that offer more opportunities for employment and better lifestyle. However, they are often also centres of inequality, acting as localities of exclusion and marginalisation.

Therefore, as access to urban liveable space becomes limited but more people migrate to urban areas, the majority locate themselves illegally on marginalized areas. Even though they would benefit from living in an area accessible to employment, infrastructure, and urban services especially health and education, some areas they occupy would be extremely marginalised and the living conditions extremely poor.

In addition, the low quality houses (mostly wooden shacks on stilts) and the environmental conditions of the land and wet areas they occupy expose these settlers to higher than average health risks. Moreover, they are also forced to live in areas devoid of open spaces and recreation, as well as inadequate circulation and access to the residential units, making services such as emergency provisions and garbage collection extremely difficult.

### 2.1.1 South African Realities, Cape Town

In this regard, the reality in South Africa, according to Kooping (2009), is that the nature of informal settlement occupancy of space is marked by certain fundamental concepts such as: 'exclusion, migration and transience'. "Exclusion and migration were the legacy left by the separatist policy of apartheid to the new democracy, with urban maps clearly demarcated by race and racial exclusion. As the apartheid regime crumbled in the 1980s, more people flocked to the margins of cities to find work and to build a tenuous future for themselves, amidst the enormous influx of human traffic and inadequate provision of sanitation, electricity and water."

The then Cape Town Mayor - Helen Zille, in April 10 2008 stated that, the improvement of living conditions in informal settlements is imperative to a functional society. The reality in Cape Town is that many informal areas are located in the cape flats. The cape flats, as an area, has a higher water table and holds the Cape aquifer, which is a future water reserve source. Hence, there are many wetlands around most of these settlements. The environmental degradation aggravates the situation of poverty found in many of the settlements.

Most of the settlements are built on inappropriate sites such as former rubble dumps (for example, Sweet Home Farm in Philippi) and wetlands (for example, Masiphumelele). These are very dense settlements comprising informal land tenure, a dense proliferation of small, make-shift shelters built from diverse materials. This populace pressure causes degradation of the local ecosystem and produces severe social and health problems. Water is obtained from communal taps, and toilet facilities range from buckets to pit latrines. These areas are prone to flooding & fires, which have affected 68,710 dwellings in the past decade, killing 358 people and displacing 237,412 City of Cape Sustainability Report, 2005).

Moreover, in Cape Town, apart from the lack of infrastructural delivery within these settlements, there is the issue of the physical environmental and weather conditions of the Cape Flats. Residents are particularly susceptible to the extreme weather that often occurs in Cape Town, especially the strong winds and freezing temperatures. Fires are also a risk to informal dwellings, as the high level of densification and inflammable building materials largely contribute to the spread of these fires. In addition, informal settlements have a negative impact on the environment they occupy, such as pollution of the environment by wastewater and the burning of fossil fuels and other inflammable material.

The city of Cape Town Development vision states that:

"...by 2040, turn Cape Town into one of the world's greatest cities in which to live and learn, work, invest and discover- a place of possibility and innovation, with a diverse urban community and all the opportunities and amenities of city life, with a natural support economic vibrancy and inspires a sense of belonging in all".

As a result, the State of the Nation Report by President Jacob Zuma, the statement by the then Cape Town Mayor Helen Zille, and the Vision for the City, provide a platform for designers to look beyond building houses as a means and solution to alleviate the lack of adequate liveable spaces and for those living in poor and marginalized settlements.

## 2.2 Site Location: Broader Metropolitan Context

The study site is situated north of Gugulethu township, and to the south of the N2 highway, 1 km from Cape Town International Airport, and approximately 17 km from Cape Town's city centre. The site is accessed via Klipfontien Road, which runs along the south western edge.



Fig 3



Metropolitan Context

Adopted: Cape Town & Environs Geological Surveys, Gb : 2009

Metropolitan Context

SCALE: 1: 50 000 @ A3

0 50 100 250 500

## 2.2.1 Site Location: Local Context Scale

The study site comprises of Barcelona and Europe precincts, which are two neighbouring informal settlements in Gugulethu, Cape Town situated on the Old Nyanga Refuse Dump, Erf 477 of Erf 8739, in the Cape Flats. The site is situated between the N2 and Klipfontein Road at the Borchers Quarry exit from the N2.

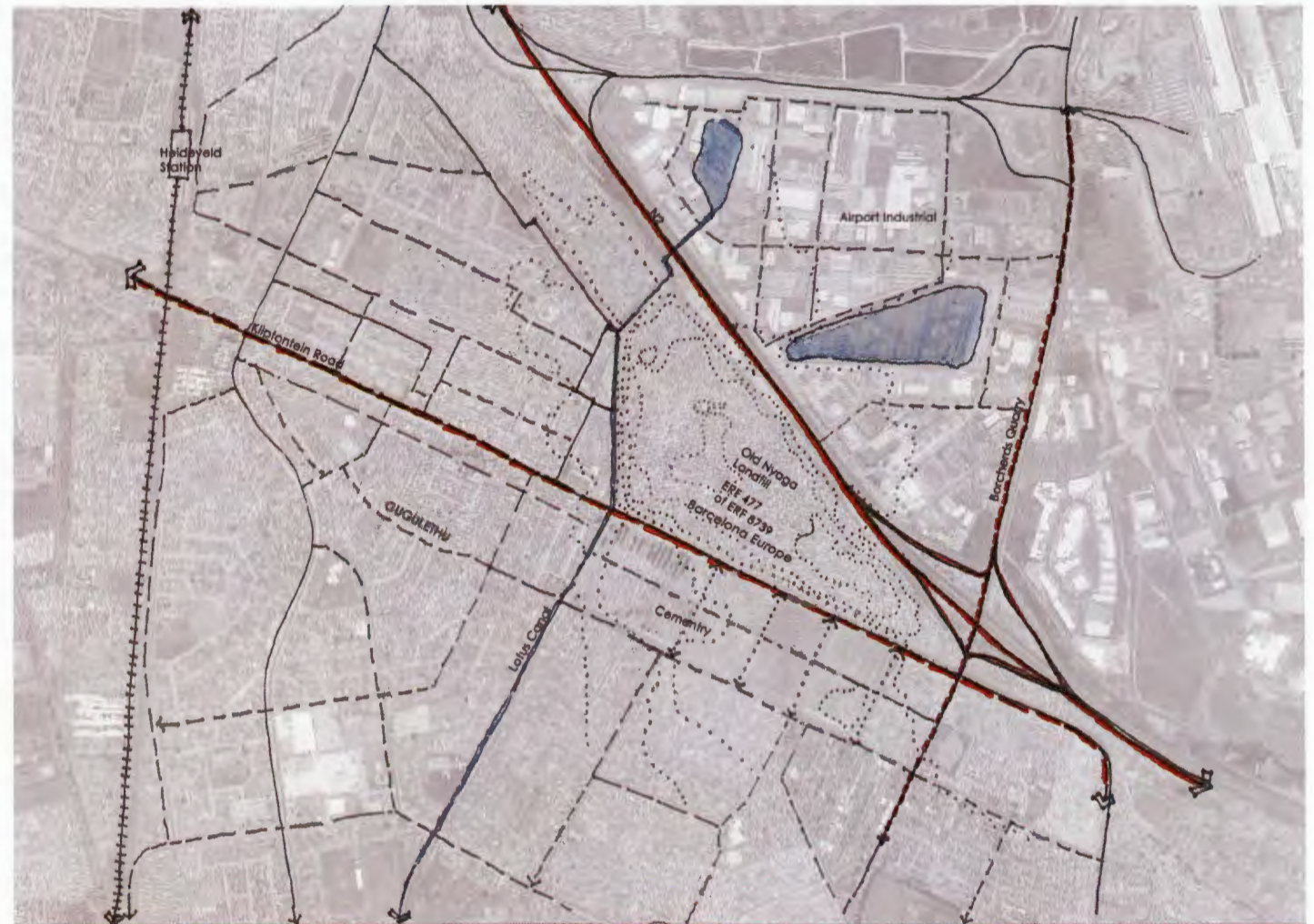


Fig 4



Site Location

Adopted: Cape Town & Environs Geological Surveys, Gb : 2009

Local Context Scale

SCALE: 1: 10 000 © A3

## 2.2.2 Site Location: Site Context

There are no formal tarred roads within the study area. However, the site is accessible by vehicles along most of the informal dirt roads. Barcelona and Europe are home to approximately 11260 people in 61.52 ha in area. (UCT, MLA & MCRP class mapping, 2011).

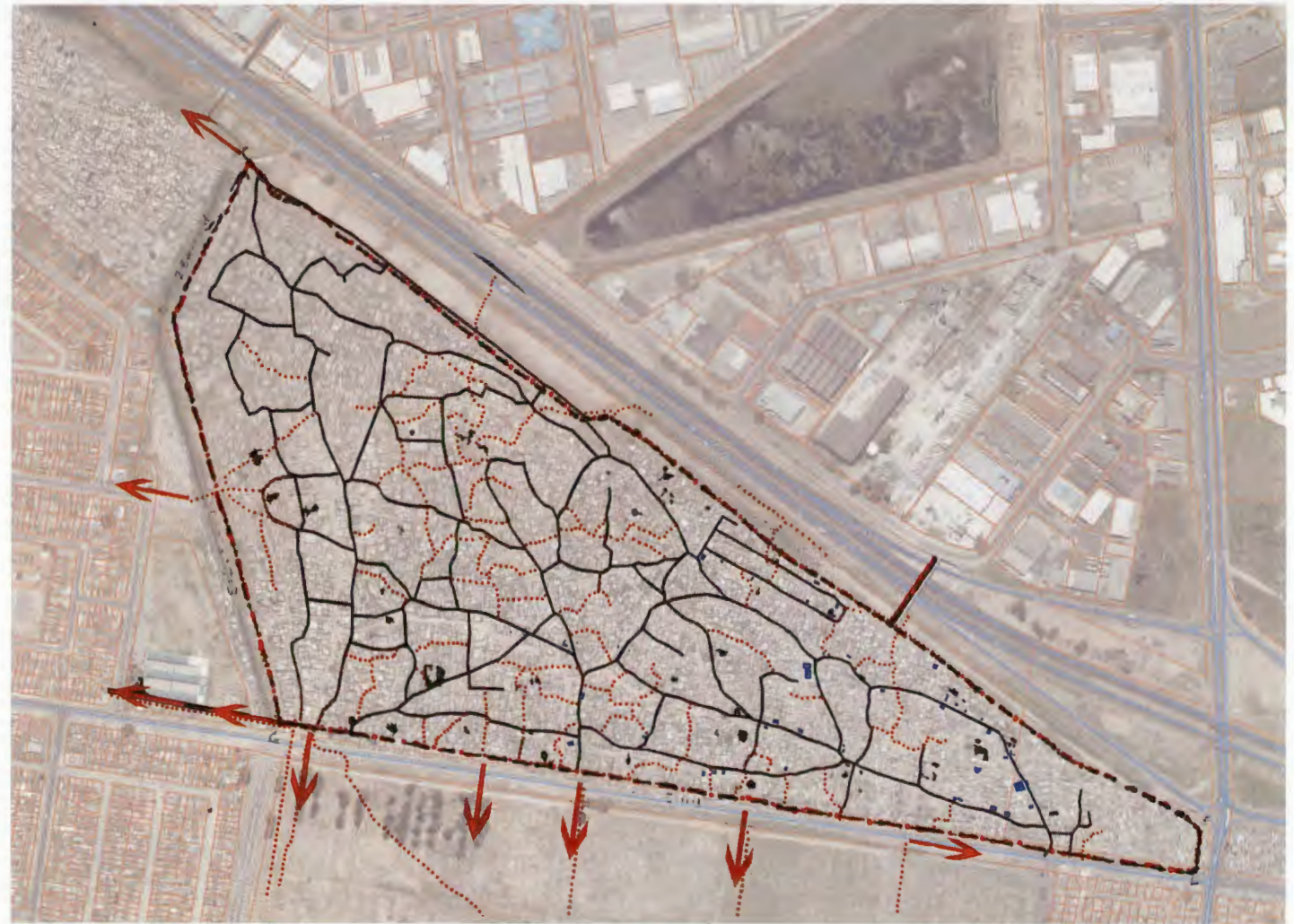


Fig 5



Site Location

Adapted: Cape Town & Environs Geological Surveys, Gls : 2009

Site Context

SCALE: 1:5000 @ A3

0 50 100 250 m

## 2.2.2 Character of The Settlement



Fig 6 The physical character of the settlements is that of a typical South African informal squatter settlement, which presents as a densely built collection of shacks, interwoven, with a few dirt roads and alleys between them. The shacks are built mostly out of recycled materials, such as packing crates which are made into walls, and corrugated iron sheeting, which allow for quick and cheap construction.

### 2.2.3 Historical Background of the site

Before people settled on the site, and before it was turned into a dump site, there was a proposal to construct a soccer stadium on the site, hence its name, Barcelona and Europe. However, the site was eventually used by the Cape Town Municipality (Cape Metropolitan Municipality) for the disposal of solid waste over a period of 31 years from 1956 to 1987. (ARG Design, 2007). It's not until the early 1990's that the above settlements emerged, due to the site's central location within the Cape Metropolitan Area and as a result of political change in the country, and rural migration to the city increased.

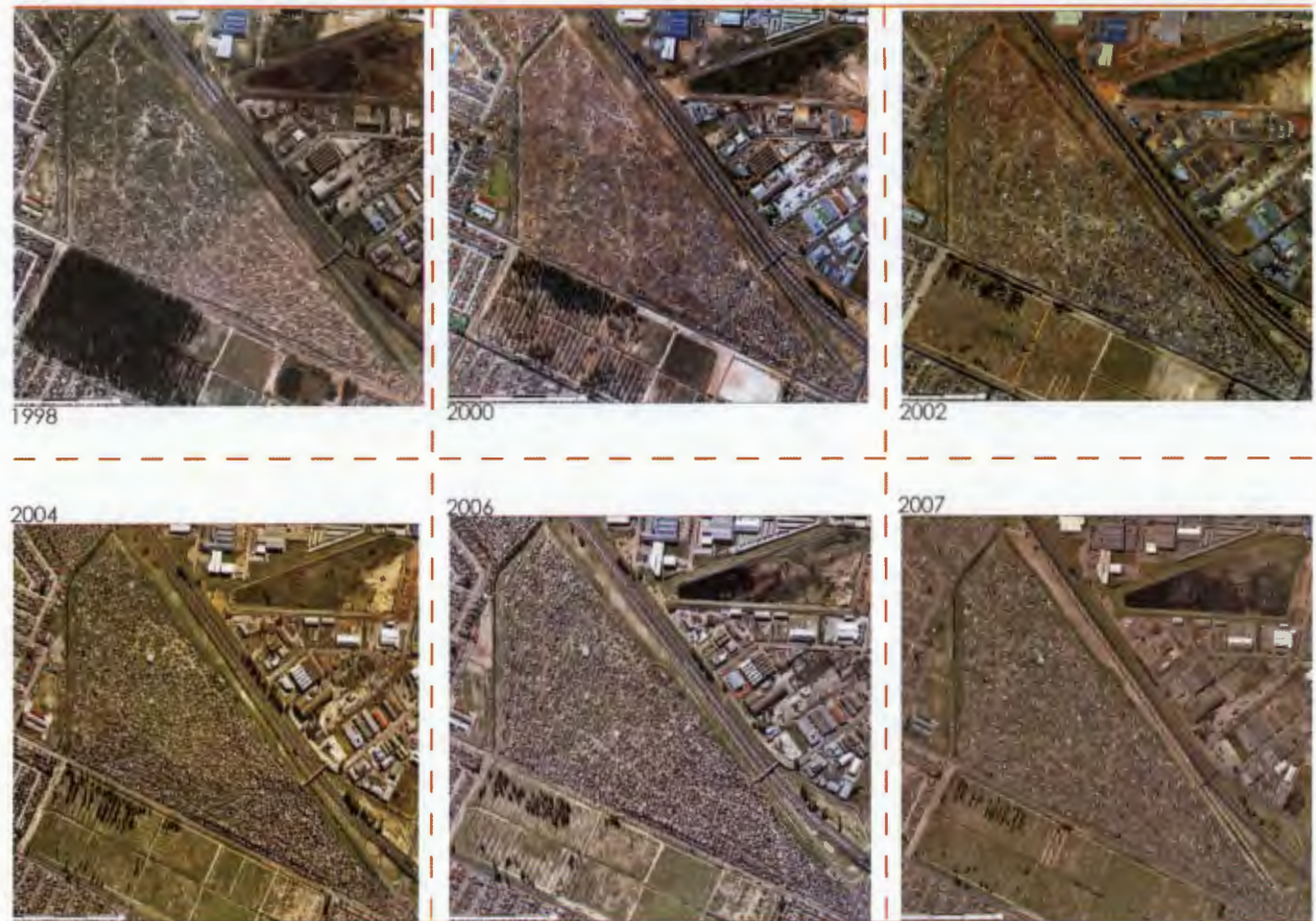


Fig 7  
Cape Town & Geological Surveyors, Gis:1998-2007

## 2.3 Nature and Characteristics of the Landfill

As mentioned above, the Cape Town Municipality used the site for the disposal of solid waste over a period of 31 years (1956-1987) (ARG Design, 2007). The contents of the landfill site comprises of household, commercial, industrial waste, as well as builder's rubble, and green waste (Jeffares & Green 1990). The total volume of the waste in the landfill has been estimated to be 3.5 cubic meters (ARG Design 2007). Although there is some degree of knowledge of the contents of the landfill, dumping then was fairly unregulated, and there are no official records of whether measures were in place to ensure prevention of contamination and pollution of groundwater by leachate.

Leachate is liquid that emerges from solid waste and usually contains soluble, suspended, or miscible materials that originated from the solid waste. This liquid must be treated carefully since it may contain hazardous materials and could contaminate ground water.

Moreover, there are no surveys available of the original ground level of the landfill before it was built. The average depth of the dump site is reported to be 6 meters, although it is greater than 10 meters below Barcelona because of sand mining, and it is estimated that the dump is 3 meters below the ground water level at this point (ARG Report 2007).

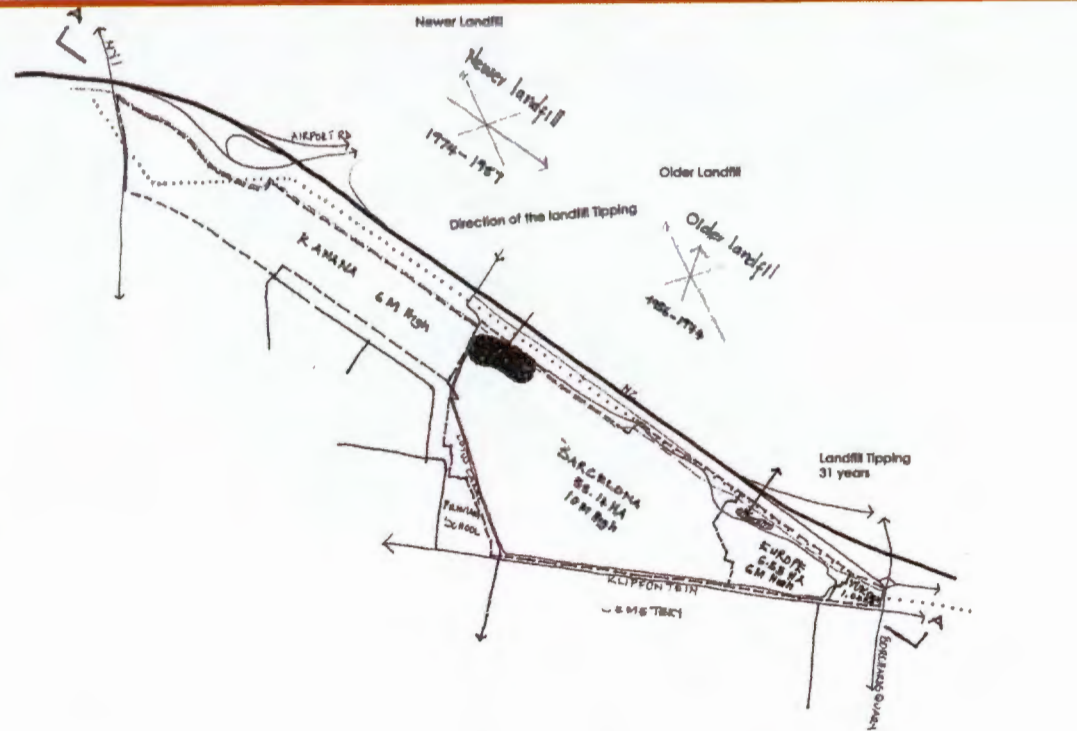
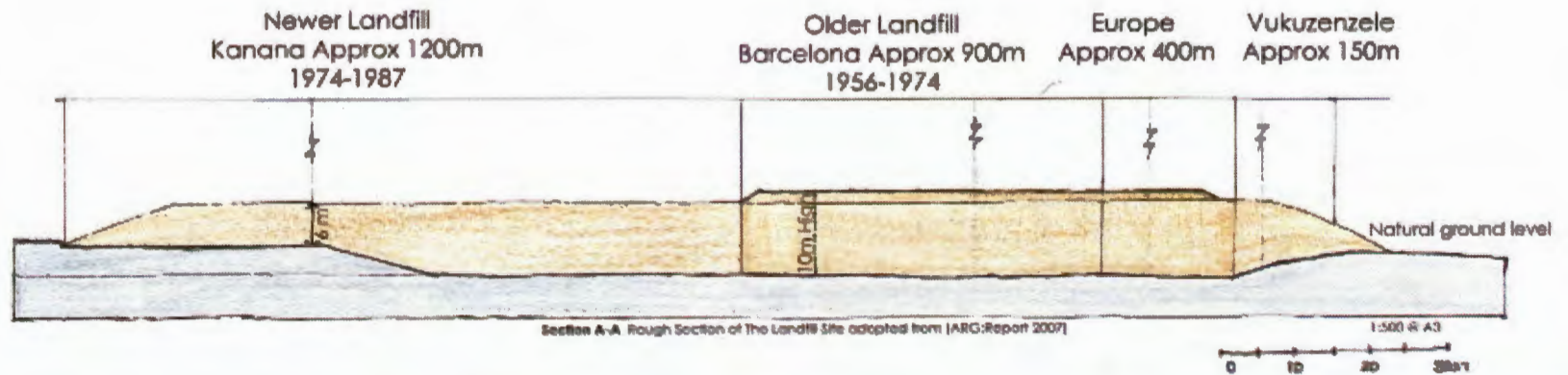


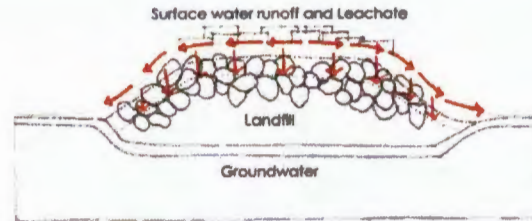
Fig 8 Nature of the Landfill  
Adopted ARG, Report 2007



### 2.3.1 Environmental and Human Concern

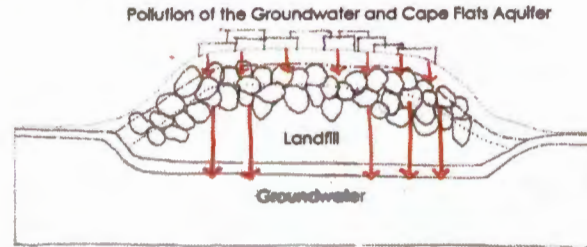
There are concerns over the lack of proper regulation of the waste dump, as there was no proper lining measure taken. Proper lining involves a system of clay or a geosynthetic membrane on the bottom of the landfill which is used to collect leachate and prevent contamination of the groundwater. A cover consists of soil and geosynthetic materials and has two functions: first as a daily cover over the waste at the close of each day's operations, and second as a final cap when the landfill is closed to prevent elements from entering and leaving the landfill mound (Tchobanoglous et al, 2007; 9-10). It is argued that the site poses serious concern to the contamination of the ground water and the aquifer. The landfill is spongy and highly compressible due to poor compaction of waste.

Other concerns about the site are that the landfill continues to produce gases, such as carbon dioxide and methane. Landfill gases are a mixture of methane and carbon dioxide generated by the anaerobic decomposition of organic wastes. Methane is a highly flammable gas and can cause explosions if contained in closed structures. (ARG Design, 2007). At the study site, the section immediately east of the existing canal is particularly unstable (ARG Design 2007), as this area is also particularly prone to fires. The fires are said to brake out as a result of methane gas emissions. (ARG Design 2007).



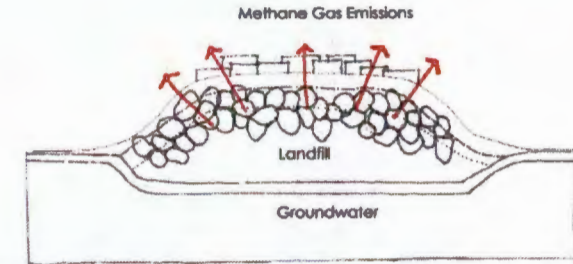
As a result of poor compaction the landfill is spongy. Hence, there is concern for surface water run-off resulting in leachate production. Studies show that significant leaching is taking place in the low lying areas to the North Western part of the landfill and contaminating the river course flowing. Leachate effects take a long time even after remedial design.

Fig 9



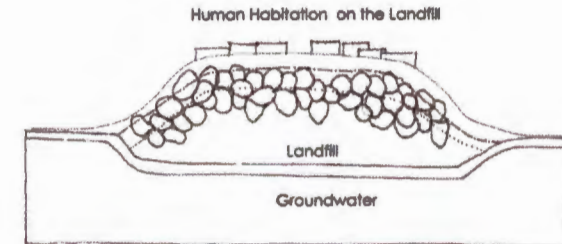
Groundwater pollution by the landfill is a major concern especially on the Cape flats Aquifer. Estimation made are that the direction of the pollution flow is from NW to SE towards false bay. The Cape Flats Aquifer is situated near the site hence, if there is evidence of pollution caused by landfill on the aquifer then it has to be cleared and rehabilitated.

Fig 11



There is concern for Methane gas and carbon dioxide emissions from the landfill. It is argued that there has been cases of explosion on the landfill. The life span of a properly capped landfill gas emission after closure is 50 years. With Barcelona there is still another approximately 15 years to go.

Fig 10



There are health, safety and living conditions concerns for an informal settlement with no adequate services on the landfill. Concern for the level of methane gas emission and the poor living conditions of the site could result on various health hazards for example Congenital abnormalities (for Pregnant women) Asthma, attacks, sore throats, eye irritation, Headaches etc. ([www.portfolo.mud.ed.ac.uk](http://www.portfolo.mud.ed.ac.uk)) Hence, Relocation of people need to be an option considered.

Fig 12

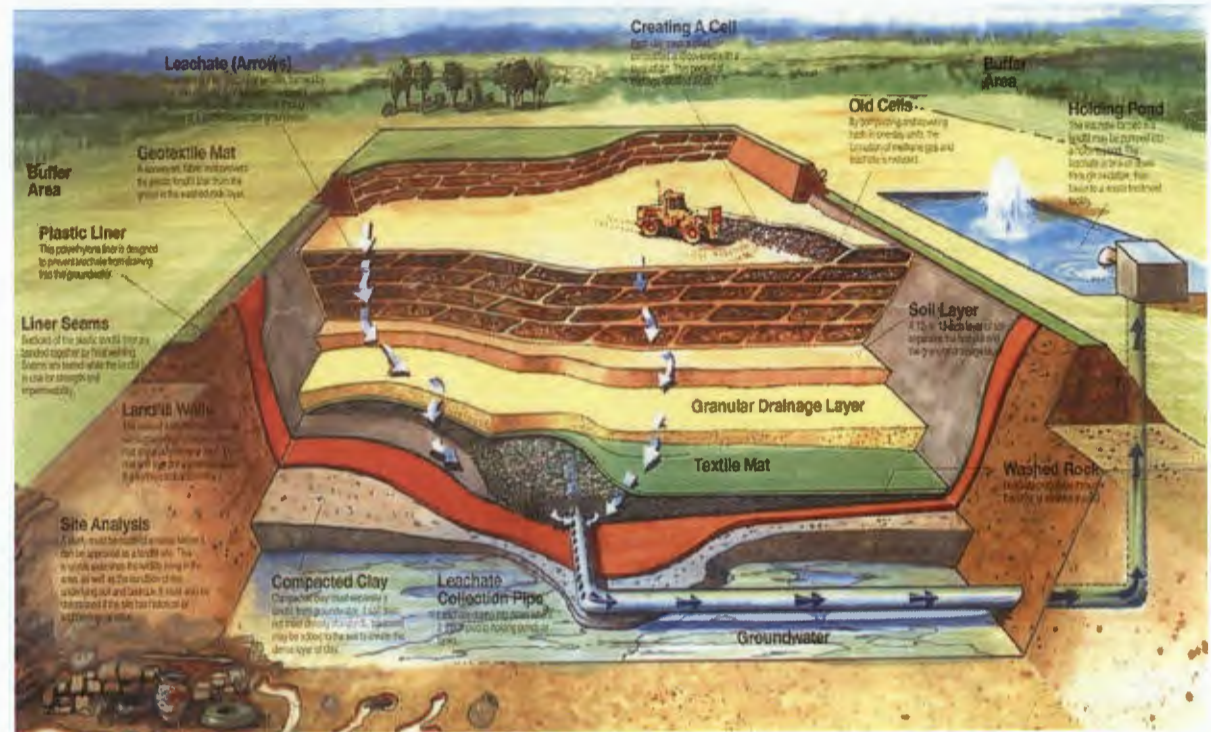
### 2.3.1 Environmental and Human Concern

As a result of the age, density, composition and thickness of the landfill, these render it unsuitable for development in the form of any housing or infrastructure, as the land is 'spongy' and uncompacted, hence, incapable of supporting any structures or pipes and sewers. It is reported that Landfills emit gases for a period of approximately 50 years after closure (EPA 2007). Therefore, our study site may still have another 13 years of emission left, as it has been 37 years since it was closed in 1974

The schematic diagram of how landfills are built (Figure 13) shows that a landfill is a self-contained unit with alternating layers of garbage and soil. Appropriate mechanisms must be in place to monitor ground water and methane gas production, as well as to collect leachate.

The concerns over human and environmental problems posed by the site are made most relevant and pressing due to its location above the Cape Flats Aquifer. The Cape Flats aquifer is a potential valuable natural resource that could provide up to 15% of the Cape Metropolitan Area's future water needs (ARG Design 2007), which could potentially be very useful when considering Cape Town's current water scarcity. (ARG Report 2007). Moreover the irregular surface of the landfill also contributes to negative impacts of the ground water through stagnant ponding of water occurring frequently in low lying areas. The high water table is easily affected and polluted as a result of this ponding polluted surface water.

It is clear that the site poses an environmental threat, both to the broader region and to its inhabitants. As reiterated in the report by (ARG Report, 2007), the very nature of the settlement being situated on the landfill, as well as the proximity of dwellings, over-crowding and unsanitary living conditions exacerbates a variety of social and mental ills as well as those of epidemic proportions. Therefore With the nature of the landfill as it is in its current state, it is necessary to consider removing the contents of the landfill and rehabilitating the land before development or stringent measures of rehabilitation and capping of the landfill needs to be undertaken.



Source:(<http://www.enviroalternatives.com>)  
Fig 13

## Site Scoping, Synthesis, Evaluation and Implication

### 3.1 Natural Element Analysis Broader context and Site Scale

- 3.1.1 Geology and Topography
- 3.1.2 Climate and Hydrology

### 3.2 Urban Analysis Analysis Broader Context and Site Scale

- 3.2.1 Access
- 3.2.2 Public Amenities
- 3.2.3 Linkage to green Coridor

### 3.3 Social Character /sense of place Site Scale

- 3.3.1 Trade
- 3.3.2 Recreation
- 3.3.3 Neighbourhood Clusters
- 3.3.4 Crime and Security

The purpose of this analysis is to identify aspects that need to be addressed critically in the short term and long term to provide direction on what actions are required in order to rehabilitate the landfill or reuse the site. A broader context and site context scale is evaluated.

*As Michael Michalko writes: "Genius often comes from finding a new perspective" (2001, 19). It is possible to avoid repeating the same treatment and creating a monotonous public space by applying a new methodology to the designer of the spaces based on a different set of values and ideas.*

## 3.2 Natural Analysis Broader Scale and Site scale

### 3.1.1 Geology and Topography

The Cape Peninsula geology is made up of three dominant rock groups' types: Malmesbury Shale, Granite and Sandstone. The Malmesbury Shale are the oldest rock group of the peninsula, made up of alternating layers of dark grey fine-grained greywacke sandstone and slate. Two Millions years ago, the Cape flats and the Noodhoek region were once submerged below sea. Hence these regions are made up of the weakly cemented calcereous marine sands. (www.environment.gov.za,2011) The study site Barcelona Europe is situated in the Cape Flats, and are made up of weakly cemented calcereous marine sands. Which is underlain by these Calcerous sand deposits at significant depths, to the extent that the bed-rock geology has not been mapped. (www.geology.uct.ac.za,2011)

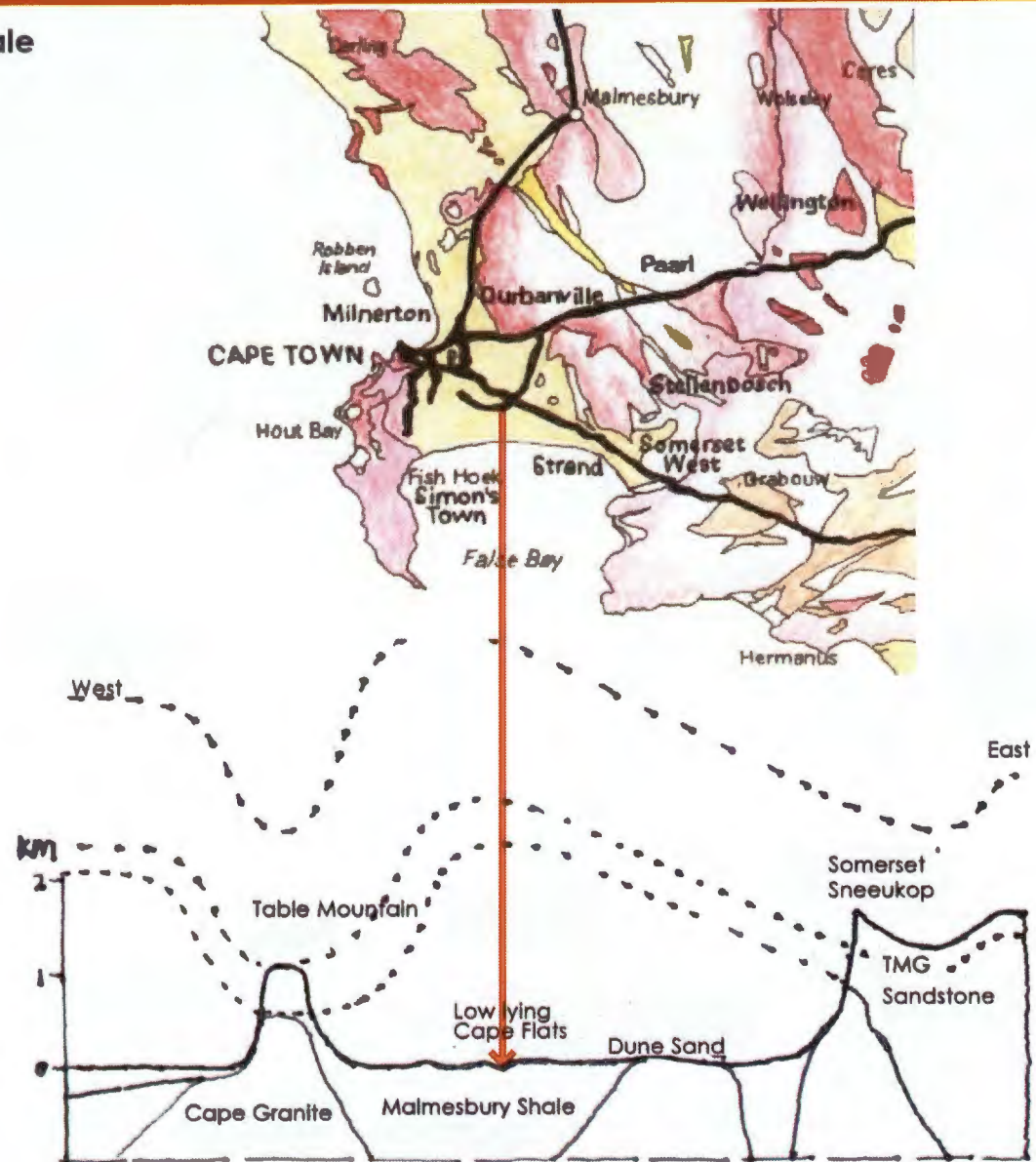


Fig 14 A cross section of the Cape peninsula showing the low lying cape flats

### 3.1.2 Climate and Hydrology

Since the Study Site, Barcelona Europe, is situated in Cape Town, South Africa it means that climatically this area will experience the region's generally long, mild to hot, dry summers and shorter, wet winters. The air movement is characterized by prevalent winds from the South-East in summer and the North-West in winter. Moreover, in winter, the prevalent North Westerly brings storms and rains.

Due to the low lying nature of the Cape Flats and its Calcerous sandy soils, plus the region's high water table, flooding is a problem in the Cape flats, especially in the informal settlement. The resultant is the regular water logging and flooding in winter time.

The housing structures in Barcelona Europe provide only minimal shelter from the natural elements. This is because the building materials used for structures (sheet metal, plastic, wood etc) are poor insulators. As a result, the inhabitants experience exaggerated heat in summer and very cold temperatures in winter. Poor drainage of the soil and the naturally high water table negatively exacerbate annual winter flooding. The high humidity levels in the area maximise the bad odour.



Fig15

**Hydrology (Drainage pattern of the site)**  
Adapted: Cape Town & Environs Geological Survey, Gb 1:7009  
UCT Planning Techniques, JLA & MCRP, APO.435F : 2011

Site Scoping

SCALE: 1:5000 @ A3  
0 50 100 250 m

### 3.1.3 Climate and Hydrology

As previously mentioned, the study site was used as a dump site, and there were no measures taken during the dumping of the waste. The landfill is therefore, prone to seepage and there is fear that there is a possibility of surface water infiltration and contaminating the ground water. Hence, due to the elevated nature of the landfill, ponding occurs in the low lying areas, the majority of the flooding/ponding taking place near road reserves and towards the canal.

The Cape Flats is a natural flood plain and has some naturally occurring wetlands. A large amount of these wetlands have been destroyed or disturbed as a result of development, agriculture and hardening of surfaces. The impacts on wetlands can be observed immediately adjacent to the site through 'disturbances' (existing settlements) and 'desire lines' (routes paths, tracks). (Harding, 2009). The N2 (SettlersWay) cuts through the northern edge, resulting in water ponding and causing flooding in certain areas. Water is canalized along the northern edge. This canal acts as a drainage system to drain away some of the flood waters, however, the canal also divides the natural hydrology (wetlands, flood plains), preventing water seepage back into the underground aquifer. The canal poses a hazard as it causes pollution, and pollutants. For example, refuse that has been dumped causes deterioration of the water quality in the canal.



Fig 16 Uncompacted waste resulting in podding and the poor drainage of the soil means that during raining seasons flooding occurs here.

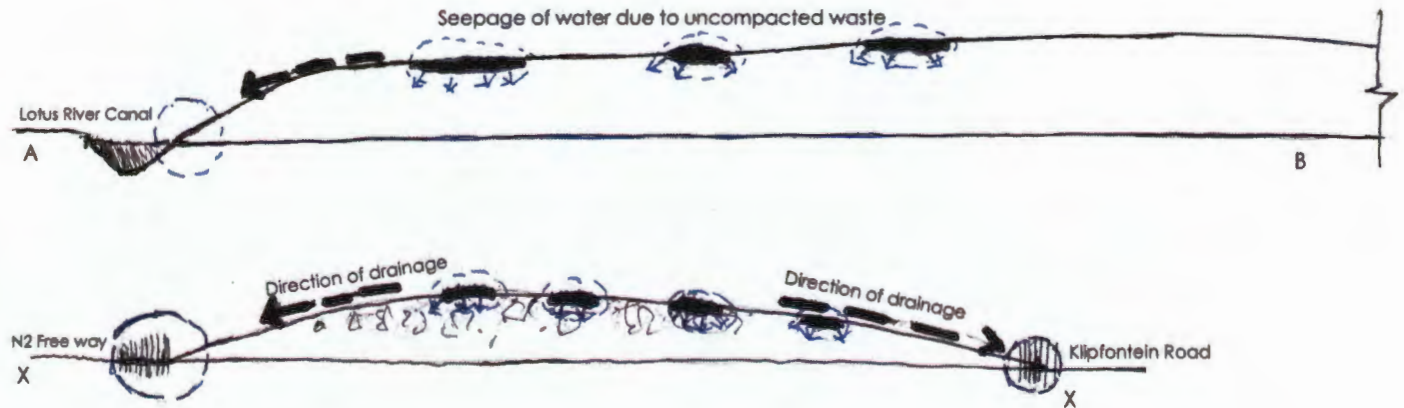


Fig 17 Sections across the site, reveal that excavation during wet seasons will have to be avoided. The canal will have to be excavated at last to avoid contamination of the ground water,



### 3.1.5 Climate and Hydrology Composite of Informants

The Cape flat is a natural flood plain and has some naturally occurring wetlands. A large amount of these wetlands have been destroyed or disturbed as a result of development, agriculture and hardening of surfaces. The impacts on wetlands can be observed immediately adjacent to the site through 'disturbances' (existing settlements) and 'desire lines' (routes paths, tracks) (Harding 2009). The N2 (SettlersWay) cuts through the northern edge resulting in water ponding and causing flooding in certain areas.

Water is canalized along the northern edge. This canal acts as a drainage system to drain away some of the flood waters, but the canal also divides the natural hydrology (wetlands, flood plains) and prevents water seepage back into the underground aquifer. The canal is a hazard as it causes pollution, and pollutants (eg. refuse that has been dumped) cause deterioration of the water quality in the canal.

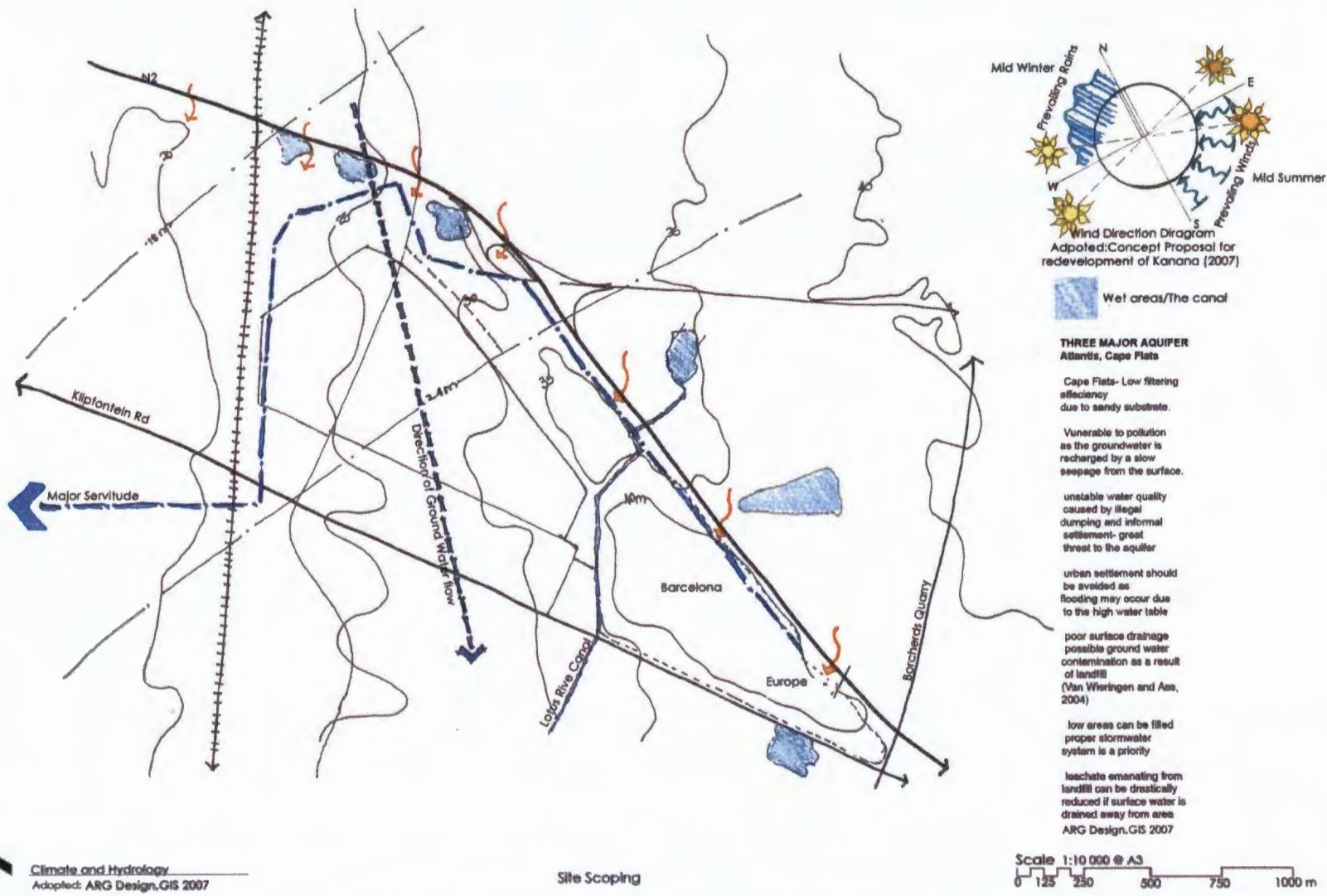


Fig 18 Climate and Hydrology  
Adapted: ARG Design, GIS 2007

Site Scoping

### 3.1.2 Vegetation



The source of vegetation that once existed on the cemetery section of the site has been gradually cleared. Leaving the site bare and no shelter from the prevailing winds. One can observe for the clearing of the vegetation on the historical maps pg.13.



Fig 19

The site is naturally of the Cape Flats Dune Stranded vegetation type. However, the site is incredibly distressed, both as a result of previous urban activities (landfill disturbance) and informality of the settlement, which has had a significant impact on the natural environment.

The density and intensity of activity on the site has resulted in very little natural vegetation remaining. The vegetation that is present is mostly alien vegetation and grasses, and resilient shrub.



Fig20

**Vegetation on site**  
 Adopted: Cape Town & Environs Geological Surveys, City : 2009  
 UCT Planning Techniques JMLA & MCRP, APO, 433F : 2011

Site Scoping

SCALE: 1:3000 @ A3  
 0 50 100 250 m

## 3.2 Urban Analysis Analysis Broader Context and Site Scale

### 3.2.1 Access

As it is important to understand the natural setting of a site, it is also important to understand and investigate the urban fabric and the cultural character of the people living around and within this site. Through this understanding then one can be able to respond accordingly.

As previously stated, the study area sits between the N2 freeway, which runs in an east-west direction north of the site and Klipfontein Road which is aligned in an east-west direction south of the site. The N2 runs all the way to Cape Town city centre. The N2 is a national road, hence very noisy.

Klipfontein road which is currently under construction will be transformed into a rapid bus carriageway dedicated bus lane. (ARG Report 2007). Located not far away in the western direction of the site is the Heideveld station which according to the ARG report 2007 it is the eighth busiest station in the Cape Metropolitan Area with approximately 11325 people commuting daily. There is a taxi rank at the station. Towards the south there is the Nyaga train station. Hence the mode of transport is mainly minibus taxi followed by train.



Fig 21



Accessing the Site (Broader Context)

Adapted: Cape Town & Environs Geological Surveys, GIS : 2009

Site Scoping

SCALE: 1:10 000 @ A3



### 3.2 Public Amenities

Barcelona Europe site is surrounded in the west by residential use; these are the low to middle income developments of Guguletu, Nyanga and Heideveld. Industrial use in the form of warehousing and associated uses as part of the Airport Industrial Development can be found in the north east. A golf course is also situated on the north east.

There are approximately 180 870 people living around the study area. This people make use of the following limited public facilities around them including, 73 schools, 2 hospitals, 18 clinics, 92 religious institutions, 9 libraries, 6 police station, 6 community halls and 8 post offices within a 2-3km radius. There are 30 small parks and sports fields servicing the 180 870 population. These sports fields are not adequate in size and are not well maintained, hence the public facilities are limited resulting in overcrowded facilities. Moreover the lack of pedestrianic bridges over the results in N2 acting as a major barrier because it is most difficult for people to access facilities north of the N2.



Context of Public Facilities around the study area



### 3.2.3 Linkage to the green Corridor

The study area does not lie alongside the biodiversity corridors of the city and there are no major open spaces in the vicinity other than the main Golf Course in the north, which is privately owned and quite exclusive. There are a few sports fields, cemeteries and parks nestled within the settlements, which make up the open space system of the study area. The open areas are insufficient. As a result people find themselves using any available open space within their surroundings regardless of the health or safety issues apparent within many areas.

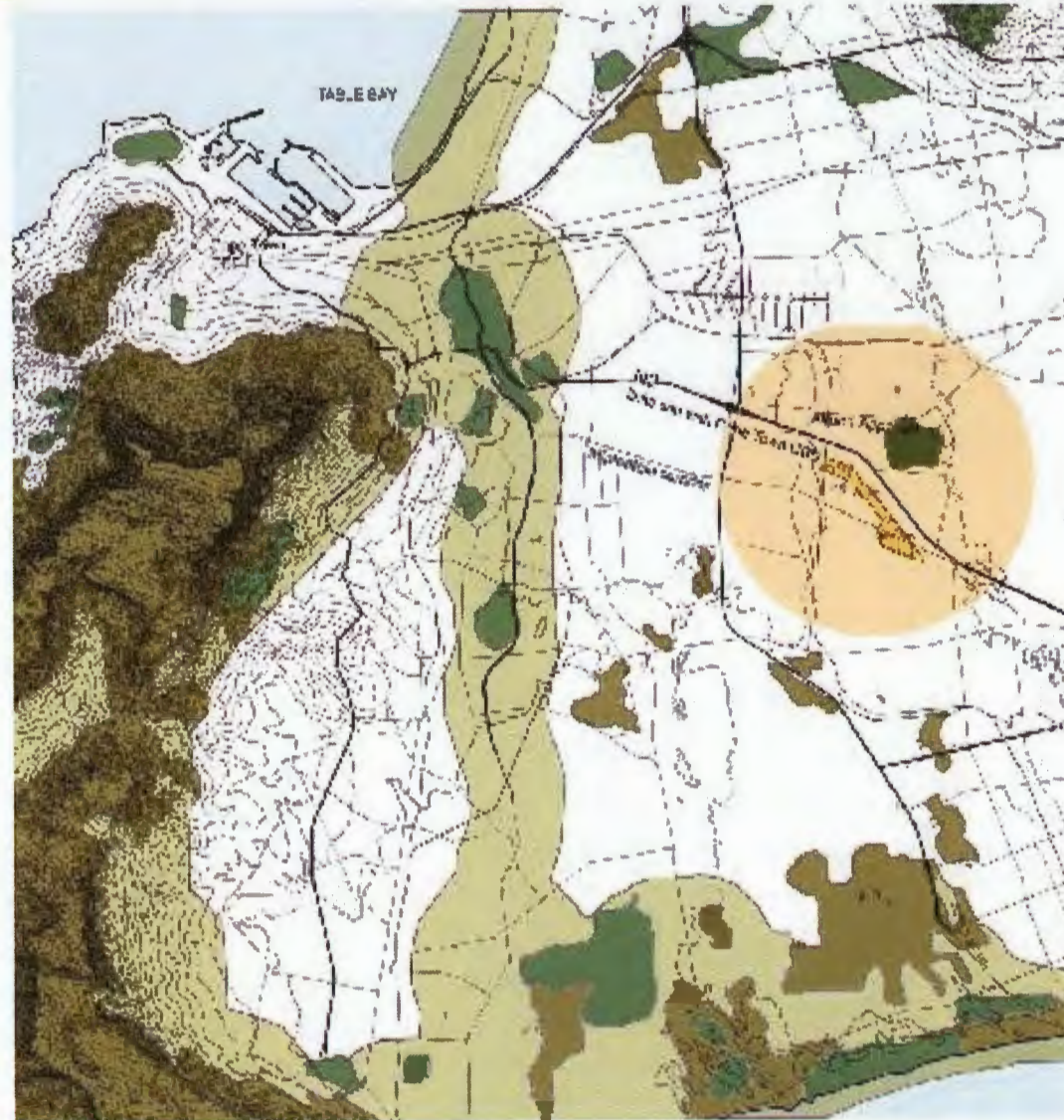


Fig 23 Adopted from:ARG, Report, 2007

### 3.3 Social Character /sense of place Site Scale

The social fabric aspect existing in Barcelona Europe is almost a typical township informal settlement experience. Where there is a complex web of social interaction between people and their social spaces.

#### 3.3.1 Trading Nodes

Along Klipfontein Road, a variety of intersections of activity can be found. These nodes can be utilized to activate nodes within the community itself, be in for trade, recreation or the development of services. The garbage disposal points are located on easily accessible path intersections and in turn have formed more pronounced utility nodes. The constant human activity around these utility nodes ranges from water collection at taps, to social interaction to informal football games.



There is a range of trading activities taking place with the settlements and some on the edge of Klipfontein road.  
Fig 23,Source: MRCP & MLA

#### 3.3.2 Recreation

The primary semi-formalized spaces that the inhabitants use for social interaction are the shebeens and churches. The few open spaces that exist in the area are used for sports and games, such as the Road Reserve of the N2, the cemetery and the streets between the shacks. There are many trades and shops which, if provided with a platform to operate it will increase the entrepreneurs produced.

Religious activity happens at a variety of spaces, within and beyond the geographic borders of the settlement. If one analyses the spatial units of the congregation, referring to paths, nodes, edges, districts, and landmarks, one finds that the various churches are critical in giving landscape legibility to the area. MRCP and MLA(2011)



Recreation activities take place at various spaces. There is a need to provide adequate multifunctional spaces that can accommodate some of the activities.  
Fig 24,Source: MRCP & MLA

### 3.3.3 Clusters and Neighbourhoods

Within Barcelona and Europe settlements the roads and pathways divide each settlement into smaller semi- districts, resulting in small neighborhood clusters. Within these clusters in some circumstances, a definite sense of community and social dependence forms, whereby individuals depend on their neighbors.

### 3.3.4 Crime and Security

Crime plays a critical role in the way people tend to socialize. Hence, according to MRCP and MLA (2011) cultural mapping, during a community meeting by residents, concerns were raised about the general occurrence of crime within the community and members also indicated a number of areas where crime occurred regularly. These nodes, depicted on the crime map, are perceived by the community to be inducers of crime because of the specific spatial characteristics that define them.

As such, these nodes are considered to be persistent areas of danger, either drawing outsiders into the community, or providing them with an escape route away from the community after a crime had been committed. Hence, when designing public spaces, addressing the spatial characteristics that specifically contribute to the occurrence of crime within these communities must be a crucial aspect of any future development efforts.



Identified areas where crime take place.  
Fig 25 Source:MRCP and MLA (2011)

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## Institutional Planning Development Frameworks Proposals

- 4.1 City of Cape Town Urban Design Department Developmental Framework Draft Proposal
- 4.2 ARG Urban designer Developmental Framework Proposal
- 4.3 Identification of Proposed Adopted Framework Plan

## CHAPTER [4]

The previous sections have outlined the issues and realities surrounding the study site. Research questions were identified surrounding the problems of inhabiting a decommissioned landfill site. This section will critically analyze and discuss the institutional development framework proposals from the City of Cape Town Urban Design department and the ARG urban planner's framework proposal. The reason for this analysis is to react to a framework that responds in light of my hypothesis.

*As Michael Michalko writes: "Genius often comes from finding a new perspective" (2001, 19). It is possible to avoid repeating the same treatment and creating a monotonous public space by applying a new methodology to the designer of the spaces based on a different set of values and ideas.*

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## 4.1 The Brief from City of Cape Town

### 4.1.1 Option 1 and 2

ARG was appointed by the strategy and planning department of the city of Cape Town to facilitate the future development of the study area. The brief as according to the ARG report, (2007) required that:

- A reassessment of the site development plan prepared by the urban design Branch be carried out
- An investigation be made, into the concept that dealt with the sustainable development of the landfills
- An assessment of the contextual analysis of the study area and future needs be carried out
- An assessment of the site in relation to the city's current priorities and needs as well as financial constraints be conducted
- An assessment of the site in relation to the needs of the community located on the site be conducted
- A break down on the phasing and costing of the project be done.

On critiquing the Cities proposal, ARG noted that, 4 development options were drafted by the city.

Option one and two address the issue of human health by indicating that people living on the Landfill need to be re-housed on an alternative site. Both options address the social needs of the surrounding communities, such as a need for recreational activities, sports fields and public parks. The proposals also address the need for initiation sites that a cultural aspect within the Cape Town Metropolitan Area. Urban agriculture is also seen as a means to economically sustaining the surrounding communities.



Fig 26

the City Option 1 AND 2

0 100 500

## 4.1.2 Option 3 and 4

Option 3 and 4 recognizes the sustainable human settlement agenda. It proposes for urban agriculture. However the proposals, according to ARG report, do not support the need for housing for the growing population. Moreover, both plans do not deal with the fundamental issues of rehabilitating the land. Hence, they do not deal with the fundamental issues that the landfill has to undergo a series of tests before the site is rendered suitable for development.

It may be that the landfill is polluting the Cape Flats Aquifer, hence, would have to be entirely removed. Therefore the issue of the site's land value becomes fundamental because when the site is cleared, it presents numerous development opportunities. The site's Location value makes it very competitive. Therefore, any future development would have to take cognizance of this fact. (ARG, 2007)



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## 4.2 ARG Developmental Framework Proposal

### 4.2 ARG Developmental Framework Proposal

ARG (2007) urban designer developed three development options and scenarios.

Option 1 requires the be people removed and site closed down

People should be removed off the site and the government should not allow people stay on this site as it against their human right to be allowed to stay on such an inhuman environment. And the site should be left as it is. However, if the site is left as it is they will continue to pollute the ground-water.

Option 2 requires that the problem should be to banked

This option involves clay-capping the site without sufficient tests with regard to the extent of the landfill pollution on the Cape Flats Aquifer and groundwater. Clay-capping is usually coupled with a gas extraction mechanism to solve the gas emission problem. This is a generic way of dealing with landfills. Clay-capping is a very expensive procedure and will not solve the pollution problem, therefore it may be more financially viable to incrementally clear the site and rehabilitate the site over a five year period at a comparable cost.

Option 3 requires that People and Waste be relocated

On their most favorable option ARG argues that the waste could be relocated and sorted, and if the material is found to be reusable, it could be returned and used for the redevelopment of the site. This is a very land intensive and costly exercise. However if phased properly the cost will be managed across the years.

ARG further proposes three approaches on how to achieve the removal of people and the landfill. They provided Briefs and solutions for each of the approaches. These approaches are as follows:

Brief 1: Limited Building Scenario:  
Brief 2: Combination Scenario  
Brief 3: Optimum Land Development Scenario.

---

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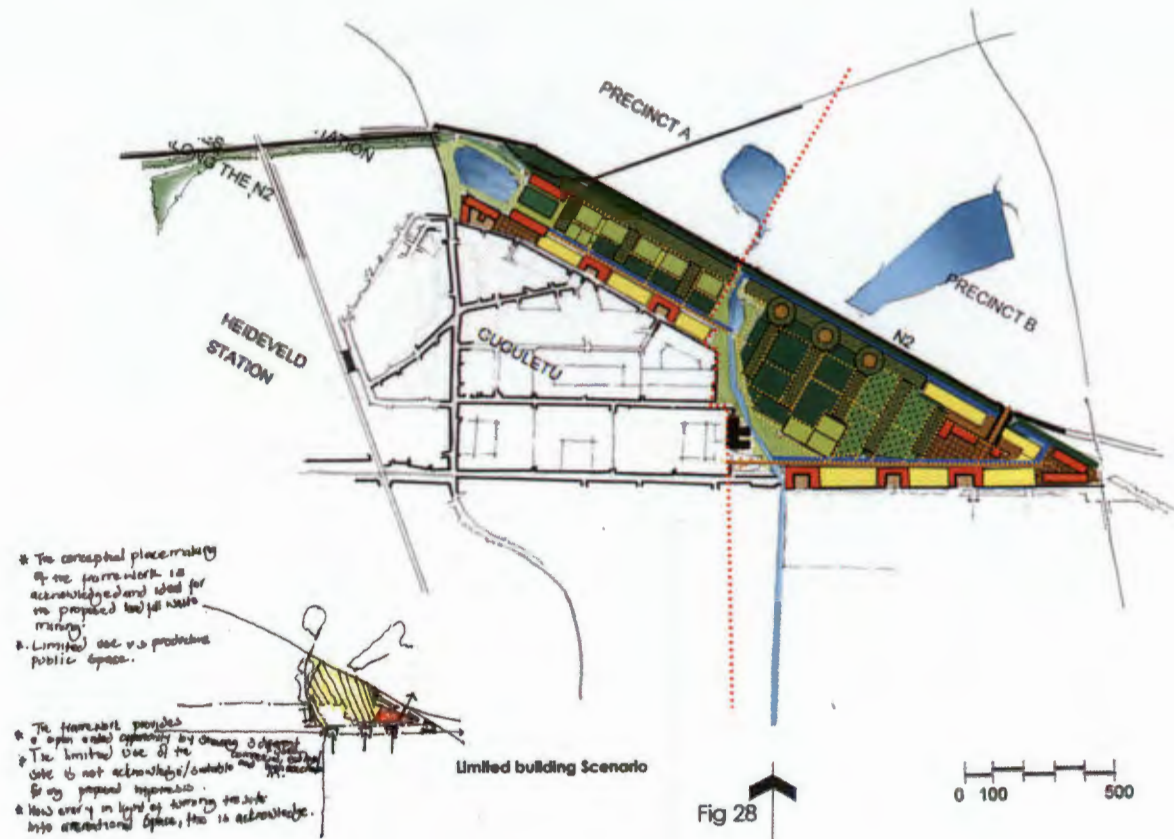
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## 4.2.1 Brief 1: Limited Building Scenario:

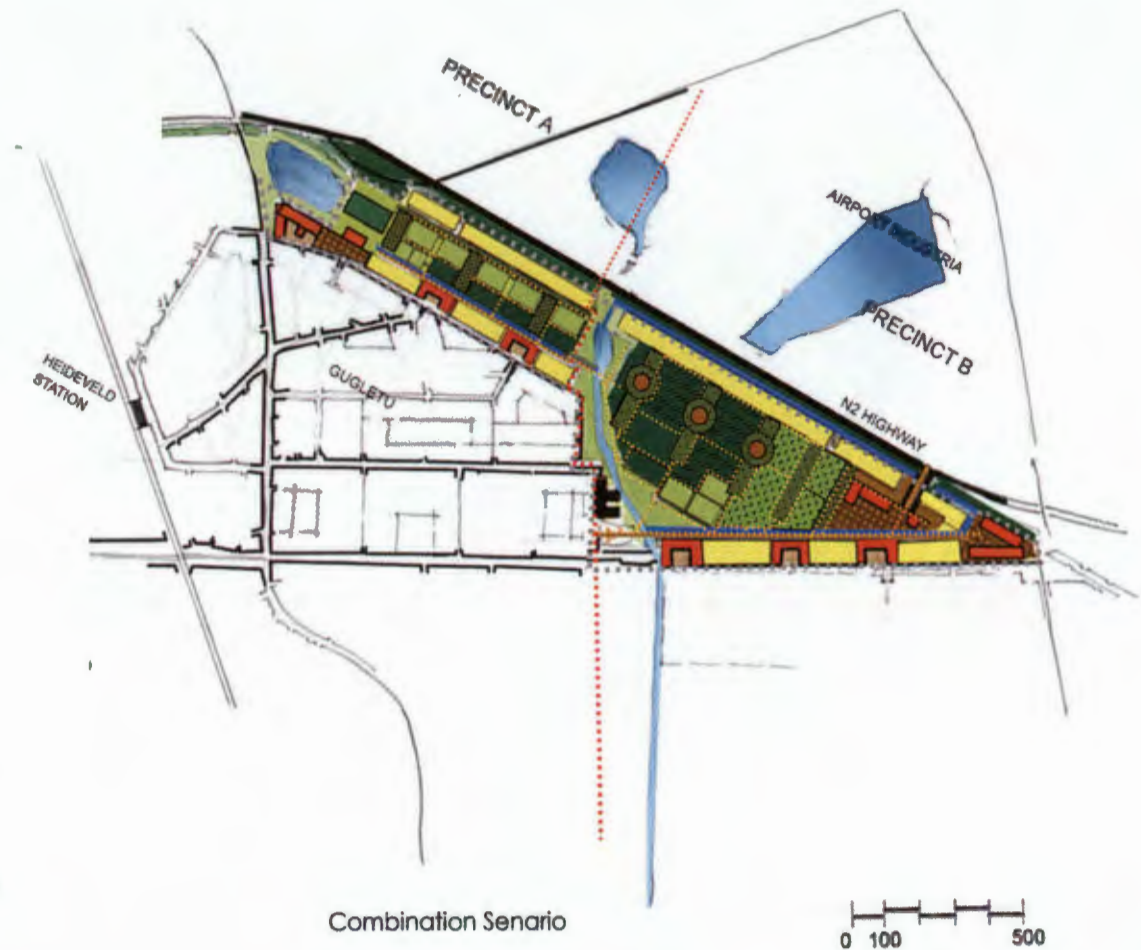
### 4.2.1 Brief 1: Limited Building Scenario:

If it is found after further investigation that the landfill's pollution of the ground water system is not severe and the polluted ground water could be naturally diluted over time. An easier, less extensive, but costly solution to address the methane gas emission problem would be to put clay on the site in order to trap the methane gas and other gases. Partial clearing would be required for the development of some structures. However, the capped area would permit soft uses such as recreational and sporting facilities. The landfill is unstable therefore; it would require a certain amount of compaction before its use (ARG, Report, 2007).



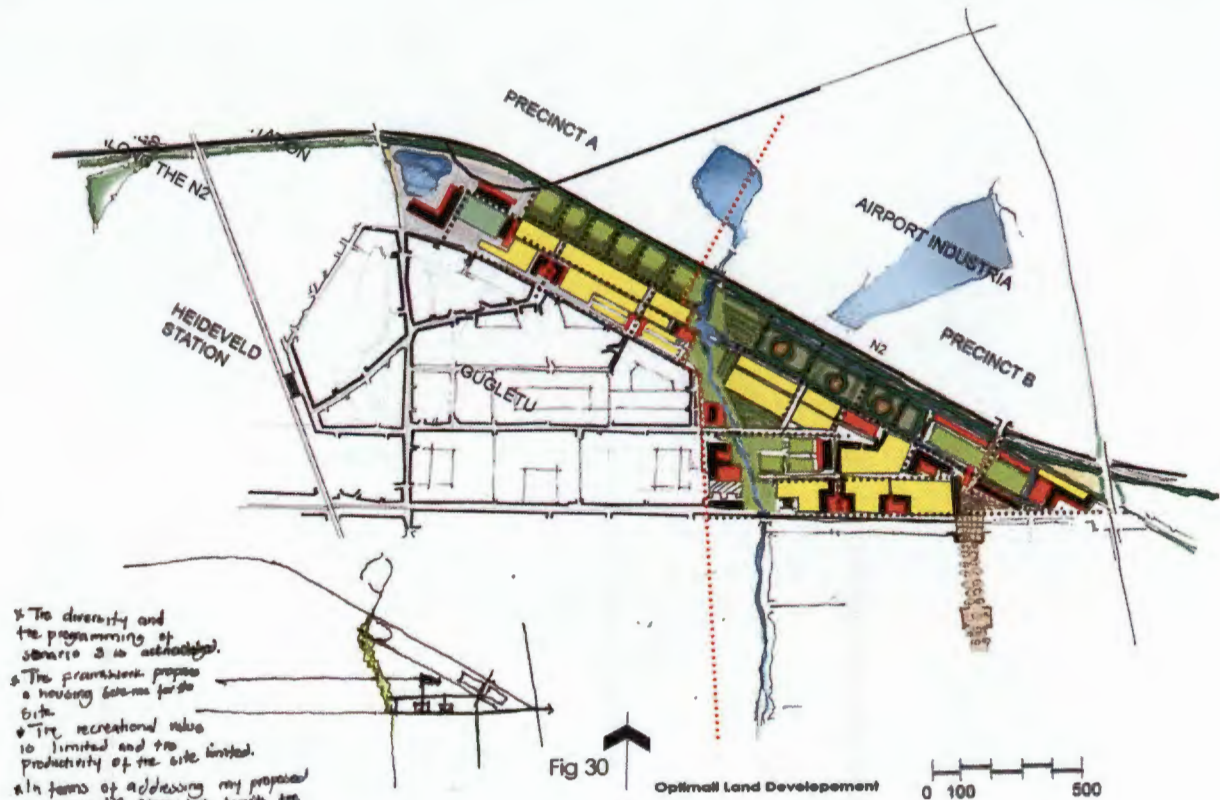
## 4.2.2 Brief 2: Combination Scenario

If, after further investigation it was found that the landfill is polluting the aquifer, an incremental phased rehabilitation of the site would be required. There is currently a backlog of approximately 360 000 houses in the Western Cape and 260 000 in the CMA (ARG, Report 2007). The site has a high land value because of its central location. The incremental approach to clearing the landfill of its contents requires careful planning and implementation. The contents of the site should be determined, and then the site should be incrementally excavated and removed in phases. The ground water would need rehabilitation, then the land would have to be prepared for development. The soil content should be tested to see if it can be remediated. Once that is done the soil should be treated and reused in the redevelopment of the site, including the recycled inert material, which can be used for compaction and for a hardened surface suitable for building construction. Once the site is cleared, the land can be prepared for development. The people currently inhabiting the site would have to be moved to the new development in a phased manner. The process would continue until the site is totally rehabilitated. This would be a very intensive and costly exercise. However, the cost would be spread over a manageable time period (ARG, Report, 2007).



### 4.2.3 Brief 3: Optimum Land Development Scenario

If after further investigation it was found that the landfill is severely polluting the Cape Flats Aquifer and groundwater, it would have to be totally cleared.



\* To diversity and the programming of scenario 3 is anticipated.

\* The framework proposes a housing scheme for the site.

\* The recreational value is limited and the productivity of the site limited.

\* In terms of addressing my proposed hypothesis, the framework benefits the hypothesis in addressing housing needs. As previously stated, people will be relocated to adequate livable space, that were previously used as recreational spaces, hence the need to address housing needs addressed.

Fig 30

Optimal Land Development

0 100 500

### 4.3 Proposed adopted Framework for the Barcelona Europe landfill

When critically examining the City's and the ARG's (2007) proposals, the conceptual proposal to turn the site into a recreational space is ideal for the site. However, the ARG framework proposal to incrementally relocate people and the waste is more ideal, as it lightly responds to my hypothesis.



Conceptual Framework Plan

Responding to the Institutional Frameworks in light on the Hypothesis  
 Conceptual Phasing of the Framework for waste mining

SCALE: 1:5000 @ A3  
 0 50 100 250m

Fig 31

## Summary of Opportunities and Constraints

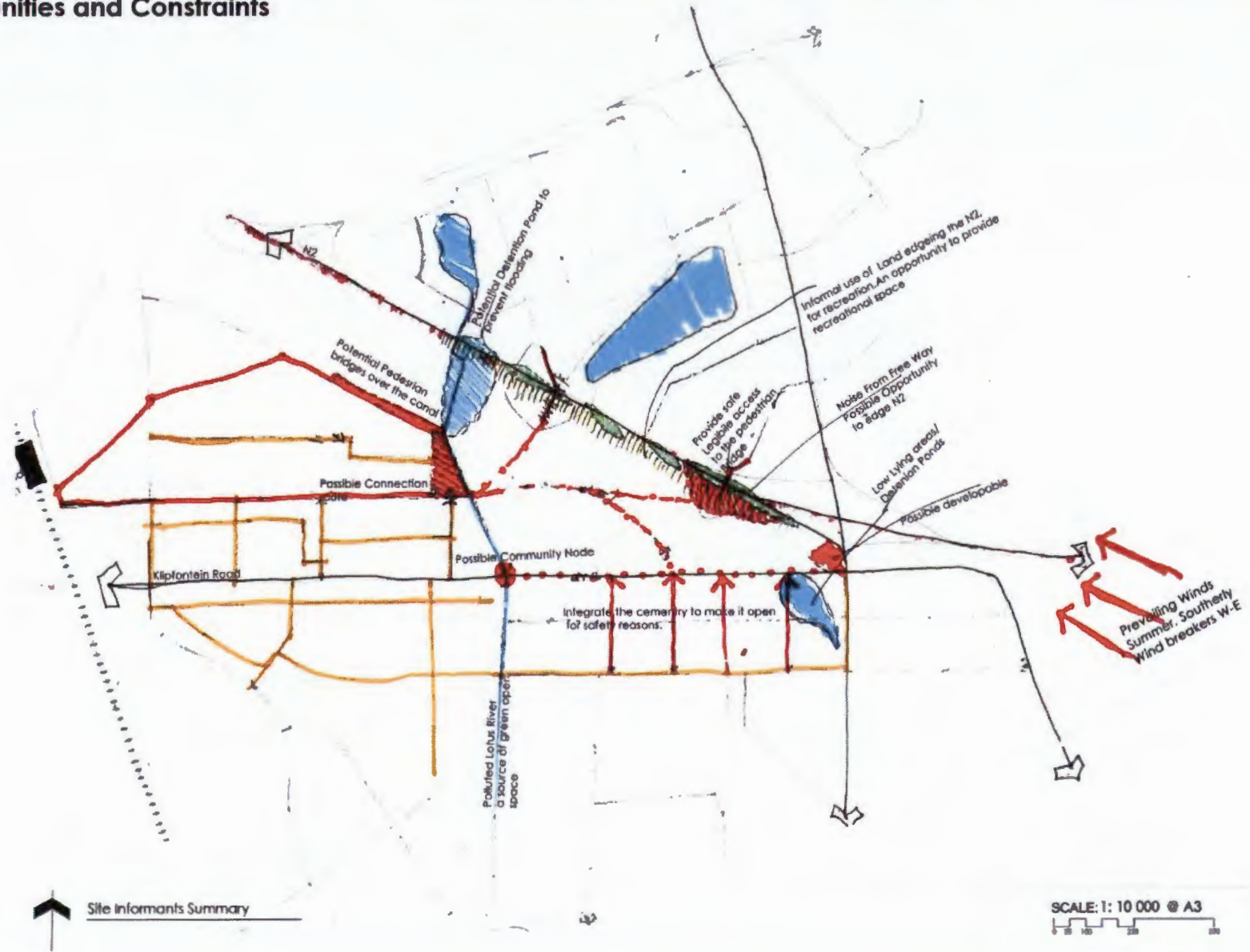


Fig 32

## Structuring Elements

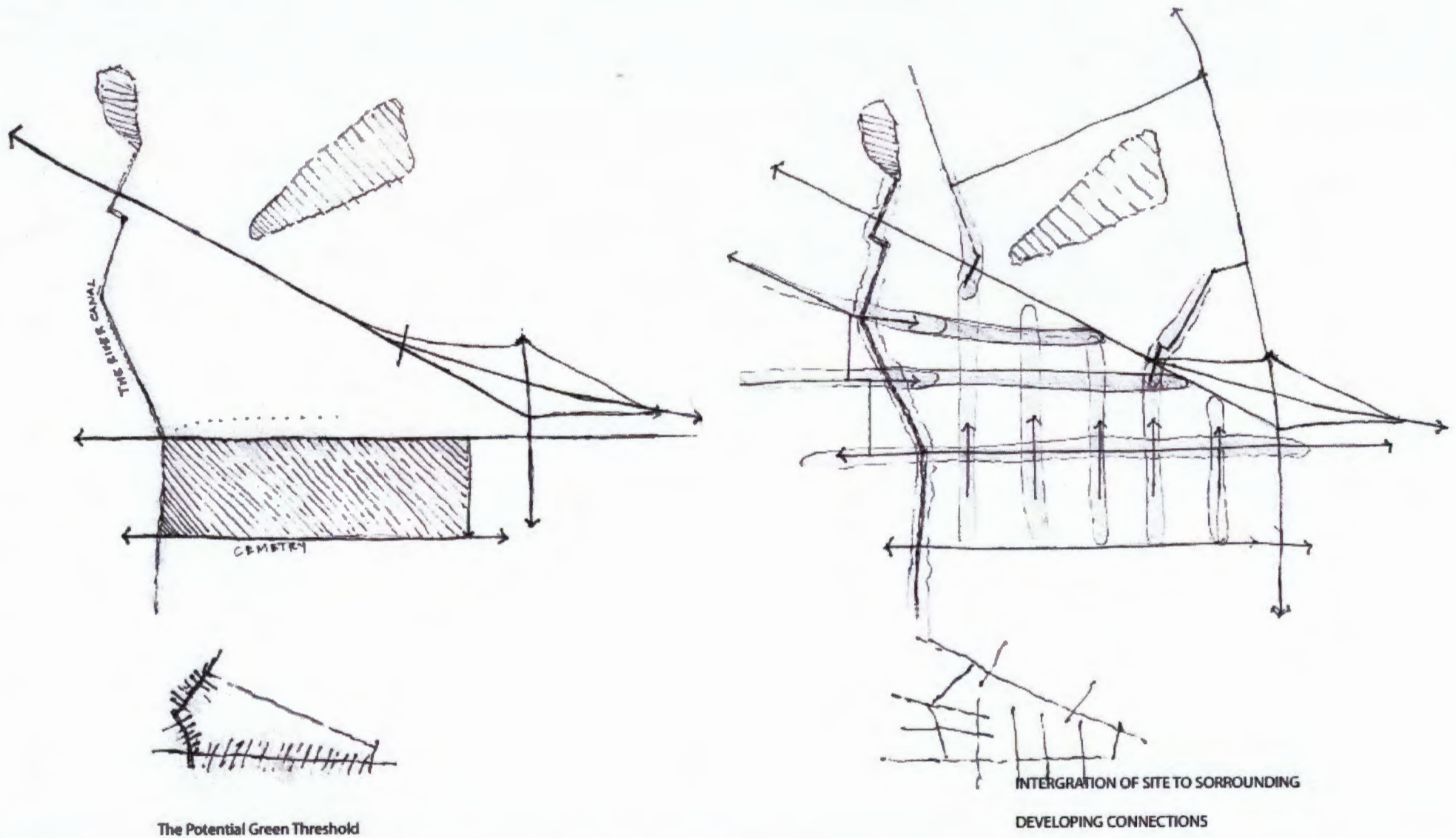


Fig 33

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## Theoretical Framework

- 5.0 The vision of the project
- 5.1 Brownfield's and Derelict Sites
- 5.2 Landscape as Infrastructure
- 5.3 Packaging the Landscape
- 5.4 Programming the Landscape
- 5.5 Non-Programmed Spaces
- 5.6 Impermanence
- 5.7 Reflecting on the Theory

## CHAPTER [5]

The first part of this section will start by discussing what are brown field's sites and reclamation of these sites. Examples of some recent Brownfield projects which have been successfully transformed into ecologically and socially productive public spaces are given.

The second part then explores and discusses a particular Project in order to highlight strategies of open space design that have been implemented to revitalize other projects, and are important to consider and may be potentially adopted in the design of the Barcelona Europe productive public space. Moreover these projects serve to reflect and demonstrate the positive impact that can be generated from investing in reclaiming of public space from brownfields site and the design of productive public spaces.

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## 5.0 The vision of the project

### Vision

Revealing ways of how people relate to their land by showing how natural processes and human activities can coexist in a long term self sustaining environment.

(The process of phasing the project through waste mining)

**Restoring the ecosystem to a state of balance by active human participation natural processes.**

Returning to public use, the land that has been inaccessible for 30 years, putting it back together to provide an exceptional productive public space for the broader communities.

**Regenerating Barcelona Europe landfill as a catalyst for changing perception.** It will show how a productive public space can be gradually transformed and can function ecologically. It will demonstrate at all scales, the methods and attitudes by which renewable energy resources and land stewardship can be implemented. The idea of waste mining be taking to a recycling centre and compost and nursery on site, and sorting of the waste taking place within the site.

It is envisioned that beyond the landscape this site will give further opportunities to take place for researching technologies for environmental and architectural design. Bringing together landscape and built form in a completely integrated way to deliver an assembly for built of buildings proposed such as recreational pavilions, resource hub, civic building, recycling centre buildings. That is, the highest international standard in which visitors can not only experience the world's diverse environment, but also the dynamics that create and sustain them.

**Reintegrating the site at all levels.** To the neighbouring communities, to city and region, while generating mixed use opportunities and responding to community aspiration.

### The Programme respond to:

#### Surrounding land use:

By a mix of development and nature designated areas. This presents positive and diverse opportunities in terms of the site's potential and wider context.

The programme enables both protection of the existing canalised river, together with creation of a considerable area of new development, providing a sufficiently robust and flexible framework with which mixed use development can be successfully integrated at a later stage.

#### The Immediate Community and broader:

With its potential to generate not only recreational, education, job creation and work business opportunity, Barcelona Europe's proposed enduses will also invigorate and diversify flows of people in the area from the broader scale. A plant propagation and administration unit, a recycling centre and compost, and bio mass processing plant will lead to a broader range of people on site.

#### Resources usage:

Certain waste processing activities serving Capetown may be continued here in Barcelona Europe, such as the collection, sorting, and dispatch for reprocessing of recyclable materials, as well as the collection and composting of organic yard waste for use on site.

### The programme activities includes:

#### Places for recreational activities that is,

Places for recreational activities (Recreation Events Fields) Visitors Recreation Centre/ Recreation Pavilion, that can serve to accommodate shifting needs and activities for the area. That is, churches, wedding ceremonies, burial services, graduation parties, and other activities. Commercial Development Pockets: -shops and cafes, including the incorporation of the existing trading that is taking place within the area.

#### Access:

Pedestrian flows, Ecological flows, Pedestrian Bridge, Vehicular route, Pedestrian route.

#### Resource hubs:

Recycleable material Centre  
Plant Nursery Centre for seed collection  
(Plant propagation and administration, including a compost processing and Biomass plant  
Civic centre Building Research/education/office working zone, with support facilities

## 5.1 Reclamation of Brownfield's and Derelict sites

## Open Space Design Strategies

According to Langhorst (2009), the reclamation of derelict or disused landscapes, specifically the ones that have been shaped by very distinct use over time, both physically and culturally, poses a set of particular challenges and questions. Contemporary approaches to abandoned and derelict sites are mostly driven by the idea of reclaiming space for a variety of uses. From the reuse of an industrial area to a conversion into housing or a park, there are a vast number of projects that cover a considerable range. Langhorst (2009) argues, that as a result of the complexities and contestation, brownfield sites or derelict sites are suitable for the development of different theories and practical approaches to the redesign of public mixed use open spaces. Some of the famous recent projects that he notes and a well known for their revitalization of derelict post-industrial sites include:

- Gas Works Park, Seattle, USA (Richard Haag, 1971)
- Landschaftspark Duisburg-Nord, Duisburg, Germany (Peter Latz & Partner, 1985-current)
- Byxbee Park, Palo Alto, USA (George Hargreaves & Assoc, Peter Richards, Michael Oppenheimer, 1991)
- Candlestick Point Park, San Francisco, USA (George Hargreaves & Assoc, Mack Architects, Douglas Hollis, 1989/90)
- Fresh Kills, Field Operations, USA (James Comer)

Comer (1999), cited in Langhorst (2009) points this out, in trying to understand the reclamation of Brownfield's sites, and adopting them into mixed use open space analysis needs to be based on an understanding of open space and landscape, as both a complex construct and process that includes naturalistic and phenomenological experience, and diverse and often competing forces, such as social constituencies and interests, political desires, ecological processes, program demands etc, allowing for the interpretation of landscape not only as a product of cultural activity, but explicitly as an agent of social, cultural, ecological and technological change (Comer, 1999 cited in Langhorst, 2009).

Gas Works Park Seattle, USA (Richard Haag, 1971)



Fig 34  
Source: [http://www.seattle.gov/parks/\\_images/olmsted/gasworks1965.gif](http://www.seattle.gov/parks/_images/olmsted/gasworks1965.gif)



The plant opened in 1906 and closed in 1956 when the City switched to natural gas. The site was abandoned for several years until the City purchased it in 1962; a design combining elements of historic preservation and park design was commissioned from landscape architect Richard Haag in the early 1970s.

Various industrial facilities within the park were converted for new uses: the boiler house, which provided steam for gasification and compressors, became a picnic shelter; the pump house, which pumped gas throughout the facility and to customers, became the play barn; the smoke arrester hood outside the pump house became a play structure for climbing.  
Source: [http://www.seattle.gov/parks/\\_images/olmsted/gasworks1965.gif](http://www.seattle.gov/parks/_images/olmsted/gasworks1965.gif)

Landschaftspark Duisburg-Nord, Duisburg, Germany (Peter Latz + Partner, 1985-current)



Fig 35  
Source: <http://www.landezine.com/index.php/2011/08/post-industrial-landscape-architecture/>

The whole park is a big adventure playground. Old industrial structures are transformed by adaptation and new interpretation: Fantasy allows to use them in new ways, to deal with them and to play with them. The existing patterns and fragments formed by industrial use were taken, developed and re-interpreted into new use.

Byxbee Park, Palo Alto, USA (George Hargreaves & Assoc, Peter Richards, Michael Oppenheimer, 1991)



Fig 36  
Source: <http://www.hargreaves.com/projects/PublicParks/Byxbee/>

Manmade artistic features are scattered throughout the park. Byxbee Park sits on top of a reclaimed landfill at the edge of the San Francisco Bay. On two feet of soil, over a one-foot-thick impenetrable clay cap, the park rests over as much as sixty feet of garbage. The park to not only provide people of Palo Alto with opportunities for recreation and contemplation of the bay marshes, birds and wildlife; but to also respond to the conditions of landfill below within the context of the surrounding confluence of complex ecosystems.

Candlestick Point Park, San Francisco, USA (George Hargreaves & Assoc, Mack Architects, Douglas Hollis, 1989/90)



Fig 37  
Source: <http://www.hargreaves.com/news/index.php>



A collaborative design by Hargreaves Associates, Mack Architects, and the artist Douglas Hollis, Candlestick Park on San Francisco's Bay edge breaks new ground in cultural facility design. A language of location was developed from the dominant elements on the site — wind and water, ships and docks, and the landfill under the park itself — and manifested itself in the detailed articulation of the place.

Field Operations, Fresh Kills, USA (James Corner)



Fig 38  
Source: [http://www.nyc.gov/html/dcp/pdf/14/2\\_dmp.pdf](http://www.nyc.gov/html/dcp/pdf/14/2_dmp.pdf)



An ambitious and innovative public works project in the world in terms of environmental reclamation, renewable energy, urban ecology, green technologies, regional recreational amenities, environmental education, art and culture. Once the world's largest sanitary waste landfill, now creatively transformed into 890 hectares of public park land. It is about dynamic staging and the cultivation of new ecologies at Fresh Kills. Fresh Kills 2030 vision of how the site shall look.

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## Reclamation of Brownfield's and Derelict sites

This idea of seeing the landscape as a complex contrast is argued further by Edward Relph (1993), who contends that place reclamation is not a simple task. He points out three styles of land Reclamation: one perspective which is about Romanization of place of the modernist theory of the 1960s and 70s. That is a pursuit of personal or group image, the looking back into history, of significant buildings and one salvaging anything they can. He points out that this approach to land reclamation is often beautifully restored and very informative, however they do nothing to challenge the placeless processes of modern development methods.

As argued by Relph (1993), the transition of the world mode of production from industrial to service economies, has created a vast inventory of large abandoned sites including old factories, closed landfills, decommissioned ports and waterfronts, former airfields, even neighborhoods and sectors of the city where labor has migrated and left empty tracts of towns. These pose huge remediation challenges which have led to advanced ecological restoration methods and management techniques. In addition, they provide an alternative aesthetic to the traditional (romantic) rural pastoral aesthetic.

With regards to, the second perspective of land reclamation, Relph argues that it is concerned with attempts to improve the products of the environment machine by making pleasant, arresting spaces. Relph argues that this perspective principle is based on the idea that, "if we have to live with a monstrous machine, we might as well decorate it to look attractive". He further argues that one needs to question this approach of reclamation because it does nothing to the idea of place making and also this kind of decorative approach are products of intensive technical and behavioral research used to manipulate a supposed sense of place, hence the main purpose of the design usually is to entice people to spend money and not worry about the environmental dilution.

For example For Barcelona Europe landfill, if the government can invest on only capping the top of the landfill, manicuring the ground, and relocating people, turning a blind eye on what is taking place underneath, then the environmental impacts will continue to take place, as the landfill will take years to decompose the waste. Moreover, the ground water will be polluted, as there is no geo lining and recapping of the surface will be need to be carried out.

Edward Relph (1993), further argues that there is a third perspective of reclaiming of place which he refers to as a radical concern which aims at critically drawing to the originality of the place, but at the same time, through careful thinking about the nature and ways in which it might be possible to make new types of places without simply copying out-dated approaches. He reiterates that maybe the radical concern has "been partly based on the conviction that a heightened sense of place is an important aspect of any attempt to redress the enormous injustices and dangers to survival that threaten us all."

He argues that this approach to reclamation tries to break away from the conventional ideologies and technical abstraction and to contact people, things, and landscape directly. Furthermore, Relph (1993), states that the radical approach to reclamation has led to a growing awareness that places do matter to people, and that they need to be reclaimed as integral parts of human environments.

In addition, he contends that place reclamation is not an easy task, and highlights that even Kevin Lynch, Christopher Alexander and others have witnessed the complexity in dealing with modern environments, and they all found it "necessary to make proposals for place making and environmental design that owe very little to conventional approaches". His argument is that within these proposals, is a straightforward idea that is of value to all issues of place and place making, the one that offers possibility for emergence of "genius loci" and that challenges the environment machine without necessarily being co-opted. This idea is simply that places have to be made largely through the involvement and commitment of the people who live and work in them; "places have to be made from inside out" (Relph, 1993 cited in Swaffield, 2002:103)

Relph (1993) concludes that Genius loci cannot be designed to order. The essence of place/ place making has to evolve, to be allowed to happen, to grow and change from the direct efforts of those who live and work in places and care about them. He argues that the ideologies and technical standards that are employed in the everyday are of no value here.

He points out that, no matter how sophisticated technically knowledgeable one may be, however the understanding of others people's lives, and problems will always be partial. "Just as outsiders cannot feel their pain, so they cannot experience their sense of place" (Relph, 1993 cited in Swaffield, 2002:105). He argues that, it is impossible to make complete places in which other people can live. That with today's world dominated by globalization and mass communication and trade, there can be no return to an environment of integrated and distinctive places.

Hence, he argues "it is the role for landscape architects, architects, planners, and social scientists to play in reclaiming and making places" (Relph, 1993 cited in Swaffield, 2002:105). He further states that their role is to find means of balancing local consideration with broader social and ecological concerns as one cannot ignore that we are living in a global world. He goes to reiterates that the process of how this is done will vary from situation to situation, but it always has to be "based on the recognition that places are the context of human life and in some manner are themselves alive, for they grow, change and decline with the individuals and groups who maintain or ignore them.

He concludes by saying that, reclaiming places is, therefore rather like trying to make or modify life its self. He says we need to be wise and gentle and be patient for the environment just like a midwife awaits the arrival of a child. "By such gentle means places might flourish again, but also the world might become less threatened." (Relph, 1993)

As so saying maybe one could echo what Girot, 2006 argues by implying that landscape architecture is about time and place (context) that is "The work of a Landscape Architect is a long term task, humble and none too lucrative which differs from that of the architect in terms of time and scale involved ...rather than fossilising the landscape and framing it in a single period". Provost, (2004) adds onto this and emphasizes the idea of movement, time and space and argues "tradition being "contemporary" and suggested that "modernity lies in tradition reviewed and corrected in cultural roots of everybody."

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## Reclamation of Brownfield's and Derelict sites

Perhaps what Relph (1993) refers to as radical perspective can be found in what Corner (2000) implies as "landscape as an agent of producing and enriching culture" (Corner, 2000: 4). It is this aspect in particular that opens the door for the 'recovery of landscape' or to what James Corner (2000: 2) suggests as , "landscape (...)as a metaphor for inclusive multiplicity and pluralism, as in a kind of synthetic 'overview' that enables differences to play themselves out. In these terms, landscape may still embrace naturalistic and phenomenological experience but its full efficacy is extended to that of a synthetic and strategic art form, one that aligns diverse and competing forces (social constituencies, political desires, ecological processes, program demands, etc., into newly liberating and interactive alliances."

Both Relph and Corner speak of a landscape as a process, implying that, there is a time element to the design of the landscape. Landscape architecture as a process entails the necessity of designing landscapes that easily facilitate future modification. Even though in most cases there is a need to address current needs of the client, if projected into future the needs will change, as politics, social economic circumstances and places changes so will the priorities among the users. Hence as John Dixon, argues place making is a "fundamental and art of milieu" that involves not only inhabitants and users but the history of the place that is made or remade, the story of the site over time.

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## Theoretical Framework Strategies

- Landscape as Infrastructure
- Packaging the Landscape
- Programming the Landscape
- Non -Programmed spaces
- Impermanence

## CHAPTER [5]

The second part explores and discusses a particular Project in order to learn about strategies that have been implemented to revitalize other projects and are important to consider and may be potentially adopted in the design of the Barcelona Europe productive public space. Moreover these projects serve to reflect and demonstrate the positive impact that can be generated from investing in reclaiming of public space from brownfields site and the design of productive public spaces.

*"Landscape is the lens through which the contemporary city is represented and the material which it is constructed" (Charles Waldheim)*

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## 5.2 Landscape as Infrastructure

According to Alex Wall, the term landscape "invokes the functioning matrix of connective tissue that organizes not only objects and spaces but also the dynamic processes and events that move through them." (Wall, 1999: 233). Treating the Barcelona Europe reclaimed Landfill productive public space as an infrastructure allows a greater potential to connect the disparate fragments found around the neighborhood.

The Merriam Webster definition of Infrastructure is as follows: "the basic physical and organizational structures needed for the operation of a society or enterprise" (Merriam Webster, 2011). According to this definition, an open space infrastructure derived from the reclaimed land would also enable the landscape to structure and organize the things that it supports. In the case of the proposed landfill, productive public spaces can act as a framework that functions to provide opportunities for new relationships and interactions among everything it supports. The neglected site has the capacity to assume an active role of connecting and supporting a diverse range of people and programs.

Creating a landscape that encourages interaction would create a thicker, and yet more permeable between the site and its surrounding, thus establishing more diverse options to access to the site. James Corner (1999) sees boundaries as creating relationships by acting as a connector rather than as a divider; "...Rather than separating boundaries, borders are dynamic membranes through which interactions and diverse transformations occur... the edges are always the most lively and rich place because it is where the occupants and forces of one system meet and interact with those from another." (Corner, 1999:54). Not only does this concept result in increased access to the site, it also suggests the boundary will become a more active space that allows diversity to thrive. In this case the Klipfontein corridor, the bridge over the N2 and the connection bridges at the river.

Czerniak, argues that a project based on an infrastructure of access and interdependence "promises contact and exchange for people in otherwise disjointed urban environments through an array of spaces, activities, and circulation systems". (Czerniak, 2007: 241). A multitude of activities and land uses already exists around the communities. Connecting them to the designed public space allows them to meet and interact with each other in new ways on a common ground.

## Open Space Design Strategies

### Louisville Kentucky Waterfront Park, George Hargreaves Associates



Fig 39 source : [www.louisvillewaterfront.com](http://www.louisvillewaterfront.com)

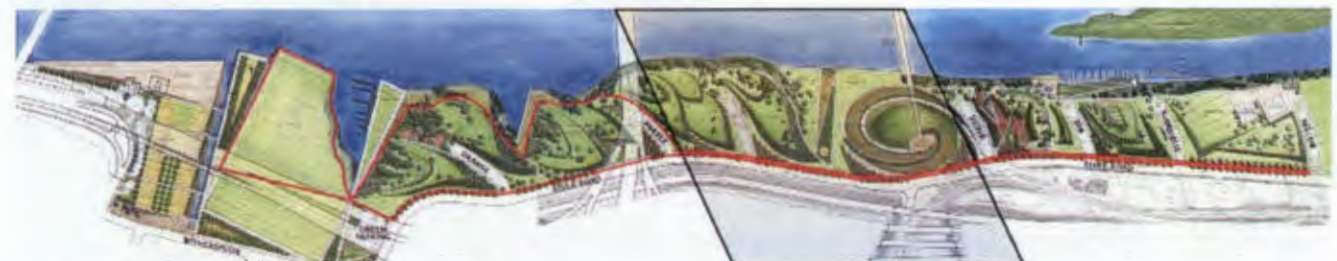


Fig 40 source : [www.louisvillewaterfront.com](http://www.louisvillewaterfront.com)

Establishing access and reprogramming the site into a civic space.

Reclamation of a marginal land formerly used for industrial transportation purposes.

Large tracts of land once rigid and served only limited industrial uses.

They are transformed into flexible space that provide a wide range

of active, and passive recreation including play grounds, festival spaces,

functional warf, trails, wet lands and open lawns.

Matrix of Connective tissues

Porous bounadries = Interaction

Access /Dynamic borders/membranes

Edge treatment

Diversity

Learned strategies

Demonstrate how public open space can give a productive image to a site.

Green space gives a visual asset to broader context especially where green open space is scarce.

Diversity of programme/unplanned spaces with wide range of opportunities.

Importance of ecological conservation in an urban context.

# Open space strategy for Louisville Kentucky Park

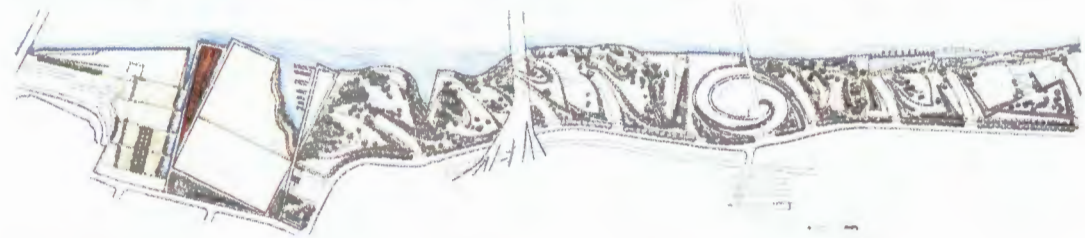
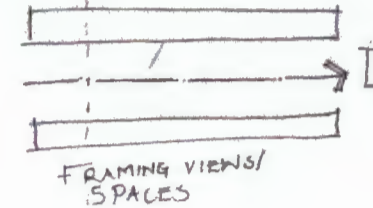
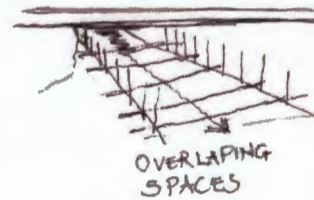
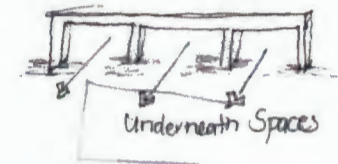
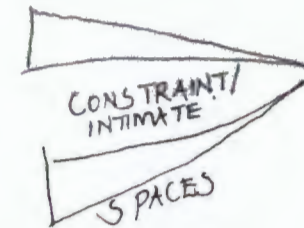
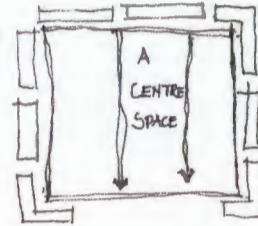
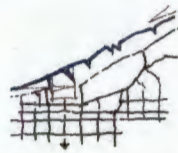
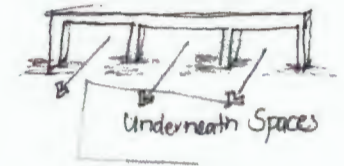
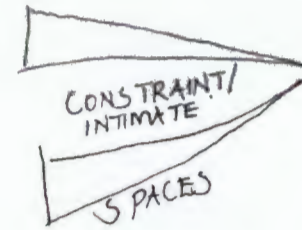
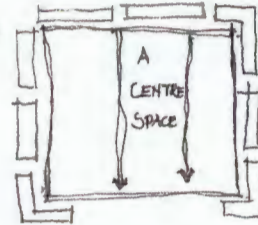


Fig 41 Diversity of spaces and dynamic use  
<http://www.louisvillewaterfront.com/>

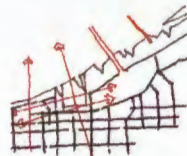
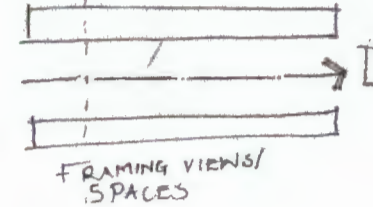
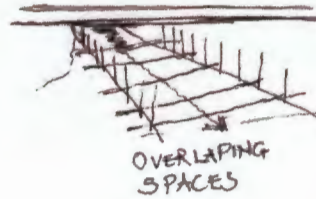
# Open space strategy for Louisville Kentucky Park



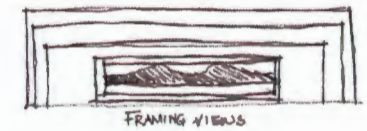
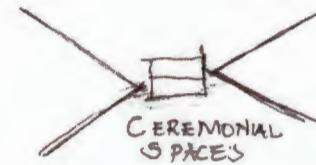
The river penetrate the land



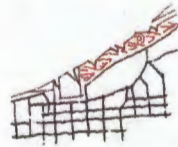
A relation to site



The breaking of grid



Movement of people



sculpturing of the land



dispersed parking areas

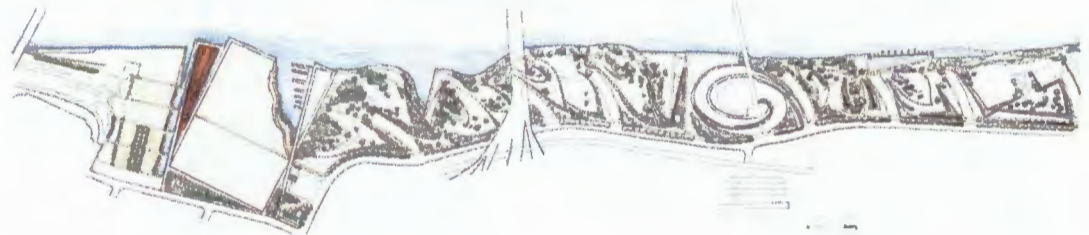


Fig 41 Diversity of spaces and dynamic use  
<http://www.louisvillewaterfront.com/>

### 5.3 Programming the Landscape

According to Jane Jacobs (1961) a park or public space exists in relation to its surrounding and its success depends on how well it can support the contextual programs. She also states that successful urban public spaces will never serve as a barrier or interrupt the functioning of the surroundings. "Rather, they help to knit together diverse surrounding functions by giving them a pleasant joint facility; in the process they add another appreciated element to the diversity and give back to their surroundings" (Jacobs, 1961: 10). Rather than creating the landscape into a formal composition of meaning and presence" James Corner suggests an alternative approach of "erasing the land of its various pasts: symbolic, political, and material" (Corner, 2001: 123). The result is a territorialized space capable of accommodating multiple interpretations and possibilities. (Corner, 2001).

Drastically transforming the reclaimed landfill space may allow it to be viewed in a new light that shakes off the stigma instilled in the land by the industrial processes that created it. Corner does not suggest that the space should then be completely left alone. Introducing particular structures can serve as a framework that supports the territorialized land as it is socially reintegrated."

"It is possible to combine land uses but this requires some discretion and even art." (McHarg, 1971). According to Alex Wall (1999), successful multifunctional surfaces are the product of a strategic urban design aimed at using program to tie spaces together. "The grafting of new instruments and equipment onto strategically staged surfaces allows for a transformation of the ground-plane into a living, connective tissue between increasingly disparate fragments and unforeseen programs" (Wall, 1999: 235).

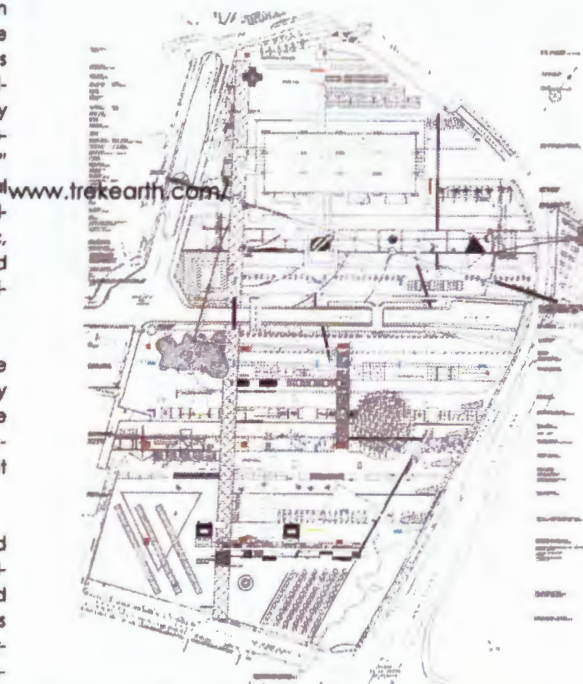


Fig 42 www.trekearth.com



Fig 43 www.trekearth.com

### Open Space Design Strategies

Landscape is a medium of Temporal change  
Transformation  
Adaptation  
succession

Waldheim (1999) argues These qualities of landscape as a medium means that due to process of urbanisation, the landscape as a medium is suited to be viewed as, open ended indeterminacy change demanded by contemporary urban conditions

Parc de la villete 1982 design of 125 acre former site of Paris slaughter house.

The design is intensively programmed public space. The landscape is seen as a basic framework for urban transformation, of a derelict site. Milestone of postmodern park design-landscape as a complex medium capable of articulating relations among urban infrastructure public events, an indeterminate future for post industrial site.

Bernard Tschumi's landscape as the most suitable through which to order programmatic and political change over time. Complex arrangement of urban activities.

Second runner up for parc de la villete Metropolitan Architect, OMA, Rem Koolhaas. Juxtaposition of unplanned relationship among various park programmes as its primary organising concept. Parallel strips of radically juxtaposed programmes on various ground level.

Ideas learnt: Landscape open endedness and indeterminacy  
Multiplicity of space that is open to possibilities and interpretation  
Art in landscape  
Knitting  
Multifunctional surfaces  
Connective tissues ground plane

# Open Space Design Strategies

Charles Waldheim believes that the landscape is capable of making up for the inability of architecture and urban design to produce coherent and convincing urban situations.

Downsview, highline and Freshkills by James Corner have shown that by programming the landscape as a medium this becomes a strategy of engaging complex ecosystems and planning for the unplanned. Time, and flexible planning becomes absolutely necessary.

In this project the use of detailed diagrams of phasing

Animal habitats

Succession planting

Hydrological systems

programmatic and planning schemes

are used. This project reveals that landscape can be programmed for future visions and also revealing that designing a landscape is a process and things can change over time.

For example in Highline, James Corner reclaims a former elevated railroad for new use, promoting timely principles of ecological sustainability, urban regeneration and adaptive reuse. Preservation and innovation to establish an urban corridor for habitat, wildlife and people. In addition to providing valuable open space for New York City, the High Line has become an economic generator for the neighborhood, attracting investment toward new cultural institutions, commercial and residential development. <http://www.asla.org/2010awards/173.htm>. The diagrams are used to really capture a sense of the vibrant growth, use, flora and fauna projected over the first 5 years of the Line.

## FRESH KILLS PARK Habitat Diversification Over Time

**0 - 15 YEARS**  
early stages: preliminary plantings related to existing biomass and habitat



Fig 44  
Source: www.nyc.gov

**15 - 30 YEARS**  
developed stages: overlapping inter-plantings and "spread" of seed bank and species, establishing strength of habitat communities and diverse ecological metrics

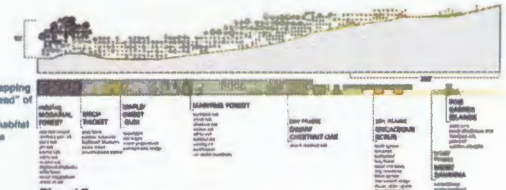


Fig 45  
Source: www.nyc.gov

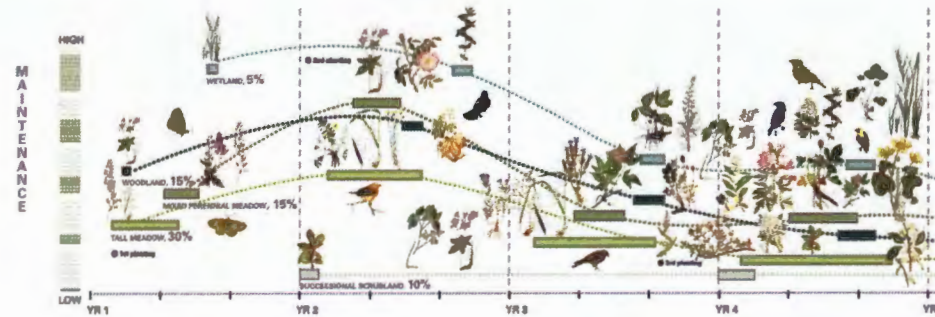


Fig 46  
Source: www.asla.org

DIVERSIFICATION IN TIME (STABILIZED MAINTENANCE / ENHANCED BIODIVERSITY)

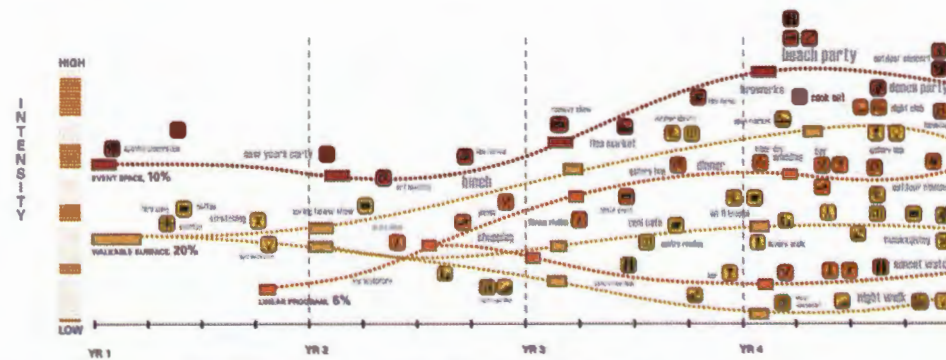


Fig 47  
source; www.asla.org

DIVERSIFICATION IN TIME (DIVERSIFIED PERFORMANCE / INCREASED POTENTIAL)

## 5.4 Non Programmed Spaces

According to Adriaan Geuze there is a need for emptiness rather than over-programming. He argues that by supporting the creativity of the user they will make the place their own, bringing their own activities to the space. Not all activities will be immediately predictable. However, they can be "designed for" by diversifying the range of possibilities supported by the landscape.

Hence to encourage a programmatically diverse public space it is critical that the strategy avoids over-programming the spaces. Defining strict programs will inhibit people from using the space in new ways. Flexible open spaces are better suited for the unforeseen recreational and social demands that may arise. "Such landscapes can respond to the emerging social values, pleasures, and tastes of a more pluralistic society" (Hester, 2006: 259). They are intentionally designed without an explicit program to allow the space to be manipulated by the users.

Alex Wall explains that rather than "comprising elements serving only one function, a design that can accommodate many functions is both economical and enriching of social space" (Wall, 1999: 245). On the same view, James Corner (2004) suggests that a good strategy will be well organized but will also remain flexible and open to assure its own longevity. "Too rigid a strategy will succumb to a surprise or to a logic other than that for which it was designed, and too loose a strategy will succumb to anything more complex or to anything more highly organized and better coordinated" (Corner, 2004: 1).

(Corner, 2004) argues that, Non-programmed spaces are able to absorb the perpetual incomplete growth associated with urbanization. These spaces can set up the conditions for urban life to play itself out. Instead of specifically programming the entire landfill park, an open ended approach can preserve the large tracts of land for unforeseeable cultural demands and also due the fact that the site will be mined incrementally, there are going to be needs that might arise.

The community of the Cape Flats has a diverse population and a variety of uses are already taking place within the built fabric. Allowing the context to dictate the program is important to creating a new meaning and image for the proposed public space. Rather than simply creating new programs into the various spaces, the suggested approach can create a landscape that the surrounding community can plug in to. (Corner, 2004).



Fig 48  
Source:www.marakidesign.blogspot.com



Fig 49  
Source:www.newta.co.za

## Open Space Design Strategies

Creativity of the user  
Flexible open ness

this could be achieved through use of the local resource that is , the labour material and skills

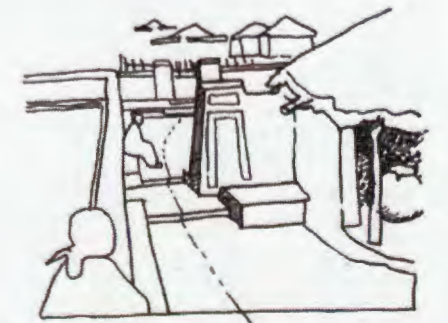
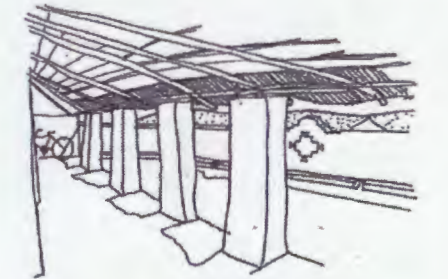


Fig 50  
Source :www.petemicharchitects.co.za

## 5.5 Packaging the Landscape

According to Julia Czerniak (2007) "Packaging the landscape is a method of gathering together objects to enhance their distinctness" Creating a network of sites groups them together so that they can be understood as an organized unit. Potential users will be able to understand and navigate a cohesive park, and thus, be more attracted to using the space. Julia Czerniak (2007) refers to the legibility of the landscape as having the capability to be easily understood. She argues that, although legibility is a simple concept, it is challenging to build it into a project through design. Considering legibility in the design process is however critical for the success of any public space must be legible to everyone who will use and support them (Czerniak, 2007).

Hence Packaging the proposed productive public spaces can help users re-establish these spaces with the surrounding context and understand the role of the public space. As Richard Berman explains, "the act of packaging can serve to attract consumers, visitors to a site, building anticipation, creating desire in people to visit and experience these sites" (Berman, 2006: 33). Finding ways to package or assemble a space transforms the spaces into a meaningful composition.

## 5.6 Impermanence

According to Waldheim (1999), the absence of limits allows the landscape to remain flexible rather than permanent. It is the only medium with the capacity to simultaneously deal with the changing densities and indeterminate futures that are a typical process of urbanization (Waldheim, 1999). Impermanent open spaces provide a sense of flexibility which can more quickly respond to changing urban conditions and preserve the reclaimed space as a public resource. Temporal programs can be introduced into the space for short periods of time, especially during the proposed mining reclamation process. Hence as for the case of the landfill mining, as the project is phased throughout the years, the functions and programmes of some spaces will change over time. Hence, temporary programs demonstrate how the land can be easily and quickly re-programmed to meet present demands without reducing its capability to serve future needs. The identified developable spaces that will be used as recycling space within the proposed productive public space and land will be transformed into functional assets as the project is developed.

## Precedents



Fig 51 Green Point Park



Fig 52 Cincinnati Waterfront Park  
Source: www.crpark.com

## Open Space Design Strategies

### Creating Legibility

Gathering objects and Creating network organised unit

This strategy is also visible in Louisville park as previously discussed. But on a local context the green point park portrays a net work of spaces that serve to accommodate a mix of activities. The open space is geared towards supporting diversity among users and programs including temporary programming for spontaneous group activities or annual festivals. The flexibility of the design allows it to be organized as a venue for large events or a place for more passive and individual activities in the heart of the city.



Fig 53 Green Point Stadium  
Source: www.capetown.gov.za

### Temporary spaces Flexibility

Another example is the Cincinnati's existing riverfront and a vision of the anticipated expansion project. (www.crpark.com) The open space is geared towards supporting diversity among users and programs including temporary programming for spontaneous group activities or annual festivals. The flexibility of the riverfront allows it to be organized as a venue for large events or a place for more passive and individual activities in the heart of the city.

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## 5.7 Reflecting on the theory

This section of theory presented above suggests that there is a potential to explore the proposed hypothesis of developing a productive public space through the landfill waste mining. Using the landscape as a medium not buildings, hence through employing variations of these concepts to re-programming the landscape and reinvent public spaces in a way that it can be perpetually influenced by the surrounding context. By connecting this dense, diverse community to the designed public space, this process demonstrates how the forgotten landscape can be transformed into potential assets for the city and region.

Hence the following questions have been revealed by the theory above:

- How and to what extent is Landscape understood as a dynamic and open ended system?
- How and to what extent is landscape understood as a product of process and transformation limited in time and space, and how does it affect the uses and users?
- How were particular needs and requirements of different users/groups met through design of open spaces?
- To what extent was the claim of offering a variety of opportunities for different uses/users met?
- How can ecological and other improvements be successfully combined with favorable social change?
- How successful can a project be in designing and offering inclusive open public space experience that becomes a destination beyond the context of neighboring communities?
- How the re-conceptualization, adaptation and enhancement of an urban decommissioned derelict site can change the cultural perception and values about a particular site?

Significant Strategies Employed by Precedent Projects and envisioned for the site.

- Flexible and diverse programming
- Temporary programs/events
- Celebrate access / diverse access
- Attract tourists and residents
- Encourage active use of green space by the river canal;
- Define new image for the site from landfill to productive public space
- Permeable boundary the klipfontein corridor can be permeable
- Open space as infrastructure
- Landfill waste mining as a productive process influenced by time.

---

## Conceptual Formulation and Strategy

- 6.1 The vision of the project
- 6.2 Strategy and responding to the proposed framework
  - 6.2.1 Relocate of people off the site
  - 6.2.2 Determining Contents of site and depth of Excavation
  - 6.2.3 What is Landfill waste Mining Process?
- 6.3 The mining process applied on the framework (Phasing of the Project)
  - 6.3.1 Framework Development process

## CHAPTER [6]

This section applies all the strategies learnt for open space design, it takes into consideration the constraints and opportunities of the site.

In light of the adopted framework, this section now applies the strategy to gradually waste mine the landfill and transforming it into a productive public space that response to the programme and vision outlined. For the vision to be achieved and the process of mining to be achieved the cost shall be spread through a 10 years phased process.

*As Michael Michalko writes; "Genius often comes from finding a new perspective" (2001, 19). It is possible to avoid repeating the same treatment and creating a monotonous public space by applying a new methodology to the designer of the spaces based on a different set of values and ideas.*

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## 6.1 The vision of the project

### Vision

**Revealing ways of how people relate to their land** by showing how natural processes and human activities can coexist in a long term self sustaining environment.

(The process of phasing the project through waste mining)

### Restoring the ecosystem to a state of balance by active human participation natural processes.

Returning to public use, the land that has been inaccessible for 30 years, putting it back together to provide an exceptional productive public space for the broader communities.

**Regenerating Barcelona Europe landfill as a catalyst for changing perception.** It will show how a productive public space can be gradually transformed and can function ecologically. It will demonstrate at all scales, the methods and attitudes by which renewable energy resources and land stewardship can be implemented. The idea of waste mining be taking to a recycling centre and compost and nursery on site, and sorting of the waste taking place within the site.

**It is envisioned that beyond the landscape this site will give further opportunities to take place for researching technologies for environmental and architectural design.** Bringing together landscape and built form in a completely integrated way to deliver an assembly for built of buildings proposed such as recreational pavilions, resource hub, civic building, recycling centre buildings. That is, the highest international standard in which visitors can not only experience the world's diverse environment, but also the dynamics that create and sustain them.

**Reintegrating the site at all levels.** To the neighbouring communities, to city and region, while generating mixed use opportunities and responding to community aspiration.

### The Programme respond to:

#### Surrounding land use:

By a mix of development and nature designated areas. This presents positive and diverse opportunities in terms of the site's potential and wider context.

The programme enables both protection of the existing canalised river, together with creation of a considerable area of new development, providing a sufficiently robust and flexible framework with which mixed use development can be successfully integrated at a later stage.

#### The immediate Community and broader:

With its potential to generate not only recreational, education, job creation and work business opportunity, Barcelona Europe's proposed enduses will also invigorate and diversify flows of people in the area from the broader scale. A plant propagation and administration unit, a recycling centre and compost, and bio mass processing plant will lead to a broader range of people on site.

#### Resources usage:

Certain waste processing activities serving Capetown may be continued here in Barcelona Europe, such as the collection, sorting, and dispatch for reprocessing of recyclable materials, as well as the collection and composting of organic yard waste for use on site.

### The programme activities includes:

#### Places for recreational activities that is,

Places for recreational activities (Recreation Events Fields) Visitors Recreation Centre/ Recreation Pavilion, that can serve to accommodate shifting needs and activities for the area. That is, churches, wedding ceremonies, burial services, graduation parties, and other activities. Commercial Development Pockets: -shops and cafes, including the incorporation of the existing trading that is taking place within the area.

#### Access:

Pedestrian flows, Ecological flows, Pedestrian Bridge, Vehicular route, Pedestrian route.

#### Resource hubs:

Recycleable material Centre  
Plant Nursery Centre for seed collection  
(Plant propagation and administration, including a compost processing and Biomass plant  
Civic centre Building Research/education/office working zone, with support facilities

### Significant Strategies Employed by Precedent Projects and envisioned for the site.

- Flexible and diverse programming
- Temporary programs/events
- Celebrate access / diverse access
- Attract tourists and residents
- Encourage active use of green space by the river canal;
- Define new image for the site from landfill to productive public space
- Permeable boundary the klipfontein corridor can be permeable
- Open space as infrastructure
- Landfill waste mining as a productive process influenced by time.

## 6.2 Strategy and responding to the proposed framework

### 6.2.1 Relocation of people off the site

It is proposed that Bio Mining or Waste mining of the landfill should be an approach taken for this site. Proper environmental management will need to be put in place during the rehabilitation and mining procedures. The implementation of the mining procedure will take place in various phases of development and will be spread over a manageable time period.

Before commencing with the mining, the First phase will be to relocate residents off the site. All the residents currently living on the site will be removed or relocated to identify adequate livable sites. With the help from the non-governmental organizations such as Community Organization Resource Centre (CORC) and Shack/Slum Dwellers International (SDI), the residents will be resettled on new sites. Relocation sites have been identified around the study area. These sites have been zoned as open space for recreation and some are road reserves.

When people are housed on the limited recreation open spaces around the study area, this strategy becomes an important argument on the need to provide the study area with an adequate recreational space.

### 6.2.2 Determining Contents of site and depth of Excavation

As previously outlined, for safety issues, all the people residing on the study site are to be relocated to suitable identified livable land. However, before any excavation can take place, the contents of the site and depth should be determined every time an excavation is to take place. Moreover, at the same time, testing for gases before the land is prepared for excavation would need to be surveyed and tested. An EIA must be taken before any change in land use of an area larger than 25 hectares (NEMA, 1998). The assessment report must highlight all impacts and implications that will need to be monitored, mitigated or preferably, eliminated by the design or operation of the site.

Potential gas problems should be highlighted in the Environmental Impact Assessment. Various testing has already been done on the Barcelona and Europe site. However, it needs to be followed up. Further testing of the air quality will need to be done on the site to give an accurate assessment. The site will need to be fenced off and proper construction management and procedures be put in place. All the workers involved will need to go through training on how to handle equipment and waste during the sorting.



#### Land Zoning Specifications

- |                         |                         |                  |
|-------------------------|-------------------------|------------------|
| 1. Community Facilities | 6. Open Space I         | 11. Undefined    |
| 2. Community Facilities | 7. Open Space I         | 12. Street       |
| 3. Municipality Housing | 8. Municipality Housing | 13. Street       |
| 4. Institutional I      | 9. Institutional I      | 14. Open Space I |
| 5. Municipality Housing | 10. Open Space I        | 15. Open Space I |

#### Relocation Sites

Relocation Site  
Option 1  
Total Square Hectares: 22.12 Open Space  
Less than 2 km from site (average)  
Flow sites in close proximity to each other  
Site fronts major secondary Road (SA)

Relocation site  
Option 2  
Total Square Hectares: 18.23 Open Space  
Less than 2 km from site (Average)  
Close Proximity to Flyovers Road  
Total land scattered over 8 sites

Relocation Site  
Option 3  
Total Square Hectares: 11.15 Open space  
Space under option 3 is currently zoned municipal parkland (Polygons) or provincial highway land (rectangles) this space should only be considered if more hectares of relocation land is needed than can be provided by option 1 and 2, or if land designated under option 1 and 2 is deemed not suitable to temporarily house community members.

Fig 54 Adapted: MLA & MRCP., Group 1, 2011, comparative analysis

SCALE: 1: 10 000 @ A1

### 6.2.3 What is Landfill waste Mining Process?

Landfill mining is the process of excavating from operating or closed solid waste landfills, and sorting the unearthed materials for recycling, processing, or for other dispositions (Lee & Jones, 1990). It is the process whereby solid waste that has been previously land filled is excavated and processed (Strange, 1998). The concept of landfill mining was introduced as early as 1953 at the Hiriya landfill operated by the Dan Region Authority next to the city of Tel Aviv, Israel. (Strange, 1998).

Landfill mining process typically involves a series of mechanical operations to recover one or all of the following: Wood for the production of wood chips; Concrete, bricks and mortar material for road construction; Metals such as iron, aluminium, copper etc. for recycling; Compost/Soil; and Landfill space. Landfill mining also provides the opportunity to remediate public health and environmental quality problems associated with the existing or closed facility (e.g. Groundwater contamination). (Lee & Jones, 1989a, b).

According to Lee & Jones (1989), the key to landfill mining operation is a set of conveyers and screens that sorts the solid wastes into three size fractions: oversized material, intermediate-sized waste, and dirt/humus. The oversized materials consist of recyclable metallic goods, white goods, plastics and rubber. The intermediate-sized materials consist of partly decomposed organics, combustibles, recyclables, and the fine fraction will mostly be stabilized soil. The main part of the process is the screening, where the main separation is done for the oversized and the soil elements.

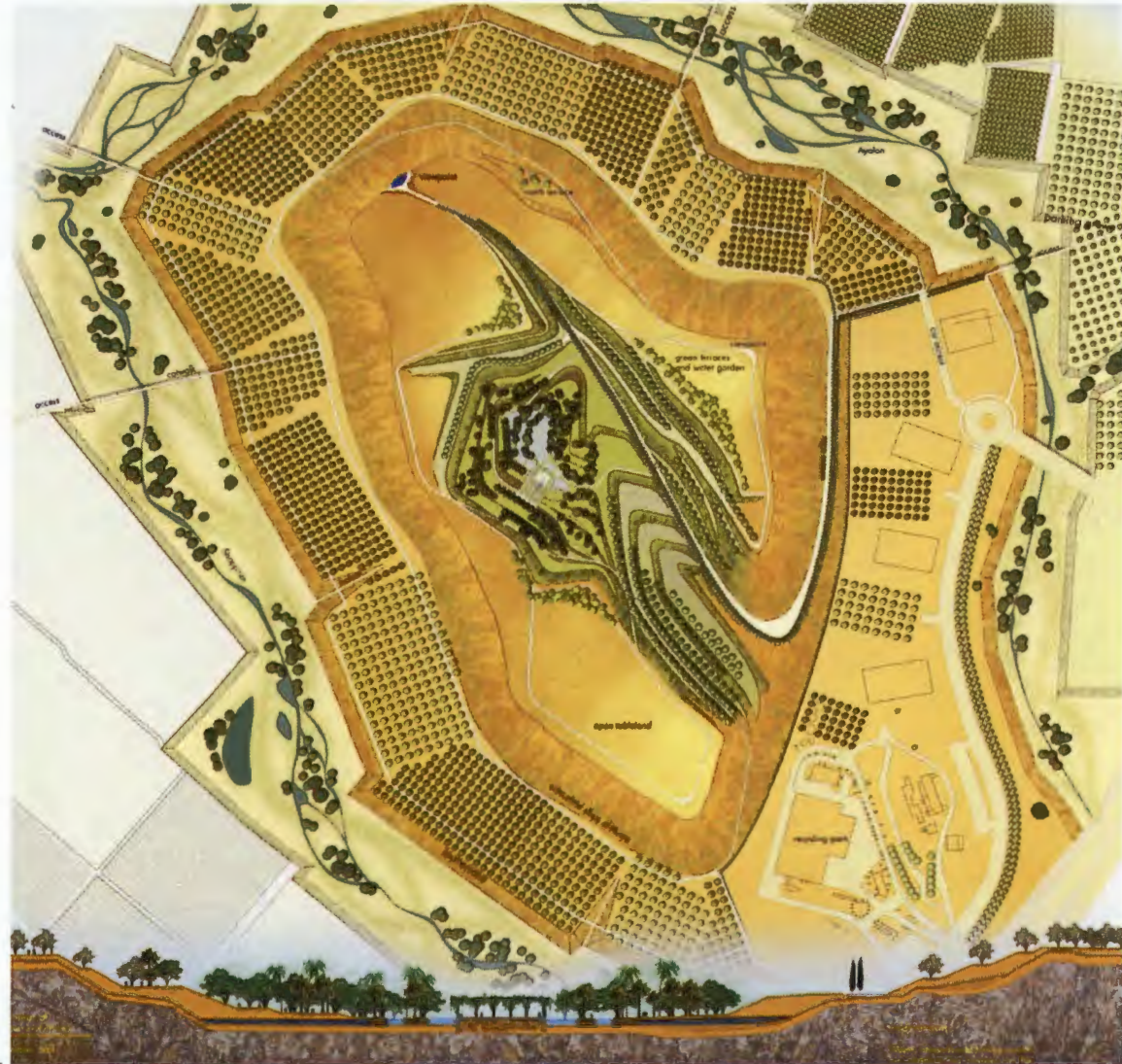


Fig 55 Source: [www.worldarchitecturenews.com](http://www.worldarchitecturenews.com)  
Hiriya Landfill Rehabilitation.

## Landfill Mining Equipment

Typical mining operation equipment includes an excavator, which removes the contents of the landfill. A front-end loader then organizes the excavated materials into manageable stockpiles and separates out bulky material. A trommel (a revolving cylindrical sieve) or vibrating screen separates soil (including the cover material) and solid wastes from the reclaimed waste. Trommel screens are more effective than vibrating screens for basic landfill mining (Murphy, 1993). The non-recyclable part of the intermediate-sized and oversized materials is typically reburied in the mined area of the landfill.

As part of the typical landfill mining, processed soil and composted organics from the waste screening process are removed and stockpiled for use at the active landfill as daily cover. For safety issues and reducing any contamination during excavation, measures are taken to avoid any leachate contamination. For example, excavated waste is moved to a special processing area where leachate can be collected. A series of berms and channels are used to prevent storm water from entering the processing and excavation areas. ( [www.waste360.com](http://www.waste360.com) Website , 2011).

Excavated waste is placed on screens, where it is separated by size. Any objects which are very large are removed prior to placement on a screen. The waste is processed to reclaim recyclable materials, which are placed in covered containers for further use. The waste that remains from the screening process is placed in an open area for further separation. ( [Enviroalternatives.com](http://enviroalternatives.com) Website, 2011)

The following machines are used in the mining process:

- Excavators
  - Conveyor belts
  - A coarse rotating trommel screen
  - A fine rotating trommel screen
  - A magnet
  - Front end loader
  - Odor control sprayer
- ( [www.wikipedia.com](http://www.wikipedia.com), 2011)



Fig 56 A coarse rotating trommel screen  
Source: [www.ultraplantltd.com](http://www.ultraplantltd.com)



Fig 58 A coarse rotating trommel screen  
Source: [www.ultraplantltd.com](http://www.ultraplantltd.com)



Fig 57 Front end loader  
Source: [www.ultraplantltd.com](http://www.ultraplantltd.com)



Fig59 Excavators  
Source: [www.ultraplantltd.com](http://www.ultraplantltd.com)

## Case Studies on Landfill Mining

### Collier County, Florida

The objectives of landfill mining of Naples Landfill in Collier County, Florida, were to reduce the potential for groundwater contamination; recover and reuse cover material, decrease site closure costs, recover recyclables, and reclaim landfill capacity (Stein, 1993). The mining operations reclaimed 50,000 tons of soil suitable for use as a landfill cover material.

### Landfill mining operation at Lancaster County

Between 1991 and 1993, approximately 219,500 m<sup>3</sup> of Municipal Solid Waste (MSW) were excavated from the landfill. (USEPA, 1997). As a result, Lancaster County converted 56 percent of the reclaimed waste into fuel. The county also recovered 41 percent of the reclaimed material as soil during trammel operations. The remaining 3 percent proved noncombustible and was reburied in the landfill (USEPA, 1997).

### Thompson, Connecticut, USA

In 1986, the municipal landfill in the town of Thompson, Connecticut initiated a landfill mining project with the objective of recapturing landfill volume and extending the life of the landfill temporarily, while a permanent disposal alternative could be selected (Strange, 1998). A local excavation contractor conducted the project using a bulldozer, a pay loader, a truck, and a screen. (<http://www.enviroalternatives.com>)

### Collier County, Florida



Fig 60 Objective: prevent Groundwater contamination  
Source: [naplesnews.com](http://naplesnews.com)

### Landfill mining operation at Lancaster County



Fig 61 Objective: Reclamation of fuel and use of machine.  
Source: [www.lcswma.org](http://www.lcswma.org)

### Thompson, Connecticut, USA



Fig 62 Objective: Recover land and use of local labour and resources



Fig 63 Fuel extraction tanks at the landfill

### New Hampshire, USA

The New Hampshire landfill site in USA served small towns and rural tourist areas. Wastes were land filled between 1979 and 1987. In 1989, the company that owned the landfill was sold, and the new enterprise filed a permit to expand the landfill. The department of Environment of that country required that approximately 160 tons of material be relocated from the old, unlined portion of the landfill to the newly lined section. As part of the relocation process, the department allowed the company to mine the unlined landfill. Once the plans were approved, the department included various requirements in the permit to build the new landfill that pertained specifically to the mining operation.

Due to concerns regarding odours, the permit prohibited any mining or waste removal operations during June, July, and August, and required that odour masking agents be applied to the wastes being processed (Strange, 1998). Throughout the landfill mining process, the impact on air quality and the quality of the storm water runoff were monitored. The monitoring process also included measuring the concentrations of oxygen, hydrogen sulphide, and volatile organics in the air. Water quality monitoring also focused on changes in conductivity and pH. Slight increases in conductivity were noted, and no changes in pH were detected. Equipment used consisted of two excavators, one front-end loader, four dump trucks, two bulldozers, one trommel screen, and one odour control sprayer. (<http://www.enviroalternatives.com>)

### Nasik, India:

Landfill mining was attempted in Nasik City, India, between 2002 and 2003. The site was 28 acres and the average waste depths ranged from four to seven meters (the city had been dumping 260 tons of waste per day for 12 years). The waste on the site was "loosened by tractor-cultivator in six inch layers and bulky waste was removed by hand." (Patel, 2007: 305). This waste was then sprayed with bio-sanitizer, accompanied by the use of a composting bio-culture (applied at 250 grams per cubic metre of garbage). Once loosened and treated, the waste was piled into two metre high wind-rows which were moved and turned once a week.

This process resulted in the piles reaching "high heap temperatures attained in 2-3 days, and visible volume reduction" (Patel, 2007: 305) within the first week. The soil was then excavated to a depth of one metre, after levelling the site, keeping it to a height of one metre above the ground level to prevent flood-water. The site was then left under observation for one year. During this time, the natural vegetation began to flourish once more, confirming that no gases remained, as these generally kill the roots of the plants. (Patel, 2007).



Fig 64 Objective: Consultation with local authorities and requiring monitoring by qualified personnel and training of workers, as well as adhering to rules and all environmental regulations and permits.

Source [www.epa.gov](http://www.epa.gov)



Fig 65 Source: Manfred Scheu and Bhattacharya (1997) cited Objective: Local labour, local resource and simple significant methods incorporated with high technology.

### 6.3 The mining process applied on site.

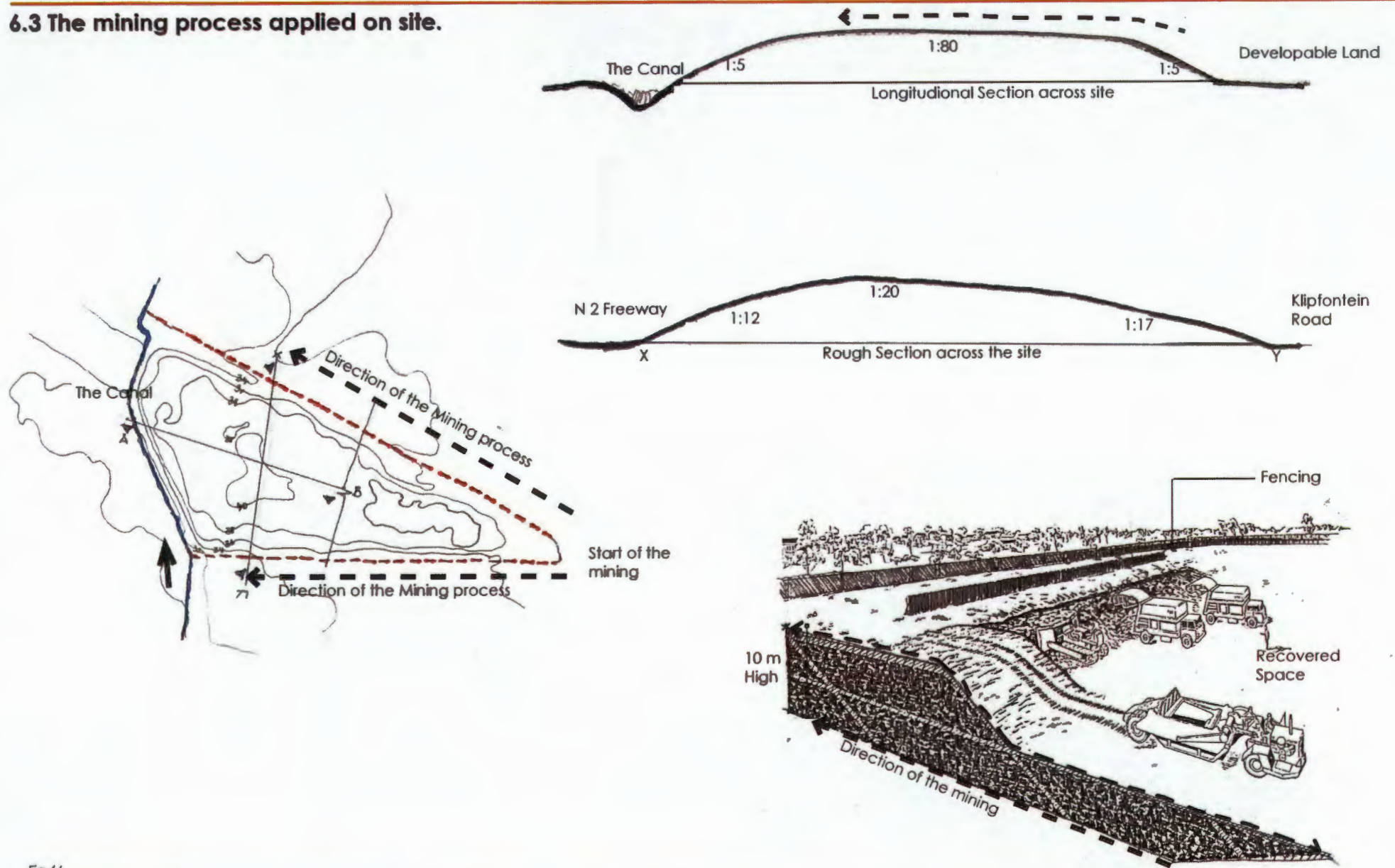
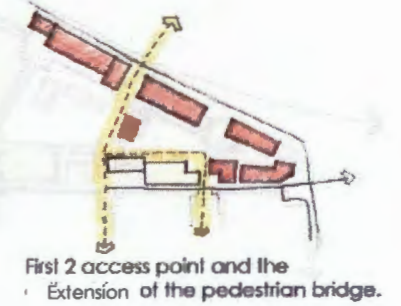
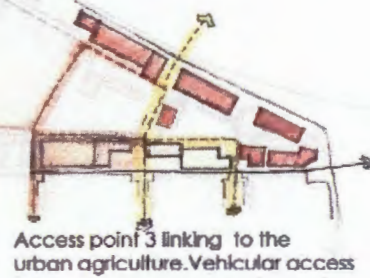
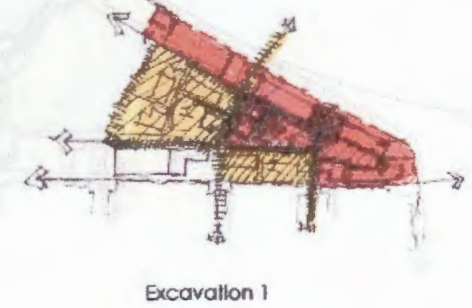
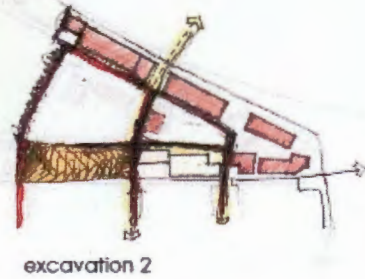
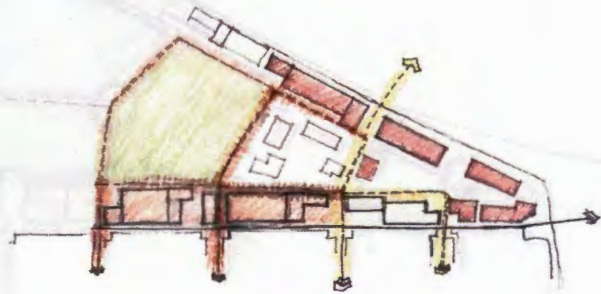


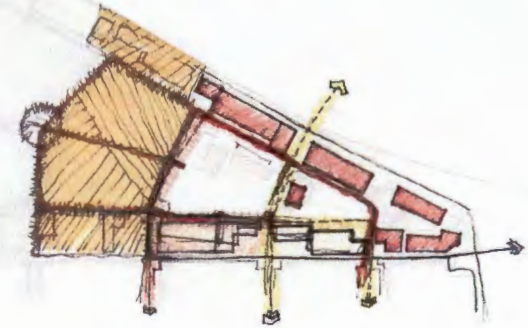
Fig 66

### 6.3. The mining process applied on site and Responding to the Conceptual Framework

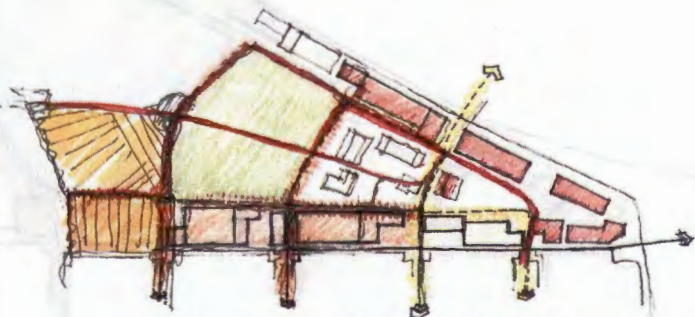




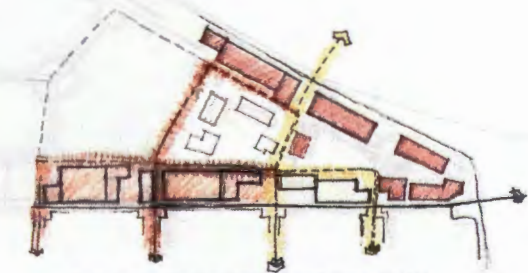
Open space Development



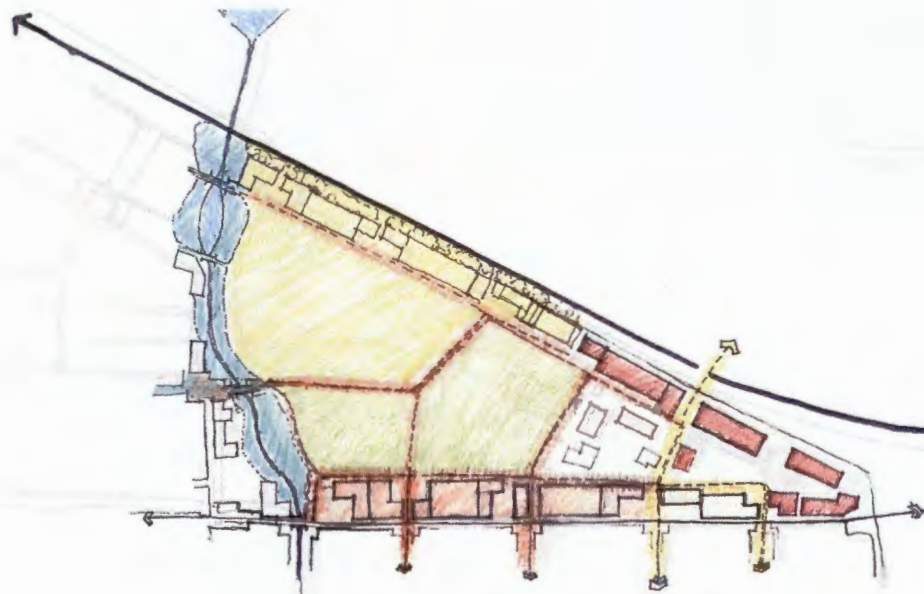
Excavation 3



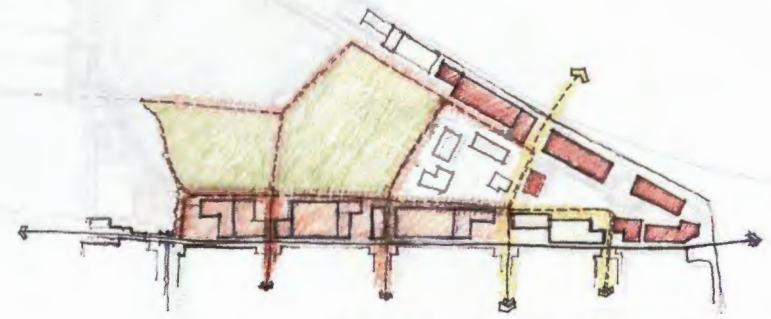
Last excavation on the access points on klipfontein road.



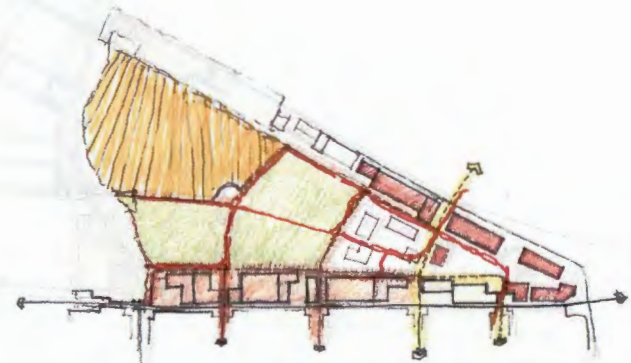
Access point 4 extended and at this stage there is the potential to relocate the recycling centre to the middle.



Finally the rehabilitation of the river Canal

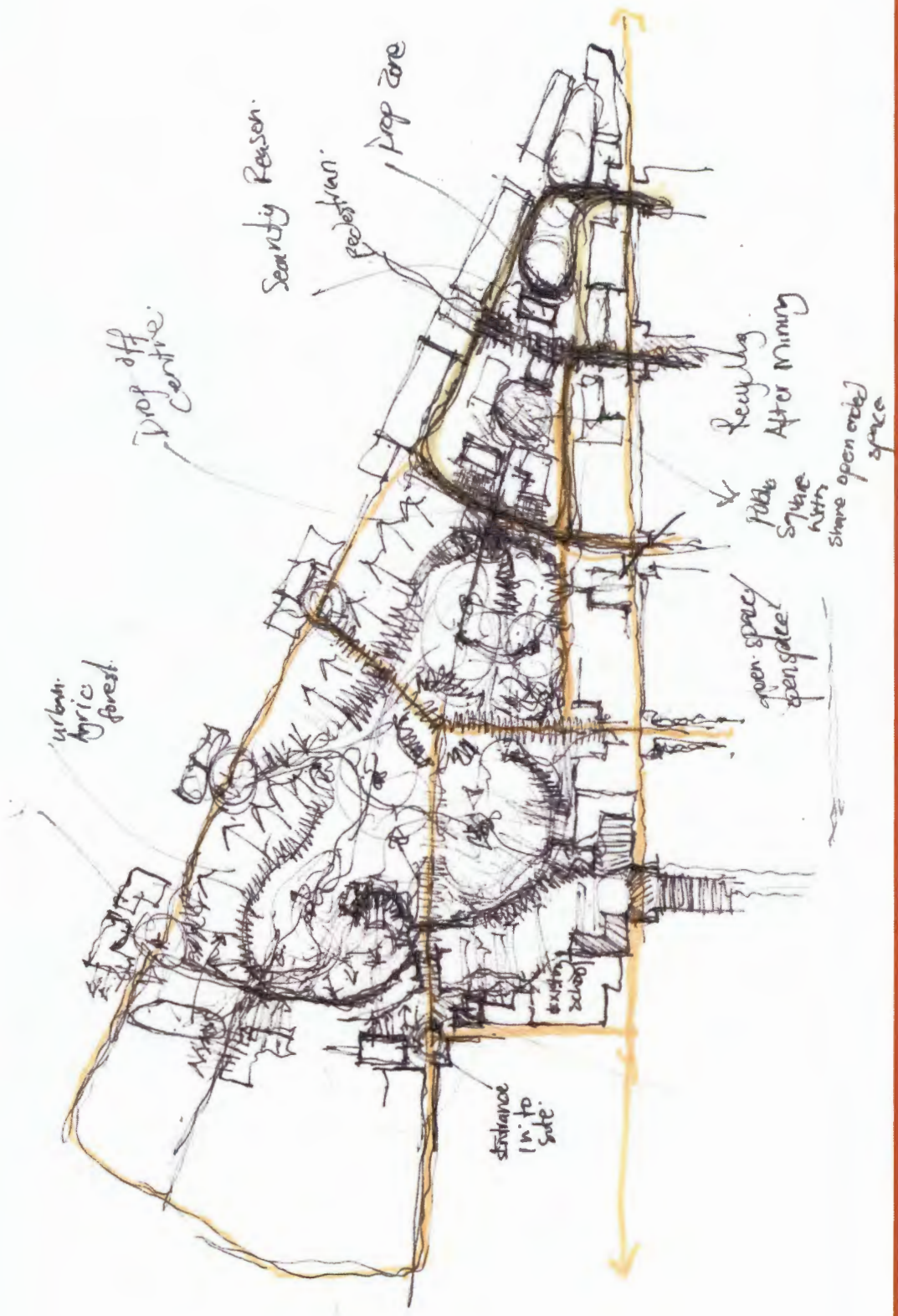


Further open space development



Last excavation of the open space

### 6.3.2 Framework Development process



SCALE: 1:5000 @ A3  
0 50 100 250 m

Initial Placemaking framework Development



Fig 71

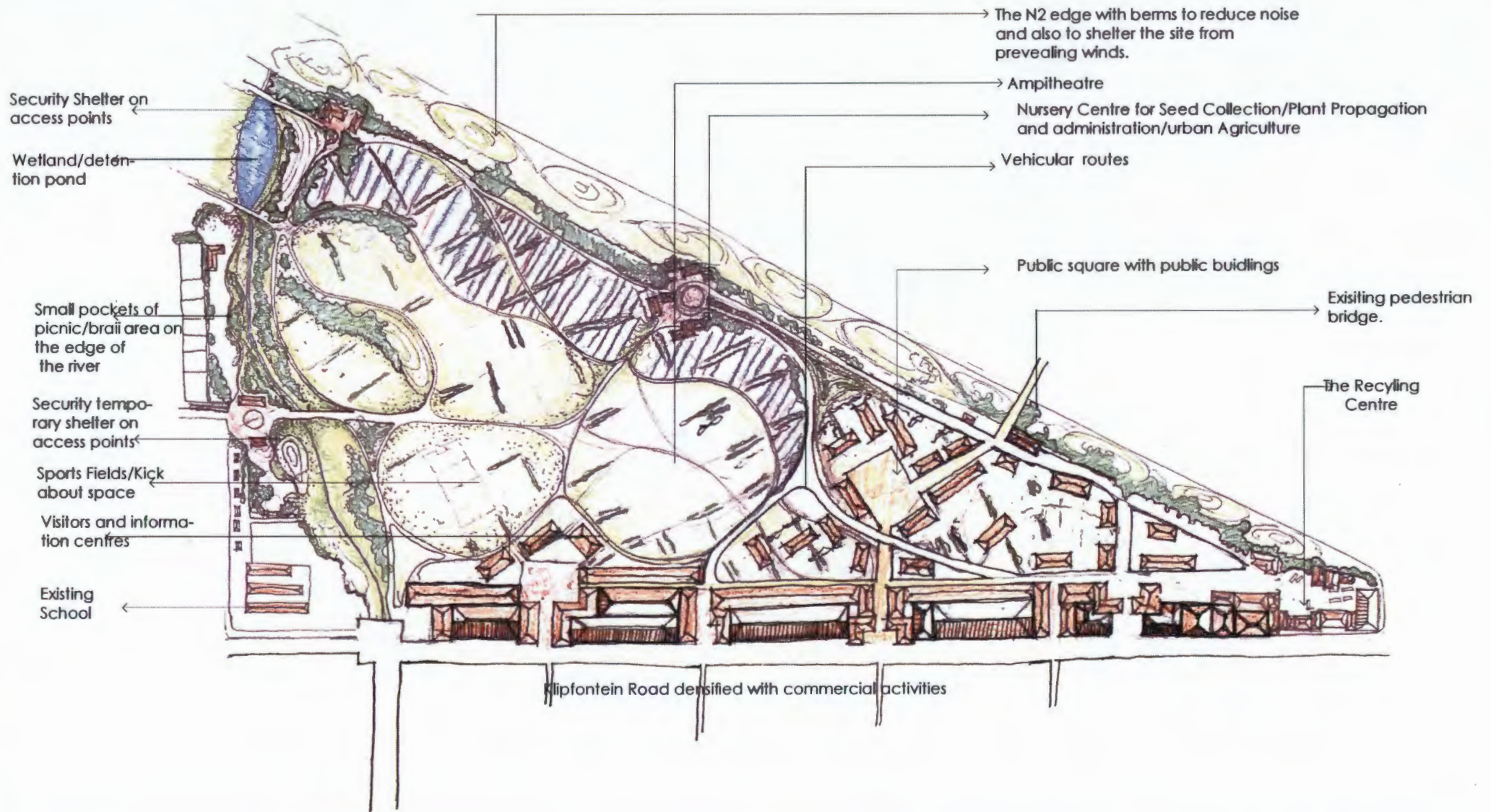
Initial Placemaking framework Development



SCALE: 1:5000 @ A3

0 50 100 250 m

# Framework Plan



# Framework Plan

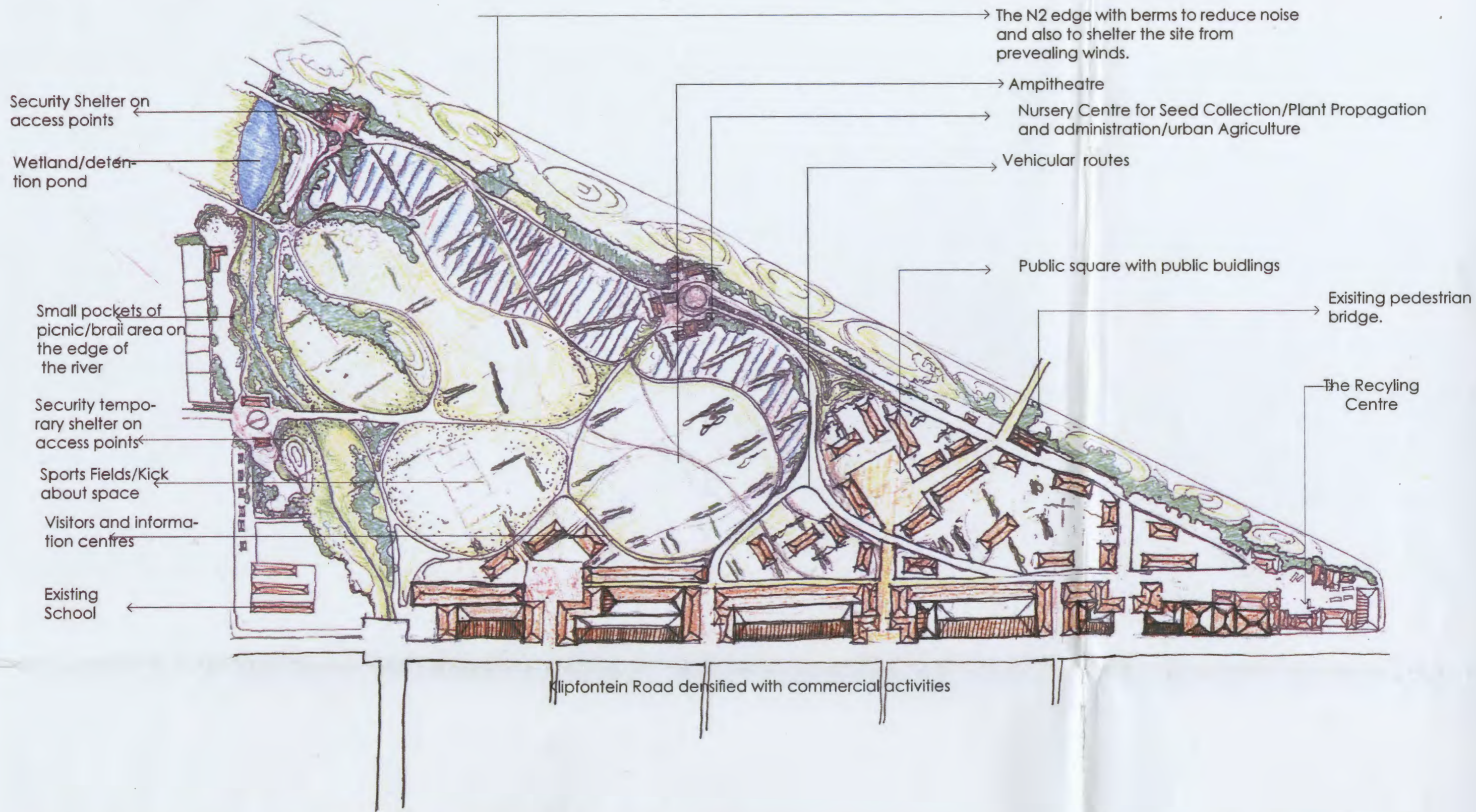


Fig 72

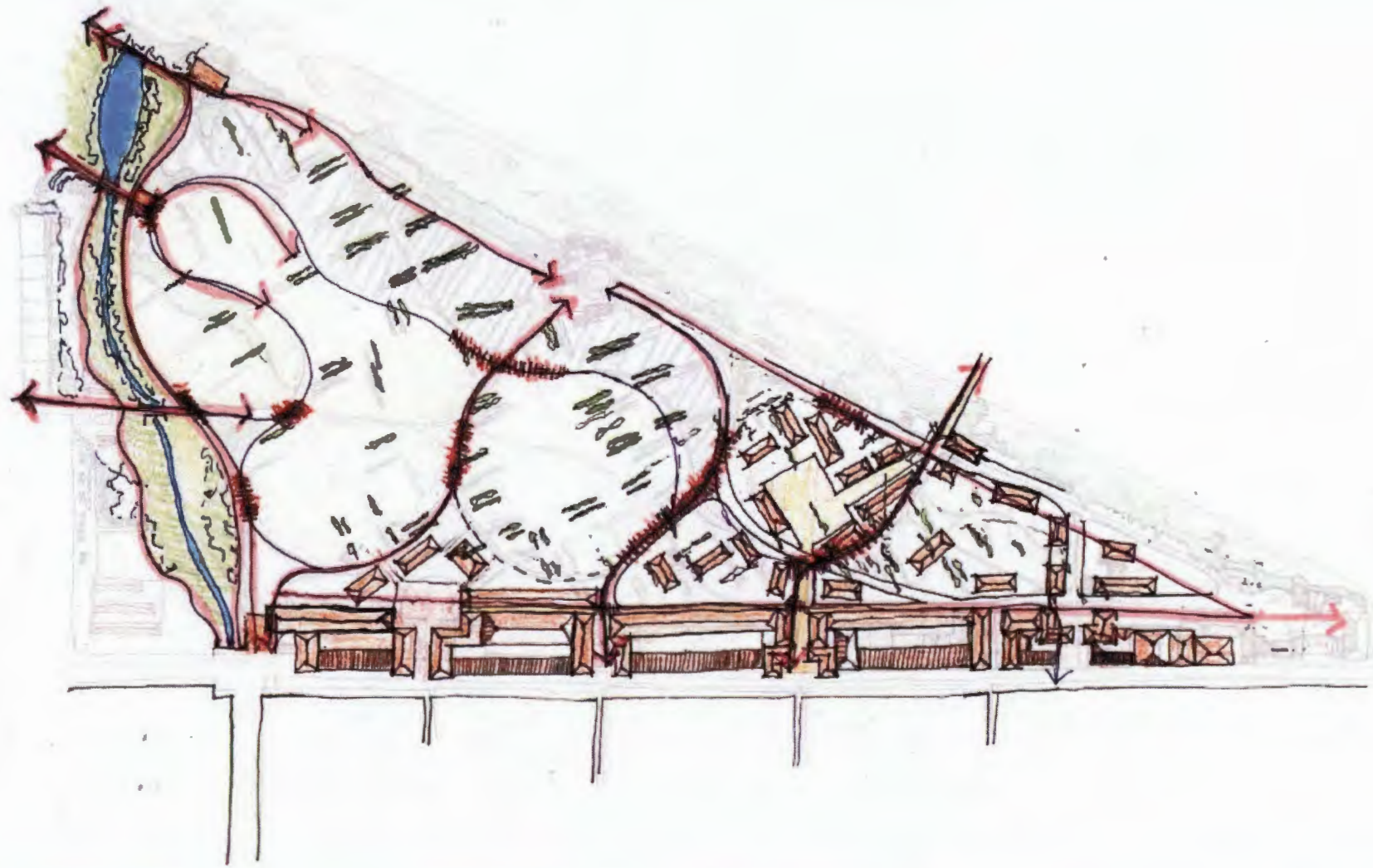
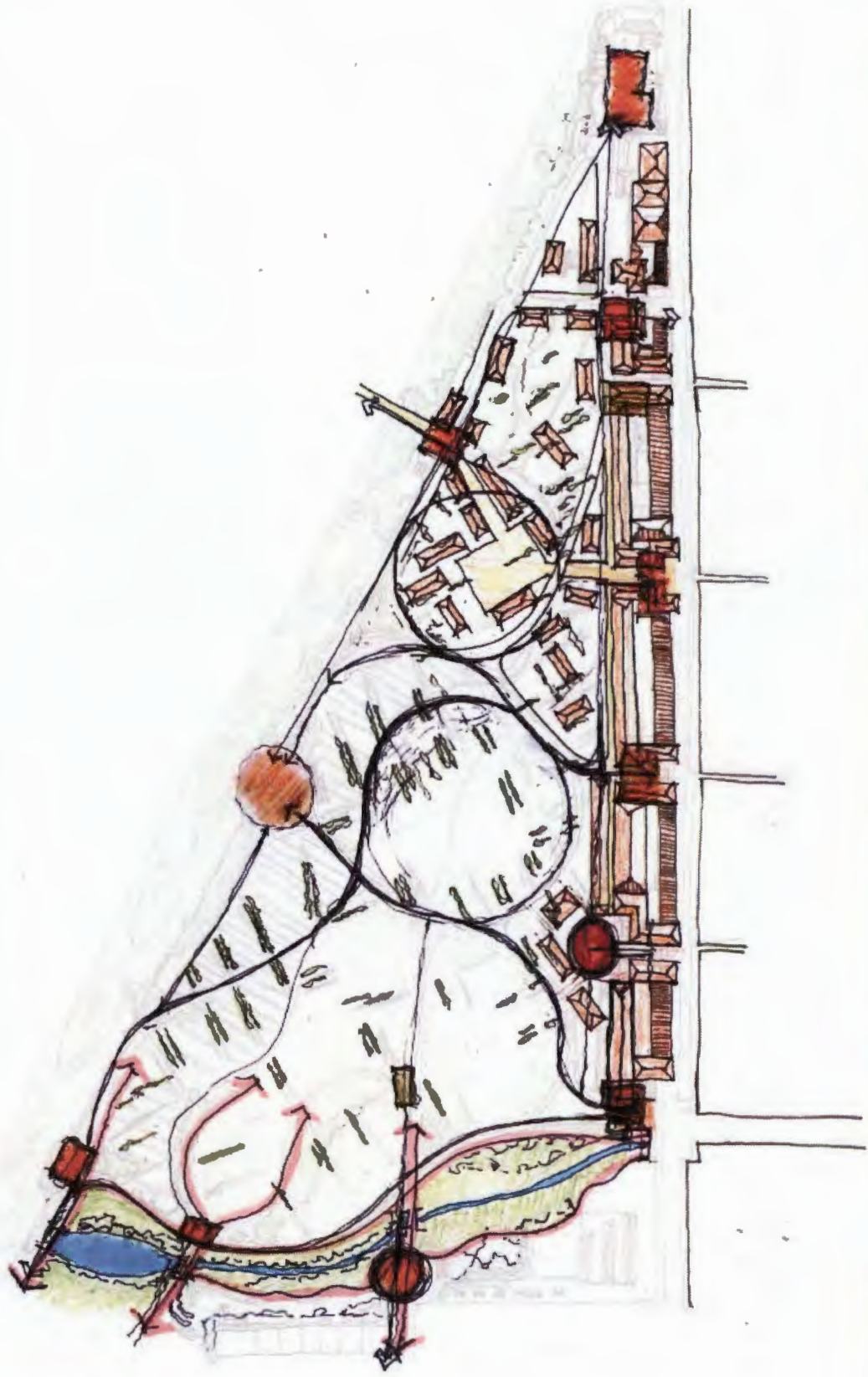


Fig 73

Access and movement along site, identification of threshold as pathways meet

SCALE 1:2000 @ A1  
1" = 100'



SCALE 1:2000 @ 1/3

Structuring Nodes becoming important access nodes

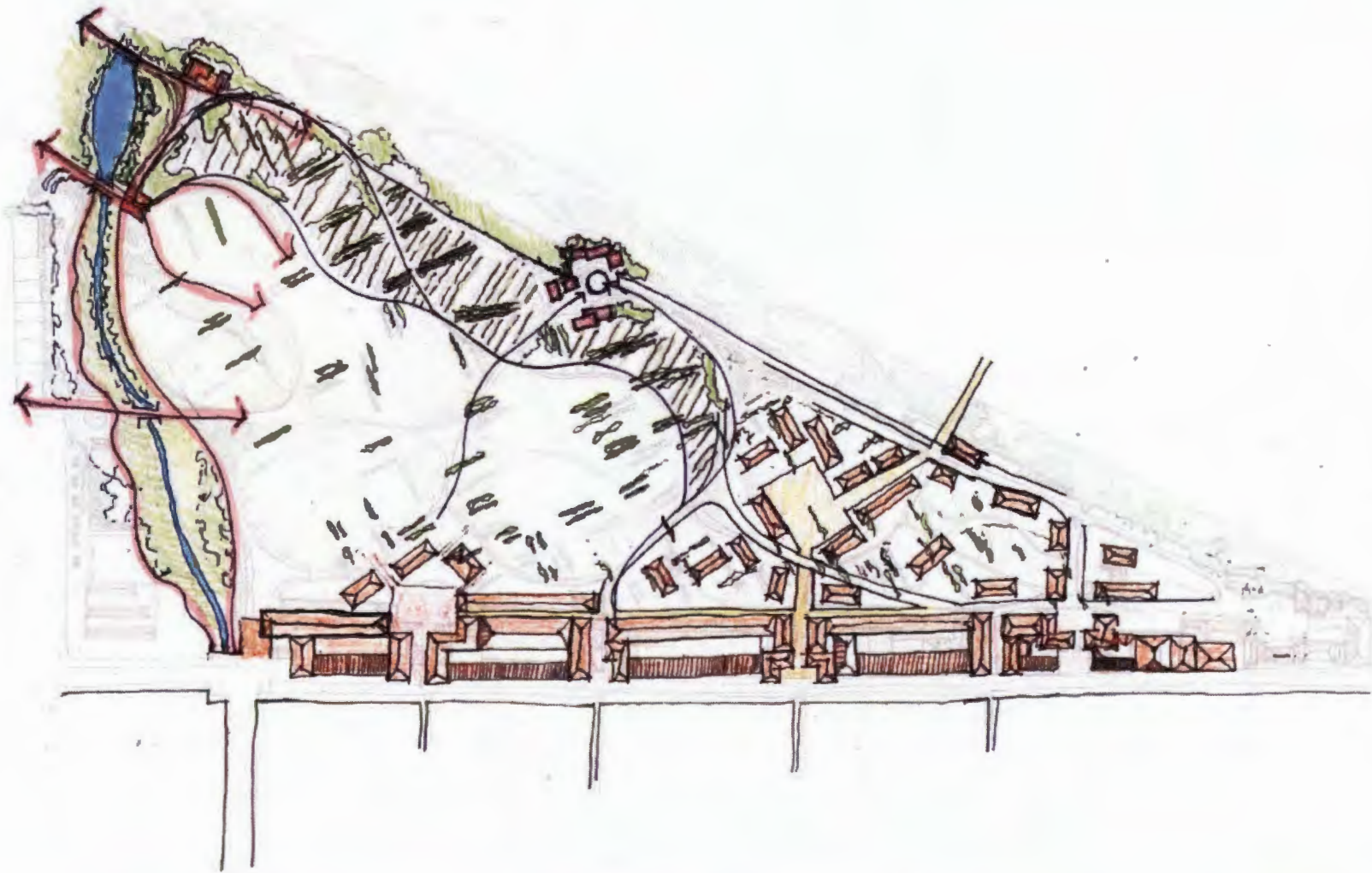
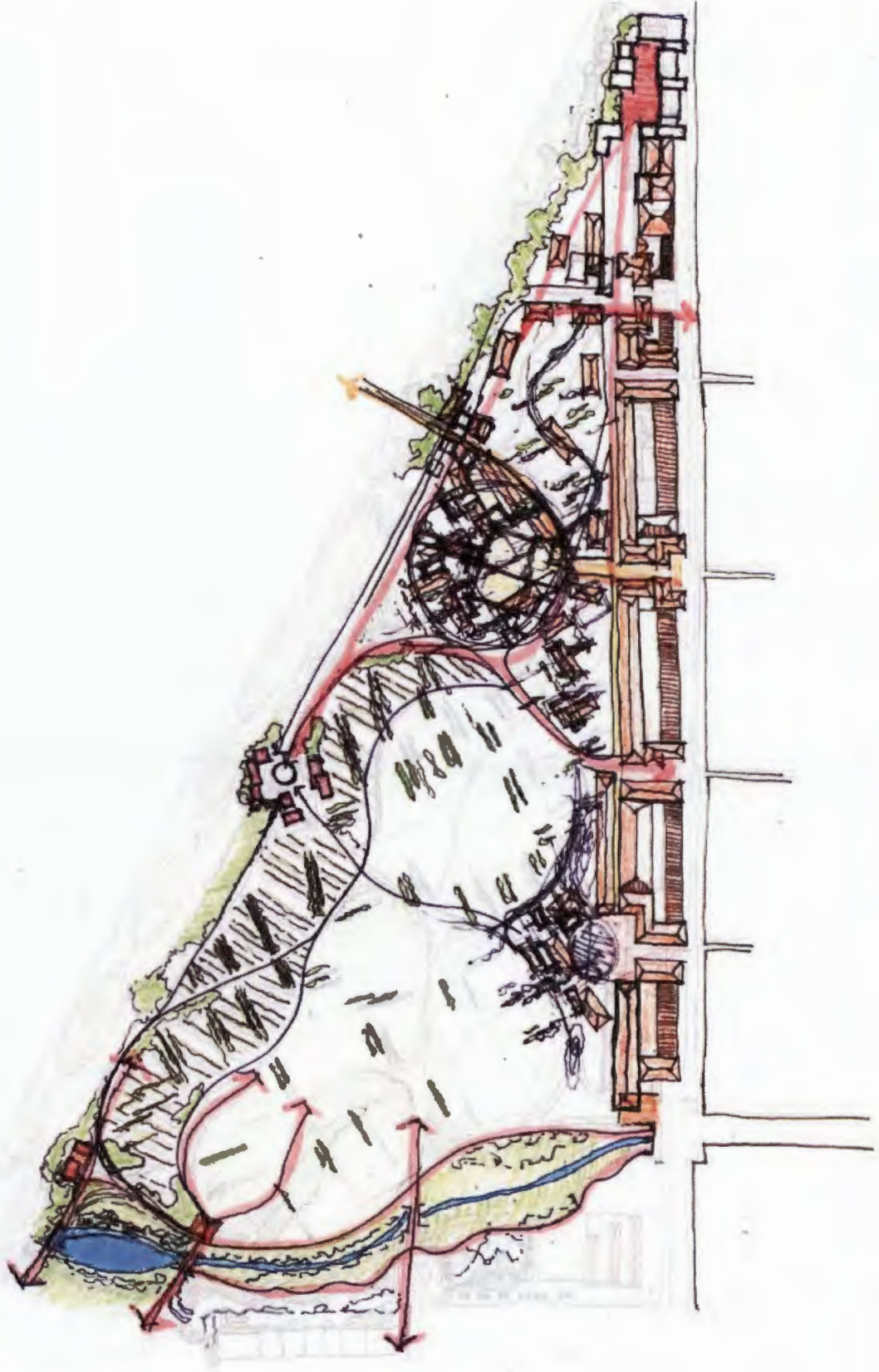


Fig 75 Trees used as Wind breakers as well as structuring elements defining spaces

SCALE 1:2000 @ A1  
0 50 100 150 200



SCALE: 1:2000 (1"=20')

Commercial Nodes and Public Usage

Fig 76

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# Sketch Plan Design Development

- 7.1 Sketch Plan Place Making Strategies
- 7.2 Sketch Process work
- 7.3 Sketch Plan
- 7.5 Details exploration

## CHAPTER [7]

This section takes into consideration the opportunities of the site and framework structuring elements .

In light of the adopted framework and the hypothesis, this section now shows the strategy of place making on a chosen node and, transforming it into a productive public space. The vision and programme of the sketch plan is to Celebrate access / diverse access, develop resource hubs such as a composting area on site and training facility, a community building, a market area, commercial nodes, recycling facilities, urban agriculture, provide access to green open space, **create spaces that are flexible and open ended.** Encourage the creativity of the user,

*As Michael Michalko writes: "Genius often comes from finding a new perspective" (2001, 19). It is possible to avoid repeating the same treatment and creating a monotonous public space by applying a new methodology to the designer of the spaces based on a different set of values and ideas.*

---

# 7.1 Sketch Plan Place Making Strategies

## Conceptualisation responding to Strategies and Theory



Louisville Kentucky Waterfront Park, George Heppner Associates  
Source: www.louisvilleky.com



**The programme activities include:**

**Places for recreational activities that is:**

Places for recreational activities (Recreation Events Plaza)  
 Visitor Reception Centre/ Reception Pavilion  
 that can serve to accommodate piling needs and activities for the area.  
 That is, churches, wedding ceremonies, busk services,  
 graduation parties, and other activities.  
 Commercial Development Package: -shops and cafes,  
 including the incorporation of the existing trading  
 that is taking place within the area.

**Access:**

Pedestrian flows, Ecological flows, Pedestrian Bridge, Vehicular route, Pedestrian route.

**Resource hubs:**

Recyclable material Centre  
 Plant Nursery Centre for seed collection  
 plant propagation and administration, including a compost processing and biomass plant  
 Civic centre building, Research/educational/office working zone, with support facilities

## Landscape as Infrastructure

Quality of context, Area Study,  
 Form, Boundaries and Interaction  
 Community equipment



## Packaging the Landscape

Creating visibility  
 Crafting object and creating network  
 Organized visit



## Non Programmed Spaces

Quality of the view  
 Public and response  
 Labour  
 Material  
 Time



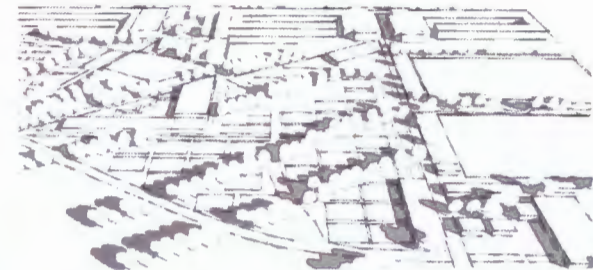
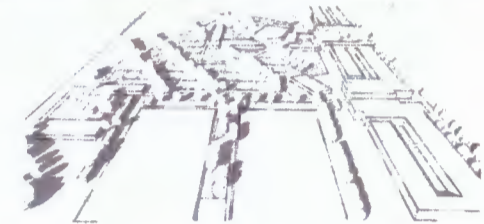
## Programming the Landscape

Art in landscape, events and future ground plans  
 Timing



## Impermanence

Temporary spaces  
 Flexibility



Vegetable garden section behind the community hall.

# 05 Sketch Plan Place Making

## Conceptualisation responding to Strategies and Theory



Louisville Kentucky Waterford Park, George Hogevoes Associates  
Source: www.parklife.com



### The programme activities include:

- Places for recreational activities that is, Places for recreational activities (Recreation Events Fields)
- Visitors Recreation Centres/ Recreation Pavilions, that can serve to accommodate shifting needs and activities for the area.
- That is, churches, wedding ceremonies, social services, graduation parties, and other activities.
- Commercial Development Pockets: shops and cafes, including the incorporation of the existing trading that is taking place within the area.

**Access:**  
Pedestrian flows, Ecological flows, Pedestrian bridge, Vehicular route, Pedestrian route.

**Resource links:**  
Recyclable material Centre  
Plant Nursery Centre for seed collection  
Plant propagation and administration, including a compost processing and biomass plant  
Civic centre building, Research/education/office working zone, with support facilities

## Landscape as Infrastructure

Access:  
Landscape as infrastructure  
Program boundaries and interaction  
Dynamic organization



## Packaging the Landscape

Creating together  
Gathering collect and creating network  
Organised life



## Non Programmed Spaces

Creativity of the user  
Flexible and open-ended  
Labour  
Masters  
Tab



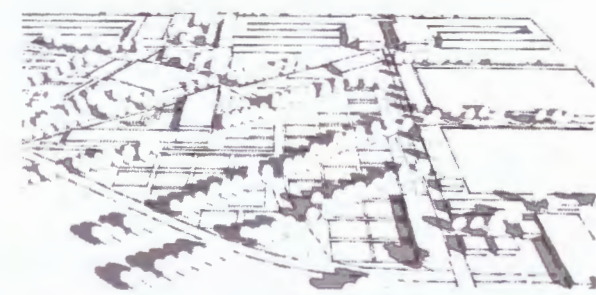
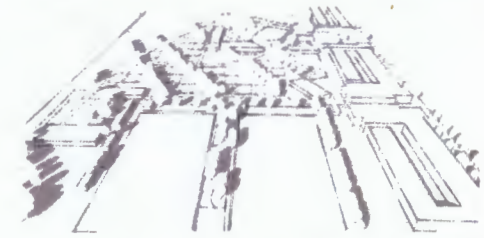
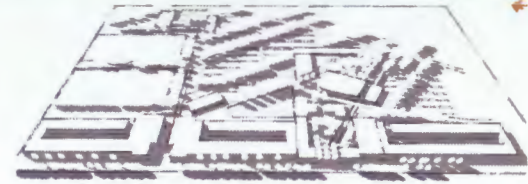
## Programming the Landscape

Form landscape-creative team ground plans  
Building



## Impermanence

Temporary spaces  
Flexibility



Vegetable garden section behind the community hall.

## BARCELONA & EUROPE PRODUCTIVE PARK



# 7.1 Sketch Plan



↑ 1:500



Birds eye over view

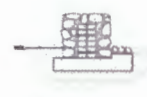
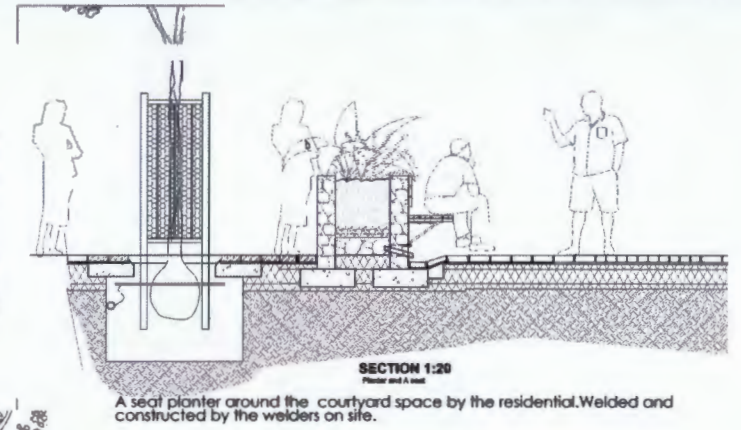
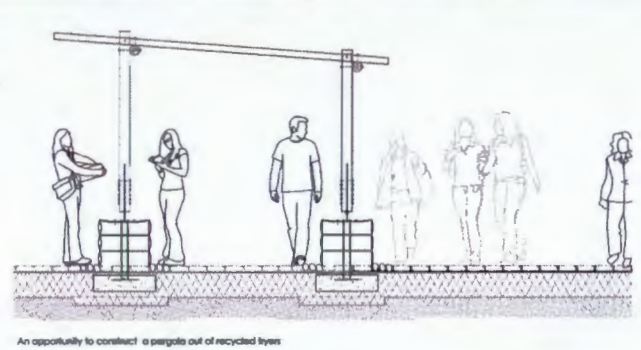
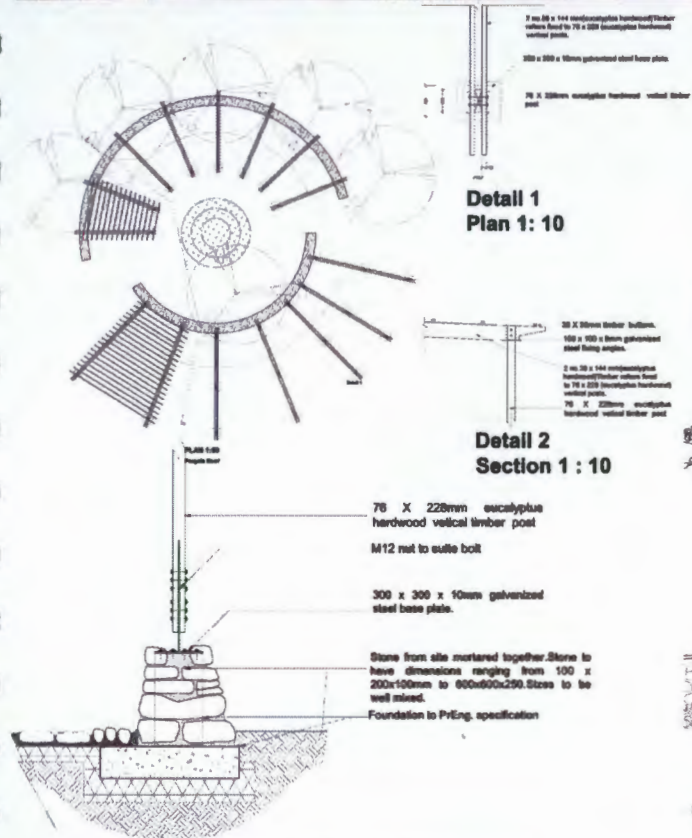
View From Soccer Fields

Community Building over looking the market area



1:500

# 07 PERSPECTIVES, SECTIONS AND DETAILS



Material from site that will be used to construct the wall.  
800 mm wide wall  
100mm concrete base  
100mm concrete base  
100mm concrete base  
100mm concrete base  
100mm concrete base  
100mm concrete base  
100mm concrete base  
100mm concrete base



Detailed section between the wall way between the soccer field. Reflecting the use of locally sourced stone and character of the space. A positive active space. Seating wall and deciduous trees with evergreen.

Detailed section from the residential side (west) to the handsurfaced playground. Reflecting the use of locally sourced material for low wall below.

Detailed section between the Soccer field and the Community composting area. Timber pergola with recycled tyres or locally sourced stone from the can be used as seating or supporting structure.



## BARCELONA & EUROPE PRODUCTIVE PARK



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## Conclusion

## CHAPTER [8]

*As Michael Michalko writes; "Genius often comes from finding a new perspective" (2001, 19). It is possible to avoid repeating the same treatment and creating a monotonous public space by applying a new methodology to the designer of the spaces based on a different set of values and ideas.*

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## Conclusion

This thesis explored the design of a brownfield site, exploring ways of incrementally rehabilitating the site and gradually transforming it into productive public spaces that have the potential to serve the shifting needs of a community.

In chapter 5 of the documents, strategies for open space design were explored while chapter 6 looked at the incremental phasing of the project at a framework level. The Strategies for open space design concentrated the place making of the productive public spaces which were explored at a sketch plan scale. This included employing various programmes and re programming the landscape and inventing public spaces that can be perpetually influenced by the surrounding context.

By connecting this dense, diverse community to the designed public spaces, through pathways, and access points, and programmed uses such as recycling, this process demonstrated how the brownfield landscape can be transformed into a potential asset for the city and region.

Most importantly through the exploration of this project i have found that designing a place that has to serve the needs of a particular community, one needs to find, clues within the community and design to enhance such clues. That is, for example, the desire lines or pathways that people use to commute from one place to the other, the socio economic activities taking place with the area, and designing and taking account of the environmental factors and weather conditions of an area.

When a city embraces its paradox implies that, design that as we design we need to draw from the site, and its characteristics as well as people despite the problem at hand. Because a project that does that will truly be relevant and richer in addressing the issues at hand.

CHAPTER  
**[9]**

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# Appendix

## CHAPTER [10]

## Project statement

Through incremental waste mining of a decommissioned uncapped landfill site and allowing for the rehabilitation of the reclaimed landscape, the landscape is gradually transformed over time, and productive public spaces are introduced as adaptable places used by the broader community for multiple activities, and programmed to respond to shifting community needs.

## Theoretical Objectives

- To investigate the re-conceptualisation, adaptation and enhancement of a derelict site can offer a variety of opportunities for different users and uses.
- An emphasis on the understanding of a landscape as a dynamic open ended system.
- Investigating how the landscape can be understood as a product of process and transformation limited in time, and space and how it affects the uses and users.

The central question explored include the meaning and potential of an urban brownfield/derelict site in a South African Context, and how we could start to re-conceptualise contemporary urbanism through a new culture of designing and offering open public space experiences that becomes a destination beyond the context of neighbouring community and where ecological and other improvements are successfully combined with social change.

## Practical Objectives

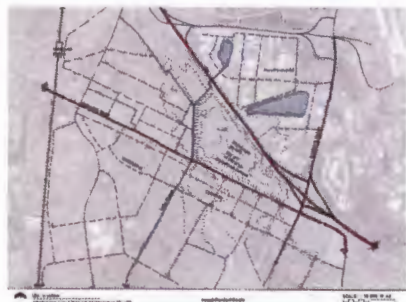
- Incrementally waste mine a landfill and gradually transform it into a productive public space.
- Examination of integrative approaches for re-adapting the reclaimed landscape and integrating to the broader context.
- Relocating of residents to identified livable spaces and gradually mining the site.
- Providing access into and across site and development of nodes to provide a variety of uses and allowing for a series of linkages that allow for the site to be integrated and be permeable to the broader context.



## Site Location



Metropolitan context



Local context



Site context

It is the assumption that because of their high degree of complexity and contestation, derelict or brownfield sites are suited to test and develop different theoretical and practical approaches to the design of public or mixed use open spaces. (Longhost, 2009)

## Character of the Settlements

The physical character of the settlements is that of a typical South African informal squatter settlement which is a densely built collection of shacks, interwoven with a few dirt roads and alleys between them. The shacks are built mostly out of recycled materials, such as packing crates which are made into walls, and corrugated iron sheeting, which allow for quick and cheap construction.



The shack fabric around existing in informal settlements is created a typical housing informal urban well established, where there is a complex web of social interaction between people and their living spaces.



Along Eliphasan Road, a variety of interaction of activity can be found, these roads can be utilized to activate nodes within the community itself, by in for traffic, tourism or the development of services.



The primary semi-formalised spaces that the settlements use the social interaction and the settlement and activities. The low, open spaces that exist in the area are used for sports and games, such as the soccer ground at the site. The secondary and low streets between the shacks.

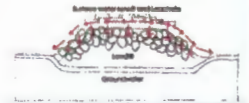
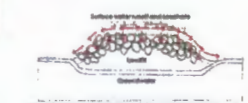
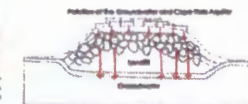


## Nature of the site as a Landfill



The Cape Town Municipality used the site for the disposal of solid waste over a period of 31 years (1956-1987) (ARG Design, 2007).

The average depth of the dump site is reported to be 6 meters, though it is greater than 10 meters below Sarcotona because of sand mixing and it is estimated that the dump is 3 meters below the ground water level of this point (ARG Report, 2007).



As a result of poor maintenance the landfill is getting closed. There is concern for surface water runoff and infiltration. There are also concerns about the infiltration of surface water into the landfill. The infiltration of surface water into the landfill is a long-term even after remedial design.

As a result of poor maintenance the landfill is getting closed. There is concern for surface water runoff and infiltration. There are also concerns about the infiltration of surface water into the landfill. The infiltration of surface water into the landfill is a long-term even after remedial design.

## Settlements Emerging

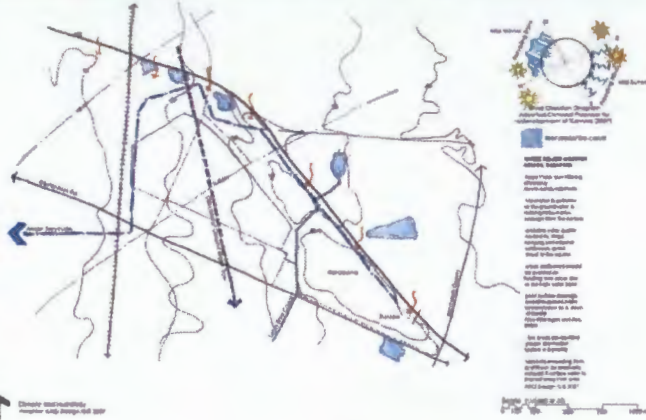


The EXPLORATION of INCREMENTAL WASTE MINING of a decommissioned LANDFILL SITE and its gradual transformation into PRODUCTIVE PUBLIC SPACE

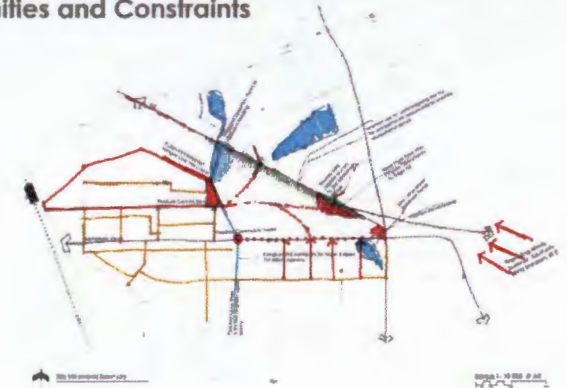
BARCELONA & EUROPE PRODUCTIVE PARK

# 02 | SITE SCOPING AND SYNTHESIS

## Topographical Nature of the Cape Flats



## Opportunities and Constraints



## Linkage to green Corridor



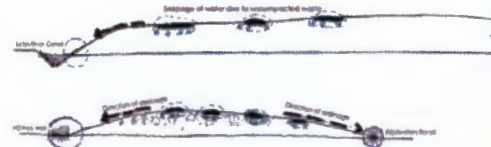
## Public Amenities



Due to the low lying nature of the Cape Flats and its relatively sandy soils, plus the regular high water table, flooding is a problem in the Cape Flats. The result is the regular water logging and flooding in winter. Moreover, there are no indigenous vegetation shelter from the strong north wind and storms.



The site's proximity to the Cape Flats Dune Strand vegetation zone has been heavily affected, both in terms of physical urban facilities (public infrastructure) and identity of the settlement, which has had a significant impact on the natural environment.



## Hydrology on Site



Unpermeated water seeping in building and the poor drainage of the site causes poor during raining seasons leaving visitors here.



The source of vegetation that once existed on the canopy section of the site has been gradually cleared, leaving the site here and no shelter from the prevailing winds.

The study area does not lie alongside the biodiversity corridors of the city and there are no public open spaces in the vicinity other than the main Golf Course in the north, which is privately owned and quite exclusive. There are a few sports fields, cemeteries and parks nestled within the settlements, which make up the open space system of the study area. The open areas are insufficient. As a result people find themselves using any available open space within their surroundings regardless of the health or safety issues apparent within many areas.

Context of Public Facilities around the study area

- Parks
- Schools
- Sports Fields
- Clinic
- Golf Course
- Sewerage Works
- Shopping Centre
- Police Station
- Underdeveloped Land
- Library



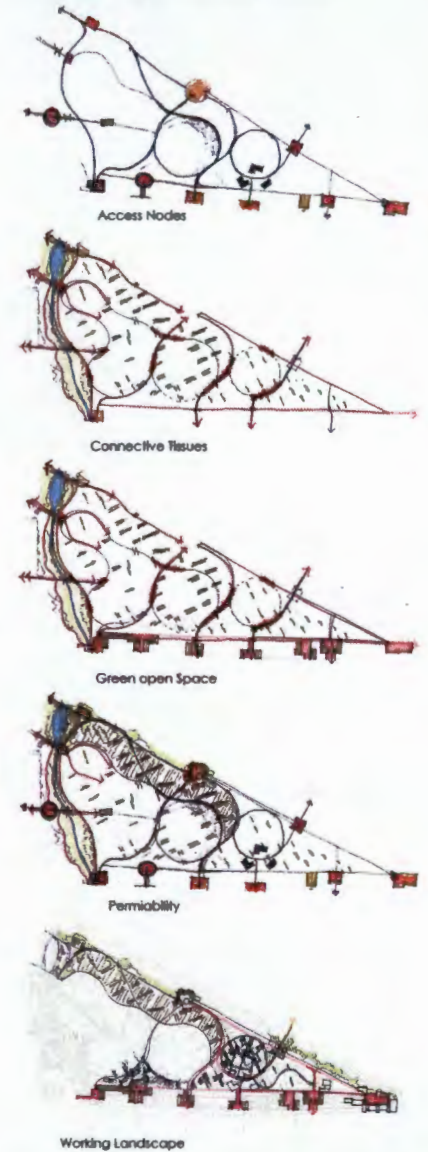
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# 04 | FRAMEWORK

## 3. Mining, Rehabilitation and Phasing Process

## Framework conceptualisation responding to Strategies and Theory

## Sketch Up development



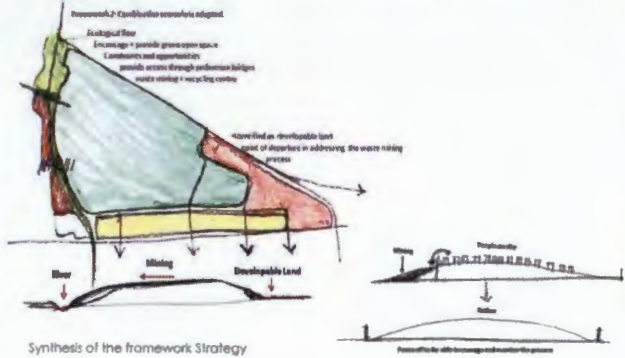
FRAME WORK PLAN : A PRODUCTIVE PUBLIC SPACE

SCALE: 1:2000 @ A1  
0 50 100 150 250

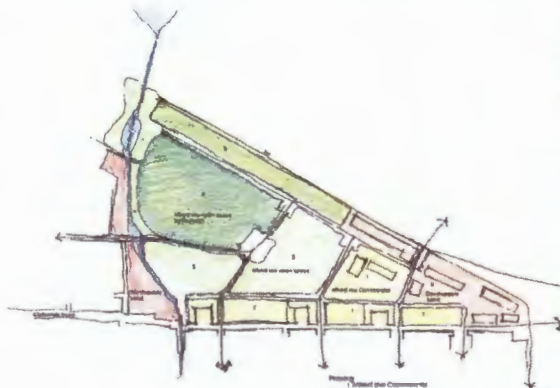


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## Existing Institutional Framework Synthesis



Synthesis of the framework Strategy



Existing Institutional Framework Synthesis

## 1. Relocation Strategy

Waste Relocation Strategy of how properly utilize their land by showing how natural processes and human activities can coexist in a long term self-sustaining environment.

Restoring the ecosystem in a state of balance by active human participation related processes. Referring to public use, the land that has been inaccessible for 30 years, cutting it back together to provide an essential productive public space for the resident community.

Regenerating Barcelona's urban layout as a solution for changing perceptions. It will show how a productive public space can be gradually transformed and can function ecologically. It will demonstrate all of these, the methods and attitudes by which appropriate strategy resources and land stewardship can be implemented. The idea of waste mining is leading to a recycling centre and compost and re-use on site, and sorting of the waste taking place within the site.

It is intended that beyond the landscape this site will give further opportunities to take place for reusing technologies for environmental and architectural design, bringing together landscape and built form in a completely integrated way to gather on assembly for built of buildings proposed such as reception pavilions, resource hub, chic building, recycling centre buildings. That is, the highest international standard in which visitors can only experience the world's diverse environment, but also the dynamic that create and sustain them.

Relocating the site at all levels, to the neighbouring communities, to city and region, while generating related use opportunities and opportunities to community development.



Relocation Sites

**Land Zoning Specifications**

1. Community Center	11. Open Space	17. Industrial
2. Community Center	12. Open Space	18. Open Space
3. Recreational	13. Open Space	19. Open Space
4. Recreational	14. Open Space	20. Open Space
5. Recreational	15. Open Space	21. Open Space
6. Recreational	16. Open Space	22. Open Space

**Relocation Site Option 1**  
 Option 1: Relocation of the site to the existing urban fabric, maintaining the existing urban structure and providing a high-quality public space.

**Relocation Site Option 2**  
 Option 2: Relocation of the site to a new urban fabric, providing a high-quality public space and a new urban structure.

**Relocation Site Option 3**  
 Option 3: Relocation of the site to a new urban fabric, providing a high-quality public space and a new urban structure.

Autopista & MICP - Group 1, 2011, comparative analysis

It is proposed that the mining or waste mining of the landfill should be an approach taken for this site. Proper environmental management will need to be put in place during the rehabilitation and mining processes.

The implementation of the mining process will take place in various phases of development and will be spread over a three-phase time period.

Before commencing with the mining process, the first phase will be to relocate residents off the site, all the residential currently living on the site will be removed or relocated to identify adequate livable sites.

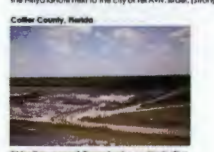
Relocation sites have been identified around the study area. This site has been chosen as open spaces for recreation and some are road reserves.

## 2. Mining and Rehalitation strategy

Landfill mining is the process of excavating from operating or closed solid waste landfills, and using the unsorted materials for recycling, processing, or for other utilization. Landfill mining typically involves a series of mechanical operations for recycling, composting, and landfill space. Landfill mining also provides the opportunity to remediate public health and environmental quality problems associated with the mining or closed facility. In a Comandante Comandancia, in a typical landfill mining, processed soil and composted organics from the waste screening process are removed and recycled for use on the active landfill or daily cover.



Collier County, Florida



Objective: prevent groundwater contamination



Objective: Reclamation of land and use of local labor and resources.

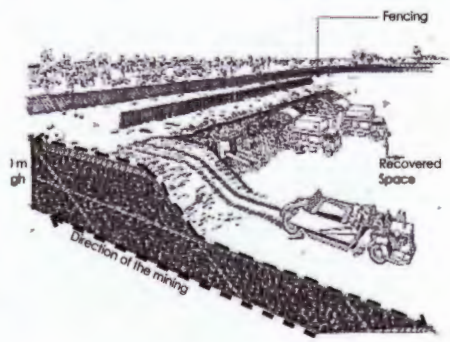
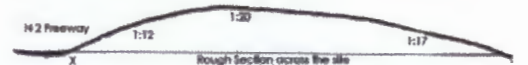


Objective: Recover land and use of local labor and resources.

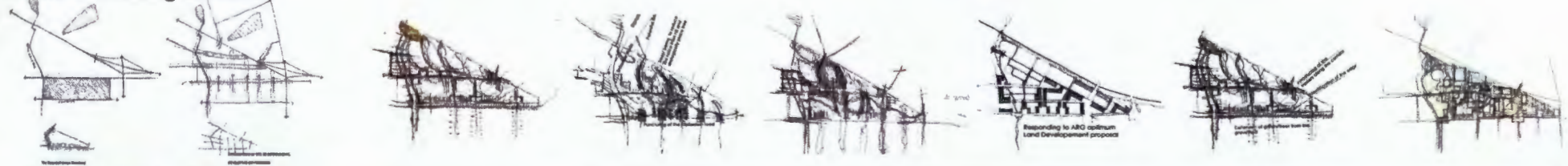


Objective: Recover land and use of local labor and resources.

## Conceptual Mining and Rehabilitation Process applied on site



## Design Process Structuring Elements



## BARCELONA & EUROPE PRODUCTIVE PARK



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