CHAPTER 3: SITE SELECTION - THE MORELETA SPRUIT

INTRODUCTION

The establishment of the city of Pretoria originated just south of the Magaliesberg Mountain range along the banks of the Apies River in Church Square.

The Magaliesberg, which originated in the west, offered three main points of access to Pretoria through geological faults in the mountain range. The first being Hartebeespoort, the second Wonderboompoort, located directly above Church Square and through which the Apies River drains into the Bon Accord Dam, and lastly Derdepoort, which is the geological fault through which the Moreleta Spruit drains into the Roodeplaat Dam.

The presence of the Moreleta Spruit, east of the Apies, allowed for further development east of the original point of establishment of Pretoria. It was through Derdepoort that traders would gain access to the Soutpansberg trading route, as the Wonderboompoort was often flooded by the Apies River. (Swanepoel and Jensen cited in Taljaard 2013)

The development of the city of Pretoria towards the east was a process of merging the original established areas around Church Square along the Apies River and the farming and industrial development which took place at Silverton along the Moreleta Spruit. Through the understanding of the historical value surrounding the Moreleta Spruit, certain areas will have higher connection to the river from a social aspect, which will aid in the nature of design intervention taking place at various points.

The Moreleta Spruit was chosen as the river system of focus rather than the Apies River, as multiple interventions and strategies have been proposed for the Apies River due its high significance and importance concerning the history of the establishment of Pretoria.

The establishment of Pretoria may have initially been influenced by the Apies River as a water source, however the expansion and growth of the city was made possible by the presence of other smaller river systems such as the Moreleta Spruit. Each system held its own significance and value in terms of provision as a resource and establishment potential.

In terms of the overall project and intention of this thesis, the main aim is the discovery and unveiling of the potential of any river source, including small scale neglected rivers, as a resource and natural system of importance within the urban environment.

The Moreleta Spruit is exposed to a number of environments to which it can interact and benefit through appropriate design and ecological interventions, ultimately reintroducing the river system to its current environment as a resource and system of significance and importance.

LOCATION:

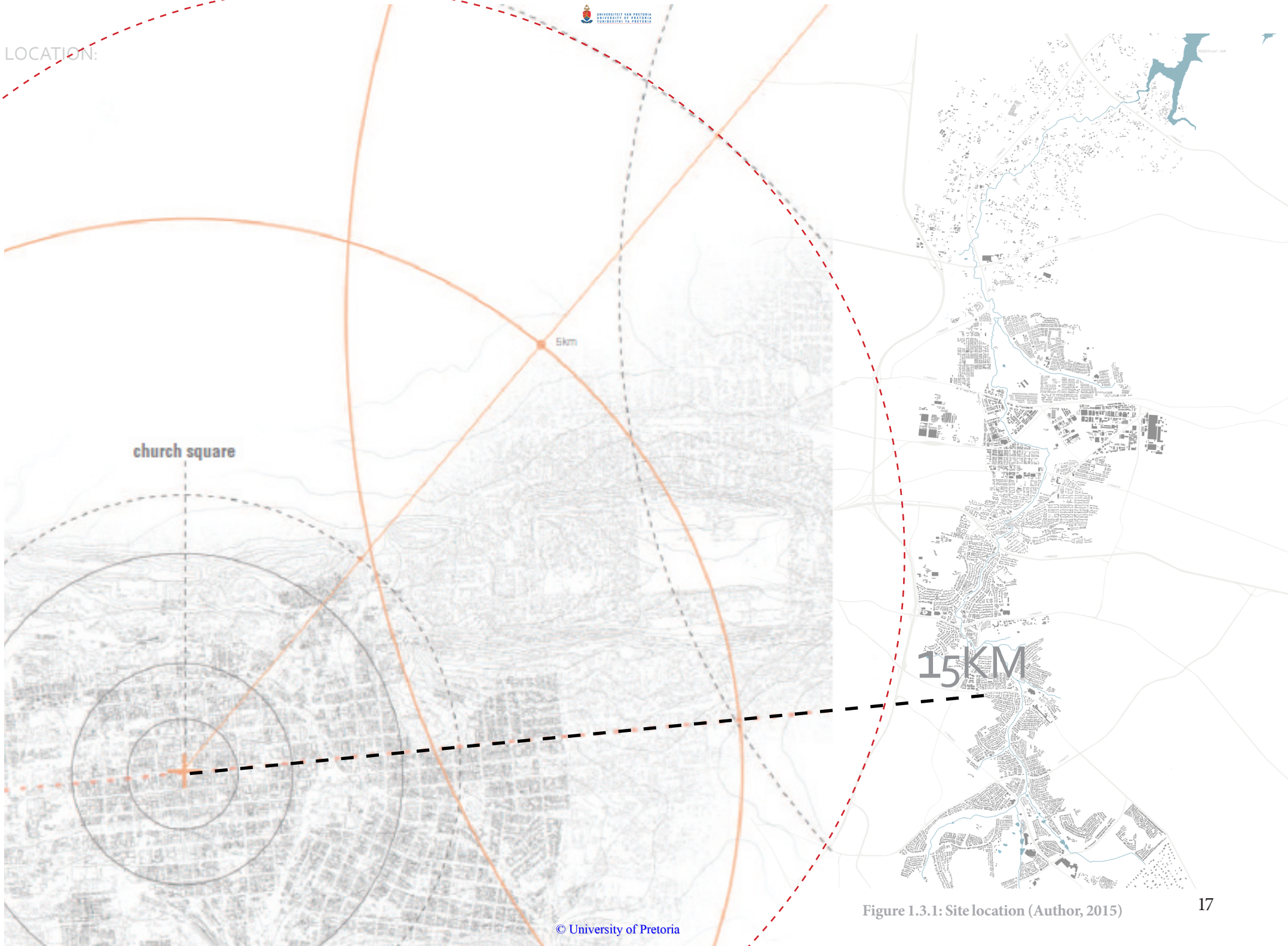
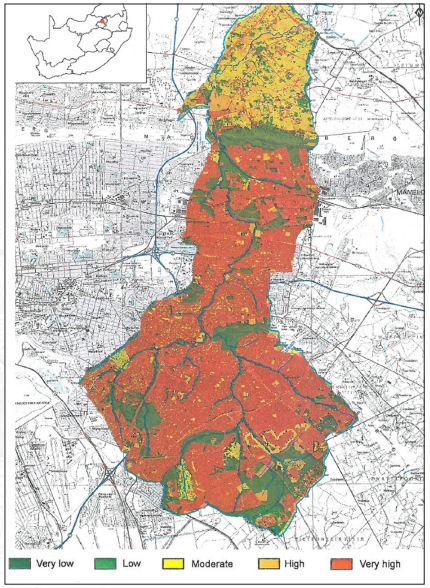


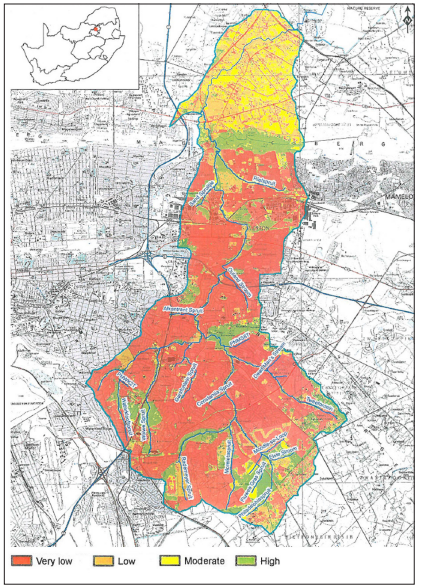
Figure 1.3.1: Site location (Author, 2015)

Figure 1.3.3: Moreleta Spruit Catchment Area (Author, 2015)

POLLUTION RISK



REHABILITATION POTENTIAL



RUNOFF RISK

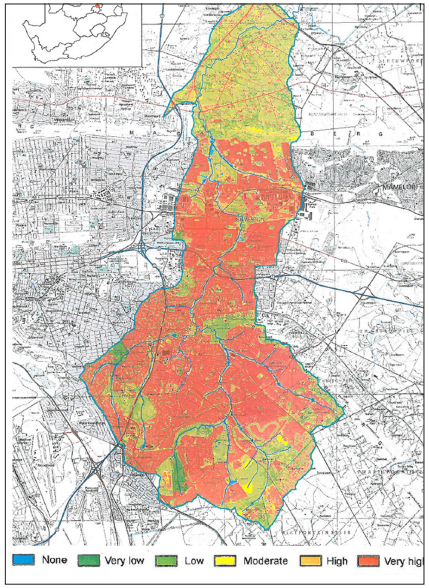


Figure 1.3.2: Catchment area analysis (The Department of Water Affairs, 2012)

The Moreleta Spruit, located within quaternary catchment A23A which forms part of the Limpopo Primary Catchment in Gauteng Province, flows from the south to the north and drains into the Roodeplaat Dam.

The Spruit and the catchment are found in the Tshwane municipal area where the catchment is mainly made up of dense urban settlement in the south and semi-urban settlement in the north. The catchment covers 68 238ha of which the Moreleta Spruit catchment makes up 19%.

There is still a rehabilitation potential within the catchment, but the human activities within the catchment will increase or decrease this potential. (The Department of Water Affairs 2012)

AREAS OF HISTORICAL SIGNIFICANCE

Derdepoort

Previous human activity is evident through visual signs of ploughing that took place when Derdepoort was still farmland, which demonstrated a high degree of technical and creative development at a particular period. Early Iron Age ceramics were discovered along the edge of the river which held potential information contributing to the understanding of both cultural and natural heritage. An existing historical canal was found in the area which previously extended to meet the Moreleta Spruit for the transportation of water to the farm, evidence that the river was used for the establishment and existence of settlements along its banks. (The Department of Water Affairs 2012. p. 6-7)

Eersterust

Eersterust was the first formal coloured township and in 1905 the existing farm was subdivided in order to create plots for the township development. It was considered to be the gateway to the industrial areas as many of the industrial workers were of the coloured racial group which led to the development in such close proximity to the industrial area of Silverton. In the 1930's the living conditions were very poor and it was only in 1962 that the first housing schemes were completed.

The name Eersterust was the result of one of three possible reasons, firstly was that the idealistic farm owner who was responsible for the development of the township named it such as it was the creation of the first resting place of the descendants of slaves. Secondly, it was the first resting stop outside of Pretoria for the postmen and traders. Thirdly, it was a place of rest for the republican forces that came with the British war. (The Department of Water Affairs 2012. p. 6-7)

Silverton

In 1845 David Botha was the first to settle in the area on Koedoespoort farm, by 1874 the Gold Rush was at its peak and the farm was bought by Hans Mundt, who developed a half way station for travellers.

Silver was discovered on the farm in later years which was responsible for the naming of the settlement. The rush was short lived, as the amount of silver was insufficient to sustain a large settlement, however a small settlement had established itself and became known for its trade and industry. The settlements development as an industrial hub was possible due to land being relatively cheap, available labour forces and close proximity to existing trade routes and water resources. (The Department of Water Affairs 2012. p. 6-7)

Faerie Glen Nature Reserve

In 1800 the Ndebele had settled in the area, remains of walls and huts are still present on the Bronberg slopes. The Hartebeespoort 304 and 305 farmlands were a permanent white settlement by 1862, and the owner of the farm was Hendrik Willem Struben who named his homestead The Willows. The floodplains were used for agricultural crops and grazing of cattle.

The development of what is known today as Lynwood road was originally

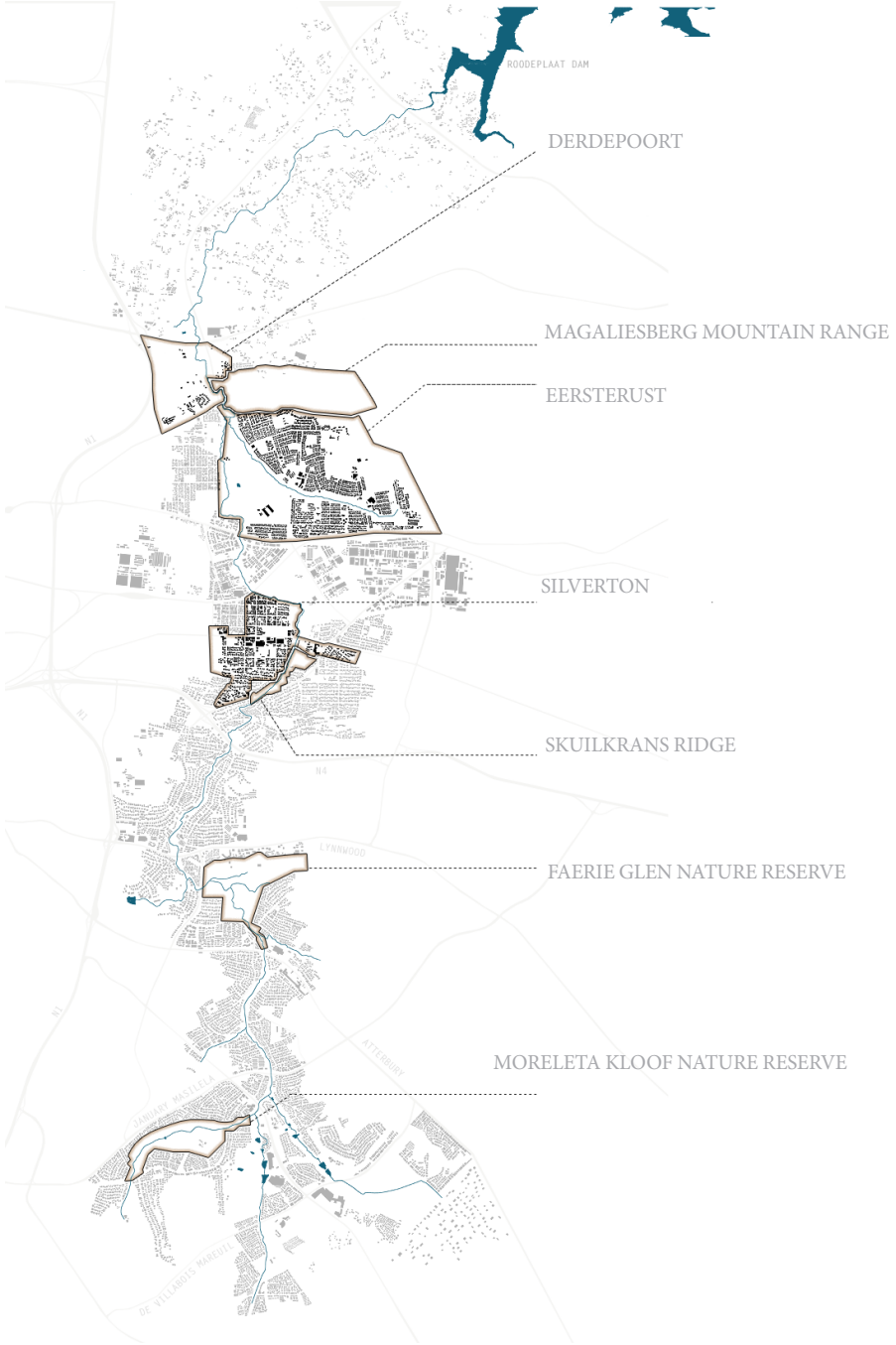


Figure 1.3.4: Moreleta Spruit Historical Significance (Author, 2015)

constructed as the sole road leading to the Struben farm. In 1965 a bridge was built over the Moreleta Spruit along Struben road which had to be increased in 1988 in order to cope with the increased volume of water runoff as development increased. (The Department of Water Affairs 2012. p. 6-7)

Moreleta Kloof Nature Reserve

Historically, the Moreleta Kloof Nature Reserve was a part of the initial farm belonging to the Rademeyer family who were known for cattle farming.

After the death of the owner, the farm was subdivided and the original farmhouse, constructed in 1903, is currently being used as a restaurant within the nature reserve. When the farm and buildings were transferred to the Pretoria council from the estate of the last owner, it was handed over on the condition that the Kloof will always be kept as a green zone and that no residential developments are permitted on the Kloof.

The Moreleta Spruit acts as an ecological and spatial link between significant ecological systems. Understanding the green corridor and places of ecological significance, informs the nature and character of the river in terms of ecological value, which in turn informs the design interventions for the rehabilitation and restoration of the natural environment and the preservation of existing and limited green space. It further serves as a migration corridor for indigenous fauna and flora which has importance in rehabilitation of natural systems, processes and biodiversity.

The exposure of users to the natural environment will contribute to the relationship between man and nature and through the design interventions the intention would be to increase recognition, importance and preservation of green spaces, addressing their significant decrease for the purpose of development and urbanisation.

The river system increases aesthetic value of the surrounding environments and the green space offers an opportunity for hiking trails, cycling routes, bird watching, photography and other activities which will instil a connection between user and the environment. (The Department of Water Affairs 2012. p. 6-7)

Photo 1.3.1: Moreleta Spruit Natural Environment (Author, 2015)

Photo 1.3.2:Faerie Glen Nature Reserve (Author, 2015)

AREAS OF ECOLOGICAL SIGNIFICANCE

Areas of Ecological Significance associated with the river system are: Magaliesberg Mountain Range Skuilkrans Ridge, Meyerspark Bird Sanctuary, Faerie Glen Nature Reserve, Struben Dam and the Moreleta Kloof Nature Reserve. The ecological condition of the Moreleta Spruit fluctuates between protected areas and the areas of the stream which are exposed to the natural environment.

As the Spruit flows through the residential areas towards the industrial area in the north, the poorer the quality of not only the water but the associated habitats and ecological functioning of the system, become. The design intervention will be required to rehabilitate and restore the damaged systems and processes as well as improving the water quality, which as a result will increase the levels of fauna and flora diversity and the aquatic ecology.

Magaliesberg Protected Natural Environment

Includes the eastern edge of the mountain range directly north of Eersterust and Mamelodi and their specific vegetation types.

Faerie Glen Nature Reserve

The 124 hectares are considered the jewel of the Moreleta system (Kantor 2010 cited in The Department of Water Affairs 2012) as the single largest area of minimally disturbed natural habitat. There is an abundance in vegetation and animal diversity found in the reserve, as well as the inclusion of the sensitive Bronberg ridge vegetation, extending along the mountain range towards the east, 10% of the ridge consists of mountain wetland.

Struben Dam Bird Sanctuary

Forms part of the flood control system of the Waterkloof Spruit, a tributary to the Moreleta Spruit system, with an abundance in bird and aquatic life and known for its Brakenveld vegetation type.

The CSIR Grounds

The close proximity of the CSIR grounds contributes to a runoff of higher quality water into that section of the Moreleta Spruit

Moreleta Kloof Nature Reserve

100 Hectares of natural habitat includes various hiking trails and human interaction with the natural environment, the high level of animal and bird life is an attraction for urban dwellers. (Kantor 2010 cited in The Department of Water Affairs 2012. p10)

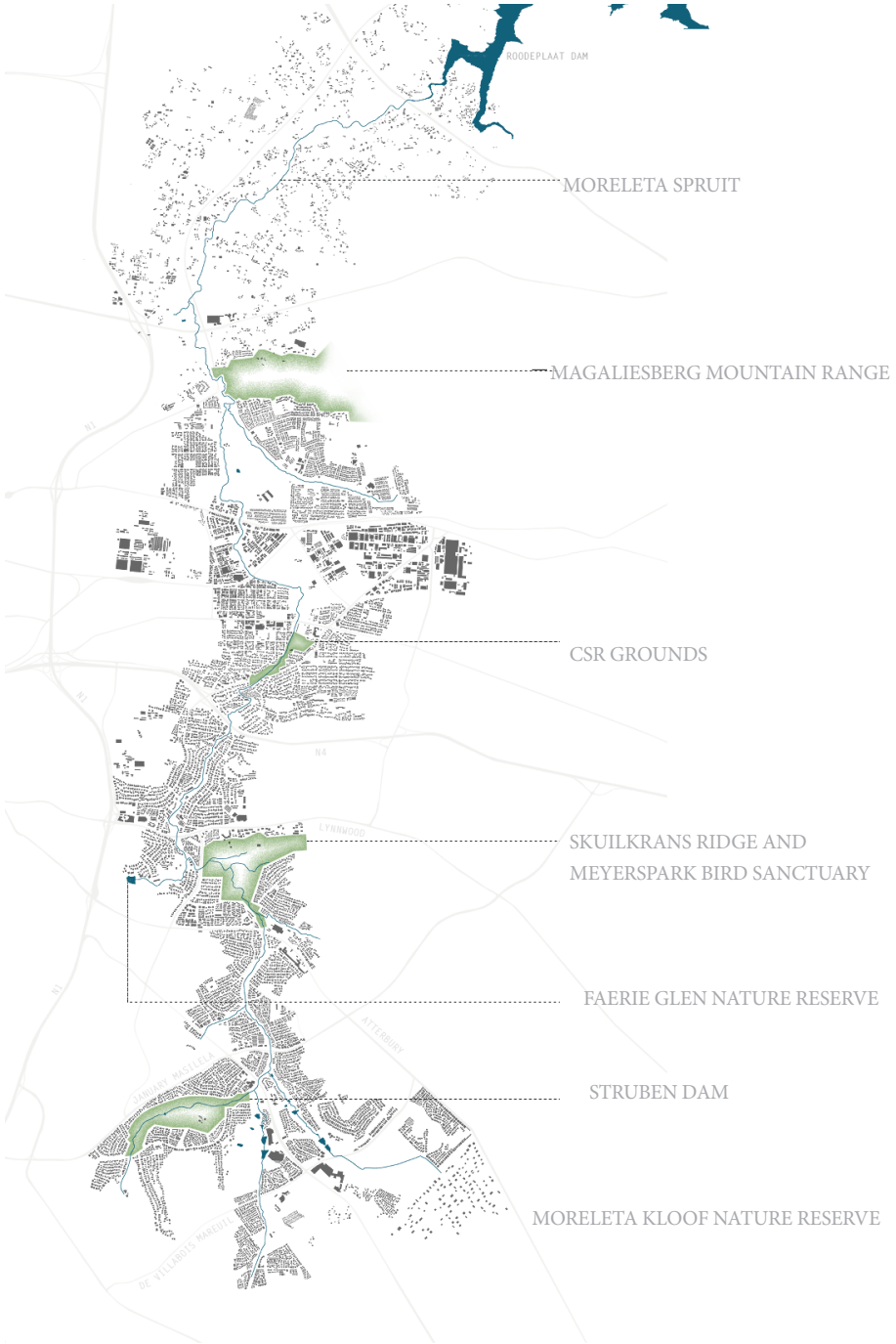


Figure 1.3.5: Areas of Ecological Significance (Author, 2015)

VEGETATION ANALYSIS

Alien Invasive Vegetation

Although there are significant problems concerning the Moreleta Spruit environment, minimal invasive species are evident around the sources of the Spruit, but as urbanisation increases and the Spruit is exposed to degradation and habitat destruction the number of invasive species is on the increase.

The main vegetation type surrounding the river origins is grassland and the original tree species found were the Acacia Karroo and Combretum Erythrophyllum. Further downstream the invasive species include the Acacia Mearnsi, Eucalyptus, Solanum Mauritianum, Populus x Canescens, Privet species, Lantana and Willows. (The Department of Water Affairs 2012. p. 7)

Regional Habitats

The change in biomes taking place along the course of the river system is reflected in the distribution of trees from grassland in the south progressing towards savannah in the north. The change in geology, climate and topography along the river system are responsible for the change in vegetation distribution. The high lying areas in the south drain the Spruit to the low lying areas in the north. (The Department of Water Affairs 2012. p. 7)

Plants with Medicinal Value

In the Faerie Glen Nature Reserve both the Lippia Javanica as well and the Lippia Rehmanni are found. The Lippia Javanice grows in the open veld, in bush and forest margins, it is very aromatic and is well known in the African tribes for its medicinal value. (The Department of Water Affairs 2012. p. 8) (Maharaj 1995 cited in The Department of Water Affairs 2012) (Linde et al 1995 cited in The Department of Water Affairs 2012)

FAUNA ANALYSIS

There is a diversity of smaller mammals found along the course of the river system. Documented are hares, mongoose, dassie, common duiker, otter, bush baby, greater cane rat, hedgehog, porcupine, spotted genet and the larger mammals which have been introduced into the reserve areas. (The Department of Water Affairs 2012. p. 10) An extended avifauna report has been attached as an indication of the various bird species to be found along the Moreleta Spruit.

AQUATIC ANALYSIS

The aquatic ecological data was obtained from The Department of Water Affair's Resource Quality Services, the National Rivers Database and the River Health Programme.
Several fish species have been recorded in the Moreleta Spruit, Ghieliemientjies, Bass (near Roodeplaat dam), Barbus Paludinosus (Straight Fin Barb), Barbus Anoplus (Chubbyhead Barb), Tilapia Sparmanii (Vleikurper), Sarotherodon Mossambicus (Bloukurper) and the Pseudocrenilabrus Philander (Southern Mouthbrooder)

GEOLOGICAL STATUS

The Moreleta Spruit is a perennial stream with a high number of tributaries feeding it. The source of the water is the Malmani Dolomite which is found in the southern region of Pretoria. (The Department of Water Affairs 2012. p. 10)

Photo 1.3.3/4/5: Moreleta Spruit Natural Environment - Skuilkrans ridge and Magaliesberg Mountains (Author, 2015)

The land use zoning within the developed environment will play an important role in determining the appropriate nature of intervention to take place within various zones. Through the evaluation of the characteristics, needs, requirements and issues within each, specific outcomes can be constructed for ways in which to address and resolve apparent issues, while ultimately rehabilitating and restoring the urban river and its environment. (The Department of Water Affairs 2012. p. 14-17)

Rural Residential

Small Holdings

The rural residential areas alternate between smallholdings and informal settlements. In areas dominated by smallholdings there is a low percentage of paved areas which means there is a low runoff and pollution risk due to high rates of infiltration as well as very high rehabilitation potential. Pollution in these areas is mainly due to agricultural activities and the accumulation of fertilizers and pesticides in runoff. There are large areas of open space surrounding the river system and private properties have direct and unrestricted interaction with the river, no fencing. The establishment of informal settlements along the banks of the river have a more negative impact than that of smallholdings, there is a high pollution risk due to the lack of sanitation and waste management services. The river, which is directly accessible, is used as a primary source for washing clothes and personal hygiene. The infringement on the flood lines and floodplains is a dangerous risk for individuals in cases of flash floods. (The Department of Water Affairs 2012. p.17-19)

Low Income Residential

Eersterust, Derdepoort, Mamelodi East, Jan Niemand Park

These areas have a moderate to high runoff and pollution risk as a result of the high percentage of paved areas and are mainly areas of mixed land use. With no restriction on access to the river system due to the lack of fencing and other forms of barriers, there are specific litter problems which are compounded by the challenges in waste collection management and services. There is a fair amount of open space surrounding the Spruit, resulting in minimal floodplain infringement which means there is a high rehabilitation potential in these areas. (The Department of Water Affairs 2012. p. 17-19)

High Income Residential

These areas make up the majority of the surrounding environment along the river system and is an area with high settlement density. The change in landscape was a direct result of the human development and activities in the area. Previously existing grasslands and seepage wetlands were replaced by impervious infrastructure with more than 60% of the landscape being transformed into built environment. The density increases towards the south, closer to the origin of the river, comprising mainly of residential areas interspersed with small pockets of commercial and industrial developments.

The majority of the Spruit has been fenced off to the public, with security controlled access. Due to the lack of management and maintenance the river system has become an unsafe place with a number of incidents of violence and theft being reported.

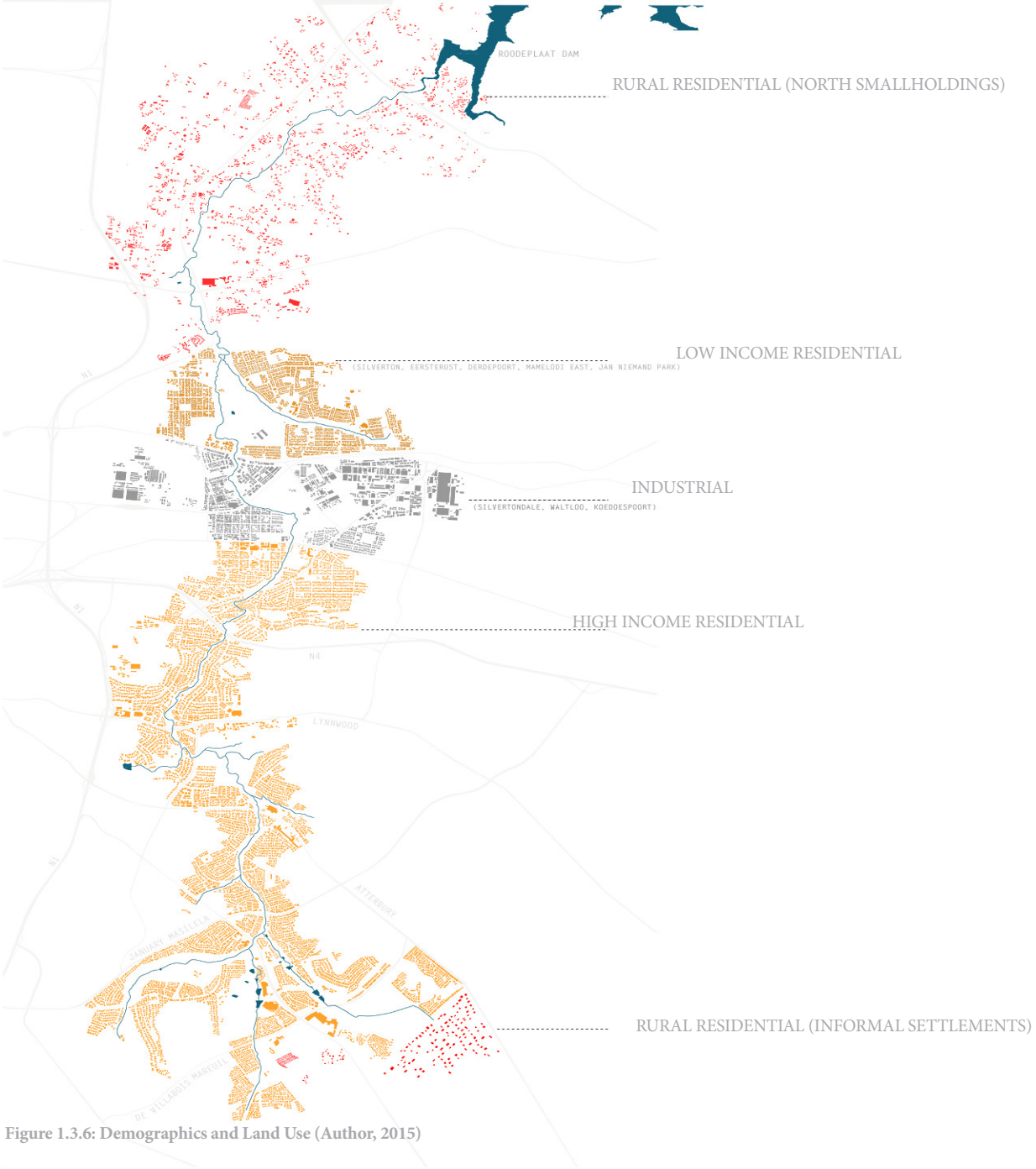
The high percentage of paved areas has resulted in a high runoff and pollution risk, with a fundamentally negative impact on the river ecosystems such as wetland functioning as well as sedimentation and erosion. There is limited open space surrounding the river, resulting in a low rehabilitation potential. The benefit of interventions in these areas would be the complete transformation and integration of the residential environments with the river fronts, drawing people to the river rather than barricading them from it. The increase in interest and understanding as well as the provision of activities and community based open areas will encourage the preservation and protection of green areas by the user. (The Department of Water Affairs 2012. p. 17-19)

Industrial

Silverton, Silvertondale, Waltloo, Koedoespoort

There are no wastewater treatment facilities within the catchment area or along the course of the Spruit. With the large number of industries evident on and around the river system, there is a significant negative impacts on the river system and it functioning due to the uncontrolled releases directly into the river system, which has now become a waste water stream through this area.
There is a high percentage of paved areas and a high runoff and pollution risk. The significant decrease in the water quality as it exits the industrial area flows directly into the agricultural and most natural surrounding environment.

There is no restricted access in the area and little to no interaction with the river system. (The Department of Water Affairs 2012. p. 17-19)



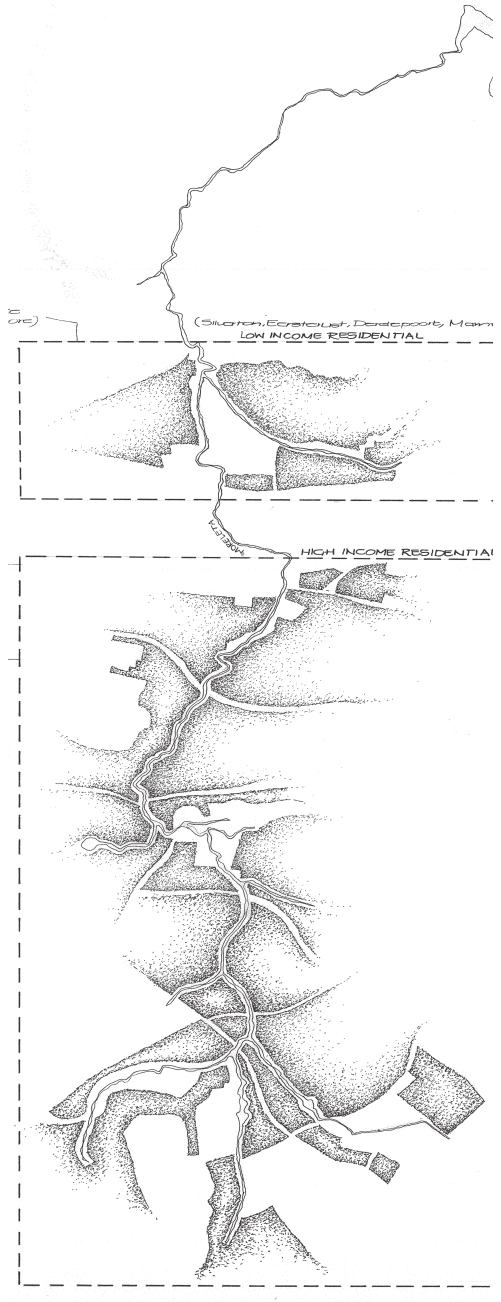


Figure 1.3.6: Demographics and Land Use (Author, 2015)

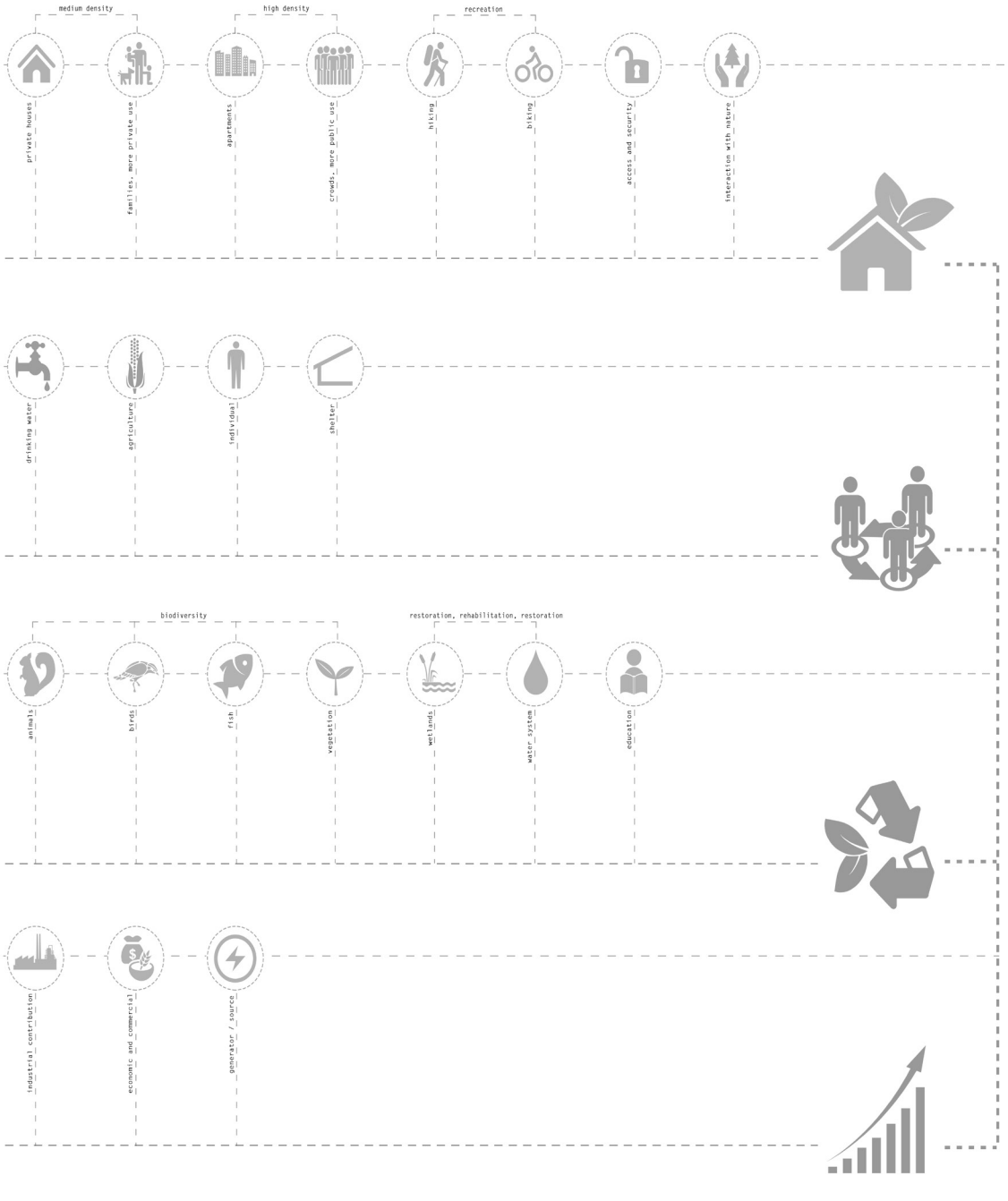
VISION AND INTENSION FOR VARIOUS DEMOGRAPHIC AREAS OF RIVER SYSTEM

HIGH INCOME RESIDENTIAL - VARYING DENSITIES - VARIOUS INTERACTION

LOW INCOME RESIDENTIAL - INFORMAL - DESIGNING FOR THE INDIVIDUAL

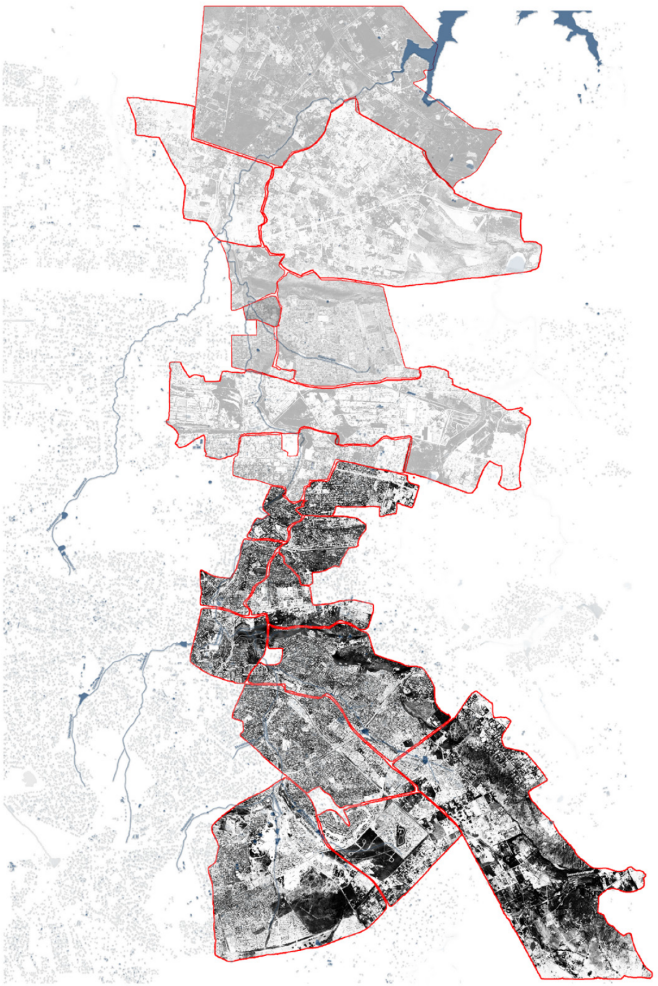
NATURAL ENVIRONMENT

INDUSTRIAL ENVIRONMENT



INDIVIDUAL POINTS OF INTERVENTION - RESPONSE OF RIVER TO THE SURROUNDING CONTEXT - VARIOUS CONTEXTS = CHANGE IN IMPORTANCE, FUNCTION, INFLUENCE, PURPOSE OF RIVER AND NATURAL ENVIRONMENT - DEVELOPMENT OF SELF SUFFICIENT ENVIRONMENTS FEEDING OFF THE NATURAL ENVIRONMENT - MUTUALISTIC RELATIONSHIP.

Figure 1.3.7: Demographic Vision and Intention (Author, 2015)



Limited Access

Increased access and designed riverfronts with public space will strengthen connection between urban and natural environment.

Cycling

Hiking

Recreation and Experience

Increase in safety and maintenance will allow for the bike and hiking trails to reopen. Encouragement of exercise through use of the natural environment.

High density housing, apartments

Larger population, public use

High Density

Larger urban parks and riverfront parks making use of urban open space for larger communities and higher densities.

Interaction with nature

Various activities which allow for the interaction with the natural environment, bird watching, photography, immersion in nature.

Families, more private use

Private houses

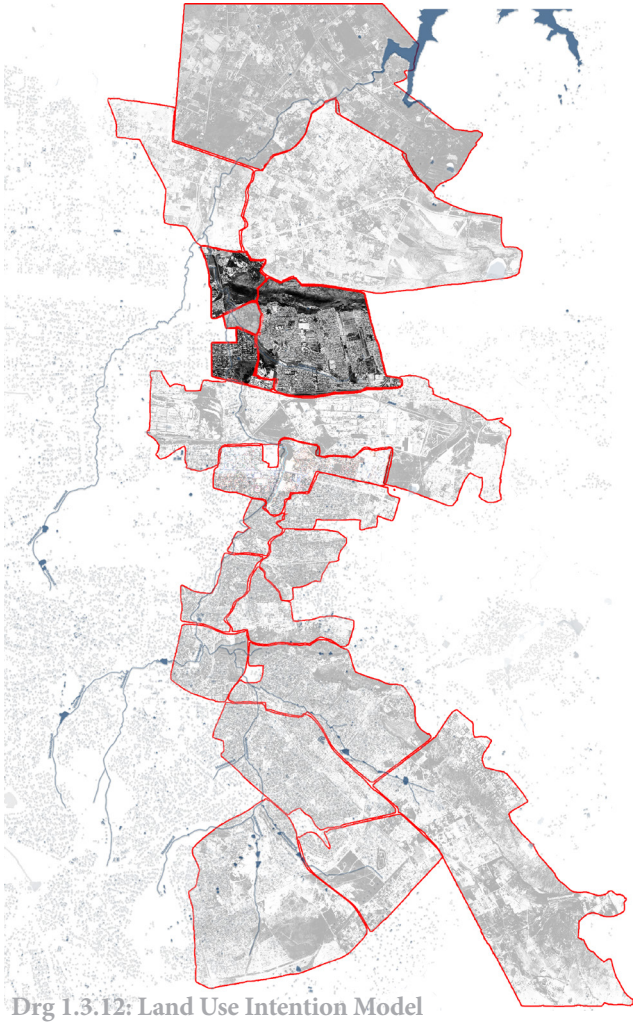
Medium Density

Smaller scale interventions for use by individuals and smaller communities with private access to river system.

HIGH INCOME RESIDENTIAL

Overall Intention:
The creation of space which allows for the integration of residential environments with the natural, taking safety and accessibility into consideration. Each space responding to the various demands and requirements of the different contexts of high and medium developments or neighborhoods.

Figure 1.3.8: High Income Residential Intention (Author, 2015)



Drg 1.3.12: Land Use Intention Model

LOW INCOME RESIDENTIAL

Overall Intention

Designing for the low income informal settlements which establish themselves along the course of the river system, a place of enablement and provision where individuals are able to sustain themselves, relying almost solely on the natural environment for basic human needs. Development of micro self sufficient systems integrating the individual into the natural processes and systems.

Figure 1.3.9: Low Income Residential Intention (Author, 2015)

Informal housing

Concerned with informal settlement establishment on river banks. Provision of water purification, waste removal and sanitation for settlements to limit direct pollution of river.

Individual

On an individual scale. Providing individuals with basic human needs of water, focusing on water delivery systems to informal sector.

Agriculture

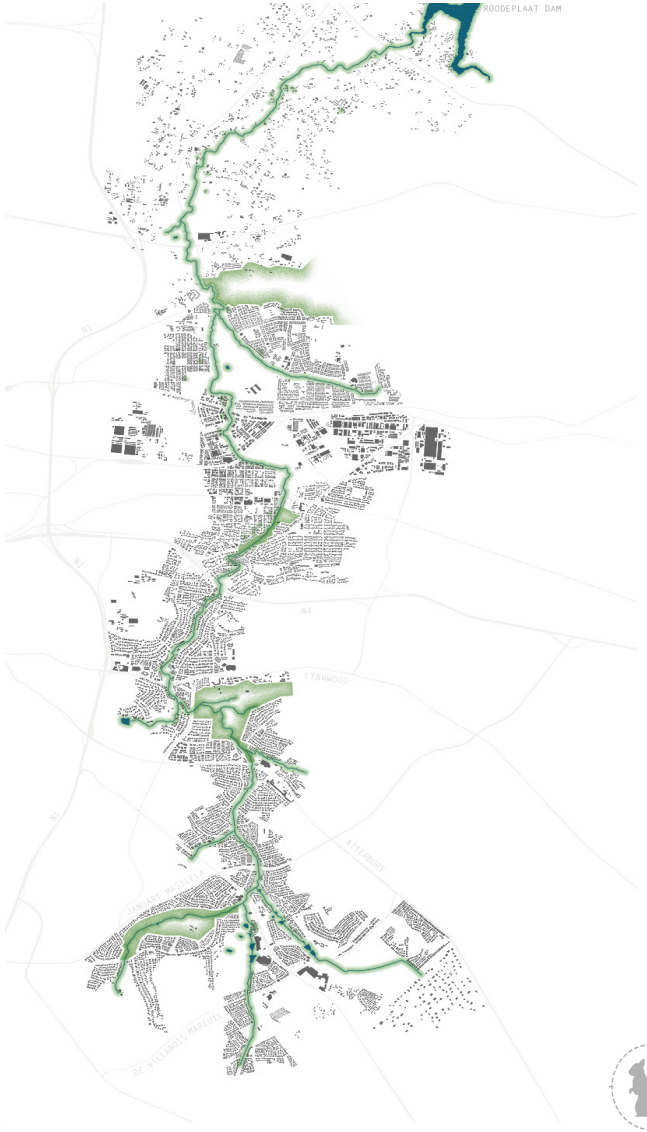
Purification and restriction of agricultural runoff into river system. Possible in river purification systems to prevent further downstream water pollution.

Use of water systems

Use of natural systems as a resource for lower income areas, involves purification, distribution and access. Strengthens connection between man and natural environment.

PROCESS & SOLUTIONS

DESIRED OUTCOME & INTENTION

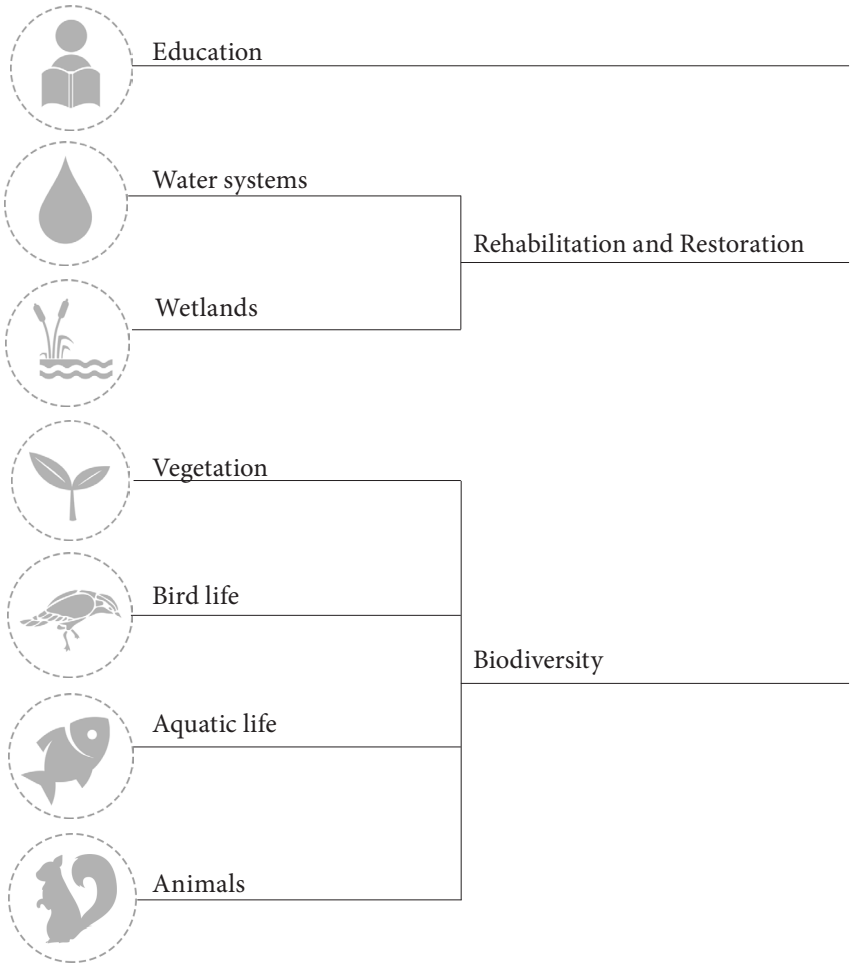


NATURAL ENVIRONMENT

Overall Intention

The rehabilitation, restoration and purification of the natural environment and systems. creating space within these ecologically significant areas for educational purposes and interaction while preserving the ecological value.

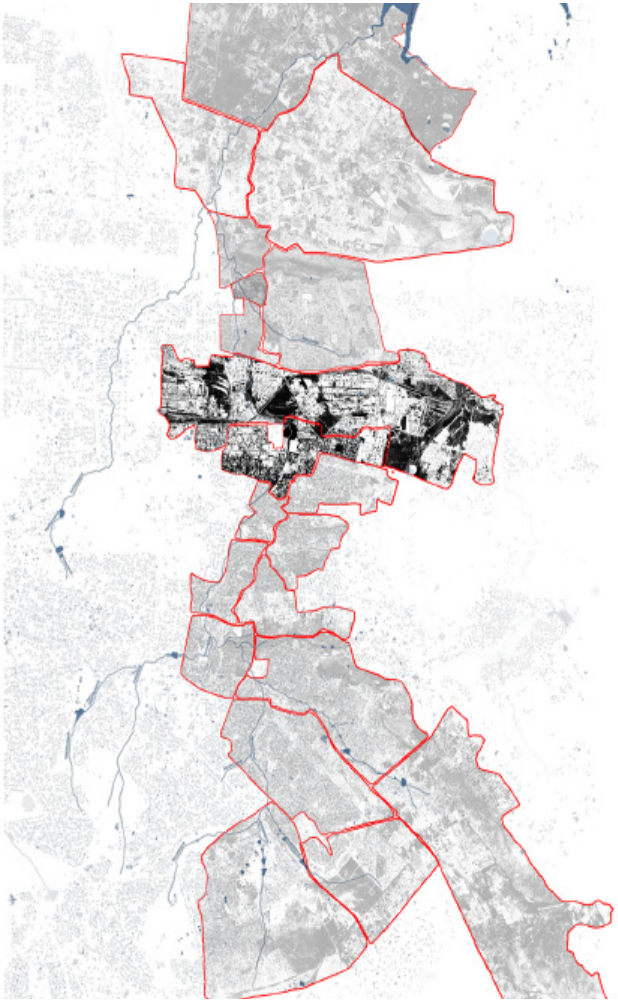
Figure 1.3.10: Natural Environment Intention. (Author, 2015)



Incorporated strategies for the education and building of awareness in people regarding the complexities of urban rivers for the understanding and promotion of sustainable use.

Rehabilitation and purification of ecological environment will benefit the economic and social environments surrounding the river system.

The rehabilitation of habitats and ecologies will provide for the re-establishment of aquatic and terrestrial biodiversity within the natural environment.



Economic and commercial use of natural system

Use of natural resource by economic sector will support preservation and ecological value of system.

Integration between industrial and natural environment

The production methods of industry which are more integrated into the natural environment and of standard which will not affect systems negatively.

Generator or resource for surrounding environment

The use of natural systems as a generator for urban environments will increase value and significance of system within environment, contributing to the preservation and support of the system.

INDUSTRIAL ENVIRONMENT

Overall Intention

Allowing the natural environment (systems and processes) to contribute to the economic and commercial sector of the built environment, the ability of the water system to become a generator and source for the developed areas and specific contexts within, adding value to the natural environment, going beyond the ecological significance.

Figure 1.3.11: Industrial Environment Intention. (Author, 2015)

Photo 1.3.6/7/8: Moreleta Spruit Human Impact and Pollution. (Author, 2015)

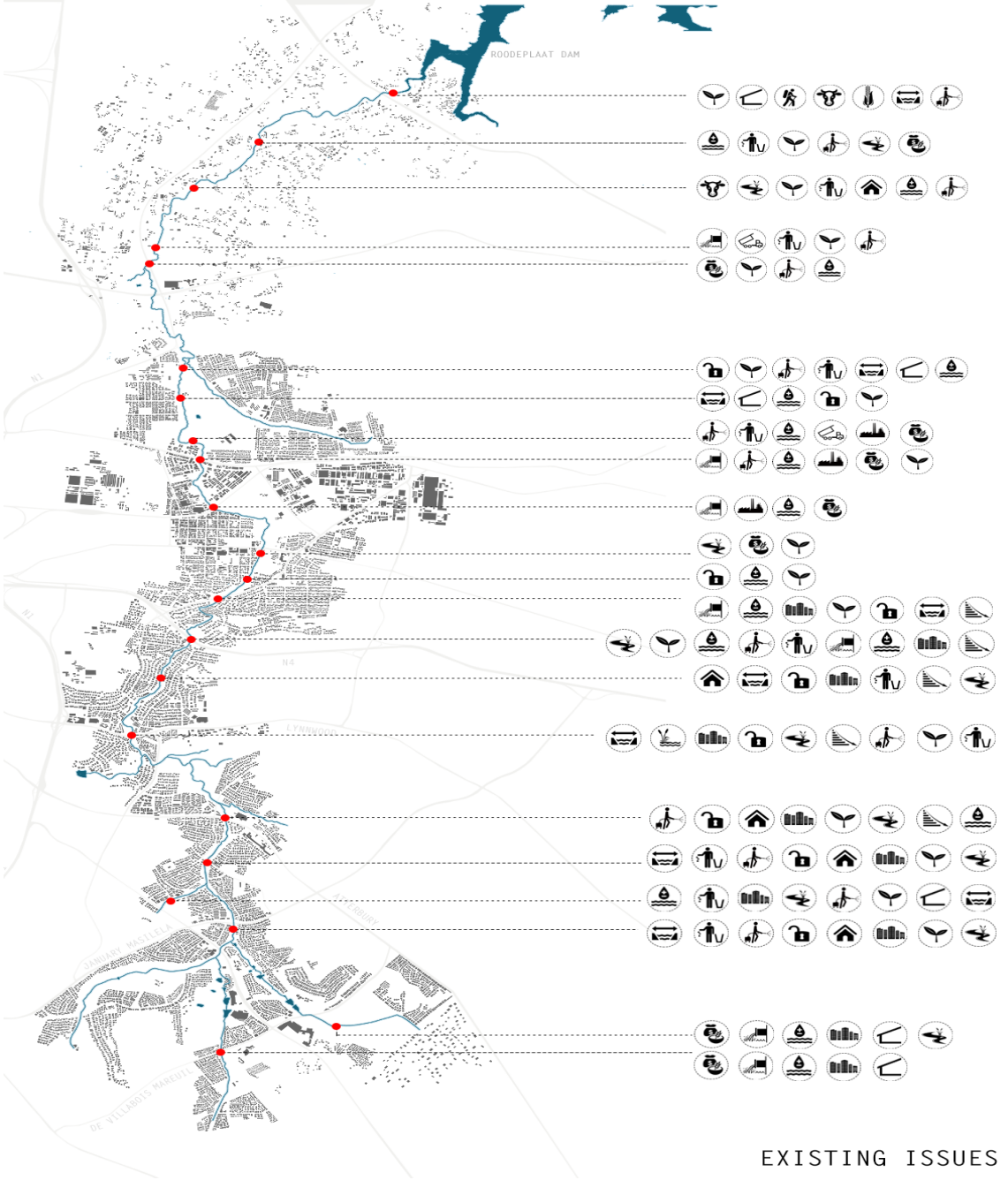


Figure 1.3.12: Mapping of issues along course of Moreleta Spruit (Author, 2015)

EXISTING PROBLEMS ON SITE

Agriculture - concentration of animal pollution, runoff risk into river.

Economic and commercial growth and developing, infringing and influencing water system.

Informal settlements, lack of services and sanitation.

High pollution risk, low water quality.

Previously existing recreational activities, potentially dangerous due to crime.

Lack of maintenance of river systems in terms of vegetation and waste management.

Littering due to lack of waste collection services.

Limited and restricted access to natural environment. Crime prevention and natural environment protection.

Crop cultivation - runoff of low quality due to fertilizers and pesticides.

Dumping of sewage into river system.

High percentage of paved areas. High percentage of runoff and pollution transportation.

Alien invasive vegetation.

High density. Urbanisation. Expansion of the built environment.

Release of industrial waste and effluent into water system.

Private property access to river system, individual influences on system.

Unlawful dumping on riverbank and in river system.

River bank erosion. Addition of sediment into river system.

Destruction of wetland systems and threatened ecologies.

Limited open space and low rehabilitation potential.

Figure 1.3.13: Moreleta Spruit Environmental Issues Key (Author, 2015)

As one of the most importat natural and cultural assets of Southeast Michigan this river system holds the basic elements of a vibrant urban place: nature, culture, people and economic activity.

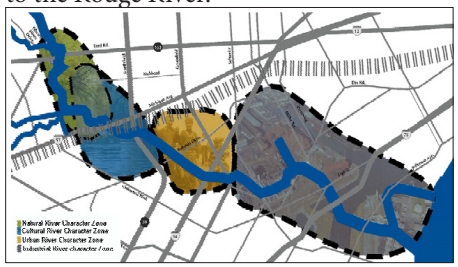
Through pollution, channelization and industry, the river and its surrounding environment are in a severe state of decline. The overall effect was the severed connection between man and the natural environment as a means to preserve and protect the reaource. As one of the most polluted rivers in the state, a masterplan was developed that will allow people, ecology and economy to coexist equitably in the landscape developing from the current condition of all elements being compartamentalized and seperated, reflective of traditional zoning patterns.

There is limited and uncomfortable public access to the river, hidden from the urban environment.

The intention of the master plan is to create connections where barriers currently exist. The concrete channels and poor water quality has reduced the ecological capability of the river to be able to support wildlife. The master plans serves as more than a greenway concept, it identifies sites of cultural and environmental importance, focuses on riverbank restoration, incorporates good planning principles with recreation, environmental stewardship and economic development and buffering residential areas from heavy industrial areas. Movement and accessibility is focused on the non-motorized pedestrian traffic through the site, including the river as a means of transportation through the inclusion of river taxis. Improved accessibility and convenience improves the connection between the urban dwellers and natural environment.

The improvement of the river increases wildlife habitat potential as well as acting as a catalyst for future development thereby improving quality of life in the existing environment, designed as a focal point and threat throughout the city which links cultural resources into a series of related experiences.

The comprehensive program proposes to merge strategies for ecological restoration, economic development, recreation and tourism by embracing the historical significance of the river and its capacity for renewal. The ultimate goal is to reinstate the river as an important resource that will enhace the ecology and quality of life in communities connected to the Rouge River.



Master Plan Development

The improved water quality and associated enhancement of the surrounding environment will expose the historical value of the river system, offering opportunities for recreation, social integration and economic development. Targeting industrial sectors to clean up effluent to a quality which is acceptable to be released into the river system. To establish continuity between the existing developments along the river system and the new opportunities four zones were identified along the river corridor:

1. Natural River Zone
2. Cultural River Zone
3. Urban River Zone
4. Industrial River Zone

Natural River Zone

Main activities in this section of the river are conservation and habitat enhancement. Opportunities have been identified in the immersion of visitors in the natural environment, using research and education as a means of interaction of people with the natural environment.

Cultural River Zone

Sensitive planning of cultural sites has created an underlying natural character which evolved from the overlapping natural zone into the cultural sites. Presence of museums add an alternative dimension to the regions past which can be experienced by the user.

Urban River Zone

Concentration of urban environment, people at work, reidential environments and recreational areas. Population growth is inevitable, the river has potential in this zone to transform from current use as a stormwater management channel to

Figure 1.3.14: Rouge River Rehabilitation Master Plan (A, Kelly and P.E, Cave - Rouge River Gateway Restoration of an Urban River)

a central amenity for the surrounding environment, an interactive corridor for use by urban dwellers as an attractive recreational resource in the heart of human life. These areas represent a barrier between the population and the river system by the impassible industrial riverfront. The connection from these neighbourhoods to the existing and proposed recreational destinations upriver will benefit all areas.

Industrial River Zone

Including the reuse of land, new technologies, efficient use of resources, energies and waste will emerge in these areas as green engineering, biocompatibility and industrial ingenuity. Alternative design and engineering methods making use of the natural resources in a sustainable manner.

The understanding of the existing conditions and potential opportunities of each zone and its unique character provides a basis for the generation of a central theme. The extension of the traits within each zone leads to four corresponding theme. The management of the corridor will be guided by the integration of;

1. Environmental Stewardship
2. Cultural Heritage
3. Recreational
4. Economic Development.

The balance of the themes within each zone has established the Rouge as a model for urban river revitilization.

Environmental Stewardship

Protection and restoration of the natural environment throughout the corridor. The creation of a healthy environment is the foundation on which the other three themes are based which are essential to both wildlife and interaction of people. Focusing on preservation and enhancing natural areas such as lakes and wetlands which offer natural systems and processes.

Cultural Heritage

Respects the hopes and plans of people who have historically settled on the banks of the river, closely linked is the regions diverse ethnic background and labour history.

Recreational

Recognises the importance of the conenction of people to the river, incorporating convenient opportunities for exercise and relaxation. Including activities such as skateboarding, walking, jogging, rollerblading and biking.

Economic Development

Symbolizes the maximum economic development, this zone has fundamental impact on the economy of the state. The goal is the sustainable manufacturing and revitilization of the old industrial waterfront for public access as the driver for new economic developments. The theme recognized that within each zone will be the dominant theme in that area, however, the zones will share a certain degree of themes as a connective thread, integrating one zone into the other for the creation of an overall identity for the corridor. A strong relationship between cultural activities, environmental programs and recreational opportunities are essential components of the corridors economic success and the improvement of quality of life for surrounding communities.

Master Plan Interventions

The choice in interventions are a result of the study of various zones overlaid with the theme for each which resulted in a design solution. The design interventions consist of:

- Commercial Tour/Water Taxi Service
- Re-naturalization of the concrete channel
- Boardwalk overlook
- Interpretive signage and landscape restoration
- Riverboat dock
- Historic rest stop
- Recreational, historical and commercial connections
- Recreational sector
- Oxbow restoration
- Wetland restoration
- Rowing and wooden boat building
- Lagoon restoration
- Adaptive re-use of historic facility
- Riverfront views
- River events: fesitvals
- Greenway link
- Celebration of diversity and historic overpass
- Connecting neighbourhood attractions
- High-Tech Industrial Park
- Public fishing
- Wastewater treatment plant and modernization
- Detroit motor speedway (Kelly and Cave n.d)

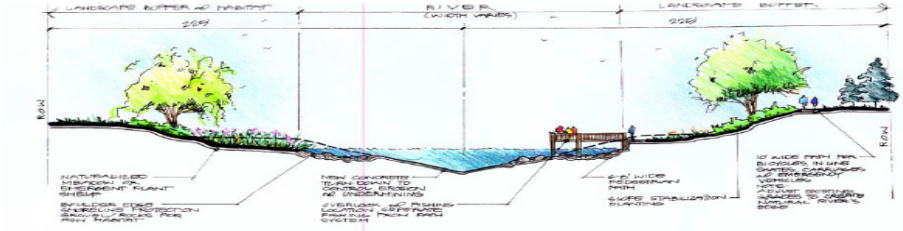


Figure 1.3.15: Rouge River Sectional Investigation. (A, Kelly and P.E, Cave - Rouge River Gateway Restoration of an Urban River)

Figure 1.3.16: Rouge River Rehabilitation Design (A, Kelly and P.E, Cave - Rouge River Gateway Restoration of an Urban River)

Case Study Relation to the Authors Design Intervention

The Rouge River Gateway Project is used as a full river system precedent as the approach is very similar to that of the author for the rehabilitation of the Moreleta Spruit.

The integrated focus on social, ecological, economic and historical elements and how these elements are experienced by the urban dweller in order to create a sense of stewardship in man over the urban environment.

The zoning of the river system regarding the various environments it encounters along its banks and the various approaches associated with each, addresses the unique characteristics and conditions within each zone resulting in a specific engineered and resolved design solution.

The integration of the zones with one another allows for maximum connectivity along the river corridor. This project reflects the intentions and various approaches of the author, namely:

1.Ecosystem restoration, heritage reservation, increased interaction between urban dweller and natural environment and economic development through the improvement and use of the natural environment and its resources.
2.The enhancement of the ecological quality of the river system will yield economic and social benefits.
3.Economic use of the natural system is used to support and add value to the ecological systems and aid in their preservation.
4. People are inherently attracted to water, therefore, with the improvement of the water quality and increased accessibility to the water system will transform these water systems into the centerpieces of developed communities.

Photo 1.3.9: Rouge River Urban Environment.

Photo 1.3.10: Prior to rehabilitation

Photo 1.3.11: Post rehabilitation

Figure1.3.17: Rouge River Rehabilitation sketcht (A, Kelly and P.E, Cave - Rouge River Gateway Restoration of an Urban River)

1. Understanding the characteristics of the unique relationship that the surrounding environment has with the Moreleta Spruit and how the relationship changes throughout the course of the river system. Understanding the direct association with the history of the city in order to celebrate the character of the development of Pretoria.

Technification

Urban dwellers and users of the riverfront should be made aware of the identity of the city as well as the provision of wildlife habitat, recreation, river interaction and job creation in the specific areas along the river. This integration will gain the respect and interest of inhabitants leading to the protection and rehabilitation of the riverfront. Obtaining a broad participation in the planning, design and rehabilitation of the riverfront from various neighbourhoods which will make use of the various needs required, providing for a more lively, inclusive and successful design due to the inclusion of various priorities. (Otto, McCormick and Leccese 2004 cited in May 2006)

2. Understanding the whole river system and plan on a larger urban scale, the watershed, floodplain, character of the river and its banks, hydrology, water quality and biological requirements. Protection and rehabilitation characteristics and functions of the river system, which are irreplaceable in terms of the necessary ecological functions they perform, benefitting both the natural and urban environments. Functions may not always be completely restorable but even a slight improvement can have widespread effects

3. Floodplain development should be minimized if not completely avoidable. Interventions should be designed to ensure that there will be no release of contaminants during a flooding event, as well as no decrease in the flood storage capacity or downstream impacts. (Otto, McCormick and Leccese 2004 cited in May 2006)

4. Provision of public access, connections and use of the river system and its banks without destruction thereof. The ease of accessibility will attract people to the riverfront, encouraging use and interaction through a number of possibilities and the regeneration of the riverfront into a public realm. Physical and visual connections should not be limited to that of commercial and residential areas, but include areas or facilities with a large variety of possible uses. Increased public use of the riverfront is essential in spite of physical, social and economic barriers. Providing for the community as a whole which in turn encourages a sense of strengthened social ties and a communal appreciation for nature. The diversity in activities and experiences which will develop along the course of the river system based on the needs and requirements of the immediate environment surrounding the individual interventions will create a dynamic experience linking open space throughout the urban environment. Inclusion of economic revitalization interventions along the riverfront tend to be more successful when integrating elements of the natural environment, through both physical and visual accessibility. Ecological and economic interventions should be mutually beneficial, providing a sense of connection attracting users to the waterfront. The more engaged a society is with the river system the more concerned it will tend to be about its long term sustainability. (Otto, McCormick and Leccese 2004 cited in May 2006)

5. Education regarding the river system is highly necessary, not only from an environmental perspective, but also from a historical point of view. The incorporation of informative and educational systems can aid in defining the river, its environment and historical connection. Through education, awareness and understanding, the development of stewardship and connection to urban river systems will materialise. (Otto, McCormick and Leccese 2004 cited in May 2006)

CONCLUSION

There are set outcomes developed for the rehabilitation, restoration and purification of the Moreleta Spruit:

1. Improvement of water quality and cost effective clean-up and treatment of urban resource.
2. Naturalised flood management systems and moderation of food damages.
3. Improved stormwater quality and management system.
4. Increase in biodiversity and ecological integrity.
5. Improved education and awareness of urban river systems and processes.
6. Reactivation of the riverfront and new opportunities for development.
7. Creation of job opportunities.
8. Provision of recreational opportunities, open spaces and park areas.
9. Connectivity between ecological, social and economic sectors.

Through the identification and evaluation of the river system as a whole as well as the various zones, each zone has unique issues and potential opportunities for the rehabilitation of the river system, as well as the integration between the specific urban characteristics and demands and the natural environment. (Otto, McCormick and Leccese 2004 cited in May 2006)