# INSTITUTE OF ENVIRONMENTAL AND RECREATIONAL MANAGEMENT

### PUBLIC SPACES AND PLACES – CURRENT TRENDS, FUTURE OPPORTUNITIES

The Development of the Elsburgspruit Catchment Management Plans based on aquatic, ecological requirements and developments.

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## 1. INTRODUCTION

City of Ekurhuleni (The City) is well known for its numerous waterbodies, including lakes, pans, dams, wetlands and streams, however the City faces many challenges in managing and protecting these waterbodies due to massive urbanisation and industrialisation. The natural environment has largely been transformed or highly impacted, but still provides ecological services.

The City has a statutory mandate and responsibility to ensure a safe and healthy environment to those living and working within their area of jurisdiction, mandated by Section 24 of the Constitution of South Africa 1996, the National Environmental management Act 1998 (Act 107 of 1998) and the National Water Act 1998 (Act 36 of 1998). The City recognized the need to ensure that watercourses rehabilitated and maintained in an environmentally sustainable manner, as per Section 28(1) of National Environmental Management Act No 104 of 1998 (as amended) which states that:

"Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped and rectify such pollution or degradation of the environment."

Furthermore the National Water Act (Act 36 of 1998) requires the protection, prevention and remediation of water courses as per Section 19 of NWA that states: "An owner of land, a person in control of land or any person who was responsible for the land or a person who occupies or uses the land on which – (a) any activity or process is or was performed or undertaken; or (b) any other situation exists which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring."

The City initiated the study to produce a remediation plan and related environmental authorisations for the Elsburgspruit Catchment.

### 1.1. Elsburgspruit Catchment Study area



# 2. APPROACH

The remediation plan was developed by conducting various specialist studies including land use study, aquatic assessment, hydrological assessment and biodiversity desktop assessment. The data obtained from the assessments was used in conjunction with engineering and landscape architecture input to determine the potential remediation interventions required for the various watercourses, as well as future opportunities for parks, educational centers and urban agriculture.

#### 2.1. Land Use

Anthropogenic impacts on the catchment have been in place for over 130 years. Many of the impacts are due to the establishment of gold mines and residue tailings of these mines continue to impact the environment. Current threats of Acid mine drainage (AMD) is severe and continued efforts from TCTA has reduced this threat. Establishment of industrial areas around the mines has also brought the need for residential areas

#### 2.2. Aquatic Assessment

The aquatic assessment conducted sampling for biotic factors included SASS5, and fish population and water physicochemical aspects. Sampling was done at various sampling points and calculated the Present Ecological State (PES) as well as the Ecological Importance and Sensitivity (EIS). The PES was calculated for all the systems using the WetHealth (Ellery, Breen and Uys, 2008) method. Most of the aquatic ecosystems of the study site scored a PES of D or lower, 7 out of 32 aquatic ecosystems had a PES above

D. This indicates how the catchment has been anthropogenically altered to a state where very little natural ecological environments remain. It is also important to note that many of the natural drainage areas has been transformed into engineered structures, with water movement in some of the sections transferred underground, to increase residential areas and decrease risk of flooding.

To understand the catchment and impacts of land use on the aquatic ecosystem, various sample points were established in the study area. Sampling for biotic factors included SASS5, and fish population and water physicochemical aspects.

# 3. PROBLEMS IDENTIFIED IN CATCHMENTS & GENERIC INTERVENTIONS

The catchment is large, with various impacts to the system. These impacts to the system have been in place for many years. Historical anthropogenic degradation of the system has altered the status quo of the system to such an extent that most of the catchment is seriously modified - this is also reflected by the PES of the systems. The water feeding into the wetland is impacted by many anthropogenic sources and the water quality in the system is low. The water quality results still show varying degrees of coliform pollution in the systems,

The major impacts observed were the sewage leaks, ineffective WWTW, encroachment into wetlands, illegal mining and litter pollution.

Similar interventions are required throughout the catchment and cannot be linked to only a select few sites. On such a large study site, specific interventions are difficult to determine as the scope, costs, location, landowners and effect on the larger catchment all impacts on the suitability of the site. To mitigate this, the aquatic ecosystems have been divided into two main sections, those with the PES above the average D and those with the PES below the average D. This automatically sets a baseline for the measurement of interventions. Over time it is expected that if the interventions are followed, the mean PES of the entire catchment will increase

Generic interventions identified for the entire catchment:

- Removal of linear channels in the wetland system to increase hydrological functioning of the wetland
- Municipal reserve to allow for the increase in conservation of the section.
- Increased connectivity and movement corridors
- Implementation of buffers
- Removal of movement barriers
- Establishment of the City of Ekurhuleni's sewage task team
- Monitoring of sewage lines and connections, section per section
- Establishment of monitoring plan for catchment
- Increased environmental education
- Alien vegetation eradication
- Establishment of City of Ekurhuleni in-house aquatic ecosystem specialists
- Litter traps

# 4. SITE SPESIFIC INTERVENTIONS IDENTIFIED

Using the observations above and other impacts observed during the site visits, specific interventions were developed to facilitate *catchment scale* changes. Smaller interventions are proposed but they will have a large impact on the overall PES condition of the catchment. The remediation goal for the catchment is to increase the PES from a D to an average of C by attaining g the following objectives:

- Ensure that the aquatic ecosystem functioning is kept at optimum,
- Restore the natural vegetation of the impacted area after the construction has occurred,
- Where possible, use new structures that would have affected the system to improve the condition of the system

The study identified 11 site specific interventions required within the Catchment however not all identified interventions are viable for implementation by The City due to cost constrains.



The following interventions were identified:

- Intervention 1: Reinstatement of the dam wall at Reiger Park. This Intervention was eliminated as the estimated cost is R100 000 000 and outside of the City of Ekurhuleni capacity.
- Intervention 2: Wetland Chanel Rehabilitation

- Intervention 3: Establish Municipal Reserve Area. Urban agriculture is also proposed in this section
- Intervention 4: Phytoremediation of an agricultural dam.
- Intervention 5: Repair hydrological drivers by including weir structures in the channel of the wetland to reinstate hydrological drivers and increased walkways
- Intervention 6: Increase attenuation footprint by the use of off channel sections to facilitate attenuation improvement in the channels. Included is the replanting of these sections to increase phytoremediation in the system. Walkways are proposed to allow for access to the area and increase environmental usefulness of the site.
- Intervention 7: Increase phytoremediation by introduction of floating wetlands (assists with reducing water quality impacts)
- Intervention 8: Removal of crossing
- Intervention 9: Reduce seep from tailings facilities This is however part of the mine's property and infrastructure and will therefore not form part plan
- Intervention 10: Remove hydrological pinch point. The old structures and their abutments should be demolished. This is however part of the mine's property and infrastructure and will therefore not form part plan
- Intervention 11: Increase phytoremediation at Germiston / Victoria Lake by the introduction of floating wetlands (assists with reducing water quality impacts)



### 4.1. Intervention 2

Intervention 2: Wetland Channel Rehabilitation- Parkdene/ Reiger Park

### 4.2. Intervention 3



Intervention 3: Establish municipal reserve area- Elspark

# 4.3. Intervention 4



Intervention 4: Increase Phytoremediation- Elspark

### 4.4. Intervention 5



Intervention 5: Repair Hydrological drivers- Parkrand

Scale 1:5000 on A3



## 4.5. Intervention 6

Intervention 6: Increase attenuation footprint- Boksburg

## 4.6. Intervention 7



## 4.7. Intervention 8



Intervention 8: Removal of crossing- Parkdene

### 4.8. Intervention 11



Intervention 11: Floating Wetlands

Scale 1:5000 on A3

# 5. CONCLUSION

During the review of the existing studies and plans within the Elsburgspruit catchment, the degradation of the wetlands was highlighted. Impacts resulting from industrialization, mining activities, inefficient/ lack of basic services, sewage contamination and urbanization were identified as the main source of degradation of the wetlands. The City now have a Catchment Master Plan and wholistic assessment indicating the most significant problems of this system and a priority list of actions from management, maintenance to capital projects. The Remediation Plan identified a variety of interventions which can be phased based on available budget. The Authorization also include for the required maintenance and opportunities for future park development, urban agriculture, tourism and education activities which will ensure the interventions are showcased. Both the Authorities and the City are now aware of the priority issues in the catchment and where to focus attention. Management of open spaces and maintenance of infrastructure are key to improving the systems ecological functioning.

# 6. REFERANCES

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