BASIC ASSESSMENT FOR THE PROPOSED OLIFANTSFONTEIN WETLAND REHABILITATION ALONG THE KAALSPRUIT, IN EKURHULENI METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE

DRAFT BASIC ASSESSMENT REPORT

Public Review Period:
29 May 2017 to 29 June 2017

COMPILED BY:
Envirolution Consulting (Pty) Ltd
PO Box 1898
Sunninghill
2157
Tel: (0861)44 44 99
Fax: (0861) 62 62 22
E-mail: info@envirolution.co.za
Website: www.envirolution.co.za

PREPARED FOR:
Ekurhuleni Metropolitan Municipality
Northern Region Dept. Roads and Stormwater
Cnr C R Swart Drive and Pretoria Road,
Kempton Park
1619
Tel: 011 999 3864
Email: marius.vhuyssteen@ekurhuleni.gov.za
Website: www.ekurhuleni.co.za

Basic Assessment Report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014 (Version 1)

Kindly note that:

1. This **Basic Assessment Report** is the standard report required by GDARD in terms of the EIA Regulations, 2014.

2. This application form is current as of 8 December 2014. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.

3. A draft Basic Assessment Report must be submitted, for purposes of comments within a period of thirty (30) days, to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken.

4. A draft Basic Assessment Report (1 hard copy and two CD's) must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application.

5. Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.

6. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

7. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.

8. An incomplete report may lead to an application for environmental authorisation being refused.

9. **Any report that does not contain a titled and dated full colour large scale layout plan of the proposed activities including a coherent legend, overlain with the sensitivities found on site may lead to an application for environmental authorisation being refused.**

10. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the application for environmental authorisation being refused.

11. No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.

12. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.

13. Although pre-application meeting with the Competent Authority is optional, applicants are advised to have these meetings prior to submission of application to seek guidance from the Competent Authority.

DEPARTMENTAL DETAILS

Gauteng Department of Agriculture and Rural Development
Attention: Administrative Unit of the of the Environmental Affairs Branch
P.O. Box 8769
Johannesburg
2000

Administrative Unit of the of the Environmental Affairs Branch
Ground floor Diamond Building
11 Diagonal Street, Johannesburg

Administrative Unit telephone number: (011) 240 3377
Department central telephone number: (011) 240 2500

(For official use only)

NEAS Reference Number:						
File Reference Number:						
Application Number:						
Date Received:						

If this BAR has not been submitted within 90 days of receipt of the application by the competent authority and permission was not requested to submit within 140 days, please indicate the reasons for not submitting within time frame.

Not Applicable

Is a closure plan applicable for this application and has it been included in this report? **No**

if not, state reasons for not including the closure plan.

There are currently no plans to decommission

Has a draft report for this application been submitted to a competent authority and all State Departments administering a law relating to a matter likely to be affected as a result of this activity? **No**

Is a list of the State Departments referred to above attached to this report including their full contact details and contact person? **Yes**

Refer to Appendix E9 – IAP Register

If no, state reasons for not attaching the list.

Not Applicable

Have State Departments including the competent authority commented? **N/A**

If no, why?

This information will be available after DBAR has been reviewed

PROJECT DETAILS

Title	:	Environmental Basic Assessment Process The proposed Olifantsfontein wetland rehabilitation along the Kaalspruit, in Ekurhuleni Metropolitan Municipality, Gauteng Province.
Report compiled by	:	Company Name: Envirolution Consulting Contact person: Ms Sheila Bolingo Postal Address: P.O.Box 1898, Sunninghill, 2157 Telephone Number: 0861 44 44 99 Fax Number: 0861 62 62 22 Email: sheila@envirolution.co.za
Client	:	Ekurhuleni Metropolitan Municipality
Report Status	:	Draft Basic Assessment Report for Public Review
Review period		**The 30-day period for review is from** **29 May 2017 to 29 June 2017**

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PUBLIC REVIEW OF THE DRAFT BASIC ASSESSMENT REPORT

The Draft Basic Assessment Report (BAR) has been prepared by Envirolution Consulting (Pty) Ltd in order to assess the potential environmental impacts associated with the proposed Olifantsfontein wetland rehabilitation along the Kaalspruit. The report is made available for public review from 29 May 2017 to 29 June 2017 at the following places:

- Olifantsfontein Library (Cnr. Peace & Mason Rd, Clayville)

The 30-day review period is from **29 May 2017 to 29 June 2017**

In order to obtain further information, register on the project database or submit your written comment to:

Environmental Assessment Practitioner

Name:	Sheila Bolingo
Physical Address:	Vista Place, Suite 1a & 2, No 52, Cnr Vorster Avenue & Glen Avenue, Glenanda
Postal Address:	PO Box 1898, Sunninghill, 2157
Telephone Number:	(0861) 44 44 99
Fax Number:	(0861) 62 62 22
E-mail:	sheila@envirolution.co.za

The due date for comments on the Draft Basic Assessment Report is 29 June 2017

EXECUTIVE SUMMARY

Envirolution Consulting was appointed by Fourth Element Consulting on behalf of **Ekurhuleni Metropolitan Municipality (EMM)** to undertake a Basic Assessment process and Water Use License for the proposed rehabilitation of the erosion channel in the Kaalspruit wetland in Clayville, in the northern region of the Ekurhuleni Metropolitan Municipality, Gauteng Province as shown in Figure 1 below. Urban development and densification in the Kaalspruit catchment and associated socio-economic led activities resulted in changes of the stream flow in the river. As a result, stream flows has changed the stability of the river channel and high sediment loads, litter and sewage pollution have had both local and downstream impacts on the Hennops River and Centurion Lake. Complaints arising caused the Department of Water and Sanitation to issue a Directive to Ekurhuleni Metropolitan Municipality to address the Kaalspruit catchment problems. This Directive issued by the Department of Water & Sanitation (DWS, 2013) provides impetus for the project.

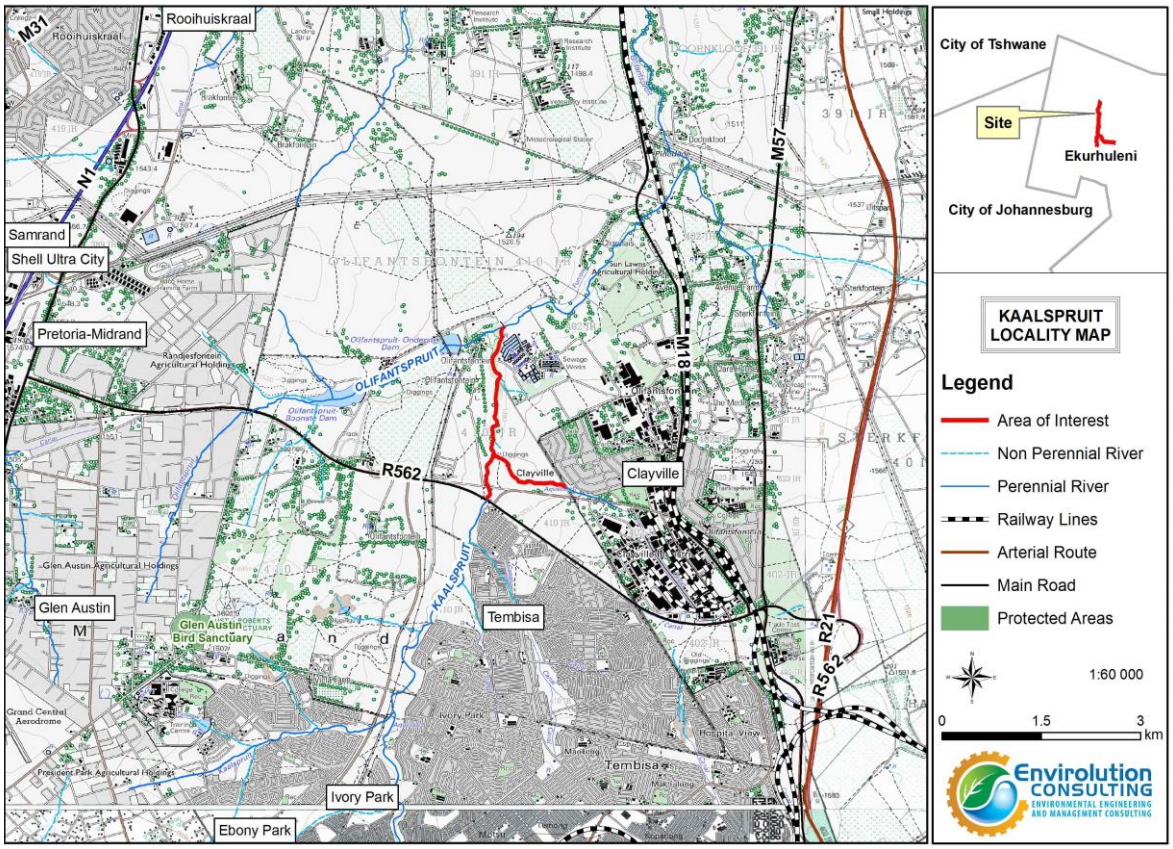


Figure 1: Locality of the proposed Rehabilitation of the Erosion Channel in the Kaalspruit wetland in Clayville (**refer to Appendix A for A3 maps).**

The directive sets out the requirement for **Ekurhuleni Metro Municipality (EMM)** to prepare a costed action plan to address the pollution emanating from the Tembisa area. It points to both catchment initiatives and the need for wetland rehabilitation. The Directive indicates that the sources of the problem lie in the catchment of the Kaalspruit. High sediment loads due to stream bank erosion, high bacterial contamination from surcharging or leaking sewer networks and high litter loads have led to the severe degradation in the Kaalspruit, Olifantspruit and Hennops River system. The project aims to mitigate downstream problems relating to pollution, environmental damage and asset damage (e.g. Centurion Lake) and will need to prevent further erosion in the

Kaalspruit, attenuate flood flows and provide a level of pollution control because of high pollutant loads from upstream sources.

A range of schemes were considered in the planning stages of the project as described in the Planning & Viability Report (**refer to Appendix I3**). Different features and designs were considered. Ultimately it was recommended that the combination of Concept's 4B and 5 would be best suitable for the proposed rehabilitation; beginning with Concept Scheme 5 (Phase 1) and then moving to Concept Scheme 4B (Phase 2). The "phase approach" for the proposed rehabilitation is due to the magnitude of the scheme, the environmental requirements and most importantly the financial requirements. Concept Scheme 4B is more expensive than Concept Scheme 5, therefore, until funds become available for the implementation of Concept Scheme 4B; Concept Scheme 5 will be in place. Phase 1 (Concept Scheme 5) looks at channel stability and sediment control whilst Concept Scheme4 will look at litter management and water quality treatment (constructed wetlands).The stabilization works (Phase 1: Concept Scheme 5) will serve as an interim measure in advance of implementation of the full constructed wetland scheme (Phase 2: Concept Scheme 4B).

The **"Preferred Scheme**" is a combination of Concept Scheme 5 and Concept Scheme 4B; however, it must be noted that there is a possibility that only Concept Scheme 5 may be developed, though this is not preferred or recommended. In addition, it would be ideal if Concept Scheme 6 could also be implemented with Concept Scheme 4B. Concept Scheme 6 considers diverting a portion of the dry weather flow (DWF) in the Kaalspruit to the Olifantsfontein waste water treatment works (WWTW) via the local sewer networks. This will be subject to an assessment of the capacity of the sewer networks and the WWTW. The benefit of this approach is that it will reduce the hydraulic loading on the constructed wetland and improve scheme performance in water treatment. It may also potentially reduce the area required for the constructed wetland (this will depend on the amount of DWF diverted. It must be noted that Concept Scheme 6 is not a standalone scheme, but will be a component of Concept Scheme 4B

This Basic Assessment Report will assess the environmental impacts associated with the construction and implementation of Phase 1 (Concept Scheme 5) and Phase 2 (Concept Scheme 4B). The nature and extent of the proposed Concept Scheme 5 and Concept Scheme 4B as rehabilitation measures for the Kaalspruit are explored in more detail in this Basic Assessment Report. This report has been compiled in accordance with the requirements of the EIA Regulations and includes details of the activity description; the site, area and property description; the public participation process; the impact assessment; and the recommendations of the Environmental Assessment Practitioner.

In order to adequately identify and assess potential environmental impacts associated with each of the above mentioned concepts as proposed rehabilitation measures, several specialist studies have been conducted in support of the Basic Assessment process and Water Use License application:

- Wetland Assessment
- Aquatic Assessment
- Heritage Assessment
- Agricultural Impact Assessment
- Social Impact Assessment

Public participation has been conducted in line with the NEMA requirements; engagement through public meetings, site notices, newspaper advert and email correspondence with authorities and interested and affected members from the community. A Water Use License Application will be submitted together with the Final Basic Assessment to the Department of Water and Sanitation (DWS).

The assessment concludes that most of **the negative impacts** associated with the rehabilitation scheme are **short-term** (i.e. during the construction phase), and the majority of the negative impacts identified can be mitigated to very low/negligible significance if all mitigation measures identified and included in the Environmental Management Programme (EMPr) attached in **Appendix H** are implemented, a number of these will be converted to positive impacts during the operation of the scheme. Some significant impacts identified for the Phase 2 of the proposed scheme was the odour nuisances with limited mitigation measures as well as the social impact of relocating subsistence farmers. The latter will need ongoing consultation amongst the different parties involved in order to identify best and practical solutions as suggested in the SIA report (**Appendix G5**). The Po**sitive impacts associated with the rehabilitation scheme are long-term** in nature and are meant to address the Directive from DWS on the current state of the river. Predominantly, impacts associated with both phases are of low significance for the negative impact and of Medium significance for the positive impacts after the implementation of recommended mitigation measures. Owing to the fact that the project is for the rehabilitation of the system that is currently under dire need for restoration, most of the impacts resulting from the project aspects are anticipated to be positive more so in the long-term of the implementation of the scheme, **these benefits of the project are expected to occur beyond the local area therefore the benefits partially offset the localised environmental costs of the project.**

SECTION A: ACTIVITY INFORMATION

1. PROPOSAL OR DEVELOPMENT DESCRIPTION

Project title (must be the same name as per application form):

1.1 Project Title

The Proposed Olifantsfontein Rehabilitation Measures along the Kaalspruit in Ekurhuleni Metropolitan Municipality

1.2 Project Background

Envirolution Consulting was appointed by Fourth Element Consulting on behalf of **Ekurhuleni Metropolitan Municipality (EMM)** to undertake a Basic Assessment process and Water Use License for the proposed rehabilitation of the erosion channel in the Kaalspruit wetland in Clayville, in the northern region of the Ekurhuleni Metropolitan Municipality, Gauteng Province (refer to **Figure 1**). Urban development and densification in the Kaalspruit catchment and associated socio-economic led activities resulted in changes of the stream flow in the river. As a result, stream flows have changed the stability of the river channel and high sediment loads, litter and sewage pollution have had both local and downstream impacts on the Hennops River and Centurion Lake. Complaints arising caused the Department of Water and Sanitation to issue a Directive to Ekurhuleni Metropolitan Municipality to address the Kaalspruit catchment problems. This Directive issued by the Department of Water & Sanitation (DWS, 2013) provides impetus for the project.

This scheme aims to mitigate problems experienced in the downstream Olifantspruit and Hennops River arising from the sediment, pollution and litter loads from the Kaalspruit catchment. It is the first of the initiatives developed in terms of the DWS Directive and is expected to be supplemented by other catchment initiatives over time. The scheme will see a substantial improvement in water quality leaving the Kaalspruit catchment, and this should improve further as the additional catchment initiatives come online and take effect.

A range of schemes were considered in the planning stages of the project as described in the Planning & Viability Report (**attached in Appendix I3**). Different features and designs were considered. Ultimately it was recommended that the combination of Concept's 4B and 5 would be best suitable for the proposed rehabilitation; beginning with Concept Scheme 5 (Phase 1) and then moving to Concept Scheme 4B (Phase 2). The "phase approach" for the proposed rehabilitation is due to the magnitude of the scheme, the environmental requirements, and most importantly the financial requirements. Concept Scheme4 is more expensive than Concept Scheme 5 therefore until funds become available for the implementation of Concept Scheme 4B; Concept Scheme 5 will be in place. Once more, it is worth noting that there is a possibility that only Concept Scheme 5 may be developed, though this is not preferred or recommended. In addition Phase 1 (Concept Scheme 5) looks at channel stability, and sediment control whilst Concept Scheme 4B will look at litter management and water quality treatment (constructed wetlands).

1.3 Activity Description

As mentioned above, a phased approach is anticipated for the rehabilitation as shown in **Figure 2**.

Phase 1 Sediment management & channel stabilisation **Concept Scheme 5**	Stage 1: Sediment trap – Kaalspruit. Associated weirs, structures & services roads.
	Stage 2: Weir construction at Kaalspruit-Clayville Arm confluence. Channel stabilisation works. Associated weirs, structures & services roads.
	Stage 3: Sediment trap – Clayville Arm. Associated weirs, structures & services roads.
Phase 2 Litter management and water quality treatment (constructed wetlands). **Concept Scheme 4 (+6)** or **Concept Scheme 4B (+6)**	Stage 4: Litter trap – Kaalspruit. First set FWS wetland cells. Associated weirs, structures channel reinforcement & services roads.
	Stage 5: Litter trap – Clayville Arm. Second set FWS wetland cells. Associated weirs, structures channel reinforcement & services roads.
	Stage 6: Third set FWS wetland cells. Associated weirs, structures channel reinforcement & services roads.
	Stage 7: Period of monitoring and review of requirements of final area of wetland development.
	Stage 8: Fourth set FWS wetland cells. Associated weirs, structures & services roads.

Figure 2: Project Phasing.

Phase 1: Concept Scheme 5: Channel stabilisation and sediment control

On initial review of Concept Scheme 4, it was agreed to rework the scheme to give focus to the primary responsibilities of the Ekurhuleni Dept. Roads & Stormwater. These responsibilities are river channel stability and sediment control. The proposed scheme layout is presented in **Figure 3**. There is no water quality treatment component to this scheme and therefore, no constructed wetland. Instead the scheme confines normal flow and flood flows in the existing main channel which will be straightened to an extent and the banks stabilised to limit erosion. Sediment traps are proposed in the upstream sections of the Kaalspruit and the Clayville Arm in order to manage the sediment yield from upstream. As shown in **Figure 3** Phase 1 entails the implementation of Concept Scheme 5 with the following features:

- Sedimentation trap at Kaalspruit and Clayville Arm - Origins of sediment include the erosion of river banks in the project area and high yield from upstream catchment areas. Constructed wetlands are vulnerable to sediment deposition, but the bulk of sediment loading occurs during storm flow and flood events. Sediment traps are needed on both branches of the river system in the project area and will need to be located immediately downstream of the litter traps.

- Weirs: For maintaining maximum hydraulic retention time and flow distribution in the wetland.

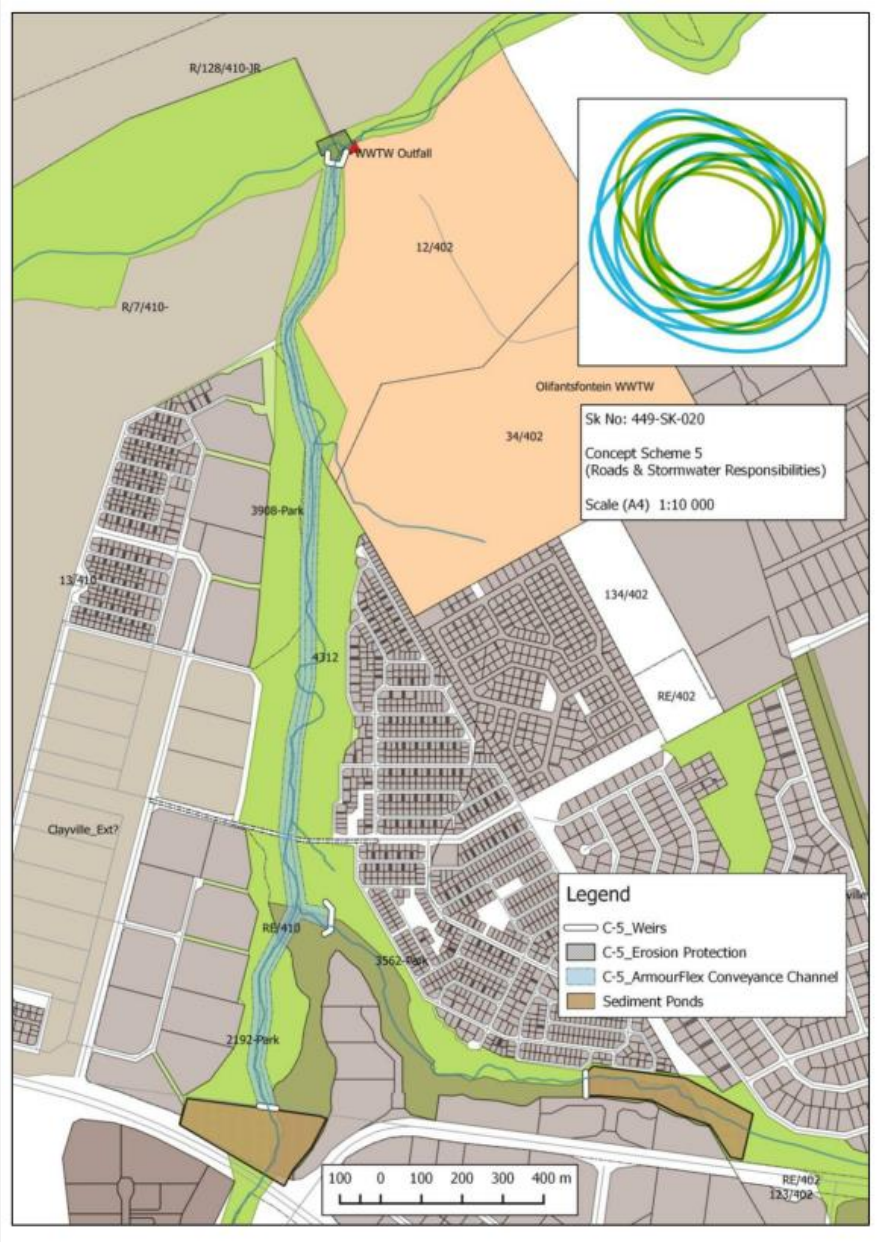


Figure 3: Concept Scheme 5 (Phase 1)

Phase 2 (Concept Scheme 4B): litter management and water quality treatment

This is a refinement of Concept Scheme 3 as described in the Planning&Viability Report (attached in **Appendix I3**), but replaces the Horizontal Sub-surface Flow (HSSF) wetland section with more Free Water Surface (FWS) wetland as it is determined that HSSF systems are significantly more costly and do not offer much greater treatment efficiency. Concept Scheme 4B also makes provision for the flood conveyance channel; hence the net effective FWS wetland area is reduced (**Figure 4**). Treatment efficiency, hydraulic retention time and general scheme performance addressed in this report refers to this scheme. Phase 1 entails the implementation of Concept Scheme 4B with the following features:

- Litter trap - Due to high litter loads that may compromise the performance and stability of the constructed wetlands, substantial litter trapping facilities are needed for both the Kaalspruit and Clayville

Arm

- Constructed wetland: The Kaalspruit stream flow has distinct sewage characteristics, particularly the dry weather flow (DWF) conditions. Treatment of municipal sewage by constructed wetland systems is considered best achieved on this site by an open water Free Water Surface (FWS) wetland. The arrangement and size of the open water and vegetated zones of the FWS will be refined at the design stage.
- Weirs: Constructed wetlands require particular hydraulic control. This will be achieved in part by the arrangement of the vegetated and open zones and internal berms, but the most important control will be achieved via a number of weirs along the length of the constructed wetland. Hydraulic control is even more important on this scheme as the available area for the scheme is too small for full treatment, so retention time must be maximised by hydraulic control.
- Flood conveyance channel: Storm flows and flood flows will be too large for the constructed wetland and need to be contained in a separate channel.
- Concept Scheme 6 (The diversion of part of the dry weather flow (DWF)) - this concept scheme considers diverting a portion of the dry weather flow (DWF) in the Kaapspruit to the Olifantsfontein WWTW via the local sewer networks. This will be subject to an assessment of the capacity of the sewer networks and the WWTW. It is an adaptation of Concept Schemes 4B; hence Concept Scheme 6 will be a component of this Concept.

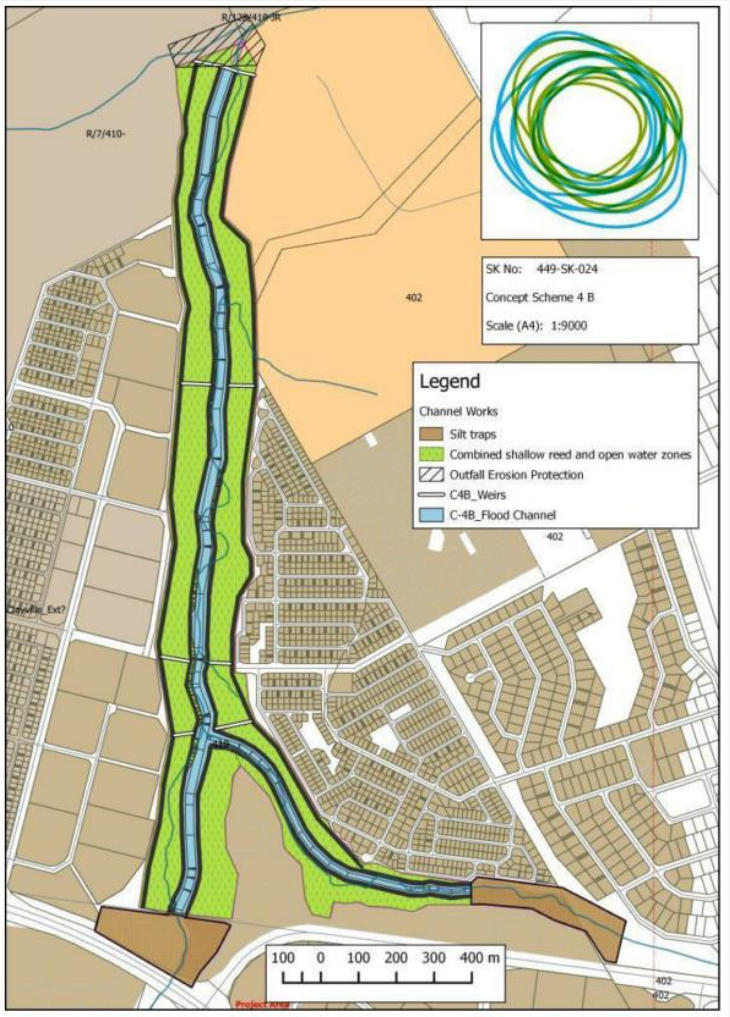


Figure 4: Concept Scheme 4B (Phase 2)

Phase 2 (Concept Scheme 6): Diversion of a portion of DWF to local sewer network

An addition to Concept Scheme 4B is the possibility of diverting a portion of the DWF to the local sewer network (please refer to **Figure 5**), thereby reducing the hydraulic and organic loading on the FWS constructed wetland and improving overall treatment performance. This proposal would utilise existing sewer lines in the project area near the R562, and the diversion structures would form part of the proposed weirs separating DWF from storm flow. This option will be reliant on available capacity at the local Olifantsfontein WWTW and the local network. These are being explored with ERWAT and will only be confirmed at a later date. This is an add-on to Concept Scheme 4B and is not anticipated to change the extent of the FWS constructed wetland scheme even though it will improve reliability and performance for the wetland.

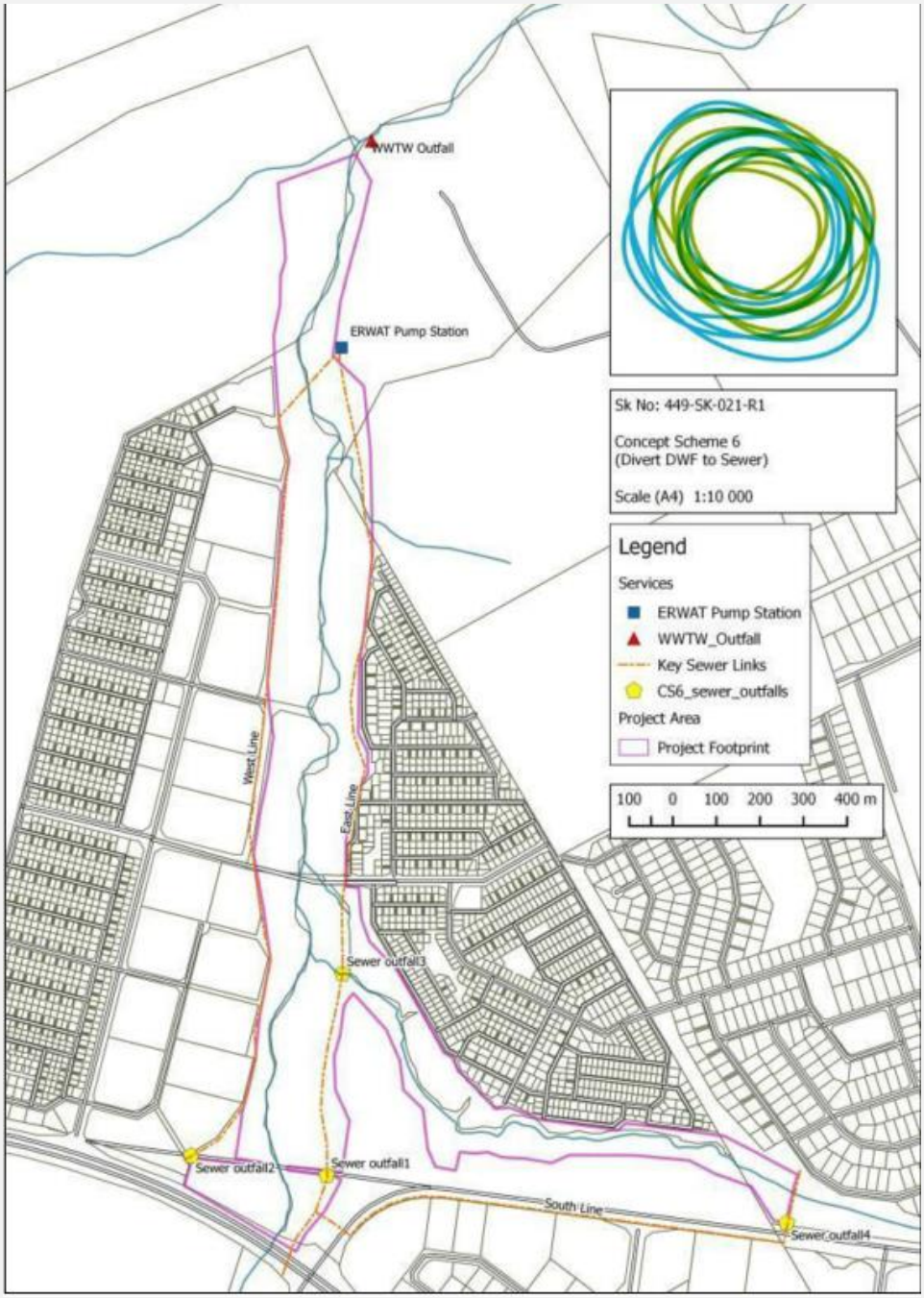


Figure 5: Concept Scheme 6 (Diversion of a portion of the DWF to local sewers before discharge to the constructed wetlands)

1.4 The Activities being applied for:

The activities to be undertaken will trigger the need for an application to the Gauteng Department of Agriculture and Development (GDARD) for environmental authorisation. Due to activities impacting on a watercourse, a Water Use License (WUL) application will also be submitted to the Department of Water and Sanitation (DWS). In terms of these Regulations (Government Notice R. 982, Government Gazette No. 38282 of 04 December 2014, under sections 24(5), and 44, of the National Environmental Management Act, 1998 ; Act No.107 of 1998); a Basic Assessment is required for this project as per the following listed activities :

Table 1: Listed activities triggered by the proposed development requiring Environmental Authorisation

Regulation	Activity	Description	Relevance
GN R983	19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse	The proposed project will result in infilling or removal of 10m³ or more of material into/from a watercourse for the proposed rehabilitation works
GN R985	14	The development of:– (i) dams or **weirs**, where the dam or **weir**, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square meters or more where such development occurs - a) within a watercourse; c) In Gauteng: **iv**. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) Gauteng Conservation Plan or in bioregional plans; **v.** sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004); **vi)** Sensitive areas identified in an environmental management framework adopted by relevant environmental body	Rehabilitation of wetland will include installation of weirs, and structures with a physical footprint of more than 10 square metres and according to SANBI classification, proposed study site falls under a site identified as Critical Biodiversity and Ecological Support Area.

It is for this reason that a Basic Assessment Process is being conducted. These activities may not commence without an environmental authorization from the competent Authority. The aim of the Environmental Impact

Assessment is to ensure that:

- The potential environmental impacts associated with the proposed project are taken into consideration
- Public Participation Process is conducted i.e. to afford any Interested and or Affected parties (I&AP) sufficient opportunity: to provide comments
- Sufficient information is provided to decision markers in order to ensure an informed decision making.

1.5 Details of Environmental Assessment Practitioner and Expertise to conduct the Basic Assessment

Envirolution Consulting (Pty) Ltd was contracted by Fourth Element Consulting on behalf of Ekurhuleni Metropolitan Municipality (EMM) as the independent environmental consultants to undertake the Environmental Basic Assessment Process for the proposed project. Furthermore, Envirolution Consulting does not have any interests in secondary developments that may arise out of the authorisation of the proposed project. Envirolution Consulting is a specialist environmental consulting company providing holistic environmental management services, including environmental impact assessments and planning to ensure compliance with environmental legislation and evaluate the risk of development; and the development and implementation of environmental management tools Envirolution Consulting benefits from the pooled resources, diverse skills and experience in environmental field held by its team. We offer solutions to environmental issues that are key during our clients' planning and decision-making processes. The Envirolution Consulting team have considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects in South Africa, including those associated with linear developments.

The EAPs from Envirolution Consulting who are responsible for this project are (refer to **Appendix I** for CV's):

- Cheda Sheila Bolingo, the principle author of this Basic Assessment holds an Honours Bachelor degree in Environmental Management and 6 years of experience in the consulting field. Her key focus areas are on strategic environmental assessment and advice on environmental impact assessments; public participation; environmental management programmes, and mapping through ArcGIS for variety of environmental projects. She is currently involved in several diverse projects across the country.
- Gesan Govender, the project manager and Environmental Assessment Practitioner (EAP) responsible for this project, is a registered Professional Natural Scientist and holds an Honours degree in Botany. He has over 15 years of experience within the field of environmental management. His key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. He is currently responsible for the project management of EIA's for several diverse projects across the country.

Select the appropriate box

The application is for an		The application is for a new	X	Other,	

upgrade of an existing development		development		specify	

Does the activity also require any authorisation other than NEMA EIA authorisation?

YES	

If yes, describe the legislation and the Competent Authority administering such legislation

Rehabilitation of the watercourse will occur on site It is for such reasons that a Water Use License has to be undertaken for the development. According to the National Water Act (NWA), 1998 (Act No.36 of 1998), the proposed development requires a Water Use License as per the following regulations:
to the use of water in terms of section 21(c) or (i) of the Act for the rehabilitation of a wetland

If yes, have you applied for the authorisation(s)?	YES	
If yes, have you received approval(s)? (attach in appropriate appendix)		NO

Impacts on the watercourse have been assessed through the BA process (**Appendix G1** - Wetland Report) for the infrastructure. The following reports / studies as outlined below will be required to be attached to the water use license application forms which will be submitted to the competent authority the Department of Water and Sanitation following the decision of the Basic Assessment Process by the Competent Authority GDARD.

- Basic Assessment Report
- Environmental authorization from GDARD once issued
- Wetland Assessment Specialist Study
- Aquatic Assessment Specialist Study
- Heritage Assessment Specialist Study
- Agricultural Impact Assessment Specialist Study
- Social Impact Assessment Specialist Study

Note that timeframes for obtaining a WUL from DWS is not specified in the GDARD.

2. APPLICABLE LEGISLATION, POLICIES AND / OR GUIDELINES

Table 2: List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations:

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
National			
National Environmental Management Act (Act No. 107 of 1998)	» NEMA requires, inter alia, that: ∗ Development must be socially, environmentally, and economically sustainable." ∗ Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied." ∗ A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions." » EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations. » In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.	» National Department of Environmental Affairs » Gauteng Department of Agriculture and Resource Development	» In terms of sections 24(2) and 24D of the National Environmental Management Act (No 107 of 1998), as read with the EIA Regulations 2014 of GN R983 and R985; a Basic Assessment process is required to be undertaken for the proposed project.
National Environmental Management Act (Act No. 107 of 1998)	» A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts.	» National Department of Environmental Affairs » Gauteng Department of Agriculture	» While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	» In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.	and Resource Development	the proposed project has found application in the EIA Phase. » The implementation of mitigation measures are included as part of the Draft EMPr and will continue to apply throughout the life cycle of the project.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	» The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. » In terms of the regulations published in terms of this Act (GN 921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. » Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that (a) The containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste; (b) Adequate measures are taken to prevent accidental spillage or leaking; (c) The waste cannot be blown away; (d) Nuisances such as odour, visual impacts and breeding of vectors do not arise; and (e) Pollution of the environment and harm to health are prevented.	» National Department of Environmental Affairs (hazardous waste) » Gauteng Department of Agriculture and Resource Development (general waste)	» In terms of GNR921, no waste license is required for the project » Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of this Act, as detailed in the applicable EMPr, as well as in accordance with the relevant Norms and Standards.
National Environmental Management: Air Quality Act (Act	» S18, S19 and S20 of the Act allow certain areas to be declared and managed as “priority areas”.	» National Department of Environmental Affairs	» Reporting in terms of compliance to GNR831 will be required.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
No. 39 of 2004)	» Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.	» Ekurhuleni Metropolitan Municipality	» While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. The Air Emissions Authority (AEL) may require the compilation of a dust management plan.
National Water Act (Act No. 36 of 1998)	» Under S21 of the Act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation. » In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.	» National Department of Water Affairs » Gauteng Department of Agriculture and Resource Development	» the proposed development requires a Water Use License as per the following regulations: • Section 21(c): impeding or diverting the flow of water in a watercourse and; • Section 21 (i): altering the bed, banks, course or characteristics of a watercourse. » Requirements set by S19 will apply throughout the life-cycle of the project.
Environment Conservation Act (Act No. 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)	» National Department of Environmental Affairs » Gauteng Department of Agriculture and Resource Development » Local Authorities	There is no requirement for a noise permit in terms of the legislation.
National Heritage Resources Act (Act No. 25 of 1999)	» S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including: » The construction of a road, powerline, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; » Any development or other activity which will change the character of a site exceeding 5 000 m^2 in extent	» South African Heritage Resources Agency	» Associated activities include the construction of storm water channels that exceeds 300 m in length, in the broader area of Olifantsfontien. » Heritage Assessment has been undertaken as part of this Basic Assessment (refer to **Appendix G3**). » Due to the density of the urban development in the region, it is very

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	» The relevant Heritage Authority must be notified of developments such as linear developments (i.e. roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m^2; or the re-zoning of a site exceeding 10 000 m^2 in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided. » Stand-alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.		unlikely that any sites or features dating to the pre-colonial history of the region would still exist in the study area. However, isolated objects such as Stone Age artefacts might be exposed in areas close to stream beds. » Some smaller, informal burial sites occur in the larger region, but would not be impacted on by the proposed development. » Should heritage features, archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
National Environment Management Protected Areas Act, 2003 (Act No. 57 of 2003).	» Wetlands and other critical Biodiversity areas are regulated under the NEM:BA. Activities that fall within the parameters of these areas require specialist assessment to determine the impacts and the residual effects of mitigation measures	» National Department of Environmental Affairs	» A wetland specialist was appointed to determine any critical biodiversity areas. No permitting requirements were triggered by the activities.
Conservation of Agricultural Resources Act (Act No 43 of 1983).	Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Declared Weeds and Invaders in South Africa are categorised according to one of the following categories: » Category 1 plants: are prohibited and must be controlled. » Category 2 plants: (commercially used plants) may	» Department of Agriculture, Forestry and Fisheries (DAFF)	» An alien species management plan to be included in the requirements of the EMPr.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread. » Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands.		
Provincial			
The Gauteng Conservation Plan (Version 3.3) (GDARD, 2011)	» The plan has classified areas within the province on the basis of its contribution to reach the conservation targets within the province. Critical Biodiversity Areas (CBAs) contain irreplaceable, important and protected areas (terms used in C-Plan 2) and are areas needed to reach the conservation targets of the Province. In addition 'Ecological Support Areas' (ESAs), mainly around riparian areas and other movement corridors were also classified to ensure sustainability in the long term. Landscape features associated with ESAs is essential for the maintenance and generation of biodiversity in sensitive areas and requires sensitive management where incorporated into C-Plan 3.	» Gauteng Department of Agriculture and Resource Development	On the study site, the sections associated with the watercourse are classified while the rest of the areas remain unclassified. The areas associated with the watercourse are classified as Ecological Support Areas

3. ALTERNATIVES

Describe the proposal and alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment.

The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. **Do not** include the no go option into the alternative table below.

Note: After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Please describe the process followed to reach (decide on) the list of alternatives below

The nature of the project precludes alternative sites or properties from the assessment. This is due to the nature and requirements of the rehabilitation and remedial measures along the Kaalspruit. The localized and direct impact of the activity on the specific site does however entail that alternative designs be considered within the mitigation hierarchy.

Provide a description of the alternatives considered

Table 3: Description of the alternatives considered

No.	**Alternative type**, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	**Description**
1	**Proposal**	**Ekurhuleni Metroplitan Municipality (EMM)** proposes the rehabilitation of the erosion channel in the Kaalspruit wetland in Clayville, in the northern region of the Ekurhuleni Metropolitan Municipality, Gauteng Province. This is a result of urban development and densification in the Kaalspruit catchment and associated socio-economic led activities resulted in changes of stream flow in the river. The project aims to mitigate downstream problems relating to pollution, environmental damage and asset damage (e.g. Centurion Lake) and will need to prevent further erosion in the Kaalspruit, attenuate flood flows and provide a level of pollution control because of high pollutant loads from upstream sources.
2	**Site alternatives** (Undertake Rehabilitation elsewhere)	No site alternatives have been investigated for the proposed

		development for the following reasons: The study area was **previously** identified as **a primary–source of sediment in the watercourse and a location suitable for treatment of litter and pollution from upstream.** It is for such reasons that no other site alternatives were considered for this development. Thus only one site is deemed feasible and practicable for the proposed development.
3	**Designs alternatives**	A phased approach is anticipated for the proposed Olifantsfontein rehabilitation, the following designs are proposed for each phase: Phase 1 (Concept Scheme 5): **Channel stabilisation and sediment control** Proposed Design (Armoured channel) This is an armoured option for a more hard engineered solution and therefore higher cost. This will allow for a narrower, steep sided channel section, potentially using something like Armourflex to prevent erosion. This option will reduce the ecological potential of the scheme, but will have higher hydraulic conveyance and will leave more floodplain available for agriculture (or public amenity), and will similarly provide more space for constructed wetland establishment in Phase 2. (Note the Phase 2 constructed wetland will replace all agriculture and/or area for public amenity when it is constructed). **Alternative 1 Design (Vegetation lined channel)** This is a soft engineered channel which will have a wider, flatter profile than the existing channel shape. This will be more suitable for long-term riparian habitat development even though channel meanders will be straightened. This will be a lower cost option. *Alternative 1 Design (Vegetation lined channel) would be recommended if the constructed wetland scheme (phase 2) is unlikely to be implemented. The Proposed Design (Armoured channel) will be necessary if the constructed wetland (phase 2) is implemented as it offers a narrower cross-section leaving maximum space for the wetland area. The proposed design for phase 1 is compatible with phase 2 which will see the constructed wetlands established on either side of the stabilised channel.* ***Therefore the proposed design (i.e. Armoured channel) is the Preferred Channel Design for Phase 1 (Concept Scheme 5) i.e. channels stabilisation and sediment control.***
		Phase 2 (Concept Scheme 4B): **litter management and water quality treatment**

		Proposed Design (Constructed Wetland system) • A constructed wetland is an engineered wetland used for water treatment purposes. • They are very sensitive to hydraulic performance. • Variable flow conditions (and especially stormwater flows and floods) are not ideal. • They are effective in treating sewage and are increasingly used as part of the waste water treatment process. • They have strict water level and flow distribution controls and while they offer ecological and landscape benefits these are secondary to treatment performance. **Alternative 1 Design (Ecological Wetland system)** • Channel stabilisation could include more habitat potential than proposed in Concept Scheme 5. • Ecological potential would be limited by severe sewage loads (until catchment interventions are implemented). • Any wetland will be vulnerable to instability and erosion under the high sediment loads from the catchment. Hence the "with silt trap" option will be important. • Some treatment of sewage loads will be provided by an ecological wetland design, but treatment potential will be much less than a constructed wetland. • Some agriculture may be possible in the floodplain, but this will depend on the intended habitat potential of the scheme (more ecologically friendly, less land available for farming). • The ecological potential of this alternative will only start to be realised when catchment interventions start to take effect. **Concept scheme 6 (in conjunction with Constructed Wetland system)** Concept Scheme 6 seeks to utilise spare capacity in the local Olifantsfontein WWTW for treating part of the DWF. Sewer lines run parallel to the scheme and part of the DWF may be diverted to the sewer lines at the weirs where DWF is separated from stormflow. The potential for this solution relies on spare capacity at the WWTW and any diverted flows will need to be carefully controlled to ensure the WWTW operations are not compromised. Discussions with ERWAT thus far confirm the WWTW does not have capacity for the full DWF. But even partial reduction of the DWF through the constructed wetland will help improve the performance and reliability of the wetland. Hence this option is an attractive add-on to the constructed wetland scheme. **The focus of the scheme performance has been centred on water quality treatment, and waste water treatment in particular. For**

		these conditions a constructed wetland (Proposed Design) will be the preferred alternative for Phase 2 rehabilitation. This referred alternative does not include Concept Scheme 6 until this is confirmed with ERWAT. As such the impact assessment will be in line with the precautionary principle. However, the addition of Concept Scheme 6 remains an attractive option and will improve the overall environmental impact score of the scheme as long as the operations of the Olifantsfontein WWTW are not compromised.

In the event that no alternative(s) has/have been provided, a motivation must be included in the table below.

N/A

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the total physical size (footprint) of the proposal as well as alternatives. Footprints are to include all new infrastructure (roads, services etc), impermeable surfaces and landscaped areas:

	the activity:
Proposed activity ()	
Alternatives:	
Alternative 1 (if any)	
Alternative 2 (if any)	
	Ha/ m^2

or, for linear activities:
Note: the size of Phase 1 and Phase 2 and their applicable alternatives are the same.

	Length of the activity:
Proposed activity	2-2.5km
Alternatives:	
Alternative 1 (if any)	2-2.5km
Alternative 2 (if any)	
	m/km

Indicate the size of the site(s) or servitudes (within which the above footprints will occur):

	Size of the site/servitude:
Proposed activity	62 ha
Alternatives:	
Alternative 1 (if any)	62 ha
Alternative 2 (if any)	
	Ha/m^2

5. SITE ACCESS

Proposal

Does ready access to the site exist, or is access directly from an existing road?	YES
If NO, what is the distance over which a new access road will be built	Approximately 150m

Describe the type of access road planned:

The site is easily accessible, from the N1 or the R21 into Olifantfontein Road (R562). Construction access will probably be via these roads, but longer term maintenance will possibly be via the local residential roads as shown in **Figure 5**. Construction of access roads and tracks of various lengths (i.e. 150m) will be required for maintenance purposes of the vegetation (reeds) in the FWS wetland, siltraps and litter traps.

Include the position of the access road on the site plan (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

Figure 5: Overview of existing access roads to the site (green)

Alternative 1

Does ready access to the site exist, or is access directly from an existing road?	YES
If NO, what is the distance over which a new access road will be built	m

Describe the type of access road planned:

Same as above

Include the position of the access road on the site plan. (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

Alternative 2

Does ready access to the site exist, or is access directly from an existing road?	YES	NO
If NO, what is the distance over which a new access road will be built		m

Describe the type of access road planned:

Include the position of the access road on the site plan. (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

PLEASE NOTE: Points 6 to 8 of Section A must be duplicated where relevant for alternatives

Section A 6-8 has been duplicated [ ] Number of times (only complete when applicable)

6. LAYOUT OR ROUTE PLAN

A detailed site or route (for linear activities) plan(s) must be prepared for each alternative site or alternative activity. It must be attached to this document. The site or route plans must indicate the following:

- the layout plan is printed in colour and is overlaid with a sensitivity map (if applicable);
- layout plan is of acceptable paper size and scale, e.g.
  - A4 size for activities with development footprint of 10sqm to 5 hectares;
  - A3 size for activities with development footprint of > 5 hectares to 20 hectares;
  - A2 size for activities with development footprint of >20 hectares to 50 hectares);
  - A1 size for activities with development footprint of >50 hectares);

- The following should serve as a guide for scale issues on the layout plan:
  - A0 = 1: 500
  - A1 = 1: 1000
  - A2 = 1: 2000
  - A3 = 1: 4000
  - A4 = 1: 8000 (±10 000)
- shapefiles of the activity must be included in the electronic submission on the CD's;
- the property boundaries and Surveyor General numbers of all the properties within 50m of the site;
- the exact position of each element of the activity as well as any other structures on the site;
- the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure;
- servitudes indicating the purpose of the servitude;
  - sensitive environmental elements on and within 100m of the site or sites (including the relevant buffers as prescribed by the competent authority) including (but not limited thereto):Rivers and wetlands;
  - the 1:100 and 1:50 year flood line;
  - ridges;
  - cultural and historical features;
  - areas with indigenous vegetation (even if it is degraded or infested with alien species);
- Where a watercourse is located on the site at least one cross section of the water course must be included (to allow the position of the relevant buffer from the bank to be clearly indicated)

FOR LOCALITY MAP (NOTE THIS IS ALSO INCLUDED IN THE APPLICATION FORM REQUIREMENTS)

- the scale of locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map;
- the locality map and all other maps must be in colour;
- locality map must show property boundaries and numbers within 100m of the site, and for poultry and/or piggery, locality map must show properties within 500m and prevailing or predominant wind direction;
- for gentle slopes the 1m contour intervals must be indicated on the map and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the map;
- areas with indigenous vegetation (even if it is degraded or infested with alien species);
- locality map must show exact position of development site or sites;
- locality map showing and identifying (if possible) public and access roads; and
- the current land use as well as the land use zoning of each of the properties adjoining the site or sites.

The **Locality Map** for the proposed development are enclosed within **Appendix A**

7. SITE PHOTOGRAPHS

Colour photographs from the center of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under the appropriate Appendix**.** It should be supplemented with additional photographs of relevant features on the site, where applicable.

Reference is made to **Appendix B – Site Photographs** included as part of this application

8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity to be attached in the appropriate Appendix.

Reference is made to **Appendix C – Facility Illustration** included as part of this application

SECTION B: DESCRIPTION OF RECEIVING ENVIRONMENT

Note: Complete Section B for the proposal and alternative(s) (if necessary)

Instructions for completion of Section B for linear activities

For linear activities (pipelines etc) it may be necessary to complete Section B for each section of the site that has a significantly different environment.

1. Indicate on a plan(s) the different environments identified
2. Complete Section B for each of the above areas identified
3. Attach to this form in a chronological order
4. Each copy of Section B must clearly indicate the corresponding sections of the route at the top of
5. the next page.

Section B has been duplicated for sections of the route	**0**	times

Instructions for completion of Section B for location/route alternatives

1. For each location/route alternative identified the entire Section B needs to be completed
2. Each alterative location/route needs to be clearly indicated at the top of the next page
3. Attach the above documents in a chronological order

Section B has been duplicated for location/route alternatives	**0**	tim es	(complete only when appropriate)

Note: The two phases (i.e. Concept Scheme 5 and 4B) of the Olifantsfontein rehabilitation measures together with their alternative designs are proposed in the same receiving environment hence no distinction of the phases or alternatives will be made in this section of the BAR..

Instructions for completion of Section B when both location/route alternatives and linear activities are applicable for the application

Section B is to be completed and attachments order in the following way

- All significantly different environments identified for Alternative 1 is to be completed and attached in a chronological order; then
- All significantly different environments identified for Alternative 2 is to be completed and attached chronological order, etc.

Section B - Section of Route		(complete only when appropriate for above)
Section B – Location/route Alternative No.		(complete only when appropriate for above)

1. PROPERTY DESCRIPTION

Property description: (Including Physical Address and Farm name, portion etc.)

The proposed remedial measures will occur within the Kaalspruit watercourse in Olifantsfotein located along the following properties:

Description / Farm Name	ERF/ Portion no	SG code
Clayville Ext 28	2183	T0JR00360000218300000
Clayville Ext 28	2184	T0JR00360000218400000
Clayville Ext 28	2185	T0JR00360000218500000
Clayville Ext 28	2186	T0JR00360000218600000
Clayville Ext 28	2187	T0JR00360000218700000
Clayville Ext 28	2191	T0JR00360000219100000
Clayville Ext 29	3562	T0JR00360000356200000
Clayville Ext 29	3180	T0JR00360000318000000
Clayville Ext 29	3181	T0JR00360000318100000
Clayville Ext 29	3182	T0JR00360000318200000
Clayville Ext 29	3183	T0JR00360000318300000
Clayville	3577	T0JR00360000357700000
Clayville	3578	T0JR00360000357800000
Clayville	3579	T0JR00360000357900000
Clayville Ext 33	3581	T0JR00360000358100000
Clayville	3582	T0JR00360000358200000
Clayville	3908	T0JR00360000390800000
Clayville Ext 34	4312	T0JR00360000431200000
Tswelopele Ext 6	4216	T0JR00360000421600000
Clayville Ext 11	1240	T0JR00360000124000000
OLIFANTSFONTEIN 410-JR (erf 7746)	R/2	T0JR00000000040200002

2. ACTIVITY POSITION

Note: The two phases (i.e. Concept Scheme 5 and 4B) of the Olifantsfontein rehabilitation measures together with their alternative designs are proposed in the same receiving environment hence no distinction of the phases or alternatives will be made in this section of the BAR.

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Proposed Activity: Centre point of the activity	**Latitude (S):**	**Longitude (E):**

In the case of linear activities:

Proposed Activity:	Latitude (S):	Longitude (E):
Starting point of the activity (**Olifantsfontein WWTW outfall**)	25° 56’ 11.69"S	28°12’ 32.33”E.
Middle point of the activity (**Porcelain Drive**)	25°57'6.62"S	28°12'26.27"E

End point1 of the activity (**Kaalspruit u/s, at R562**)	25°57' 34.26"S	28°12' 23.69"E.
End point2 of the activity (**Clayville Arm, service crossing**)	25°57' 30.59"S	28°13' 07.07"E.

Alternative 1
- Starting point of the activity
- Middle point of the activity
- End point of the activity

Latitude (S):	Longitude (E):

For route alternatives that are longer than 500m, please provide co-ordinates taken every 250 meters along the route and attached in the appropriate Appendix

Addendum of route alternatives attached **N/A**

The 21 digit Surveyor General code of each cadastral land parcel

Refer to table in Point 1.

3. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Proposed Activity

Flat	**1:50 – 1:20**	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

4. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site.

Proposed Activity

Ridgeline	Plateau	Side slope of hill/ridge	Valley	**Plain**	Undulating plain/low hills	**River front**

5. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Note: The two phases (i.e. Concept Scheme 5 and 4B) of the Olifantsfontein rehabilitation measures together with their alternative designs are proposed in the same receiving environment hence no distinction of the phases or alternatives will be made in this section of the BAR.

Is the site(s) located on any of the following?

	Proposed Activity:		Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)		NO✔	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES ✔		YES	NO	YES	NO

Seasonally wet soils (often close to water bodies)	YES ✔		YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil		NO✔	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES ✔		YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)		NO✔	YES	NO	YES	NO
Any other unstable soil or geological feature		NO✔	YES	NO	YES	NO
An area sensitive to erosion	YES ✔		YES	NO	YES	NO

(Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

b) are any caves located on the site(s) NO ✓

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S):	**Longitude (E):**
°	°

c) are any caves located within a 300m radius of the site(s) NO✓

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S):	**Longitude (E):**
°	°

d) are any sinkholes located within a 300m radius of the site(s) NO✓

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S):	**Longitude (E):**
°	°

If any of the answers to the above are "YES" or "unsure", specialist input may be requested by the Department

Hydrology

The Kaalspruit is a tributary of the Olifantspruit and the Hennops River in the upper regions of the Crocodile-Groot Marico Water Management Area. It is located in Quaternary Catchment A21B (**Figure 5**). The Secondary catchment A2 is the catchment of the Crocodile River. WR90 sets the catchment yield at 2.8% of mean annual rainfall which is a low annual yield. However, WR2012 shows this estimate has been revised down by 23%. Quaternary A21B will therefore be sensitive to changes in the natural flow regime.

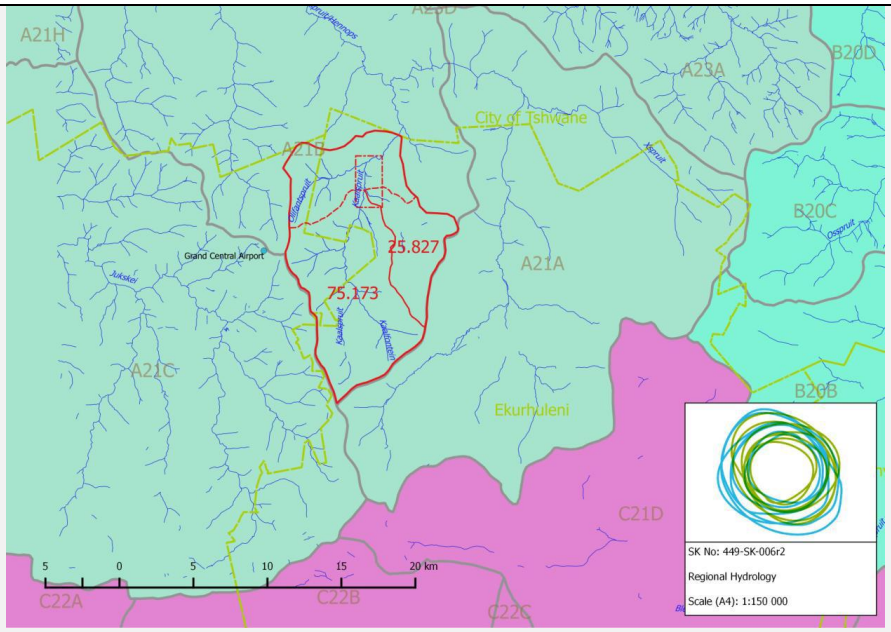


Figure 5: Regional Hydrology (Source: Fourth Element Planning and Viability Report 2017)

The project area and associated catchment is shown in **Figure 6**. The project area includes the confluence of the Clayville Arm and the Kaalspruit and extends to the confluence with the Olifantspruit. The main subcatchments contributing to the design of the wetland scheme is the upper Kaalspruit catchment (75.2km2) and the Clayville Arm (25.8km2). There is also a small 2.6km2 catchment within the project area, mainly draining residential areas.

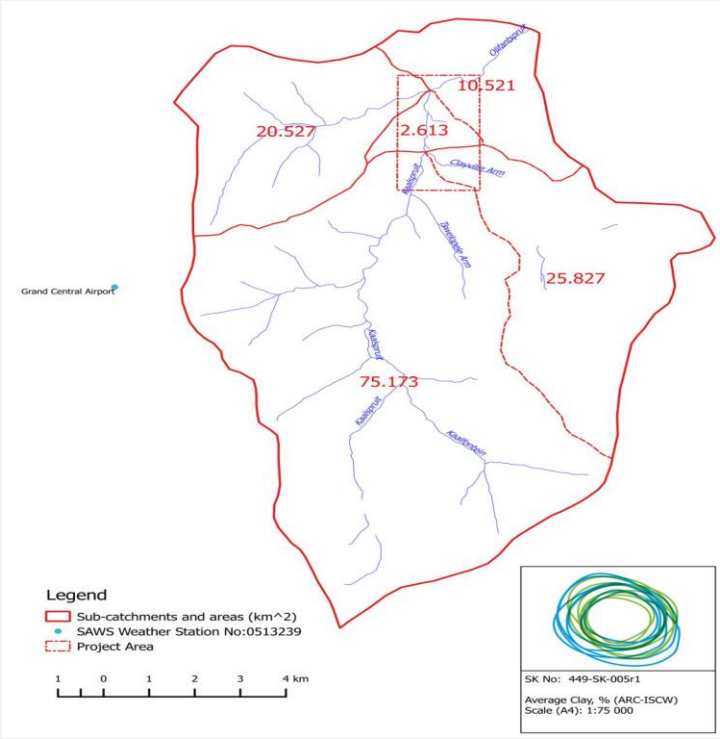


Figure 6: Sub-catchments and watercourses (Source: Fourth Element Planning and Viability Report 2017)

Geology and Soils

The dolomite geology dominating the eastern portions of the site have particular important on the hydrological

responses of the site, as well as the design of the constructed wetland. Catchments on dolomite generally have much lower catchment yields that those on other geology, even in storm events. For example it is likely the low catchment yield indicated in Section 1 will be attributed in some part to the extensive dolomite areas in the region. The catchment of the Clayville Arm is almost entirely on dolomite, while the Kaalspruit is 80% granite. The project area is also almost entirely on dolomite.

Catchment soils are determined from the land type maps prepared by the ARC (2006). The soils are largely Sandy-Clay-Loams, Sandy-Loams and Loamy-Sands. The Soil Forms that were identified within the project area that were considered for the delineation of wetland areas include Westleigh, Sepane and Glenrosa. According to DWAF (2005) these Soil Forms are indicative of seasonal and temporary wetland zones. An additional and noteworthy Soil Form that was identified for the study is Inhoek, with a summary provided below:

- Melanic topsoil, with a bleached B horizon (unspecified);
- The pH of the soil is expected to be alkaline, in excess of 5.5, possible 7 pH;
- Erosion is likely to be an issue as a result of differences between the A and B horizons; and
- Soil fertility is expected to be beneficial for rehabilitation efforts.

Areas sensitive to erosion

The banks have undergone severe erosion in most instances and limited vegetation cover is present on the banks of the Kaalspruit and its tributaries. Through much of the project area the Kaalspruit has eroded down to bedrock. River banks are high (4m to 8m), steep and highly unstable, and there is evidence of erosion and bank collapse after every storm event (**Figures 7a &b**). Sand mining also occurs along the river banks from time to time (**Figure 7c**), leading to further bank instability and erosion potential. Subsistence agriculture typically extends right up to the top of the river bank (**Figure 7a**). In places riparian trees that help stabilise the banks have been removed in recent years to make space for crops.

Figure 7 Evidence of soil erosion along the banks **a)** River eroded to bedrock, with steep banks. **b)** Steep sided, unstable river banks over 4m high.

c) Sand mining on river banks.

6. AGRICULTURE

Does the site have high potential agriculture as contemplated in the Gauteng Agricultural Potential Atlas (GAPA 4)?	YES ✓	

The agricultural potential of the soils on the site vary according to the dominant soil form as described below

Structured Soils: The project area is mostly covered by the soils of the Valsrivier (orthic A horizon / pedocutanic B horizon / unconsolidated material without signs of wetness), Arcadia (vertic A horizon / unspecified material – usually unconsolidated material or weathering or hard rock) and Katspruit (orthic A horizon / G horizon) forms. As these soils pose significant tillage constraints, are associated with the watercourse and are poorly drained this area is classified as being of **low agricultural potential**. (Refer to Figure 8)

Hutton Soil Forms: The project area also contains the Hutton (orthic A / red apedal B / unspecified – usually hard or weathering rock) forms with varying amounts of rock in the profile. This soil covers a much smaller portion of the site area, estimated at less than 20%. The rocks consist mainly of chert and quartzite pebbles and extensive manganocrete layers and boulders occur at depth in most of the profiles. These soils are well-drained, as is indicated by the red colour, and are considered to be of **high agricultural potential**. The potential can be increased through irrigation practices as these soils rarely exhibit any significant drainage impediments. This is only applicable in areas outside of the extended drainage depression. In the dryland agricultural state these soils vary in terms of potential mainly due to localised water holding capacity differences. The presence of the rocks is not extensive enough to pose a limitation to tillage

.

Figure 8: Hutton dominated soil (green areas) and structured soil areas (red) – associated with the wetland / watercourse area around the Kaalspruit

Please note: The Department may request specialist input/studies in respect of the above.

7. GROUNDCOVER

To be noted that the location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Indicate the types of groundcover present on the site and include the estimated percentage found on site

Proposed Activity

Natural veld - good condition % =	Natural veld with scattered aliens % =	**Natural veld with heavy alien infestation % =10**	**Veld dominated by alien species % =15**	Landscaped (vegetation) % =
Sport field % =	**Cultivated land %=70**	Paved surface (hard landscaping) % =	Building or other structure % =	**Bare soil % =5**

Please note: The Department may request specialist input/studies depending on the nature of the groundcover and potential impact(s) of the proposed activity/ies.

Are there *any rare or endangered flora or fauna species* (including red list species) present on the site	**NO✓**

If YES, specify and explain:

Are there <u>any *rare or endangered flora or fauna species*</u> (including red list species) present within a 200m (if within urban area as defined in the Regulations) or within 600m (if outside the urban area as defined in the Regulations) <u>radius of the site.</u>	**NO✓**

If YES, specify and explain:

Are there any special or sensitive habitats or other natural features present on the site?	YES✓	

If YES, specify and explain:

Wetland

Two FEPA wetlands were identified either within 500 m or in close proximity to the project area; these are presented in **Figure 9**. Contour data (5 m) and Google Earth imagery were also considered to identify any other potential wetland areas. The FEPA wetlands are not classified as ecological priority areas and are artificial system (man-made), these will be unaffected by the scheme.

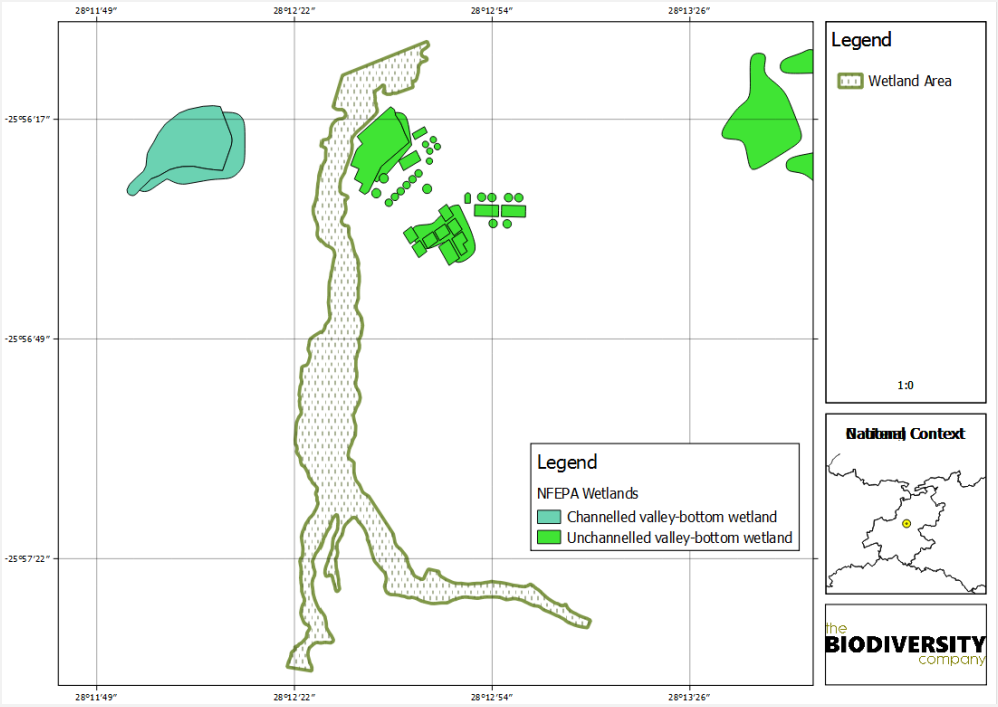


Figure 9: The FEPA wetlands that were considered for the study

The wetland area associated with the project area was identified and delineated. The details of the corresponding HGM units with the wetland classification as per SANBI guidelines (Ollis, Snaddon, Job, & Mbona, 2013) are presented in **Table 4** and **Figure 10**. Two (2) HGM units were identified within the 500m project assessment boundary, namely:

- Channelled Valley Bottom (HGM[1] 1) – Kaalspruit. This will be replaced by the FWS constructed wetland.
- Channelled Valley Bottom (HGM 2) – Clayville. This will be partly modified to improve flood conveyance and will include a sediment trap.

Both these systems are severely modified. HGM1 is disconnected from the main watercourse and has been largely replaced by agriculture. On completion of the FWS constructed wetland some ecological function will return to the area, mainly in the lower reaches, but this will be limited. HGM2 is severely affected by sediment and poor water quality, and is overrun by reeds. It is expected the ecological function of this area of wetland will be marginally improved by the reduction of sediment and litter loads.

Table 4: Wetland classification as per SANBI guideline

[1] Hydrogeomorphic (HGM)

Wetland Name	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland	Western Bankenveld	Dry Highveld Grassland Group 5	Valley Bottom	Channelled Valley Bottom	(N/A)	(N/A)
HGM 2	Inland	Western Bankenveld	Dry Highveld Grassland Group 5	Valley Bottom	Channelled Valley Bottom	(N/A)	(N/A)

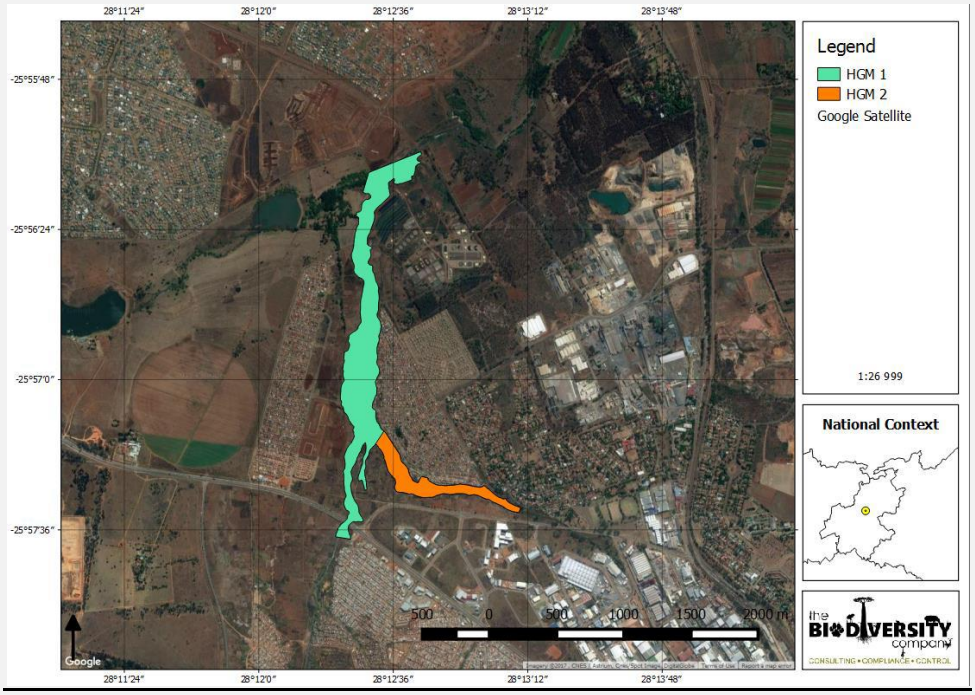


Figure 10: The identified HGM units for the study

Wetland Functionality, Status and Sensitivity

The wetland system associated with the Kaalspruit was determined to be in a seriously modified state (Category E), this suggesting a large change in ecosystem processes and loss of natural habitat and biota and has occurred (Macfarlane et al, 2008). The wetland system associated with the Clayville tributary was determined to be in a moderately modified state (Category C), suggesting a moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact (Macfarlane et al, 2008).

River condition

The poor water quality of the Kaalspruit is central to the problems reported in the DWS Directive (**Figure 11a**). Sources of sewage in stormwater are various, such as broken sewers (**Figure 11b**) and blocked sewers due to solid waste or deliberate blocking for sewage mining. Monitoring and analysis of the streamflow during the initial stages of the project is reported and shows the dry weather streamflow may be characterised as a mild to medium strength sewage concentration.

Figure 11: River condition **a)** Severe water quality conditions. **b)** Broken sewer line.

The present ecological state of the river system is presented in **Appendix G2** (Aquatic Assessment) of this report. Due to high pollution loads the dissolved oxygen levels in both streams is extremely low, providing very limited opportunity for aquatic life. Sewage fungus is present along the entire watercourse in the project area (**Figure 12**). The riparian habitat is also heavily disturbed by erosion, collapsing banks and subsistence agriculture, presenting a watercourse that is in an overall severely degraded state.

Figure 12: Sewage fungus and poor water quality conditions.

Vegetation

The Project area falls within the Rocky Highveld Grassland, specifically the Carletonville Dolomitic Grassland. The vegetation type is considered to be Vulnerable (VU), with a protection level described as "poorly protected". The vegetation type within the study area is classified as the Rocky Highveld Grassland within the Grassland Biome of South Africa (Mucina & Rtherford, 2006) or the Bankenveld Rocky Highveld Grassland as described by Bredenkamp and Van Rooyen (1996).

Riparian Vegetation

The following plant communities were identified within the project area:

1. Wetland and moist grassland: Wetland and moist grassland communities are limited to the section directly adjacent to the Kaalspruit as well its tributaries. However, the banks have undergone severe erosion in most instances and limited vegetation cover is present on the banks of the Kaalspruit and its tributaries. Ideally a spruit in the true sense should have a lush cover of grass species such as *Imperata cylindica* protecting the

river banks against erosion. Instead, here the dominant species include *Phragmites australis* (Giant Reed), *Typha capensis* (Bulrush) *and Arundo donax* (Spanish Reed/ Giant Reed). *Junucus effuses* and the invasive *Persicaria lapathifolia* (spotted knotweed) was present within the marginal zone. Invasive trees *Acacia mearnsii* (Black Wattle) and *Populus* spp (Poplar) in particular have established along the Kaalspruit (**Figure 13**).

Figure 13: Wetland and moist grassland A: Bank erosion evident; B: Invasive woody species including *Populus* spp. and *Acacia mearnsii, Arundo donax* present on opposite bank. C: Alien invasive species and bank erosion.

2. Secondary and transformed grassland (less than 10% of project area): Secondary grasslands develop where the original, primary (undisturbed) grassland vegetation was removed (i.e. by cultivation). After such disturbances cease, pioneer grassland species, as well as weedy plants, colonise the disturbed areas leading to a secondary grassland state with lower species diversity as opposed to the primary (climax) state prior to any disturbances. Where grasslands were historically disturbed although no cultivation took place (e.g. compaction of the soils), the result could also resemble a secondary grassland state with limited species diversity. Primary grasslands are species rich ecosystems, which once disturbed, are difficult, if not impossible to restore. Species diversity included mainly invasive species such and the dominant invasive species were *Tagetes minuta* (Khaki Weed) *Rumex crispus* (Curly Dock) and *Flaveria bidentis* (Smeltersbush). The grass species included but were not limited to; *Themeda triandra* (Red Grass), *Eragrostis curvula* (Weeping Love Grass), *Pogonarthria squarrosa* (Herringbone Grass), *Hyparrhenia hirta* (Common Thatching Grass) and *Urochloa mosambicensis* (Bushveld Signal Grass). Some indigenous forbs included the medicinal plants *Artemissia affra* (African wormwood) *Chamaecrista mimosoides* (Fishbone Cassia) and *Oxalis obliquifolia* (Sorrel) (**Figure 14**).

Figure 14: Secondary and transformed grassland A: Isolated patch of grassland with hardly any invasive species. B: *Tagetes minuta* dominated secondary grassland. C: Secondary grassland in between maize fields and wetland.

3. Agricultural fields (approx. 70% of the project area): The transformed areas consisted of areas that

comprised degraded and highly disturbed vegetation with little ecological function and a high degree of alien invasive plant species, or areas comprising monocultures (e.g. maize and pasture) and built-up areas (i.e. roads and bridge crossings). Crops included maize (*Zea mays*), pumpkin and soya beans.

Gauteng Conservation Plan

The Gauteng C-Plan indicates that the project area is primarily classified as a Critical Biodiversity Area, with smaller portions of Ecological Support Areas delineated by the GDARD. The GDARD information does not provide any information that could be considered for the delineation of wetland areas, other than suggesting that wetlands may be in the general vicinity. The location of the study area in relation to the Gauteng C-Plan is presented in **Figure 15.**

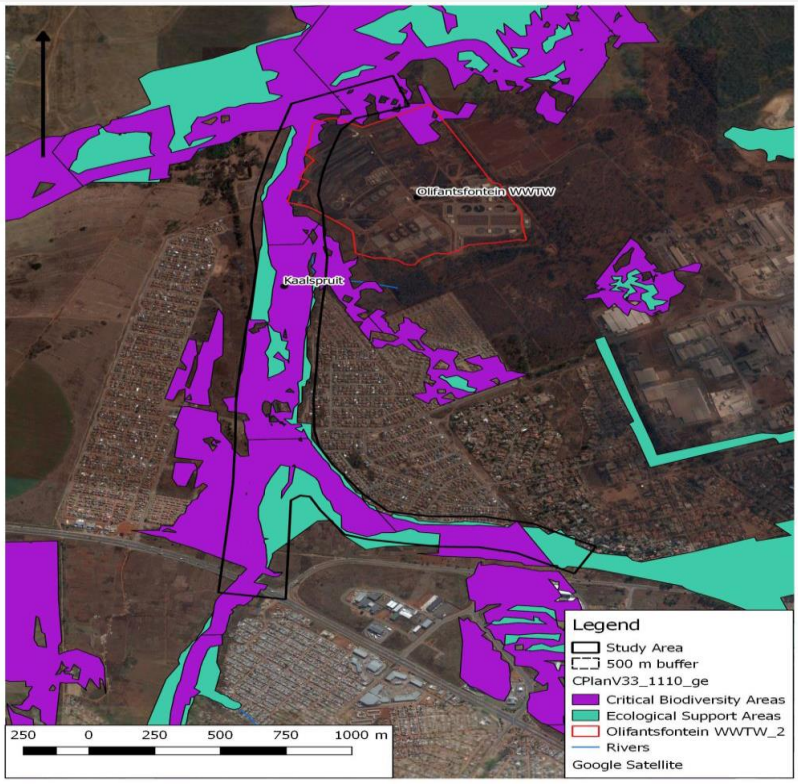


Figure 15: Gauteng Conservation Areas relevant to the study site

In summary, in spite of the study area being near channel valley bottom wetlands, these are disconnected from the river system and mostly cultivated. The wetland system associated with the study area was determined to be largely modified. In addition, the instream ecology is almost non-existent due to the present ecological state of the river system and the riparian ecology is mostly dominated by alien species. Vegetation is rather disturbed and degraded, no species of conservation concern were found. Therefore in spite of the site being on Critical Biodiversity Area (CBA), with smaller portions of Ecological Support Areas as per GDARD' C-Plan, the results of the current investigation are not totally in agreement with this as explained above

Was a specialist consulted to assist with completing this section	**YES✓**

If yes complete specialist details

1.) Wetland Ecologist/ Aquatic Specialist

Name of the specialist:	Andrew Husted		
Qualification(s) of the specialist:	Andrew Husted, is Pr Sci Nat registered in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew Husted is an Aquatic, Wetland and Biodiversity Specialist with 12 years' experience in the environmental consulting field. Andrew is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.		
Postal address:	420 Vale Ave, Ferndale		
Postal code:	2194		
Telephone:	081 319 1225	Cell:	081 319 1225
E-mail:	info@thebiodiversitycompany.com	Fax:	086 527 1965

Are any further specialist studies recommended by the specialist? [redacted] **NO ✓**

If YES, specify: **N/A**

If YES, is such a report(s) attached? [redacted] **NO ✓**

If YES list the specialist reports attached below

N/A

Signature of specialist: 

Date: **15.01.2018**

2.) Heritage Specialist

Name of the specialist:	J van Schalkwyk		
Qualification(s) of the specialist:	J A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 30 years. Based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape, Northern Cape, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. Based on this work, he has curated various exhibitions at different museums and has published more than 60 papers, many in scientifically accredited journals.		
Postal address:	62 Coetzer Avenue, Monument Park, 0181		
Postal code:	2194		
Telephone:	[redacted]	Cell:	076 790 6777
E-mail:	jvschalkwyk@mweb.co.za	Fax:	[redacted]

Are any further specialist studies recommended by the specialist? [redacted] **NO ✓**

If YES, specify: **N/A**

If YES, is such a report(s) attached? [redacted] **NO ✓**

If YES list the specialist reports attached below

N/A

Signature of specialist:		Date:	**30.11.2016**

3.) Agricultural Specialist

Name of the specialist:	J.H. van der Waals		
Qualification(s) of the specialist:	Johan van der Waals has a PhD Soil Science, Pr.Sci.Nat, is also a Member of: Soil Science Society of South Africa (SSSSA). He is an accredited member of: South African Soil Surveyors Organisation (SASSO) and registered with: The South African Council for Natural Scientific Professions Registration number: 400106/08.		
Postal address:	PO Box 40568 Garsfontein		
Postal code:	0060		
Telephone:	012 993 0969	Cell:	082 570 1297
E-mail:	johan@terrasoil.co.za	Fax:	086 274 6653

Are any further specialist studies recommended by the specialist?		**NO ✓**
If YES, specify:	**N/A**	
If YES, is such a report(s) attached?		**NO ✓**

If YES list the specialist reports attached below

N/A

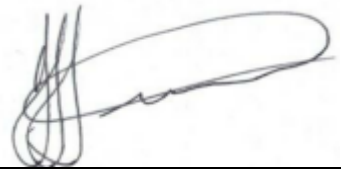
Signature of specialist:		Date:	**16.03.2017**

4.) Social Specialist

Name of the specialist:	Amina Ismail

Qualification(s) of the specialist:	Amina Ismail has more than 20 years of experience working in sustainable development, including at least 12 years as a senior consultant to government, industry and non-government org, and 7 years as a government official in environment and development functions. She has prepared numerous Social Impact Assessments, as deliverables for Environmental Impact Assessments (EIAs), Social and Labour Plans (SLPs) and Global Reporting Initiative (GRI) sustainability reporting. She has a Master's degree in Management (Public and Development). She also has an Honours degree in Medical Sciences and a Postgraduate Diploma in Science (in Environmental Studies). As a recipient of the Harvard-South Africa Fellowship, she focused her year of study at Harvard University, United States, on Sustainable Development and Public Policy, and Health Research and Policy
Postal address:	4 Melville Estates, 24 Main Road East, Melville Extension 1, Johannesburg
Postal code:	2092
Telephone: [redacted]	Cell: 082 452 9799
E-mail: solanum@worldonline.co.za	Fax: [redacted]

Are any further specialist studies recommended by the specialist?	[redacted] **NO ✓**
If YES, specify:	**N/A**
If YES, is such a report(s) attached?	[redacted] **NO ✓**
If YES list the specialist reports attached below	
N/A	

Signature of specialist: 

Date: **11.04.2017**

Please note; if more than one specialist was consulted to assist with the filling in of this section then this table must be appropriately duplicated

8. LAND USE CHARACTER OF SURROUNDING AREA

Using the associated number of the relevant current land use or prominent feature from the table below, fill in the position of these land-uses in the vacant blocks below which represent a 500m radius around the site

Proposed Activity:

1. Vacant land	**2. River, stream, wetland**	3. Nature conservation area	4. **Public open space**	5. Koppie or ridge
6. Dam or reservoir	**7. Agriculture**	8. Low density residential	**9. Medium to high density residential**	10. Informal residential
11. Old age home	12. Retail	**13. Offices**	14. Commercial & warehousing	15. Light industrial
16. Heavy industrial[AN]	17. Hospitality facility	18. Church	19. Education facilities	20. Sport facilities
21. Golf course/polo fields	22. Airport[N]	23. Train station or shunting yard[N]	24. Railway line[N]	25. Major road (4 lanes or more)[N]
26. Sewage treatment plant[A]	27. Landfill or waste treatment site[A]	28. Historical building	29. Graveyard	30. Archeological site
31. Open cast mine	32. Underground mine	33.Spoil heap or slimes dam[A]	34. Small Holdings	
35 Other land uses (describe):	**Tarred road crossing over the watercourse by means of culvert**			

NOTE: Each block represents an area of 250m X 250m, if your proposed development is larger than this please use the appropriate number and orientation of hashed blocks

Site

NORTH

	4	**4**	**1**	**26**	**26**
	9	**1, 2, 7**	**1**	**1, 26**	**9**
WEST	**9**	**2**	**2, 35**	**1, 2; 7,9**	**9**
	9	**1, 2, 7**	**1, 2, 7**	**1, 2, 7,9**	**9**
	1	**1**	**9**	**9,13**	**13**

EAST

SOUTH

Note: More than one (1) Land-use may be indicated in a block

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed activity/ies. Specialist reports that look at health & air quality and noise impacts may be required for any feature above and in particular those features marked with an "A" and with an "N" respectively.

Have specialist reports been attached **YES✓**
If yes indicate the type of reports below

- Wetland Assessment
- Aquatic Assessment
- Heritage Assessment
- Agricultural Impact Assessment
- Social Impact Assessment
- Geotechnical Investigation

The above specialists reports are attached within **Appendix G** of this report

9. SOCIO-ECONOMIC CONTEXT

Describe the existing social and economic characteristics of the area and the community condition as baseline information to assess the potential social, economic and community impacts.

The primary receiving environment for the project is the Ekurhuleni Metropolitan Municipality (EMM). The social environment that could potentially be impacted on is described in this section. While the primary social environment are the communities of the EMM, it is noted that impacts and benefits will be experienced downstream of the water course as well. Where this is significant from a social impact perspective, the SIA will include it.

The site of rehabilitation activities on the Kaalspruit falls wholly within Ward 1 of the EMM. Ekurhuleni township of Tembisa and the City of Johannesburg townships of Ivory Park and Ebony Park are located to the South of the project area. Clayville, in Ekurhuleni, is situated along the eastern boundary of the Kaalspruit. People from these communities use the land adjacent to the Kaalspruit to grow crops. Much of the farming is subsistence, but some crops are bartered for bread or sold to raise money for households' school expenses. There are sewage miners in the upstream communities, who allegedly block the sewerage to mine sewage for any valuable items. There is also illegal sand mining taking place along the banks of the Kaalspruit. Another factor to consider is that much of the land along the Kaalspruit in the project area is privately owned, although the project area itself is mainly on municipal owned land. In fact, the meeting that was convened on 19 January 2017 was requested by a developer in the area. Community members had planted crops on the land and the owner of the land was planning to develop the land. Crops on the land therefore could be destroyed if the development went ahead before harvesting the crops. Subsistence farmers using the land would also not have further access to the land to plant their crops.

Ekurhuleni's mission is "To provide sustainable and people-centred development services that are affordable, appropriate and of high quality by focusing on the social, environmental and economic regeneration of our city and communities, as guided by the principles of Batho Pele and through the commitment of a motivated and dedicated team". Developments on the Kaalspruit will affect downstream users in the Olifantspruit, and the Hennops River into which it flows. Improvements in the Kaalspruit will have a positive impact, for instance, on the Centurion Lake. Currently, the lake is degraded. Plans to restore the lake to a park, and link the Centurion Mall to the Centurion Gautrain station as an economic mode were presented at the Hennops Catchment Management Forum on 31 January 2017. The development, however, will come at great capital cost. According to a government official present at the meeting, improvements on the Kaalspruit will contribute towards improving the water quality over several years. Reducing sedimentation through erosion control in Phase 1 of the project will reduce the load on the catchment system including Centurion Lake over several years. However, the most significant benefit is the potentially substantial improvement of a water resource; all other related benefits are compliant to this.

The Hennops Catchment Management Forum brings together capacities in the 3 local municipal governments, namely, the Cities of Tshwane, Ekurhuleni and Johannesburg, and other interested and affected stakeholders, to manage the health of the Hennops River catchment. Amongst its activities, it reports on water quality and plans capacity building awareness and education. The Hennops Catchment Management Forum therefore provides an institutional opportunity to co-ordinate improvements in the Hennops River system and promote awareness and understanding amongst its affected stakeholders.

10. CULTURAL/HISTORICAL FEATURES

Please be advised that if section 38 of the National Heritage Resources Act 25 of 1999 is applicable to your proposal or alternatives, then you are requested to furnish this Department with written comment from the South African Heritage Resource Agency (SAHRA) – Attach comment in appropriate annexure

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as-

(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site-

(i) exceeding 5 000 m2 in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Are there any signs of culturally (aesthetic, social, spiritual, environmental) or historically significant elements, as defined in section 2 of the National Heritage	**NO ✓**

Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close (within 20m) to the site?	[redacted]

If YES, explain:

If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist if one was already appointed:

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development: *As no sites, features or objects of cultural significance are known to exist in the study area, there would be no impact as a result of the proposed development.*

Will any building or structure older than 60 years be affected in any way?	[redacted] **NO** ✓
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	**NO** ✓

If yes, please attached the comments from SAHRA in the appropriate Appendix

SECTION C: PUBLIC PARTICIPATION (SECTION 41)

1. THE ENVIRONMENTAL ASSESSMENT PRACTITIONER MUST CONDUCT PUBLIC PARTICIPATION PROCESS IN ACCORDANCE WITH THE REQUIREMENT OF THE EIA REGULATIONS, 2014.

2. LOCAL AUTHORITY PARTICIPATION

Local authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least thirty (30) calendar days before the submission of the application to the competent authority.

Was the draft report submitted to the local authority for comment?	NO
If yes, has any comments been received from the local authority?	NO

If "YES", briefly describe the comment below (also attach any correspondence to and from the local authority to this application):

If "NO" briefly explain why no comments have been received or why the report was not submitted if that is the case.

As this is the Draft Basic Assessment Report at present, it will be submitted for comment to the local authority and as well as to other stakeholders. Once comments have been received at the end of the 30-day review period, they will be recorded and reflected in the Final Basic Assessment Report.

Comments are anticipated once the Draft Basic Assessment Report (DBAR) (this report) has been circulated to all stakeholders and I&AP's. The following public participation was conducted for the proposed project:

Identification of stakeholders, including occupiers of the property, owners and occupiers of land adjacent to the site, municipal officials and relevant State Departments as part of the Public Participation Process. All respondents were placed on the project database. This database will be supplemented by I&APs who will contact the EAP to be included on the database. The database will be used throughout the process to inform the stakeholders of the project.

In order to canvass the issues and concerns of the broader public and to ensure that all IAPs are afforded the opportunity to comment on the proposed development, the proposed project was announced as follows:

- Erection of site notices, size (A2) advertising the proposed development and displaying the contact details of the EAP were prepared and displayed on-site. The site notices will serve the purpose of informing potential IAPs of the project and therefore afford them the opportunity to comment.
- Distribution of the notification letter with a registration and comment sheet, and the locality map to state departments and other potential stakeholders through emails.
- An advert was placed in the Kempton Express on 10th November 2016 to notify the public about the Basic Assessment process, invite members of the public to register as I&APs on the project's database.
- A second advert was placed in the Citizen on 29th May 2017 to notify the public of the availability of the Draft Basic Assessment Report.
- Communication with local authorities and stakeholders
- The comments received on the application and DBAR will be included in the response and comment sheet.
- A copy of the Draft Basic Assessment Report will be made available for public review for a 30 day review period at the Olifantsfontein Public library and copies send to all registered I&APs
- Any further comments received during the review period of the draft Basic Assessment as well as responses provided will be captured and recorded within the Comments and Response Report in the final Basic Assessment Report that will be submitted to GDARD.
- Once GDARD has made a decision on Environmental Authorization: The registered I&APs, stakeholders and organs of state will be notified of the department's decision.

3. CONSULTATION WITH OTHER STAKEHOLDERS

Any stakeholder that has a direct interest in the activity, site or property, such as servitude holders and service providers, should be informed of the application at least **thirty (30) calendar days** before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders? **Yes**✓

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

The public were notified of the application, during the process notification, the following comments he were received during the process notification period as summarised below:

- The majority of the stakeholders requested to be included on the project database and to be kept informed of the process
  "Your details have been added to our project database and you will be kept informed of the progress of this process. The report once ready will be released to the public for 30 days legislated commenting period and you will be informed of the DBAR availability".
- I'm a concerned citizen of South Africa residing at Clayville (Olifantsfontein). We have been experiencing and affected by sewer / sewerage smell around Clayville area and it is getting worse by the week. We would like this matter addressed in accordance to help us and get rid of this rather unpleasant growing smell.
- I think this project will be very beneficial to us as residents though I don't know what project entails. For past 5 years we tried to level the area but we could not win because we were using community contributions. I attached one photo just to see how far we went trying to fix the place as playing space for kids so that they don't play next to the stream, the drainage in our area they just flow into the bush not directly to the stream, if undergrounds pipes can be installed to flow to the stream it will be much better.

Details of this correspondence has been captured in **Appendix E10** (comments from I&APs on the application).The Draft report is still to be released to the public for 30 days, any additional comments that will be received during the DBAR review period will all be captured and recorded within the Comments and Response Report attached as **Appendix E6** of the Final Basic Assessment Report (FBAR).

If "NO" briefly explain why no comments have been received

4. GENERAL PUBLIC PARTICIPATION REQUIREMENTS

The Environmental Assessment Practitioner must ensure that the public participation process is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees and ratepayers associations. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorization it may have issued if it becomes apparent that the public participation process was flawed.

The EAP must record all comments and respond to each comment of the public / interested and affected party before the application report is submitted. The comments and responses must be captured in a Comments and Responses Report as prescribed in the regulations and be attached to this application.

5. APPENDICES FOR PUBLIC PARTICIPATION

All public participation information is to be attached in the appropriate Appendix. The information in this Appendix is to be ordered as detailed below
Appendix 1 – Proof of site notice
Appendix 2 – Written notices to I&APs
Appendix 3 – Proof of newspaper advertisements

Appendix 4 –Authority Consultation
Appendix 5 – Minutes of any public and/or stakeholder meetings – **this is anticipated during the Draft BAR review period**
Appendix 6 - Comments and Responses Report
Appendix 7 –Comments from I&APs on Basic Assessment (BA) Report - **Comments are anticipated during the Draft BAR review period**
Appendix 8 –Comments from I&APs on amendments to the BA Report N/A
Appendix 9 – Copy of the register of I&APs
Appendix E10 - Comments from I&APs on the application

SECTION D: RESOURCE USE AND PROCESS DETAILS

Note: Section D is to be completed for the proposal and alternative(s) (if necessary)

Instructions for completion of Section D for alternatives

1) For each alternative under investigation, where such alternatives will have different resource and process details (e.g. technology alternative), the entire Section D needs to be completed
4) Each alterative needs to be clearly indicated in the box below
5) Attach the above documents in a chronological order

Section D has been duplicated for alternatives **0** times (Complete only when appropriate)

Section D Alternative No. (complete only when appropriate for above)

1. WASTE, EFFLUENT, AND EMISSION MANAGEMENT

Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	YES✓
If yes, what estimated quantity will be produced per month?	Could not be determined at this stage, but TOTAL project waste estimated to be less than 350 m^3

How will the construction solid waste be disposed of (describe)?

Some construction rubble/ solid waste will arise from demolition of an old bridge and removal of already partially demolished concrete weirs in the river. This solid waste will be temporarily stored on site in designated waste skips or stockpiles and then reused where possible for gabion construction and backfill. Surplus material will be removed by an appropriate waste contractor appointed by the main construction contractor to an approved landfill site. This will be managed through the EMPr. There will also be extensive earthworks in Phase 2 arising from the levelling and terracing of the constructed wetland. Attempts will be made to balance material requirements such that there is minimal import or export of material, but there may be some

Where will the construction solid waste be disposed of (describe)?

General waste removed from site will be disposed of at a suitably licensed disposal facility. The nearest licensed landfill site is the Tembisa Landfill site. Safe disposal certificates must be obtained and kept on site for the duration of the construction phase

Will the activity produce solid waste during its operational phase?	YES✓
If yes, what estimated quantity will be produced per month?	`m^3

How will the solid waste be disposed of (describe)?

Solid waste will be generated in three forms:

Litter collected from the litter traps:- this will be stored at each trap facility up to a maximum 100m3 before removal. Removal will be on an as-and-when basis. The estimated annual litter yield is 285 tons or 3002 m³

Sediment: The sediment traps need to be cleared on a regular basis to ensure the optimum efficiency of the traps. It was estimated that average annual sediment yield from the Kaalspruit catchment is approximately 17500 m³/annum and 12500 m³/annum from Clayville Arm mainly in the storm season. The quality of the sediment will need regular testing. It is anticipated that it will need to be disposed at a registered landfill site, but other sustainable opportunities may arise depending on test results (e.g. soils for composting).

The constructed wetland: The vegetation (reeds) in the FWS wetland will need to be harvested on a regular basis to ensure the health of the reeds and operation of the system. Harvesting on a 5-year rotational basis is currently anticipated, but this will be determined during monitoring of the system. The harvested reeds are expected to be suitable for composting and agricultural use, but they will need testing for contamination in each case. The biomass to be harvested at any one stage is not yet determined.

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity?	NO ✓

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

During both construction and operation phase a registered landfill sites e.g. Tembisa Landfill site within the study area can be used as they still have capacity.

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	NO ✓

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?	NO ✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

During Construction, wastes must be separated at source into recyclable and non-recyclable materials and distributed for recycling where applicable. During the construction phase, construction waste rubble should be re-used as fill material, erosion protection and gabion construction where possible. The re-use of construction waste materials will minimize the amount of waste that will need to be disposed of at registered municipal waste facilities. In addition, there will be extensive earthworks, but import and export of material will be minimised by balancing cut and fill requirements as far as possible.

Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	**NO ✓**	
If yes, what estimated quantity will be produced per month?	N/A m3	
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)?	YES	NO

Will the activity produce any effluent that will be treated and/or disposed of on site?	**NO**

If yes, what estimated quantity will be produced per month?	✓ N/A m3

If yes describe the nature of the effluent and how it will be disposed.

N/A

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA

Will the activity produce effluent that will be treated and/or disposed of at another facility?	**NO** ✓

If yes, provide the particulars of the facility:

Facility name:	N/A		
Contact person:	N/A		
Postal address:	N/A		
Postal code:	N/A		
Telephone:	N/A	Cell:	
E-mail:	N/A	Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

N/A

Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?		**NO**✓
If yes, what estimated quantity will be produced per month?		
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)?	**YES**	**NO**

Will the activity produce any effluent that will be treated and/or disposed of onsite?	**YES**✓

If yes describe how it will be treated and disposed of.

As the scheme is a treatment facility in itself, it will be treating existing poor water quality conditions in the river. The scheme will discharge to the same river system and while the discharge will significantly improve the current conditions, the actual performance of the scheme (and therefore the quality of water discharged) is as yet undetermined.

One option being considered is the diversion of a portion of the DWF to the local sewer network, thereby reducing the load on the constructed wetland. Discussions are underway with ERWAT to assess the potential for this, but until they have accepted any such solution, it is to be assumed that there will be no discharge to the municipal network.

Effluent arising during the construction stages will be managed using chemical toilets and the sewage waste will be collected by the waste service provider for treatment at a treatment facility.

Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	**YES**✓	
If yes, is it controlled by any legislation of any sphere of government?		**NO**✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

The activity itself will not contribute directly to emissions released into the atmosphere except possible short-term dust emissions during the construction phase. Emissions generated will be in the form of dust, carbon dioxide and other vehicle emissions generated by diesel powered machinery and trucks during the construction process i.e. tip trucks, TLB's, excavators and dust from the movement of the construction vehicles. These emissions will be composed primarily of carbon monoxide (CO) and will be of a low concentration. In addition to this, the scheme (Phase 2) has the potential to release odour during its operational phase, more so in the early stage of the implementation of the scheme..

2. WATER USE

Indicate the source(s) of water that will be used for the activity

Municipal	Directly from water board	groundwater	river, stream, dam or lake	other	the activity process itself will not use water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate
the volume that will be extracted per month: litters

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix
Does the activity require a water use permit from the Department of Water Affairs? **YES✓**
If yes, list the permits required

A Water Use License Application will be submitted after the Final Basic Assessment Report has been submitted to GDARD. Section 21 (c) & (i) are triggered by the activities.

If yes, have you applied for the water use permit(s)? **YES✓**
If yes, have you received approval(s)? (attached in appropriate appendix) **NO ✓**

A Water Use License Application will be submitted to Department of Water and Sanitation (DWS) concurrently with the availability of the DBAR. The DBAR will also be made available to the Department of Water and Sanitation for comment during the DBAR review period.

3. POWER SUPPLY

Please indicate the source of power supply e.g. Municipality / Eskom / Renewable energy source

The development will not require power supply during its operation phase. However generators will be used as a source of power if needed during the construction phase.

If power supply is not available, where will power be sourced from?

Please see above.

4. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Constructed wetlands are a highly energy efficient and sustainable method of treating polluted water. If all the sewage in the stream were to be diverted to a formal treatment works the increased energy demand would be significant. Hence the scheme is inherently energy efficient, and it could help point the way forward for long-term treatment solutions as our existing works need to be upgraded or expanded.

In other activities (construction and operation) the scope of work will be structured in a way that, where possible, the use of labour intensive methods will be employed. Not only will it serve the local community but it also saves the use of Pneumatic Equipment that requires a lot of energy input.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

The proposed development is not an energy-intensive development that will require energy/electricity input for its continued operations and will therefore not consume energy during its operation phase.

SECTION E: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts as well as the impacts of not implementing the activity (Section 24(4) (b) (i).

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summaries the issues raised by interested and affected parties.

1. I'm a concerned citizen of South Africa residing at Clayville (Olifantsfontein). We have been experiencing and affected by sewer / sewerage smell around Clayville area and it is getting worse by the week. We would like this matter addressed in accordance to help us and get rid of this rather unpleasant growing smell.
2. I think this project will be very beneficial to us as residents though I don't know what project entails. For past 5 years we tried to level the area but we could not win because we were using community contributions. I attached one photo just to see how far we went trying to fix the place as playing space for kids so that they don't play next to the stream, the drainage in our area they just flow into the bush not directly to the stream, if undergrounds pipes can be installed to flow to the stream it will be much better.

As this is the Draft Basic Assessment Report at present, it will be submitted for comment to the local authority and as well as to other stakeholders. Once comments have been received at the end of the 30-day review period, they will be recorded and reflected in the Final Basic Assessment Report.

Summary of response from the practitioner to the issues raised by the interested and affected parties (including the manner in which the public comments are incorporated or why they were not included)
(A full response must be provided in the Comments and Response Report that must be attached to this report):

1. As part of the proposed rehabilitation measures, Water quality treatment is one of the priorities of the scheme, this will be achieved through the Phase 2: Concept Scheme 4B (sewage treatment and litter capture) whereby breakdown of sewage pollution in the Kaalspruit. Further information will be provided in this regard when the DBAR will be made available for public review.
2. Part of the reason for the project's "wetland rehabilitation" focus is the stabilisation of the Kaalspruit in the project area, this will be achieved as part of "River stabilization", and this implies stopping erosion and sediment loss.

Details of this correspondence has been captured in the Comments and Responses Report (refer to **Appendix 6**).

2. IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION AND OPERATIONAL PHASE

Briefly describe the methodology utilized in the rating of significance of impacts

The purpose of impact assessment is to assign relative significance to predicted impacts associated with the

project, and to determine the manner in which impacts are to be avoided, mitigated or managed. The potential environmental impacts were identified based on the nature of the receiving environment, a review of the proposed activities, and the issues raised in the public participation process.

The potential impacts of the proposed development were identified through a site visit, the Environmental Assessment Practitioners experience and expertise in the field and specialist study reports. In the Basic Assessment Report, the potential impacts are broadly identified and outlined. An assessment of the potential impacts is provided, identifying the impacts that are potentially significant and recommending management and mitigation measures to reduce the impacts. In general, it is recognized that every development has the potential to pose various risks to the environment as well as to the residents or businesses in the surrounding area. Therefore, it is important that these possible risks are taken into account during the pre-construction phase of the development.

In accordance with the requirements from the EIA Regulations 2014 GN 982, Regulation 19 (3) and as set out in Appendix 1, the following impacts of the issues identified through the basic assessment phase were assessed in terms of the following methodology. All impacts are assessed according to the following criteria.

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected.
  - The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate with
  - a score of 1 being site specific,
  - 2 = local (site + immediate surrounds),
  - 3 = regional (the impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns) ,
  - 4 = national and
  - a score of 5 being international (where the impact has international ramifications that extend beyond the boundaries of South Africa).

- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or;
  - Permanent - assigned a score of 5.

- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

- The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:

- Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
- Assigned a score of 2 is improbable (some possibility, but low likelihood);
- Assigned a score of 3 is probable (distinct possibility);
- Assigned a score of 4 is highly probable (most likely); and
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which is described as positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:
S= (E+D+M) P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance** weightings for each potential impact are as follows:

- < **30 points**: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- **30-60 points**: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- **>60 points**: High (i.e. Impact is significant, mitigation is critical to reduce impact or risk. Resulting impact could influence the decision depending on the possible mitigation. An impact which could influence the decision about whether or not to proceed with the project.).

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the **CONSTRUCTION and OPERATION PHASE** for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

2.1 IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION PHASE

A summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the **CONSTRUCTION PHASE** of the **Phase 1** and **Phase 2** of the proposed Olifantsfontein rehabilitation measures along Kaalspruit.

a) Phase 1 (Concept Scheme 5): Channel stabilisation and sediment control.

Table 5: Phase 1 (Concept Scheme 5): Preferred Design (Armoured channel) and Alternative1 Design (Vegetation lined channel) Construction Impacts

*(Note: As the impacts of the Preferred Design (Armoured channel) and Alternative 1 Design (Vegetation lined channel) do not differ significantly, the table below describes the impact for both **alternatives;** where the two alternatives differ **in impacts,** reference is made accordingly).*

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
IMPACT ON WATERCOURSES (Clearing of areas for infrastructure; Temporary offices & laydown areas; Access routes and points' Cutting of channels; Vehicle & machine activity; Stabilization of banks; Construction of structure foundations; Setting of litter traps)		
Nature of the Impact: Siltation/sedimentation of watercourse. • Earthwork activities when constructing • Clearing of surface vegetation will expose the soils, which in rainy events would wash into the rivers or streams e, causing sedimentation.	Most of the works in Phase 1 will be directly on the river banks, excavating and reshaping the banks and armouring as necessary. Therefore some loss of river bank material into the normal streamflow is unavoidable. However, due to the already high sediment loads in the river, the construction works are not expected to worsen conditions. Work should be undertaken in the dry season, thereby minimising erosion risk in the construction area.	Expected to be limited provided that the mitigation measures are implemented correctly

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>

- Erosion (e.g. gully formation, bank collapse)

Description	Without Mitigation	With Mitigation
Probability	Probable (3)	Improbable (2)
Duration	Short-term (2)	Short-term (2)
Extent	Site (1)	Site (1)
Magnitude	Low(4)	Minor (2)
Significance	**21 (Low)**	**10 (Low)**
Status (positive, negative or neutral)	Negative	Negative

This impact is assessed to be of low risk and of short term since sedimentation is one of the biggest issue the site is currently facing, with proper mitigations, this impact can be reduced to a much lower significance.

</td><td>

For works and construction yard away from the river banks the additional requirements below will apply:

- Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the ECO
- The contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter watercourses. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken
- Sediment barriers should be installed immediately after initial disturbance of the watercourse or adjacent upland
- Where wetlands are adjacent to the construction areas and these areas slopes toward the wetland, install sediment barriers along the edge of the construction areas as necessary to prevent sediment flow into the wetland.
- Sediment barriers must be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls or restoration of adjacent upland areas is complete
- It is important that topsoil should be conserved in areas where bedrock is shallow to avoid sedimentation
- Run-off from the camp site must not discharge into neighbours' properties or into adjacent wetlands, rivers or streams
- Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.

</td><td></td></tr>
<tr><td colspan="3">IMPACT ON VEGETATION</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr>
<td>Nature of the Impact: <u>Loss and disturbance of watercourse habitat</u>

• Loss and disturbance of watercourse habitat and fringe vegetation due to direct development on the watercourse;
• Natural riparian vegetation composition is virtually none existent. Any remaining vegetation is alien and even that little habitat it may offer is disturbed by erosion, collapsing banks and occasional sand mining.
• Historic wetlands are no longer functional and transformed by agriculture. Any remaining moist grassland communities are limited to very small patches directly adjacent to the Kaalspruit (<10% of the project area).
• The banks have undergone severe erosion in most instances and limited vegetation cover is present on the banks of the Kaalspruit and its tributaries.
• Habitat structure is continually disturbed by flash floods and erosion. Habitat function is negated by severe sewage pollution.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Probable (3)</td></tr>
</table>
</td>
<td>▪ Proposed works in Phase 1 will be directly on the river banks, excavating and reshaping the banks and armouring, generally, this technology does not allow for the rehabilitation of watercourse habitat, therefore no mitigation measures are possible.</td>
<td>None</td>
</tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Duration</td><td>Permanent (5)</td><td>Permanent (5)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Negligible (0)</td><td>Negligible (0)</td></tr>
<tr><td>Significance</td><td>21 (Low)</td><td>21 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negligible</td><td>Negligible</td></tr>
</table>
Based on the limited vegetation onsite, this impact is assessed to be of negligible significance
</td><td></td><td></td></tr>
<tr><td>
Nature of the Impact: <u>Possible Spread of alien invasive species</u>

• The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Very improbable (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Minor (2)</td></tr>
</table>
</td><td>
▪ Alien invasive species (i.e. invasive woody species including Populus spp. and Acacia mearnsii, Arundo donax) that were identified within the study site should be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation
▪ All alien seedlings and saplings must be removed as they become evident for the duration of construction.
▪ All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.
▪ Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate
</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Significance</td><td>27 (Low)</td><td>12 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>

This impact is assessed to be low as the majority of the vegetation composition on site consists mainly of introduced, alien and/or ruderal species, the risk of further spread can be substantially reduced to a much lower to negligible significant</td><td>corrective action where invasive species are observed to establish.
▪ Rehabilitate or vegetate disturbed areas</td><td></td></tr>
<tr><td colspan="3">VISUAL IMPACTS</td></tr>
<tr><td>Nature of the Impact: Visual Impacts

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Short-term (2)</td><td>Short-term (2)</td></tr>
<tr><td>Extent</td><td>Limited to Local Area (2)</td><td>Limited to Local Area (2)</td></tr>
<tr><td>Magnitude</td><td>Medium (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Medium)</td><td>20 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>▪ Ensure that no litter, refuse, waste, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent or surrounding properties including road verges, roads or public places and open spaces during or after the construction period. All waste/litter/rubbish etc. must be disposed of at an approved dumping site as approved by the Council.
▪ Bare surfaces must be rehabilitated as soon as possible with indigenous vegetation that will be able to grow in the area;
▪ The landscape must be rehabilitated in such a way that it corresponds to the surrounding topography;
▪ Should overtime/night work be authorized, the Contractor shall be responsible to ensure that lighting does not cause undue disturbance to neighboring residents. In this situation low flux and frequency lighting shall be utilized.</td><td>The risk is low provided the mitigation measures are implemented</td></tr>
<tr><td colspan="3">HERITAGE IMPACT</td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of heritage</td><td>▪ Nonetheless, should graves, fossils or any archaeological artefacts be</td><td>N/A</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>sites due to the development.
There are no heritages or archeological resources identified at the project site. Therefore this impact will not be assessed further in this basic assessment report</td><td>identified during construction, work on the area where the artefacts were found, must cease immediately and it should immediately be reported to a heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</td><td></td></tr>
<tr><td colspan="3">SOCIAL IMPACTS</td></tr>
<tr><td>Nature of the Impact: Livelihoods improved during construction

• Labour will be required for construction activities of the proposed development. It is therefore expected that jobs will be created during the construction period.
• The construction labour requirements have not been estimated as yet. It is expected that much of the work will require mechanised construction methods because of the bulk of the works. However, there will also be a need for manual labour construction methods. The construction of the full scheme may run over 7 to 10 years as it will need to be developed in phases.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Very short-term (1)</td><td>Very short-term (1)</td></tr>
</table>
</td><td>▪ The project must increase the possibility that locals are employed and involved in the rehabilitation.
▪ This provides the opportunity for affected communities to benefit, but also provides an opportunity to raise awareness amongst affected communities about the benefits of the project.</td><td>Construction can provide a limited number of jobs. There will therefore not be enough jobs on offer compared with the number of people that apply.

It is very likely that there will be some disturbance to subsistence agriculture in the floodplain during construction of phase 1</td></tr>
</table>

Potential impacts:			Proposed mitigation:	Risk of the impact and mitigation not being implemented
Extent	Limited to site(1)	Limited to site (1)		
Magnitude	Low (4)	Low (4)		
Significance	**Low (18)**	**Low (24)**		
Status (positive, negative or neutral)	Positive	Positive		

b) Phase 2[2] (Concept Scheme 4B): litter management and water quality treatment.

Table 6: Phase 2 (Concept Scheme 4B): Preferred Design (Constructed Wetland system) and Alternative 1 Design (Ecological Wetland system) Construction Impacts

(Note: As the impacts of the Preferred Design (Constructed Wetland system) and Alternative 1 Design (Ecological Wetland system) do not differ significantly, the table below describes the impact for both alternatives; where the two alternatives differ in impacts, reference is made accordingly).

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td colspan="3">IMPACT ON WATERCOURSES
(Clearing of areas for infrastructure; Temporary offices & laydown areas; Access routes and points' Cutting of banks / channels; Vehicle & machine activity; Stabilization of banks; Construction of structure foundations; Construction of diversion channel, weirs and Artificial wetland, and Setting of litter traps)</td></tr>
<tr><td>Nature of the Impact: Siltation/sedimentation of watercourse.

• Earthwork activities when constructing
• Clearing of surface vegetation will expose the soils, which in rainy events would wash into the rivers or streams e, causing sedimentation.
• Disturbance of soil surface
• Disturbance of slopes through creation of roads and tracks adjacent to the watercourse
• Erosion (e.g. gully formation, bank collapse)

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Short-term (2)</td><td>Short-term (2)</td></tr>
</table>
</td><td>▪ Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the ECO
▪ The contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter watercourses. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken
▪ Sediment barriers should be installed immediately after initial disturbance of the watercourse or adjacent upland
▪ Where wetlands are adjacent to the construction areas and these areas slopes toward the wetland, install sediment barriers along the edge of the construction areas as necessary to prevent sediment flow into the wetland.
▪ Sediment barriers must be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion</td><td>Expected to be limited provided that the mitigation measures are implemented correctly</td></tr>
</table>

2 Phase 2 may include Concept Scheme 6 which entails the diversion of part of the DWF

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low(4)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>28 (Low)</td><td>15 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>

This impact is assessed to be of low risk and of short term since sedimentation is one of the biggest issue the site is currently facing, with proper mitigations, this impact can be reduced to a much lower significance.
</td><td>controls or restoration of adjacent upland areas is complete
▪ It is important that topsoil should be conserved in areas where bedrock is shallow to avoid sedimentation
▪ Run-off from the camp site must not discharge into neighbours' properties or into adjacent wetlands, rivers or streams
▪ Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.</td><td></td></tr>
<tr><td>Nature of the Impact: <u>Impeding the flow of water and altering the flow dynamics of the river.</u>

• The source of this impact includes the compaction of soil and the clearing of vegetation for the constructed wetland, which may change the quantity and fluctuation properties of the watercourse by for example obstructing water flow.
• This impact is not really relevant to the operational phase unless huge spills are experienced

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Improbable (2)</td><td>Very Improbable (1)</td></tr>
</table>
</td><td>▪ Construction affecting watercourses must be restricted to the dryer winter months.
▪ Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMPr.
▪ High energy stormwater input into the watercourses should be prevented at all cost.
▪ Changes to natural flow of water (surface water as well as water flowing within the soil profile) should be taken into account.</td><td>Very low risk provided that the suggested mitigations are implemented.</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Duration</td><td>Short-term (2)</td><td>Very short-term (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>18 (Low)</td><td>4 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of the Impact: <u>Changes in water quality due to foreign materials and increased nutrients.</u>

• Construction activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage in the rivers.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Improbable (2)</td><td>Very Improbable (1)</td></tr>
<tr><td>Duration</td><td>Short-term (2)</td><td>Very short-term (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>18 (Low)</td><td>4 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>▪ Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.
▪ Provision of adequate sanitation facilities located outside of the watercourse area or its associated buffer zone
▪ The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.
▪ After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use.
▪ Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer.
▪ Control of waste discharges
▪ Maintenance of buffer zones to trap sediments with associated toxins</td><td>Very low risk provided that the suggested mitigations are implemented.</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>It is not anticipated that construction activities will have a noticeable impact on the water quality of the site as the condition on site is that the Present Ecological State (PES) for the Kaalspruit is very poor coupled with excessive amount of litter. Therefore, this impact is assessed to be of low risk and with best environmental practice onsite, the significance of this impact can be lowered further to almost negligible.</td><td></td><td></td></tr>
<tr><td colspan="3">IMPACT ON VEGETATION</td></tr>
<tr><td>Nature of the Impact: <u>Possible Spread of alien invasive species</u>

• The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Very Improbable (1)</td></tr>
<tr><td>Duration</td><td>Short-term (2)</td><td>Very Short-term (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Minor (2)</td></tr>
</table>
</td><td>▪ Alien invasive species (i.e. invasive woody species including Populus spp. and Acacia mearnsii, Arundo donax) that were identified within the study site should be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation
▪ All alien seedlings and saplings must be removed as they become evident for the duration of construction.
▪ All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.
▪ Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Significance</td><td>24 (Low)</td><td>4 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Positive</td></tr>
</table>

This impact is assessed to be very low significance as Phase 2 will replace all the vegetation in the study area which mainly consists of introduced, alien and/or ruderal species, the risk of further spread can be substantially reduced to a much negligible significant.
</td><td>corrective action where invasive species are observed to establish.
Rehabilitate or vegetate disturbed areas</td><td></td></tr>
<tr><th colspan="3">IMPACT ON FAUNA</th></tr>
<tr><td>Nature of impact: <u>Changes to the faunal community due to habitat loss and transformation</u>

Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Improbable (2)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short- term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>14 (Low)</td><td>12 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>▪ Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer.
▪ Regular dust suppression during construction, especially along access roads which are used frequently.
▪ No construction activity should be allowed at the site between sunset and sunrise.
▪ All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.
▪ All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.</td><td>Expected to be limited provided that the mitigation measures are implemented</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td colspan="3">VISUAL IMPACTS</td></tr>
<tr><td>Nature of the Impact: Visual Impacts

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Short-term (2)</td><td>Short-term (2)</td></tr>
<tr><td>Extent</td><td>Limited to Local Area (2)</td><td>Limited to Local Area (2)</td></tr>
<tr><td>Magnitude</td><td>Medium (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Medium)</td><td>20 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>• Ensure that no litter, refuse, waste, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent or surrounding properties including road verges, roads or public places and open spaces during or after the construction period. All waste/litter/rubbish etc. must be disposed of at an approved dumping site as approved by the Council.
▪ Bare surfaces must be rehabilitated as soon as possible with indigenous vegetation that will be able to grow in the area;
▪ The landscape must be rehabilitated in such a way that it corresponds to the surrounding topography;
▪ Should overtime/night work be authorized, the Contractor shall be responsible to ensure that lighting does not cause undue disturbance to neighboring residents. In this situation low flux and frequency lighting shall be utilized.</td><td>The risk is low provided the mitigation measures are implemented</td></tr>
<tr><td colspan="3">HERITAGE IMPACT</td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of heritage sites due to the development.

There are no heritages or archaeological resources identified at the project site. Therefore this impact will not be assessed further in this basic assessment report</td><td>▪ Nonetheless, should graves, fossils or any archaeological artefacts be identified during construction, work on the area where the artefacts were found, must cease immediately and it should immediately be reported to a heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</td><td>N/A</td></tr>
<tr><td colspan="3">AGRICULTURAL POTENTIAL IMPACTS</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>Nature of the Impact: <u>Loss of low potential agricultural land</u>

• The large part of the scheme is proposed on the structured soil area which considered being of low agricultural potential as well as unsuitable for crop production due to the effects on water quality and increased sediment loads on the river.
• The significance of the direct occupation of the constructed wetland footprint on this soil is low due to its limited agricultural potential.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Permanent (5)</td><td>Permanent (5)</td></tr>
<tr><td>Extent</td><td>Limited to site (1)</td><td>Limited to site (1)</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>40 (Medium)</td><td>40 (Medium)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>▪ None possible as all the land in the project area will be taken up by the scheme by means of the constructed wetland.</td><td>Low, due to the low agricultural potential of the soil, although no mitigation measure possible</td></tr>
<tr><td>Nature of the Impact: <u>Loss of high potential agricultural land</u>

• A smaller portion of the scheme is proposed on the Hutton soil form areas are which are considered to be of high agricultural potential as these soils have</td><td>▪ Loss of agricultural land is a long term loss and no mitigation measures exist</td><td>None</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
adequate rooting depth potential, suitable physical properties and an inherent pH buffering potential (to counter acidification that may result from nitrogen fertiliser use) due to the dolomite parent materials.
• The overall cumulative impact of reduction in the agricultural potential in the region is considered low at present due to the limitations on the fact that the catchment is characterised by extensive urban development and therefore the flooding frequencies are significantly higher than in rural areas where flood plain agriculture is practiced.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Permanent (5)</td><td>Permanent (5)</td></tr>
<tr><td>Extent</td><td>Limited to site (1)</td><td>Limited to site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>70 (High)</td><td>70 (High)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>

The combined impact on productive agricultural soils is estimated as a weighted combination of the two impacts. It is estimated that the high potential agricultural soils cover approximately 15% of the project area. This infers a weighted value of significance of 24.1, which remains to be an overall Low level of significance.
</td><td></td><td></td></tr>
</table>

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
SOCIAL IMPACTS		
Nature of the Impact: Increased poverty during construction of Phase 2. • There is subsistence farming on private and municipal-owned land adjacent to the Kaalspruit . The farmers said that they were residents of Clayville and surrounding areas including Tswelopele, Duduza, Winnie, Ebony Park and Ivory Park. The land is being occupied illegally and farmers who were consulted said they were willing to move to another piece of land. Crops provide food for their households, and some farmers barter crops such as maize for bread, and sell crops such as spinach to raise money to cover schooling and other household expenses. The farmers explained that most of them were not employed elsewhere, and that they were growing crops on this land for more than 10 years. • The project Planning and Viability Report describes the limited space for the wetland phase (Phase 2) of the scheme. Maximum use of space is therefore required for the scheme to perform efficiently. Farmers therefore will lose access to the land when phase 2 is constructed. It is expected that Phase 1 of the project will be undertaken over 3 years.	▪ Farmers currently do not have secure legal access to the land, and therefore no right to use the land. Subsistence farmers are thus already in an insecure situation even without the project going ahead. Farmers may move of their own accord but if they do not have legal access to land they will continue to be vulnerable. The project has highlighted their plight. The farming activity is a critical source of food and livelihood for them. ▪ It is recommended that the project footprint for Phase 2 be determined in the first year of implementing Phase 1. Negotiations will then have to be initiated with affected landowners, and agreements reached on which portions of their properties they are willing to sell for incorporation into the scheme. Delineation of the land required for the wetland will also indicate which farmers will have to move off the land. Municipal and private land owners should be requested to allow farmers to continue their farming activities for 18 months, while they engage with relevant government departments to secure alternative land. ▪ The approach to developing the management measures acknowledges that the multi-sectoral nature of food security requires inputs from various sectors such as social development, agricultural support, local economic development, land use planning, land affairs, education, and enforcement. The Gauteng Department of Agriculture explained that the EMM Social Development function responsible for food security has secured land for subsistence farming by obtaining permission from	If mitigated timeously, there should be no residual risks

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr>
<td>Construction for Phase 2 of the project, therefore, will at the earliest, commence 3 years after Phase 1 starts.
• Although farmers are occupying the land illegally, removing people's access to the land during Phase 2 will be equivalent to economic displacement. This will result in the loss of the access to land, for families to grow food. Starvation and consequently poverty will therefore deepen if farmers do not secure access legally to alternative land to continue their subsistence farming.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Improbable (1)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Very short- term (1)</td></tr>
<tr><td>Extent</td><td>Local (1)</td><td>Local (1)</td></tr>
<tr><td>Magnitude</td><td>High(8)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>48 (Medium)</td><td>4 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>schools and other state institutions to allow people to grow food on its properties. The Agriculture department also explained that as the farmers are using their crops to barter for bread, and sell their crops for a small income, they are part of the local economy. The EMM Local Economic Development should therefore, according to the Agriculture department, assist the farmers with progressing its LED activity. The Government is the proponent in this case, and will have to seek a solution through Inter-Governmental Co-operation.
▪ The three government stakeholders EMM Social Development, EMM Economic Development and Gauteng Department of Agriculture, responsible for food security, local economic development and subsistence agriculture respectively, will be invited to a focus group meeting with the subsistence farmers, to be held during the public participation process. The departments will be requested to explain their Constitutional mandates to farmers in terms of subsistence farming and local economic development, and advise farmers on possible processes to legally secure land to continue subsistence farming. Outcomes from the meeting will be used to prepare the mitigation measures and time-frames to manage this impact. It is acknowledged that other government departments will have to be involved as the need arises. The Law Enforcement function in the EMM, for instance, will have to police the area once farmers leave, to ensure that other farmers do not illegally occupy the land.
▪ Management measures must be considered in light of the Constitutional Right to Access to Food. According to the Human Rights Commission, Government must create an enabling environment for people to grow or</td>
<td></td>
</tr>
</table>

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
	obtain adequate food for themselves and their families. The Commission acknowledged that each adult must feed themselves and their families, through engaging in legal activities. If citizens are unable, for reasons beyond their control, to enjoy the right to adequate food, government is obliged to directly provide access to that right. ▪ Although not compulsory, reference can be made to international good practice in the IFC's PS5 (IFC, 2012) and Handbook for Preparing a Resettlement Action Plan (IFC Environment and Social Development Department, 2002) to inform the preparation of management measures. One of the IFC principles is that where people are using land they have no rights over, then their livelihoods being supported by this land must be restored where there is involuntary resettlement. Another principle is that involuntary resettlement be treated as an opportunity for improving the livelihoods of the affected people, and should be undertaken with this in mind. The proposed wetland project therefore affords potential to conceive a thriving sustainable urban agriculture project, building on the current strengths of the subsistence farmers in the area. Opportunities can be created for extending the project to a commercial one, growing high value and in-demand crops such as Moringa (personal communication, Mr. Y. Mitha, 2017). This can allow subsistence farmers to get out of a subsistence mode and into an entrepreneurial one	
Nature of the Impact: <u>Livelihoods improved during construction</u> o Labour will be required for construction activities of the proposed development. It is therefore expected	▪ The project must increase the possibility that locals are employed and involved in the rehabilitation. ▪ This provides the opportunity for affected communities to benefit, but also provides an opportunity to raise awareness amongst affected communities about the benefits of the project.	Construction can provide a limited number of jobs. There will therefore not be enough jobs on offer compared with the number

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>that jobs will be created during the construction period.
o The construction labour requirements have not been estimated as yet. It is expected that much of the work will require mechanised construction methods because of the bulk of the works. However, there will also be a need for manual labour construction methods. The construction of the full scheme may run over 7 to 10 years as it will need to be developed in phases.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Very short-term (1)</td><td>Very short-term (1)</td></tr>
<tr><td>Extent</td><td>Limited to site(1)</td><td>Limited to site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>Low (18)</td><td>Low (24)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td>of people that apply.

It is very likely that there will be disturbance to subsistence agriculture in the floodplain during construction of phase 2</td></tr>
<tr><td colspan="3">AIR QUALITY IMPACT</td></tr>
<tr><td>Nature of the Impact: Dust generation</td><td>▪ Continuous watering of the site should be carried out to prevent dust</td><td>If mitigated timeously, there</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr>
<td>

Clearance of vegetation will expose bare ground and movement of heavy duty vehicles and machinery on site will generate dust.
The increased dust resulting from construction activities (vegetation clearing, site preparation, earthworks, uncovered topsoil stockpiles and sand piles and loads on vehicles), vehicles, plant and machinery poses a health hazard to construction staff and people living and working in the vicinity of the site.
The overall impact on the environment is likely to be of low significance as the will not release emissions into the atmosphere and impacts associated with dust and vehicle emissions will be localised.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Short-term (2)</td><td>Very short-term (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>24 (low)</td><td>8 (moderate)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>
pollution during windy and dry conditions.

A continuous dust monitoring process needs to be undertaken during construction.
Speed restriction of 20km/h must be implemented for all construction vehicles.
All vehicles transporting friable materials such a sand, rubble etc must be covered by a tarpaulin or wet down.
Construction work to be undertaken during weekdays as far as practical.
No burning of refuse or vegetation is permitted.

</td>
<td>should be no residual risks</td>
</tr>
</table>

2.2 IMPACTS THAT MAY RESULT FROM THE OPERATION PHASE

A summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the **OPERATION PHASE** of the **Phase 1 and Phase 2** of the proposed Olifantsfontein rehabilitation measures along Kaalspruit.

a) **Phase 1 (Concept Scheme 5):** Channel stabilisation and sediment control

Table 7: Phase 1 (Concept Scheme 5): Preferred Design (Armoured channel) and Alternative1 Design (Vegetation lined channel) Operational Impacts

*(Note: As the impacts of the Preferred Design (Armoured channel) and Alternative 1 Design (Vegetation lined channel) do not differ significantly, the table below describes the impact for both **alternatives;** where the two alternatives differ **in impacts,** reference is made accordingly).*

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
IMPACT ON WATERCOURSES		
Nature of the Impact: Stabilisation of the river banks • There is a clear need for work on channel stability to reduce erosion and sediment loads in the catchment • Part of the reason for the project's "wetland rehabilitation" focus is the stabilisation of the Kaalspruit in the project area, stopping erosion and sediment loss. • This will be achieved by confining normal flow and flood flows which will be straightened to some extent, and by stabilising banks to limit erosion. **Description** | **Without enhancement** | **With enhancement**	Enhancements: ▪ Do not allow erosion to develop on a large scale before taking action. ▪ Make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas. ▪ Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area. ▪ Remove only the vegetation where essential for maintenance purposes and do not allow any disturbance to the adjoining natural vegetation cover. The grassland can be removed as sods and re-established after construction is completed. ▪ Protect all areas susceptible to erosion (especially the sloped rocky grassland) and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.	None

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Probability</td><td>Highly Probable (5)</td><td>Highly Probable (5)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>High (8)</td></tr>
<tr><td>Significance</td><td>60 (High)</td><td>70 (High)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of the Impact: <u>Sedimentation control</u>

• According to the DWS directive High sediment loads due to stream bank erosion is amongst the reasons for the severe degradation in the Kaalspruit, Olifantspruit and Hennops River system. Centurion Lake has reported particular impacts of sedimentation and pollution over the years.
• The two main sources of suspended sediments are inflow from the upstream catchment areas and erosion of the river channel in the project area.
• According to the Planning & Viability Report by Fourth Element, sediment load is not only an environmental risk to the river system; it is also a risk to the successful operation of the scheme. Constructed wetlands and natural wetland systems are highly</td><td>Enhancements:
▪ Rehabilitated vegetation should not be impacted on by maintenance.
▪ Maintenance activities should not impact on rehabilitated areas and where soil or vegetation disturbances took place, this should be rehabilitated immediately.
▪ Runoff from the maintenance footprint must be managed to avoid erosion and pollution problems.
▪ To ensure that the proposed sediment traps function effectively, monthly would be recommended (cleaning and clearing inlet and out structures) with sediment removal considered annually (depending on build-up).</td><td>Expected to be low</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
susceptible to sediment deposition and build-up which affects the hydraulic performance and physical stability of the wetland.
• It is therefore intended to introduce sediment traps at the upstream locations of the scheme. These will be designed to treat suspended sediments in storm flows which carry the bulk of the mineral sediment load.

<table>
<tr><th>Description</th><th>Without enhancement</th><th>With enhancement</th></tr>
<tr><td>Probability</td><td>Highly Probable (5)</td><td>Highly Probable (5)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>High (8)</td></tr>
<tr><td>Significance</td><td>65 (High)</td><td>75 (High)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>
Nature of the Impact: <u>Control of spread of alien invasive species</u>

All riparian vegetation (mainly alien invasive species) will be removed with the implementation of Phase 1

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
</table>
</td><td>▪ Vegetation in and around the scheme need to be carefully managed and maintained.
This will be a substantial improvement to the vegetation in the project area and downstream.</td><td>None</td></tr>
</table>

<table>
<tr><th colspan="2">Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td colspan="2"><table>
<tr><td>Probability</td><td>Probable (3)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>27 (Low)</td><td>30 (Medium)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table></td><td></td><td></td></tr>
<tr><td colspan="4">SOCIAL IMPACTS</td></tr>
<tr><td colspan="2">Nature of the Impact: <u>Improved land values and greater investment opportunity</u>

• Phase 1 of the project will control sediment and stabilise the river channel.
• Further, sediment traps will be provided in the upstream sections on both Kaalspruit and Clayville arms, to manage sediment from upstream. An outfall weir at the confluence with the Olifantspruit will provide further erosion protection. Stabilising the banks will result in retaining topsoil as well as retaining the land area.
• Riparian private and public landowners, including the City of Ekurhuleni, along the banks of the Kaalspruit and downstream of it, will benefit from sediment</td><td>▪ There are several interventions that can enhance the impact. The project has assisted in highlighting dangerous and illegal practices occurring in the area. Some of these activities carry high health risks to people. Other practices, if they are not curtailed and if they escalate, can burden the scheme over time.
▪ It is recommended that the EMM rehabilitation project management team co-ordinate addressing the socio-economic aspects of this project during Phase 1.
▪ The EMM waste management function must be engaged, to discuss solutions to manage waste better so that it does not continue to stress the Kaalspruit. The Hennops Catchment Management Forum is planning capacity building, awareness and education activities related to the Hennops River system. It can be an ally to promote awareness and understanding of the scheme and the impact of illegal activities on the river system. The forum will be engaged during the public participation</td><td>It will be necessary to monitor sand mining in the longer term, to ensure that illegal mining does not put pressure on the scheme over the long term. Variable water quality (including from variable sedimentation levels) may lead to variable performance of the scheme, and is likely to require more intensive maintenance. Enhancement measures including monitoring will be dependent on the capacity of</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr>
<td>control.
• The project construction of stabilizing the banks in will reduce sedimentation, thereby restoring or improving the land value downstream over time during operations.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium-term (3)</td><td>Long-term (4)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>High(8)</td><td>Very High (10)</td></tr>
<tr><td>Significance</td><td>Medium (42)</td><td>Medium (51)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td>
<td>process, to determine its resources for implementing awareness programmes.
▪ The alleged irrigation of crops with sewage, sand mining and sewage mining points to a larger problem. Many people are unemployed and turning to hazardous, illegal and destructive ways to make a living. These practices are not only found in Ekurhuleni, but across the country. If these people are ineligible for a social grant, the state is unable to meet its obligation of Section 27 of the Constitution. Government departments responsible for economic development will be consulted during the public participation process of the EIA, to understand how unemployed people can be supported to enable them to pursue legal livelihoods, and thereby refrain from destructive activities that threaten the sustainability of natural resource capital.</td>
<td>government departments and if the Hennops Catchment Management Forum has resources to assist with long term education and awareness. The persistence of residual risks therefore is dependent on whether there is the initial capacity to address them in the short and long terms.</td>
</tr>
</table>

b) Phase 2[3] (Concept Scheme 4B): litter management and water quality treatment

Table 8: Phase 2 (Concept Scheme 4B): Preferred Design (Constructed Wetland system) and Alternative 1 Design (Ecological Wetland system) Operational Impacts

(Note: As the impacts of the Preferred Design (Constructed Wetland system) and Alternative 1 Design (Ecological Wetland system) do not differ significantly, the table below describes the impact for both alternatives; where the two alternatives differ in impacts, reference is made accordingly).

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
IMPACT ON WATERCOURSES		
Nature of the Impact: Litter management • According to the Planning & Viability Report by Fourth Element, a prevalence of backyard shacks and informal settlements has been observed in areas such as Tswelopele in Tembisa whereby each stand now houses two to four families instead of one, with knock on impacts on waste disposal. Damage caused by blocking of stormwater infrastructure is also evident in the catchment area. • The existence of the litter in the project area has a number of impacts: o It affects the aesthetics of the environment. o There are potential health hazards which can be associated with excess volumes of litter. o Aquatic fauna area at risk. o It aids in the distribution and accumulation of pathogenic, carcinogenic and toxic substances. o It is a financial burden as it requires time and	Enhancements: ▪ Treatment of litter at source would not only reduce the design requirements of this Kaalspruit scheme, but it would also reduce damage cost and maintenance in the catchment area.	High litter load within the catchment

[3] Phase 2 may include Concept Scheme 6 which entails the diversion of part of the DWF

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>money to control and manage.
• Two ideal locations for litter traps are proposed, these are areas where a step exists in the natural drainage route or floor of the water course (please refer to Appendix I3: Planning & Viability Report). This will provide the hydraulic head needed for the operations of the trap. For the project area, the land available to include the complete solution, i.e. sediment traps and wetland area, requires the litter traps to be as far as possible upstream in the available project area.

<table>
<tr><th>Description</th><th>Without enhancement</th><th>With enhancement</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>52 (Medium)</td><td>65 (High)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of the Impact: <u>Improved water quality</u>

According to the Planning & Viability Report by Fourth</td><td><u>Enhancements:</u>
▪ Should performance on water quality treatment appear to be successful, the final FWS wetland cells may be converted to more natural wetland</td><td>Poor water quality within the catchment</td></tr>
</table>

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
Element: • The Present Ecological State (PES) for the Hennops system is "Seriously Modified" (Class E), but the Ecological Sensitivity is "High" and linked to fish species rarity and sensitivity to water quality and flow modification. • Central to suitable conditions for aquatic life is the dissolved oxygen levels in the water and levels of saturation. These need to be above 5mg/l and between 80% and 120% respectively. Current levels in the Kaalspruit are well below these levels (<3mg/l, and 22% to 47 %,). • A cause of the low oxygen levels are the high Bacteriological and Chemical Oxygen Demand levels (BOD and COD) in the water as indicated in Table 3.3. Clearly the Kaalspruit contributes to the poor conditions in the Hennops system. • Water quality treatment for this site can be effectively achieved by means of a constructed wetlands, the Kaalspruit stream flow has distinct sewage characteristics, particularly the dry weather flow (DWF) conditions. Treatment of municipal sewage by constructed wetland systems is considered best achieved on this site by an open water Free Water Surface (FWS) wetland • The proposed Constructed Wetlands intends to also control pollution loads in the project area • The flow in the Kaalspruit contains pathogens that are a health concern; these are mainly associated with the E.Coli and will therefore be removed as part	establishment.	

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
of the treatment of the E.Coli.
• The main disinfection opportunity will be exposure to sunlight in the open water zones of the FWS, There is also possibility of increased oxygenation of flow using a cascade profile for all weirs in the system, which will accelerate the decomposition of the E.Coli.

The potential addition of Concept Scheme 6 (the diversion of a portion of the DWF to the local sewer network) will further improve the performance and reliability of the constructed wetland. Although this enhancement is not evaluated here, by reducing the sewage load it will help address one of the most serious (and deteriorating) conditions in the Kaalspruit at present.

<table>
<tr><th>Description</th><th>Without enhancement</th><th>With enhancement</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>regional 3)</td><td>regional 3 (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
</table>
</td><td></td><td></td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Significance</td><td>52 (Medium)</td><td>65 (High)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of Impact:: Flood risk management

• A flood conveyance channel will be a necessary component of the scheme for flood risk management of adjacent properties.
• Storm flows and flood flows will be too large for the constructed wetland and need to be contained in a separate channel.
• The flood conveyance channel will offer some mitigation of flood risk due to the function of the associated sediment trap, but the lowering of downstream risk just due to this will be small.
• However, a larger benefit will arise due to reduced sediment loads and litter loads that affect the hydraulic capacity of the downstream river channel, bridges, culverts, etc. This will help reduce flood risk in the Hennops River system more noticeably.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long-term (4)</td><td>Long-term (4))</td></tr>
</table>
</td><td>Enhancements:
If the constructed wetland fills in the eroded channel and generally raised the invert level of the system, conveyance will still need to be maintained to limit flood risk to private property, and especially the right bank.</td><td>Low risk, as flooding is not the biggest concern for this area.</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>
<table>
<tr><td>Extent</td><td>Regional (3))</td><td>Regional (3))</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>High (8)</td></tr>
<tr><td>Significance</td><td>39(moderate)</td><td>45(moderate)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of Impact:: Ecological Enhancement

• According to the Planning & Viability Report by Fourth Element:, the treatment and conveyance components of the scheme will need to use the full space available to achieve the best performance possible. The anticipated treatment performance may not achieve the Target Water Quality Objectives (TWQO's) in line with SA Water Quality Guidelines (DWA, 1996), but they will still be higher than many urban stream conditions and will allow for significant positive changes in ecological conditions in the receiving system downstream (i.e. all the way to Centurion)
• The extent of ecological enhancement starts downstream of the scheme and extends at least to Centurion Lake on the Hennops River, a length of some 15km of watercourse.</td><td>Enhancements:
Ecological enhancement to be reviewed during concept design when the hydraulic modelling of the scheme may enable the refinement of the scheme such that amenity and ecological features to be considered.</td><td>None</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>

However, it is expected that there will be opportunity to provide for public access and habitat enhancement along the lines scoped by the GOA, et al (2007) study, particularly at the downstream end of the scheme where water quality conditions will have improved.
According to the Aquatic report (Appendix G2) improvement in aquatic and habitat conditions are very likely to arise, even without formal ecological design.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Permanent (5)</td><td>Permanent (5)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>High (8)</td></tr>
<tr><td>Significance</td><td>80 (High)</td><td>80(High)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of the Impact: <u>Control of spread of alien invasive species</u></td><td>▪ Vegetation in and around the scheme need to be carefully managed and maintained.</td><td>None</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>

- All riparian vegetation (mainly alien invasive species) will be removed with the implementation of Phase 1Phase 2 will remove all alien vegetation from the site, building on the benefits of Phase 1. This will substantially reduce the threat of the spread of alien species downstream.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>27 (Low)</td><td>40 (Medium)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>

</td><td>

- This will be a substantial improvement to the vegetation in the project area and downstream.

</td><td></td></tr>
<tr><td colspan="3">VISUAL IMPACTS</td></tr>
<tr><td>

Nature of the Impact: <u>Enhanced Aesthetics</u>

- According to George Orr Associates (2003), the Kaalspruit catchment is responsible for 95% of the urban litter load in that area.

</td><td>

Source controls of litter. These include the following:

- Cleansing operations or source control measures and activities that may affect stormwater quality like:
  - Better placement of bins
  - More frequent collection of litter from bins

</td><td>None</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>

The rehabilitation of the wetland would result in substantial improvements in litter management by capture and removal of litter particularly during storm and flood events.
This will improve the overall aesthetics of the area

<table>
<tr><th>Description</th><th>Without enhancement</th><th>With enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Long-term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>High (8)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>60(High)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td>

Street sweeping methods to ensure litter is not transported into drainage systems
Placing of communal collection depots

Construction activity
Business surveys
Education

</td><td></td></tr>
<tr><td colspan="3">AGRICULTURAL POTENTIAL IMPACTS</td></tr>
<tr><td>Nature of the Impact: <u>Loss of low potential agricultural land</u>

• The large part of the scheme is proposed on the</td><td>▪ None possible as all the land in the project area will be taken up by the scheme by means of the constructed wetland.</td><td>Low, due to the low agricultural potential of the soil, although no mitigation</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>structured soil area which considered being of low agricultural potential as well as unsuitable for crop production due to the effects on water quality and increased sediment loads on the river.
• The significance of the direct occupation of the constructed wetland footprint on this soil is low due to its limited agricultural potential.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Permanent (5)</td><td>Permanent (5)</td></tr>
<tr><td>Extent</td><td>Limited to site (1)</td><td>Limited to site (1)</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>40 (Medium)</td><td>40 (Medium)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td></td><td>measure possible</td></tr>
<tr><td>Nature of the Impact: <u>Loss of high potential agricultural land</u>

• A smaller portion of the scheme is proposed on the Hutton soil form areas are which are considered to be of high agricultural potential as these soils have adequate rooting depth potential, suitable physical properties and an inherent pH buffering potential (to counter acidification that may result from nitrogen fertiliser use) due to the dolomite parent materials.</td><td>▪ Loss of agricultural land is a long term loss and no mitigation measures exist</td><td>None</td></tr>
</table>

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td>

- The **overall cumulative impact** of reduction in the agricultural potential in the region is **considered low** at present due to the limitations on the fact that the catchment is characterised by extensive urban development and therefore the flooding frequencies are significantly higher than in rural areas where flood plain agriculture is practiced.

Description	Without Mitigation	With Mitigation
Probability	Definite (5)	Definite (5)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to site (1)	Limited to site (1)
Magnitude	Moderate (6)	Moderate (6)
Significance	**70 (High)**	**70 (High)**
Status (positive, negative or neutral)	Negative	Negative

The combined impact on productive agricultural soils is estimated as a weighted combination of the two impacts. It is estimated that the high potential agricultural soils cover approximately 15% of the project area. ***This infers a weighted value of significance of 24.1, which remains to be an overall Low level of significance.***

Description	Without Mitigation	With Mitigation
Significance	**24.1 (High)**	**24.1 (High)**
Status	Negative	Negative

</td><td></td><td></td></tr>
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<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td colspan="3">SOCIAL IMPACTS</td></tr>
<tr><td>
Nature of the Impact: Improved land values and greater investment opportunity downstream

• Phase 2 of the project will introduce constructed wetlands on either side of the central flood channel.
• This is meant to improve water quality and control litter within the catchment.
• In order to improve the performance of the wetland, the surface area will have to be extended from what is currently available. Some land (i.e. flood plains) adjacent to the Kaalspruit therefore will have to be incorporated into the scheme.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium-term (3)</td><td>Long-term (4)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>High(8)</td><td>Very High (10)</td></tr>
<tr><td>Significance</td><td>Medium (42)</td><td>Medium (51)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td>
▪ There are several interventions that can enhance the impact. The project has assisted in highlighting dangerous and illegal practices occurring in the area. Some of these activities carry high health risks to people. Other practices, if they are not curtailed and if they escalate, can burden the scheme over time.

▪ However, addressing these socio-economic challenges is not a straightforward matter. Sand and sewage mining, and growing crops for food are livelihood activities. From a sustainable livelihoods perspective, if people are advised to stop these illegal and destructive activities, what support is there available to them on alternative livelihood options? It is important that farmers, however, are at least made aware of the dangers of irrigating their crops with sewage water, and sewage miners are informed about the risks associated with coming into contact with raw sewage. Certain strains of E.coli in human sewage carry a risk of contracting illnesses such as diarrhoea (CDC, 2017). The risk is higher if sewage is used to irrigate crops that will not be cooked before being consumed.

▪ In order to implement interventions, it will also be necessary to identify the institutions responsible for addressing these illegal socio-economic activities. There are components of environmental health, local economic development, social welfare, water and sanitation, waste management, and law enforcement functions that will need to be undertaken. This will need a co-operative approach to be effective.

▪ As an immediate priority, as a health risk management rather than an
</td><td>
It will be necessary to monitor sand mining in the longer term, to ensure that illegal mining does not put pressure on the scheme over the long term. Variable water quality (including from variable sedimentation levels) may lead to variable performance of the scheme, and is likely to require more intensive maintenance. Enhancement measures including monitoring will be dependent on the capacity of government departments and if the Hennops Catchment Management Forum has resources to assist with long term education and awareness. The persistence of residual risks therefore is dependent on whether there is the initial capacity to address them in
</td></tr>
</table>

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
	enhancement measure, the EMM Environmental Health department must be requested to investigate allegations that crops are being irrigated with sewage. Farmers must be informed about the health risks of this activity, and warned that tampering with municipal sewage infrastructure may carry penalties. The EMM Environmental Health will be invited to address the farmers during the public participation focus group discussion. The other priority is for the EMM Water and Sanitation to warn sand miners that they can be criminally prosecuted if they continue mining the sand banks of the Kaalspruit. The EMM Water and Sanitation can report the sand miners to the Blue Scorpions if sand mining continues. The EMM waste management function must be informed that solutions to manage waste better in the long term will be required, to manage stress on the Kaalspruit. Sewage miners must also be informed by the EMM Department of Water and Sanitation that their practices are illegal, and they can be prosecuted. The Hennops Catchment Management Forum is planning capacity building, awareness and education activities related to the Hennops River system. It can be an ally to promote awareness and understanding of the scheme and the impact of illegal activities on the river system. The EMM: Water and Sanitation participates in the Hennops Catchment Management Forum. It is recommended that the EMM: Roads and Storm Water formally inform the EMM Departments of Water and Sanitation, and Waste Management about the scheme and how the latter functions can maintain and enhance the efficiency of the scheme. ▪ The alleged irrigation of crops with sewage, sand mining and sewage mining points to larger problems beyond what the scheme can technically solve. Many people are unemployed, and are turning to hazardous, illegal	the short and long terms.

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
	and destructive ways to make a living. These practices are not only found in Ekurhuleni, but across the country. If these people are ineligible for a social grant, the state is unable to meet its obligation of Section 27 of the Constitution. The EMM departments responsible for social welfare and economic development will be consulted during the public participation process of the EIA, to understand how unemployed people can be supported to enable them to pursue legal livelihoods, and thereby refrain from destructive activities that threaten the sustainability of natural resource capital.	
Nature of the Impact: Increased poverty during operations of Phase 2. • There is subsistence farming on private and municipal-owned land adjacent to the Kaalspruit. The farmers said that they were residents of Clayville and surrounding areas including Tswelopele, Duduza, Winnie, Ebony Park and Ivory Park. The land is being occupied illegally and farmers who were consulted said they were willing to move to another piece of land. Crops provide food for their households, and some farmers barter crops such as maize for bread, and sell crops such as spinach to raise money to cover schooling and other household expenses. The farmers explained that most of them were not employed elsewhere, and that they were growing crops on this land for more than 10 years. • The project Planning and Viability Report describes the limited space for the wetland phase (Phase 2) of	▪ Farmers currently do not have secure legal access to the land, and therefore no right to use the land. Subsistence farmers are thus already in an insecure situation even without the project going ahead. Farmers may move of their own accord but if they do not have legal access to land they will continue to be vulnerable. The project has highlighted their plight. The farming activity is a critical source of food and livelihood for them. ▪ It is recommended that the project footprint for Phase 2 be determined in the first year of implementing Phase 1. Negotiations will then have to be initiated with affected landowners, and agreements reached on which portions of their properties they are willing to sell for incorporation into the scheme. Delineation of the land required for the wetland will also indicate which farmers will have to move off the land. Municipal and private land owners should be requested to allow farmers to continue their farming activities for 18 months, while they engage with relevant government departments to secure alternative land.	If mitigated timeously, there should be no residual risks

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
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the scheme. Maximum use of space is therefore required for the scheme to perform efficiently. Some farmers therefore will lose access to the land when phase 2 is constructed. It is expected that Phase 1 of the project will be undertaken over 3 years. Construction for Phase 2 of the project, therefore, will at the earliest, commence 3 years after Phase 1 starts.
• Although farmers are occupying the land illegally, removing people's access to the land during Phase 2 will be equivalent to economic displacement. This will result in the loss of the access to land, for families to grow food. Starvation and consequently poverty will therefore deepen if farmers do not secure access legally to alternative land to continue their subsistence farming.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Improbable (1)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Very short- term (1)</td></tr>
<tr><td>Extent</td><td>Local (1)</td><td>Local (1)</td></tr>
<tr><td>Magnitude</td><td>High(8)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>48 (moderate)</td><td>4 (Low)</td></tr>
<tr><td>Status (positive, negative or neutral)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>
▪ The approach to developing the management measures acknowledges that the multi-sectoral nature of food security requires inputs from various sectors such as social development, agricultural support, local economic development, land use planning, land affairs, education, and enforcement. The Gauteng Department of Agriculture explained that the EMM Social Development function responsible for food security has secured land for subsistence farming by obtaining permission from schools and other state institutions to allow people to grow food on its properties. The Agriculture department also explained that as the farmers are using their crops to barter for bread, and sell their crops for a small income, they are part of the local economy. The EMM Local Economic Development should therefore, according to the Agriculture department, assist the farmers with progressing its LED activity. The Government is the proponent in this case, and will have to seek a solution through Inter-Governmental Co-operation.
▪ The three government stakeholders EMM Social Development, EMM Economic Development and Gauteng Department of Agriculture, responsible for food security, local economic development and subsistence agriculture respectively, will be invited to a focus group meeting with the subsistence farmers, to be held during the public participation process. The departments will be requested to explain their Constitutional mandates to farmers in terms of subsistence farming and local economic development, and advise farmers on possible processes to legally secure land to continue subsistence farming. Outcomes from the meeting will be used to prepare the mitigation measures and time-frames to manage this impact. It is acknowledged that other government
</td>
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</tr>
</table>

Potential impacts:	Proposed mitigation:	Risk of the impact and mitigation not being implemented
	departments will have to be involved as the need arises. The Law Enforcement function in the EMM, for instance, will have to police the area once farmers leave, to ensure that other farmers do not illegally occupy the land. ▪ Management measures must be considered in light of the Constitutional Right to Access to Food. According to the Human Rights Commission, Government must create an enabling environment for people to grow or obtain adequate food for themselves and their families. The Commission acknowledged that each adult must feed themselves and their families, through engaging in legal activities. If citizens are unable, for reasons beyond their control, to enjoy the right to adequate food, government is obliged to directly provide access to that right. ▪ Although not compulsory, reference can be made to international good practice in the IFC's PS5 (IFC, 2012) and Handbook for Preparing a Resettlement Action Plan (IFC Environment and Social Development Department, 2002) to inform the preparation of management measures. One of the IFC principles is that where people are using land they have no rights over, then their livelihoods being supported by this land must be restored where there is involuntary resettlement. Another principle is that involuntary resettlement be treated as an opportunity for improving the livelihoods of the affected people, and should be undertaken with this in mind. The proposed wetland project therefore affords potential to conceive a thriving sustainable urban agriculture project, building on the current strengths of the subsistence farmers in the area. Opportunities can be created for extending the project to a commercial one, growing high value and in-demand crops such as Moringa (personal	

<table>
<tr><th>Potential impacts:</th><th>Proposed mitigation:</th><th>Risk of the impact and mitigation not being implemented</th></tr>
<tr><td></td><td>communication, Mr. Y. Mitha, 2017). This can allow subsistence farmers to get out of a subsistence mode and into an entrepreneurial one</td><td></td></tr>
<tr><td colspan="3">AIR QUALITY IMPACT</td></tr>
<tr><td>Nature of Impact: Odour nuisance

• There is a potential negative impact of the scheme to produce an odour should a free water surface (FWS) constructed wetland design be implemented.
• FWS systems are frequently associated with elevated odours and mosquito problems which will be a concern as the scheme is located within a residential community, and may affect future land development potential. In addition to the nuisance factor on the local community, there may also be an impact on land values.
• This will be more prevalent in the upstream sections of the scheme.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Highly probable (4)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium-term (3)</td><td>medium-term (3)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>40 (moderate)</td><td>40 (moderate)</td></tr>
</table>
</td><td>▪ No identified effective mitigation measures, there are a few experimental techniques for odour reduction in wetland (e.g. lime addition) but at it will not be practical at the size of wetland proposed, it may, lessen odour but never ridding it completely.

▪ The extent of the conditions is unknown at this stage, and measures to reduce the effects will be investigated further in the concept design stage. These impacts therefore cannot be assessed at this stage, and management measures will have to be informed by technical solutions.</td><td>There are measures that can be introduced to reduce the effects, but not remove them entirely, therefore the residual risks for this impact is moderate.</td></tr>
</table>

Potential impacts:			Proposed mitigation:	Risk of the impact and mitigation not being implemented
Status (positive, negative or neutral)	Negative	Negative		

3. NO GO OPTION

No go Alternative (compulsory). This is the option of not implementing the proposed rehabilitation measures along Kaalspruit

Table 9: Potential impacts should the Development not be Approved **"No-Go" Alternative**

Potential impacts:	**Significance rating of impacts (positive, negative or neutral):**	**Proposed mitigation:**	**Significance rating of impacts after mitigation:**	**Risk of the impact** and **mitigation not being implemented**
High sediment loads due to stream bank erosion	N – Very High	Implementation of the proposed rehabilitation measures	P – Very High	Very High risk
High bacterial contamination	N – Very High	Implementation of the proposed rehabilitation measures	P – Very High	Very High risk
High litter loads	N – Very High	Implementation of the proposed rehabilitation measures	P – Very High	Very High risk
Flood Risk	N –Medium	Implementation of the proposed rehabilitation measures	P –Medium	High risk
Poor water quality	N – Very High	Implementation of the proposed rehabilitation measures	P –High	Very High risk
Alien Invasive Plants	N – Very High	There are no mitigation measures	N – Low	Very Low risk

Visual Impacts expected on the construction site.	Negligible	There are no mitigation measures	Negligible	No risk
Heritage Impacts	Negligible	There are no mitigation measures	Negligible	No risk
Loss agricultural land	N-Low and High	There are no mitigation measures	N-Low and High	No risk
Improved land values and greater investment opportunity	Negligible	Implementation of the proposed rehabilitation measures	P-Medium	Low risk
Livelihoods improved during construction	Negligible	Implementation of the proposed rehabilitation measures	P-Low	Low risk

If the no go alternative is pursued, then the operational-related positive impacts will not be realised, no jobs will be created.

This is the option of not implementing the rehabilitation measures along the Kaalspruit. This option will result in no impacts occurring on the biophysical environment (i.e. biodiversity, soils), and will result in no visual or social impact. However, this will result in the situation where the eroded Kaalspruit channel between the provincial road R562 and the Olifantsfontein Waste Water Treatment Plant" is not fixed and the current downstream problems relating to pollution, environmental damage and asset damage (e.g. Centurion Lake) will remain. This will result in a lost opportunity for prevention of erosion in the Kaalspruit, to attenuate flood flows and provide a level of pollution control of high pollutant loads from upstream sources for the communities in the area. However this option (i.e. no-go) will support the continuation for subsistence agricultural activities in the area. The project area is extensively used for subsistence agriculture, an important socio-economic activity in the project area. The scheme (Phase 2) is likely to take out the area the agricultural activities, therefore a no-go option will allow agricultural activities within the rehabilitation area to continue.. **All in all the negative impacts of the no go option alternative are considered to outweigh the positive impacts of this alternative.**

The no go option is therefore not preferred.

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

- Appendix G1: Wetland Assessment
- Appendix G2 - Aquatic Assessment
- Appendix G3 - Heritage Assessment
- Appendix G4 - Agricultural Impact Assessment
- Appendix G5 - Social Impact Assessment
- Appendix G6 - Geotechnical Investigation

Describe any gaps in knowledge or assumptions made in the assessment of the environment and the impacts associated with the proposed development.

- Aquatic ecosystem is dynamic by nature and is subject to seasonal changes and variations. The results of this assessment are based on the results of a single dry season survey only.
- According to the wetland definition used in the National Water Act (NWA), four wetland indicators are used to delineate wetland boundaries. Taking into account that the general area has been disturbed considerably by agriculture activities, especially subsistence crop farming, not all wetland indicators could be comprehensively implemented for the study. The limitations associated with the implementation of the relevant indicators may inhibit the accuracy of the wetland delineation. Wetland systems identified at desktop level within 500 m of the project area were considered for the identification and desktop delineation, with wetland areas within the project area being the focus for ground truthing.
- Funds must be secured to implement Phase 2 (Concept Scheme 4B) and ideally, in addition, Concept Scheme 6. The SIA will assume that funds will be obtained, and assesses the impacts for Phase 1, Phase 2 and Concept Scheme 6. It however, acknowledges that the EMM will have to facilitate inter-departmental co-operation to obtain multi-departmental commitment of funds required, if all three Concept Schemes are to be implemented to derive optimal benefits of the wetland rehabilitation project.
- If wetland rehabilitation (Phase 2 of the project) occurs when there is crop already planted, there will be economic displacement. Even if there is no crop planted when rehabilitation disturbs the land being used, people will lose the potential to continue with their farming activity. People will lose access to the land to continue to grow food and generate a small income.

4. IMPACTS THAT MAY RESULT FROM THE DECOMISSIONING AND CLOSURE PHASE

Briefly describe and compare the potential impacts (as appropriate), +significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Proposed and Alternative Rehabilitation Designs

Potential impacts:	**Significance rating of impacts(positive, negative or neutral):**	**Proposed mitigation:**	**Significance rating of impacts after mitigation:**	**Risk of the impact** and **mitigation not being implemented**
It is not foreseen that the proposed development would reach a decommissioning and closure phase due to the nature of the development (stream rehabilitation). Impacts associated with the decommissioning phase were therefore not assessed.				

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

Not Applicable

Where applicable indicate the detailed financial provisions for rehabilitation, closure and ongoing post decommissioning management for the negative environmental impacts.

On-going post decommissioning management cost will not be determined as this phase of the development is not anticipated due to the nature of the development. A breakdown of the preliminary scheme costing is provided in **Figure 16**. These estimates are very preliminary and are subject to refinement in concept and detailed design. Although preliminary, they are useful for comparison between scheme options.

Year	Phase	Components	Base cost	+25% P&Gs	Year Cost	Phase Cost
Stage 1	Phase 1	Sediment trap – Kaalspruit	R18.39	R22.99		
		1 x weir	R3.84	R4.80		
		Portion of access & services	R0.75	R0.94	R28.72	
Stage 2		Clayville Arm weir and Olifantspruit confluence weir	R7.67	R9.59		
		Channel rehabilitation	R39.89	R49.86	R59.45	
Stage 3		Sediment Trap - Clayville Arm	R7.46	R9.33		
		1 x weir	R3.84	R4.80		
		Portion of access & services	R0.75	R0.94	R15.06	R103.23
Stage 4	Phase 2	Litter trap - Kaalspruit	R26.45	R33.06		
		Portion of access & services	R0.75	R0.94		
		Stage 1 FWS (10.49ha) - Kaalspruit (up to Porcelain Rd)	R13.67	R17.09		
		3 x weir structures	R11.51	R14.39		
		Stage 1 Flood Conveyance Channel Upgrade (675m)	R2.95	R3.68	R69.16	
Stage 5		Stage 2 FWS (11.97ha) - Kaalspruit (below Porcelain)	R15.60	R19.50		
		1 x weir structures	R3.84	R4.80		
		Stage 2 Flood Conveyance Channel Upgrade (770m)	R3.36	R4.20		
		Litter trap - Clayville Arm	R12.76	R15.94		
		Portion of access & services	R0.75	R0.94	R45.38	
Stage 6		1 x weir	R3.84	R4.80		
		Stage 1 FWS (9.03ha) - Clayville Arm	R11.77	R14.71		
		Diversion Channel	R1.03	R1.29		
		Portion of access & services	R0.75	R0.94	R21.74	
Stage 7		Scheme monitoring period				
Stage 8		Stage 3 FWS (11.31ha) - Kaalspruit (next to WWTW)	R14.74	R18.43		
		1 x weir structures	R3.84	R4.80		
		Stage 3 Flood Conveyance Channel Upgrade (840m)	R3.67	R4.58		
		Portion of access & services	R0.75	R0.94	R28.74	R165.02

Figure 16: Potential project cost and phasing, assuming a combination of Concept Schemes 5 and 4B. (Values in R'millions).

5. CUMULATIVE IMPACTS

Describe potential impacts that, on their own may not be significant, but is significant when added to the impact of other activities or existing impacts in the environment. Substantiate response:

Cumulative impacts can result from actions which may not be significant on their own but which are significant when added to the impact of other similar actions.

The catchment is highly transformed with dense residential areas as well as roads. The wetland system associated with the Kaalspruit was determined to be in a largely modified state (Category E) and completely disconnected from the main watercourse and has been largely replaced by agriculture, this suggesting a large change in ecosystem processes and loss of natural habitat and biota and has occurred (Macfarlane *et al,* 2008). Vegetation composition has been substantially modified consisting mainly of introduced, alien and/or ruderal species. Hydrology of the area is mainly modified as well as large change in the ecosystem processes

and loss of natural habitat and biota and has occurred. Hence the cumulative impacts on the ecological integrity of the site are largely negligible.

Positive Cumulative Impacts associated with the proposed rehabilitation of the Kaalspruit include the following three primary functions of the scheme and will have far reaching benefits:

- **Litter Management** – Litter capture and removal, particularly during storm and flood events.
- **Sediment Management** - Capture of sediment from upstream sources. Protection of constructed wetland and downstream reaches.
- **Water quality treatment (constructed wetlands)** - Breakdown of sewage pollution in the Kaalspruit.

In particular the above functions support the protection of water resources which the region is short of, but they will also enable the rehabilitation of river reaches far downstream. Other positive cumulative impacts associated with the proposed scheme will include:

- **River stabilisation** - Part of the reason for the project's "wetland rehabilitation" focus is the stabilisation of the Kaalspruit in the project area, stopping erosion and sediment loss. (River stabilisation should be automatically achieved as part of the measures to address the first three functions.)
- **Flood management** - There is no specific requirement for flood peaks and/or volume to be managed, but the scheme must convey flood flows safely through the project area. However, the sediment traps will attenuate the flood peaks to some extent.
- **Ecological enhancement** - Some ecological enhancement is likely to naturally accrue due to improved water quality and the constructed wetlands, but additional opportunities for enhancement should be explored where possible, though this will likely be a future scenario once the performance of the constructed wetland has been monitored and evaluated
- **Public amenity development -** Possibly developed hand-in-hand with ecological enhancements, the scheme should seek to contribute to the residential environment in the project area. This will also be part of the future scenario.
- **Ground water recharge** - Groundwater recharge is a very effective means of urban water resources management and the dolomite geology at the site provides a unique opportunity for this. However, water quality and geological stability are important issues to be resolved**.**
- It is expected that **local employment** will be secured in both phases.

All these efforts, if the required funding is secured, will lead to an overall cumulative benefit for the catchment. Responsible environmental management will be required during the entire project life cycle. These management measures should be guided by the Environmental Management Plan, attached as **Appendix H**

6. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that sums up the impact that the proposal and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

This section provides a summary of the environmental assessment and conclusions drawn for the Proposed Olifantsfontein rehabilitation measures along Kaalspruit in the Ekurhuleni Municipality, Gauteng Province. In

doing so, it draws on the information gathered as part of the Basic Assessment process (and from the various specialist study) and the knowledge gained by the environmental consultants during the course of the process and presents an informed conclusion regarding the environmental impacts associated with the proposed rehabilitation measures along Kaalspruit.

Phase 1 (Concept Scheme 5) will involve **Channel stabilisation and sediment control,** the following alternative designs were considered for this concept scheme:

- Proposed Design (Armoured channel): This is an armoured option for a more hard engineered solution and therefore higher cost. This will allow for a narrower, steep sided channel section, potentially using something like Armourflex to prevent erosion. This option will reduce the ecological potential of the scheme, but will have higher hydraulic conveyance and will leave more floodplain available for agriculture (or public amenity), and will similarly provide more space for constructed wetland establishment in Phase 2. *(Note the Phase 2 constructed wetland will replace all agriculture and/or area for public amenity when it is constructed).*
- **Alternative 1 Design (Vegetation lined channel):** This is a soft engineered channel which will have a wider, flatter profile than the existing channel shape. This will be more suitable for long-term riparian habitat development even though channel meanders will be straightened. This will be a lower cost option.

Phase 2 (Concept Scheme 4B) **will involve litter management and water quality treatment as well as the diversion of part of the dry weather flow DWF(Concept Scheme 6),** the following alternative designs were considered for this concept scheme:

- Proposed Design (Constructed Wetland system): A constructed wetland is an engineered wetland used for water treatment purposes; they are effective in treating sewage and are increasingly used as part of the waste water treatment process. They have strict water level and flow distribution controls and while they offer ecological and landscape benefits these are secondary to treatment performance.
- Alternative 1 Design (Ecological Wetland system): Channel stabilisation could include more habitat potential than proposed in Concept Scheme 5, ecological potential would be limited by severe sewage loads (until catchment interventions are implemented) and any wetland will be vulnerable to instability and erosion under the high sediment loads from the catchment. Hence the "with silt trap" option will be important. Some treatment of sewage loads will be provided by an ecological wetland design, but treatment potential will be much less than a constructed wetland. Some agriculture may be possible in the floodplain, but this will depend on the intended habitat potential of the scheme (more ecologically friendly, less land available for farming). This option will place extra pressure on the identification and implementation of catchment interventions. The ecological potential of this alternative will only start to be realised when catchment interventions start to take effect.

The following conclusions can be drawn from the specialist studies undertaken within this Basic Assessment:

Wetland Assessment:

Two (2) HGM units were identified within the 500m project assessment boundary, namely:

- Channelled Valley Bottom (HGM[4] 1) – Kaalspruit. This will be replaced by the FWS constructed wetland.
- Channelled Valley Bottom (HGM 2) – Clayville. This will be partly modified to improve flood conveyance

[4] Hydrogeomorphic (HGM)

and will include a sediment trap.

Both these systems are severely modified. HGM1 is disconnected from the main watercourse and has been largely replaced by agriculture. On completion of the FWS constructed wetland some ecological function will return to the area, mainly in the lower reaches, but this will be limited. HGM2 is severely affected by sediment and poor water quality, and is overrun by reeds. It is expected the ecological function of this area of wetland will be marginally improved by the reduction of sediment and litter loads.
The proposed project was determined to pose low to moderate risks to the wetland systems.

The PES of the wetlands was determined to vary from moderately to largely modified, it is important to note that the proposed rehabilitation interventions are expected to improve the overall functioning and integrity of the wetland systems. The majority of the "Low" risks are associated with the negative risks identified for the study. These risks are largely associated with construction activities. The majority of the "Moderate" risks are associated with positive risks identified for the study, which are key rehabilitation interventions for the project. Despite the moderate risks identified for the project, the majority of these moderate risks have been determined to be positive aspects for the success of the project. Based on the nature of the project, it is the opinion of the specialist that the project proceed in order to implement the prescribed rehabilitation interventions. Therefore the potential impact associated with the project is of low significance for the negative impact during the construction phase and of Medium significance for the positive impacts during the operational phase of the scheme.

Aquatic, riparian vegetation & wetland ecosystems baseline assessment:
The aquatic, wetland and riparian vegetation ecosystems associated with the Kaalspruit have been extensively degraded. The Kaalspruit channel is deeply incised and water quality represents a significant limiting factor of aquatic biodiversity. The channel is already eroded down to bedrock the channel sides will continue to erode laterally resulting in a widening of the channel. The project will stabilise the Klipspruit river banks which will become the flood conveyance channel. Impacts are anticipated to be negligible in the project area, but moderate to high (positive) in the downstream Olifantspruit and Hennops River.

Heritage assessment:
The impacts to heritage resources by the proposed project are considered to be of negligible as no sites, features or objects of cultural significance are known to exist in the study area, there would be no impact as a result of the proposed development.

Soil and Agriculture potential:
The site is dominated by a structured soil area which is considered to be of low agricultural potential due to its proximity to the Kaalspruit though they support subsistence level farming with small portion of the high agricultural potential being affected. The agricultural potential of the site will be lost under the scheme, the impacts of the scheme is considered to be low (negative) with regard to the general agricultural potential of the site and of high significance to the smaller portion of the high agricultural potential soil.

Social Impact Assessment:
It is the opinion of the social specialist that from a social impact perspective, the project should be authorised.

The project will fulfil the requirements of the DWS Directive to the EMM to address the problems in the Kaalspruit. The project will significantly reduce the high sediment loads, high bacterial contamination and high litter loads that have led to the severe degradation in the Kaalspruit, Olifantspruit and the Hennops River system. The project will, by reducing sedimentation and improving water quality, contribute significantly towards stemming further deterioration of riparian land, and improve the aquatic habitat in the Hennops River system. Private and government riparian land owners downstream will have their land protected from further erosion. Further, the return of river health alongside their properties can restore or increase their property values.

The project has highlighted the plight of communities in the vicinity of the Kaalspuit who are undertaking subsistence farming on land adjacent to the Kaalspruit. They are occupying municipal and private land illegally. Most, if not all, of the farmers depend on the land adjacent to the Kaalspruit to grow crops for food, to barter some crops for bread, and to sell some crops to fund domestic expenses such as school fees. It is expected that some farmers will be moved off the land they are occupying, to implement Phase 2 of the rehabilitation project. Considering the high levels of poverty and unemployment amongst urban households in Ekurhuleni and Johannesburg it is important that these communities are supported to identify options to continue subsistence farming, but in legal manner. The EMM Social Development and Local Economic Development and the Department of Agriculture will be invited to engage with the subsistence farmers at a focus group discussion during the public participation period. This is in light of the three government functions giving effect to Section 27 of the Constitution that confers rights to all people in South Africa to have access to adequate food. The project is also expected to provide manual jobs during the construction period. This, however, is expected to be of low significance.

The positive impact of improving land values in Phase 2 of the rehabilitation can be enhanced with collaborative efforts of departments in the EMM, including water and sanitation, local economic development, water and sanitation, social development, and law enforcement. The benefits of enhancing the proposed impact will be to reduce pressure on the wetland scheme in the long term. Enhancements can also reduce the costs of treatment because better river quality flowing into the rehabilitation scheme will result in better river quality flowing out of the scheme. Enhancements can therefore introduce environmental and financial sustainability into the scheme. Enhancements will be dependent on the capacity of the relevant government departments, to institute management measures such as improved service delivery models.

The EMPr is designed to mitigate the above potential impacts and other disturbances and should be constantly adhered to by the contractor to mitigate pollution of the wetland and the surrounding environment. It thus of utmost importance that the mitigation measures proposed in this EMPr be adopted and be monitored by an independent Environmental Control Officer throughout the project phases to ensure the significance of the above impacts are minimised or negated were possible

Recommended alternative:

Phase 1 (Concept Scheme 5): Alternative 1 Design (Vegetation lined channel) would be recommended if the constructed wetland scheme (phase 2) is unlikely to be implemented. The Proposed Design (Armoured channel) will be necessary if the constructed wetland (phase 2) is implemented as it offers a narrower cross-section leaving maximum space for the wetland area. The proposed design for phase 1 is compatible with phase 2

(proposed design – constructed wetland) which will see the constructed wetlands established on either side of the stabilised channel. ***Therefore from an environmental and technical perspective, the proposed design for Phase 1 (i.e. Armoured channel) is nominated as the Preferred Design for Phase 1 (Concept Scheme 5 - channels stabilisation and sediment control)*** as the majority of its impacts during construction and operation phases can be mitigated to an acceptable level.

Phase 2 (Concept Scheme 4B): The preferred design is a constructed wetland, engineered for water treatment purposes. The Alternative design (ecological wetland) ecological potential would be limited by severe sewage loads within the project area and would not address the current problem in the short term. For these conditions a constructed wetland (Proposed Design) will be the preferred alternative for Phase 2 rehabilitation. ***Therefore from an environmental and technical perspective, the proposed design for Phase 2 (i.e. Constructed Wetland system) is nominated as the Preferred Design for Phase 2 (Concept Scheme 4 B and 6) for litter management and water quality treatment*** as all its impacts during construction and operation phases can be mitigated to an acceptable level.

The identified impacts and mitigation measures are envisaged to be the same as identified for the Preferred designs and alternative designs during construction/operation for the most part. However, in both phases the softer engineer (i.e. alternative designs) solutions will have better ecological benefits and less impact on the agricultural activity onsite than the harder engineered solutions (proposed designs). It is important to note that the **focus of the rehabilitation** has been centred on **water quality treatment, and waste water treatment** in particular. Therefore for this reason, the proposed designs have been nominated as the preferred alternatives as they will effectively and efficiently address the proposed rehabilitation measures along Kaalspruit.

Alternative 2 Design

See above, the impacts are similar with minor difference and therefore compared collectively**.**

No-go (compulsory)

This is the option of not implementing the rehabilitation measures along the Kaalspruit. This option will result in no impacts occurring on the biophysical environment (i.e. biodiversity, soils), and will result in no visual or social impact. However, this will result in the situation where the eroded Kaalspruit channel between the provincial road R562 and the Olifantsfontein Waste Water Treatment Plant" is not fixed and the current downstream problems relating to pollution, environmental damage and asset damage (e.g. Centurion Lake) will remain. This will result in a lost opportunity for prevention of erosion in the Kaalspruit, to attenuate flood flows and provide a level of pollution control of high pollutant loads from upstream sources for the communities in the area. However this option (i.e. no-go) will support the continuation for subsistence agricultural activities in the area. The project area is extensively used for subsistence agriculture, an important socio-economic activity in the project area. The scheme (Phase 2) is likely to take up a large part of the agricultural lands, but it should consider support of remaining agriculture activities. All in all the negative impacts of the no go option alternative are considered to outweigh the positive impacts of this alternative. **The "no-go alternative" is therefore not preferred**.

7. IMPACT SUMMARY OF THE PROPOSAL OR PREFERRED ALTERNATIVE

A summary of the impact assessments is presented in the tables below. The tables cover the construction and operational impacts for each of Phase 1 and Phase 2 separately. An overall weighted score is provided in each case. Thus far each of the environmental issues are assigned equal weighting (I.e. the weighted score is the average of each of the individual scores. The scores for the operational condition of the total scheme are also presented, being the simple addition of the Phase 1 and Phase 2 scores. Line items that would result in double counting are counted only in the first instance (usually Phase 1). The impact scores are also colour coded according to the following:

<-60	High negative
-30 to -60	Moderate negative
0 to -30	Low Negative
0 to 30	Low positive
30 to 60	Moderate positive
>60	High positive

Phase 1 (Concept Scheme 5): Preferred Scheme

Environmental Aspect	No mitigation	With mitigation
Impact Summary table during the Construction Phase of Phase 1 (Concept 5)		
Siltation/sedimentation of watercourse	-21	-10
Loss and disturbance of watercourse habitat	-27	-27
Possible spread of alien invasive species	-27	-12
Visual Impacts	-30	-20
Livelihoods improved	18	24
Weighted value	-17.4	-9
Impact Summary table during the Operation Phase of Phase 1 (Concept 5)		
Stabilisation of the river banks	60	70
Flood risks management	39	45
Sedimentation control	65	75
Control of spread of alien invasive species	27	30
Improved land values and greater investment opportunity	42	51
Livelihoods improved during construction		
Weighted value	46.6	54.2

Phase 2 rehabilitation (i.e. Concept Scheme 4B) Preferred Scheme

Impact Summary table during the Construction Phase of Phase 2 (Concept 4B)		
Siltation/sedimentation of watercourse.	-28	-15
Impeding the flow of water and altering the flow dynamics of the river.	-18	-4
Changes in water quality due to foreign materials and increased nutrients	-18	-4
Possible spread of alien invasive species	-24	-4
Changes to the faunal community due to habitat loss and transformation.	-14	-12
Visual Impacts	-30	-20
Loss of agricultural land - area weighted value	-24.1	-24.1
Increased poverty during construction of Phase 2	-48	-4
Livelihoods improved during construction	18	24
Dust generation	-24	-8
Weighted value	-21.0	-7.1
Impact Summary table during the Operation Phase of Phase 2 (Concept 4B)		
Litter management	52	65
Improved water quality	52	65
Ecological Enhancement	80	80
Control of spread of alien invasive species	27	40
Visual impacts (Enhanced Aesthetics)	33	60
Loss of agricultural land - area weighted value	-24.1	-24.1
Improved land values and greater investment opportunity	42	51
Increased poverty during operations of Phase 2.	-48	-4
Odour nuisance	-40	-40
Weighted value	19.3	32.5

Impact scores are not intended to be definitive measures of environmental impact, but they are a useful guide to evaluating the overall environmental performance of a new development and they assist in interpreting key influences of a scheme.

Firstly it would appear that the construction programmes of each phase are overall **Low Negative**. The "without mitigation" scores are more or less mid-range in the low category, and these are potentially modified to scores of less than -10 if proposed mitigation measures are implemented, approaching a negligible level of impact. While it is generally presumed that construction activities are damaging to the environment, the state of disturbance of the site with the extensive cover of alien species, loss of historic wetlands, severe degradation of the watercourse and the extremely polluted state of the stream, there has been some debate whether much of the construction activities will be detectable in the baseline conditions of the stream on site or even downstream.

Secondly, once established the operational conditions of both Phase 1 and Phase 2 are overall positive. The combined scoring of the two phases is a measure of the project overall as summarised below. The combined score for the overall scheme is a **High Positive,** whereas if the scheme is developed only to Phase 1 the impacts remain **Moderate Positive**.

Scheme impacts	No mitigation	With mitigation
Phase 1 on its own	46.6	54.2
Phase 1 + Phase 2	65.9	86.7

Analysing the scores in a bit more detail, Phase 1 returns a mid to high score **Moderate Positive** (without and with mitigation), while Phase 2 returns a score of **Low Positive** to **Moderate Positive** (without and with mitigation). Given the dire state of present day conditions on the site and the impact they have on more than 15km of watercourse downstream, these scores are lower than anticipated. Additionally, that Phase 2 has a lower score than Phase 1 is also contrary to the intent of the phasing of the scheme where Phase 2 addresses two of the underlying problems identified in the DWS Directive (litter and sewage in the stream) while Phase 1 addresses one (sediment). Assessment of the impacts of Phase 2 confirms this is where the main positive impacts are achieved, particularly water quality, litter and ecology. However, it is also where two of the main negative impacts are identified; impacts on the subsistence farmers (increase in poverty) and odour nuisance.

The presence of the subsistence farmers on site has been an issue for the project from the beginning. Efforts were initially made to try to develop local farming to be part of the overall solution, but due to the severity of the pollution in the stream the scheme needed maximum area for treatment and the farmers would be restricted to the privately owned land along the river corridor. Unfortunately this land is being developed at this time and it appears there will be minimal land available for any subsistence farming.

While the project team is very aware of the vulnerability of the subsistence farmers, their illegal occupation of land complicates the implementation of mitigation measures that are within the capability of a project of this nature. The plight of the subsistence farmers is part of wider socio-economic conditions in both metropolitan areas of Ekurhuleni and Johannesburg that sees members of the urban community seek benefit from marginal lands. Addressing these issues should be part of a wider initiative to address poverty alleviation in the metropolitan areas. As indicated in the specialist's social impact assessment, such an initiative should involve both metropolitan and provincial government cooperation.

If farming & sand mining is deemed illegal and impacts removed from evaluation

Phase 1 on its own	46.6	54.2
Phase 2 (no increased poverty)	27.7	37.1
Phase 1 + Phase 2 (no increased poverty)	74.3	91.3

If the overall scheme impacts are evaluated with the impacts on poverty alleviation moved outside the scope of the scheme, the impact scores are as shown in the table above. The benefits of Phase 2 are scored **Moderate Positive** with mitigation, and the benefits of the scheme overall increases within the **High Positive** range. Hence, the impact of the scheme on those people illegally farming on the site, and whether this should be attributed to, and mitigated by, the scheme is a debate that will affect the value of the scheme to Ekurhuleni. If it is considered in the light of a 'No-Go' scenario where the scheme is not implemented, what should the municipality do about the illegal farming on the site? This issue is closely linked with illegal land development in the Kaalspruit catchment that is the cause of the litter, sewage and sediment problems in the river, and appears to be a symptom of the much wider socio-economic problems affecting the metropolitan municipalities of Ekurhuleni and Johannesburg. Both municipalities are very aware of the complexity of the problems and solutions are proving very difficult to develop on a site by site basis. Again this points to interventions on a wider scale by both local and provincial government. It seems that the mitigation of the impact on the illegal farmers on this site should be considered as an initiative separate to this scheme.

One aspect of the impact assessment that has to be attributed to the scheme is that of odours generated during the treatment of sewage loads in the constructed wetland. The level of odour us uncertain, but it may be worse than is currently experienced by the local residents. Efforts will be made to mitigate this effect during detailed design, but with variable sewage loading in the DFW stream flow the level of odour development will be difficult to determine before construction. While the condition should improve over time as upstream catchment interventions take effect, the precautionary principle is applied here and a worst case scenario envisaged. Odour generation will be limited to the upper sections of the constructed wetland, near the R562, and should be substantially reduced by Porcelain Drive.

Despite this aspect, the overall impact of the scheme is seen to be highly positive, with far reaching benefits downstream of the site.

A further aspect not addressed in the impact scores but still an important consideration for the scheme, is the potential for diverting a portion of the DWF to the local sewer system for treatment at the adjacent Olifantsfontein WWTW (Concept Scheme 6). Ultimately the sewage in the stream is from the catchment of the WWTW and should be received by the facility, but early discussions with ERWAT indicate there will be capacity limitations and the mixing of the DFW in the operations at the WWTW needs to be considered carefully. However, any reduction in DWF flowing through the constructed wetland will assist in reducing hydraulic and organic loading in the wetland and will improve overall performance and reliability of the system. Hence this remains a highly attractive option, with relatively small additions to the design of Concept Scheme 4B. Clearly this assumes that the diversion of DWF to the WWTW does not compromise the operations at Olifantsfontein WWTW or result in significant additional upgrade of the WWTW. Discussions on this still need to be finalised.

For alternative:

During construction and operation phases of the development, It is noted that the impacts of Alternative 1 rehabilitation design are similar as that of the proposed. The only difference that arises is the social impacts that

emanate with the Alternative 1 rehabilitation designs. Refer to the assessment table above.

Having assessed the significance of impacts of the proposal and alternative(s), please provide an overall summary and reasons for selecting the proposal or preferred alternative.

Urban development and densification in the Kaalspruit catchment and associated socio-economic led activities resulted in changes in stream flow in the spruit. Storm flows have changed the stability of the river channel and high sediment loads, litter and sewage pollution have had both local and downstream impacts on the Hennops River and Centurion Lake. Complaints arising caused the Department of Water and Sanitation to issue a Directive to Ekurhuleni Metropolitan Municipality to address the Kaalspruit catchment problems. This scheme aims to mitigate problems experienced in the downstream Olifantspruit and Hennops River arising from the sediment, pollution and litter loads from the Kaalspruit catchment. It is the first of the initiatives developed in terms of the DWS Directive and is expected to be supplemented by other catchment initiatives over time. The scheme will see a substantial improvement in water quality leaving the Kaalspruit catchment, and this should improve further as the additional catchment initiatives come online and take effect.

This Basic Assessment Report has provided a comprehensive assessment of the potential environmental impacts associated with the proposed rehabilitation designs along the Kaalspruit stream in Ekurhuleni.

- **Key negative impacts associated with the rehabilitation include:**
  - Social impacts: The possible re-location of informal subsistence farmers (Phase 2)
  - Air quality impacts: Odour nuisances (Phase 2)
- **Key positive impacts associated with the rehabilitation include:**
  - Stabilising of the river banks which is currently being eroded
  - The reduction and control of sedimentation within the Kaalspruit
  - Management of litter within the catchment
  - Improved water quality, which contribute significantly towards stemming further deterioration of riparian land,
  - Improved the aquatic habitat in the Hennops River system
  - Erosion control of private and government riparian, land owners downstream will have their land protected from further erosion.
  - Restoration of river health alongside properties

The assessment concludes that most of **the negative impacts** associated with the rehabilitation scheme are **short-term** (i.e. during the construction phase), majority of the negative impacts identified can be mitigated to very low/negligible significance if all mitigation measures identified and included in the Environmental Management Programme (EMPr) attached in **Appendix H**. Some significant impacts identified for the Phase 2 of the proposed scheme was the odour nuisances with limited mitigation measures as well as the social impact of relocating subsistence farmers. The latter will need ongoing consultation amongst the different parties involved in order to identify best and practical solutions as suggested in the SIA report (**Appendix G5**). The Po**sitive impacts associated with the rehabilitation scheme are long-term** in nature and are meant to address the Directive from DWS on the current state of the river. Predominantly, impacts associated with both phases are of low significance for the negative impact and of Medium significance for the positive impacts after the implementation of recommended mitigation measures. Owing to the fact that the project is for the rehabilitation of the system that is currently under dire need for restoration, most of the impacts resulting from the project aspects are anticipated to be positive more so in the long-term of the implementation of the scheme,

these benefits of the project are expected to occur beyond the local area therefore the benefits partially offset the localised environmental costs of the project.

It is the **opinion of the EAP** that the Proposed Designs for Phase 1 and 2 schemes **will not have a significant environmental impact** and is therefore recommended for implementation as the wetland systems are severely modified and disconnected from the main watercourse and has been largely replaced by agriculture. The findings this report indicate that there are **no significant environmental fatal flaws** associated with the proposed development, the majority of the negative impacts associated with the project are minor, the positive impacts outweigh the negatives considerably and thus, with the application of effective mitigation measures, the proposed project is regarded to be feasible and sustainable. Responsible environmental management will be required on site, during the planning and construction phases of the scheme.

8. SPATIAL DEVELOPMENT TOOLS

Indicate the application of any spatial development tool protocols on the proposed development and the outcome thereof.

Provincial Spatial Development Framework (PSDF)

The Gauteng PSDF is a provincial and strategic planning policy that responds to and complies with in particular the National Development Plan vision 2030 and the National Spatial Development perspective (NSDP). This framework promotes a developmental state in accordance to the principals of global sustainability as is stated by among others, the South African constitution and enabling legislation. The Gauteng PSDF is based on six growth and development pillars, each of which has its onset of drivers with long term-programmes. Pillar 1 highlights the job creation. The proposed development will create jobs opportunities during the construction phase, these employment opportunities will target local community members that are usually excluded from mainstream economic and formal employment. Therefore, the development is in line with the Gauteng PSDF.

Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).

According to the IDP, in order to realise the Vision for Environmental Sustainability and Resilience there are a number of immediate constraints that the NDP suggest will first need to be addressed. South Africa faces the challenge of deteriorating environmental quality due to pollution and natural resource degradation, destruction and/or depletion. If the current challenges are not effectively addressed they will exacerbate the rate of environmental degradation and have the potential to undo or undermine many of the positive advances made in meeting South Africa's own development goals. and the Millennium Development Goals (MDGs) as well as the 2030 vision. Other challenges
requiring immediate attention include:

- Inadequately informed decision-making and governance
- Natural resource degradation and depletion of ecological infrastructure
- Waste (e.g. hazardous waste, healthcare waste, mine dumps, leachate/sludge & general/solid
- waste management)
- Air pollution
- **Water pollution**
- Adapting to changing climate

In light of the above this project is in line with the City's IDF. This project aims at rehabilitating the wetland system which has suffered stress from erosion, canalization, spread of alien invasive plant species etc. Overall scores show that the wetland system in along the Kaalspruit is in a critical condition and no longer provides many services it would have provided in its reference state, including water energy attenuation, sediment trapping and support of high biodiversity. The Present Ecological Situation and Ecological Condition of the various subsections of the site will be improved by the rehabilitation exercise

Level Of Unemployment: The IDP states that like the high national unemployment rate, Ekurhuleni suffers the same fate. It has the highest unemployment rate in Gauteng compared to other metros. According to StatSA, unemployment in Ekurhuleni stands at 28.8%. This is higher than the national rate and can be attributed, among others, to internal migration with individuals being attracted to Ekurhuleni in search of employment. 36.9% of the unemployed is youth – something requiring the municipality to constantly refine its job creation strategies on a continuous basis in order to address the needs of this grouping. 72% of Ekurhuleni's population is economically active (i.e. those who are employed or unemployed but looking for work).. The remedial works on site infrastructure will contribute to the social benefit that include job creation and skills transfer that will occur during the construction phase of the project, increased employment and skills transfer is aligned with the Municipalities Development Plans.

9. RECOMMENDATION OF THE PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the Environmental Assessment Practitioner as bound by professional ethical standards and the code of conduct of EAPASA).	YES

If "NO", indicate the aspects that require further assessment before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

There are no environmental or social impacts of high significance that would prevent the implementation of the proposed Olifantsfontein rehabilitation measures along Kaalspruit within the Ekurhuleni Metropolitan Municipality, Gauteng Province. From an environmental perspective, **both Concepts 5 and 4B** preferred designed alternative **of the proposed rehabilitation are recommended** as many of the impacts can be minimised or mitigated. Additionally, the benefits of Concept 6 (the diversion of a portion of DWF to local sewers) will further enhance the scheme overall, and this option should be implemented if technically feasible. The benefits of the project are expected to occur at a regional and local level, these benefits partially offset the localised environmental costs of the project. The construction phase should be implemented according to the EMPr to adequately mitigate and manage potential impacts associated with construction activities.

The construction activities should be monitored against the approved EMPr, the Environmental Authorisation and all other relevant environmental legislation. Relevant conditions to be adhered to include:

- The EMPr should be a legal binding document and an extension of the Environmental authorisation once issued by GDARD
- The appointed contractor should be contractually bound to comply with the conditions of the EMPr

- An independent ECO should be present during construction to monitor the implementation of the EMPr and the environmental authorization once issued and compile monthly audit report for submission to the relevant authorities
- Compliance with the mitigation measures outlined in this BA report and EMPr;
- Avoid, as far as reasonably possible, disturbing wetlands within the study area. Where this is unavoidable, appropriate remediation steps must be taken
- Only authorized structures should be constructed within the watercourse
- Adequate measures must be put in place to prevent polluted runoff water from entering the, watercourses, thus preventing surface and groundwater pollution.
- All relevant legislation and requirement of other government departments (National, Provincial), in particular of Section 28 (duty of care) of NEMA, must be complied with.
- In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of section 30 of NEMA.
- A Water Use License must be obtained from Department of Water and Sanitation prior to the commencement of construction activities.
- A plant permit for the removal of identified protected plant species on site must be obtained from the relevant authority.
- Compliance with all legal requirements in relation to environmental management and conditions of the authorization issued by GDARD.
- Construction noise on site must not exceed 85DB as required by the Health and Safety Act
- The site after construction must be rehabilitated back to its original state, if not possible to a state that conforms to the principles of sustainable development.

10. THE NEEDS AND DESIREBILITY OF THE PROPOSED DEVELOPMENT *(as per notice 792 of 2012, or the updated version of this guideline)*

Urban development and densification in the Kaalspruit catchment and associated socio-economic led activities resulted in changes in stream flow in the spruit. Storm flows have changed the stability of the river channel and high sediment loads, litter and sewage pollution have had both local and downstream impacts on the Hennops River and Centurion Lake. Complaints arising caused the Department of Water and Sanitation to issue a Directive to Ekurhuleni Metropolitan Municipality to address the Kaalspruit catchment problems. This Directive issued by the Department of Water & Sanitation (DWS, 2013) provided impetus for the project. The project aims to mitigate downstream problems relating to pollution, environmental damage and asset damage (e.g. Centurion Lake), and will need to prevent further erosion in the Kaalspruit, attenuate flood flows and provide a level of pollution control because of high pollutant loads from upstream sources.

11. THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED (Consider when the activity is expected to be concluded)

Duration and Validity: The environmental authorization is required for a period of 10 years from the date of issue. Should a longer period be required, the applicant/EAP will be required to provide a detailed motivation on what the period of validity should be

12. THE PERIOD ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

(must include post construction monitoring requirements and when these will be concluded.)

If the EAP answers "Yes" to Point 7 above then an EMP is to be attached to this report as an Appendix

EMPr attached	YES

SECTION F: APPENDIXES

The following appendixes must be attached as appropriate (this list is inclusive, but not exhaustive):

It is required that if more than one item is enclosed that a table of contents is included in the appendix

Appendix A: Site plan(s) – (must include a scaled layout plan of the proposed activities overlain on the site sensitivities indicating areas to be avoided including buffers)

Appendix A: Site plan(s)
Appendix B: Photographs
Appendix C: Facility illustration(s)
Appendix D: Route position information (N/A)
Appendix E: Public participation information
Appendix F: Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information
Appendix G: Specialist reports
Appendix H: EMPr
Appendix I: Other information

CHECKLIST

To ensure that all information that the Department needs to be able to process this application, please check that:

- Where requested, supporting documentation has been attached;
- All relevant sections of the form have been completed.