mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Scoping Report for Listed Activities Associated with Operations at Ezulwini Complex, Sibanye Gold Limited

DMR REFERENCE NUMBER: GP 38 MR

DRAFT FOR PUBLIC REVIEW

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT:	Sibanye Gold Limited
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FILE REFERENCE NUMBER SAMRAD:	

This document has been prepared by Digby Wells Environmental.

Report Type:	**Scoping Report - DRAFT FOR PUBLIC REVIEW**
Project Name:	**Scoping Report for Listed Activities Associated with Operations at Ezulwini Complex, Sibanye Gold Limited**
Project Code:	**GOL2376**

Name	Responsibility	Signature	Date
Khosi Dlamini	Report Writer		August 2015
Marcelle Radyn	Project Manager		August 2015
Grant Beringer	Project Sponsor		August 2015

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE SCOPING PROCESS

- The objective of the scoping process is, through a consultative process, to:
  - Identify the relevant policies and legislation relevant to the activity;
  - Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
  - Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
  - Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
  - Identify the key issues to be addressed in the assessment phase;
  - Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
  - Identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

EXECUTIVE SUMMARY

Digby Wells Environmental (Digby Wells) was appointed by Sibanye Gold Limited (SGL) to conduct the Environmental Impact Assessment (EIA) process for the West Rand Tailings Retreatment Project (WRTRP) in Gauteng, South Africa.

The EIA is considered a tool with which to identify and manage potential impacts on the environment as a result of a particular project. Environmental risks associated with such a project or development is also identified and mitigation measures proposed. The completion of an EIA is a regulatory requirement in terms of the provisions of the National Environmental Management Act, 1998, as amended (NEMA) and the EIA process which is regulated in accordance with the Environmental Impact Assessment Regulations, 2014[1] (the EIA 2014 Regulations). The overarching purpose of the EIA process is to determine, assess and evaluate the consequences (positive and negative) of a proposed development, activity or project.

This Scoping Report forms part of the EIA process and aims to identify those environmental issues and concerns that require investigation as well as determine feasible alternatives. This information is then used to determine the scope of work for the impact assessment phase of the EIA process. During the scoping phase those persons interested or affected by the project were informed of the project as well as provided the opportunity to include their input in terms of issues and concerns they may have. The process diagram for the scoping phase is provided in the figure below.

The objectives of the scoping report are, therefore, to:

- Identify policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity;
- Identify and confirm the preferred activity and alternative(s);
- Identify the key issues to be addressed in the impact assessment phase;
- Define the terms of reference and scope of these specialist studies to sufficiently identify and assess the potential impacts of the proposed project; and
- Agree on the level of assessment and the extent of further consultation to be undertaken to determine the potential impacts and risks of the proposed project.

[1] GN R982 published in Government Gazette 38282 of 4 December 2014

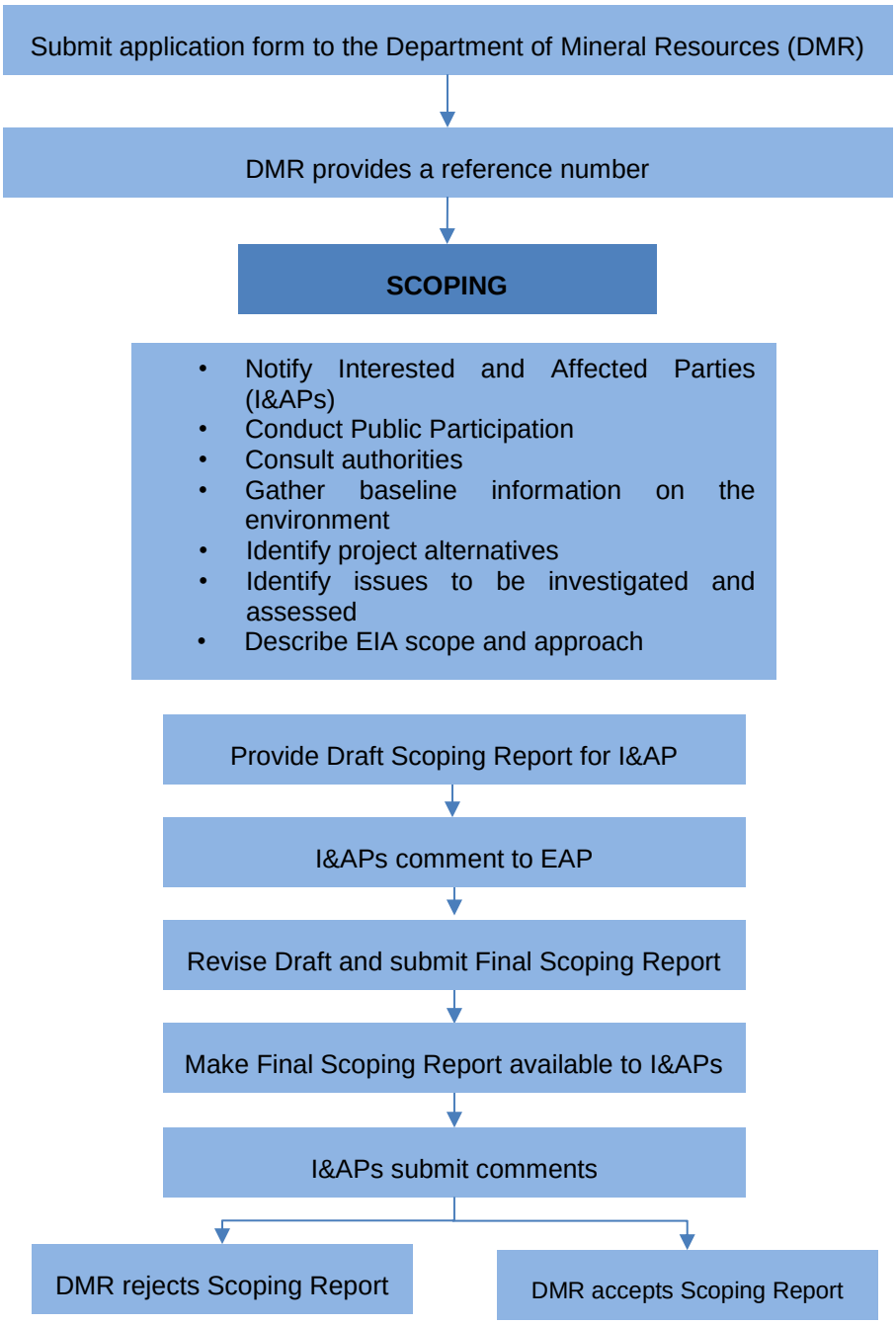

Figure I - Scoping Phase Process

Project Overview

The broader West Rand, including Carletonville in the far west to Randfontein in the northeast and including Westonaria centrally, contains an estimated 1.3 billion tonnes of surface gold and uranium tailings with approximately 170 million pounds of recoverable uranium and 11 million ounces of recoverable gold. SGL, as the current majority owner of these resources, plans to exploit it to develop a strong, long life and high yield surface mining business. Key to the successful execution of this business growth and development strategy is the West Rand Tailings Retreatment Project (WRTRP).

Project Applicant

GFI Mining South Africa (Pty) Limited, (Registration Number 2002/031431/07) was, prior to February 2013, a subsidiary within the Gold Fields Group. In early 2013, Gold Fields unbundled its Kloof Driefontein Complex (KDC) and Beatrix gold mines in the Free State to create SGL (Registration Number 2002/031431/06) and listed them as a fully independent company on both the JSE and the NYSE Stock Exchanges.

In parallel in 2012, Gold One International Limited (Gold One) acquired Rand Uranium Limited (Rand Uranium) and in the same year acquired the Ezulwini Mining Company (Pty) Ltd (Ezulwini) in an agreement with First Uranium Corporation.

Subsequently, in October 2013, SGL acquired the interest held by Gold One in Rand Uranium and Ezulwini. These Gold One assets are now part of Sibanye Gold, and comprise the Cooke Operations (underground mining and reclamation operations), that currently produce gold and uranium.

Table I: Contact details for SGL

Company name:	Sibanye Gold Limited
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Project History

Prior to the creation of SGL, Gold Fields had embarked on a project known as the West Wits Project (WWP), aimed at retreating Tailings Storage Facilities (TSFs) on the West Rand. Its intention was to recover residual gold, uranium and sulfur through a central processing plant, where viable, and storing the residual tailings on a proposed Centralised TSF (CTSF) near South Deep's existing Doornpoort TSF.

Similarly Rand Uranium had embarked on the Cooke Uranium Project (CUP) which endeavoured to treat the Cooke TSF for gold, uranium and sulfur and ultimately deposit the residual tailings on to the proposed Geluksdal TSF. The CUP and WWP were essentially two independent projects with similar broad objectives, processing infrastructure and deposition sites and within a 25 km radius of each other.

Elements of the CUP and WWP projects have been approved and authorised, as indicated in Table II, although not in their entirety. Stakeholders and departments expressed concern over the implementation of two similar projects in proximity of one another and the accumulation of their impacts. It was proposed that these projects be combined to provide a consolidated solution for the region.

The WRTRP therefore integrates the WWP and CUP into one project, where up to 13 current and historical TSFs and current arising tailings, will be centrally processed through a new proposed Central Processing Plant (CPP) and the residue deposited onto a new proposed Regional TSF (RTSF). A Return Water Dam (RWD) will be constructed adjacent to the RSTF to contain any potential water runoff, with the water to be treated at an Advanced Water Treatment Facility (AWTF).

As stated, should one of the elements of the WRTRP not be authorised, the entire project will be unable to proceed. In this case SGL will revert back to the CUP and WWP projects and further pursue the approval of the outstanding applications.

Table II: CUP and WWP Authorisation Status

Authorisation/Application	Cooke Uranium project		West Wits Project	
	Title	**Status**	**Title**	**Status**
Environmental authorisation (under the NEMA)	Environmental Impact Assessment (EIA) For The Proposed Uranium Plant And Cooke Dump Reprocessing Infrastructure	Approved never implemented	Final Environmental Impact Report	Approved never implemented
	Geluksdal TSF and Pipeline EIA & EMPR	Approved never implemented		
Water use licence (under the NWA)	Geluksdal TSF and Pipeline IWULA and IWWMP	Suspended upon further investigation	Integrated Water Use Licence Application Proposed new Centralised Tailings Storage Facility and associated infrastructure	Pending approval
	Geluksdal Pipeline General Authorisation	Approved never implemented		
EMP Amendment (under the MPRDA)	Environmental Impact Assessment (EIA) For The Proposed Uranium Plant And Cooke Dump Reprocessing Infrastructure	Approved never implemented	Amendment: Driefontein, Kloof and South Deep Mine West Wits Project Environmental Management Programmes	Suspended upon further investigation
	Geluksdal TSF and Pipeline EIA & EMPR	Suspended upon further investigation		
Authorisation change request	CoR226 Authorisation Change Request -049	Approved never implemented	Unknown	

Project Description

There is a long history of gold and uranium mining in the broader West Rand area which has resulted in tailings containing in excess of 170 million pounds of uranium and 11 million ounces of gold. SGL, through the split from Gold Fields and the acquisition of Gold One and Ezulwini, currently owns the majority of the tailings in the area and its gold and uranium resources.

The key to successfully capitalising these resources relies on the execution of the WRTRP. The concept of the WRTRP is well understood with an 8 year history of extensive metallurgical test work, environmental studies, feasibility studies and design by a number of major mining houses. A pre-feasibility study (PFS) completed during 2013 for the WRTRP has confirmed that there is a significant opportunity to extract value from the SGL surface resources in a cost effective sequence.

The implementation of the WRTRP will be done in phases to achieve the objectives of the ultimate project. The Ultimate Project and the Initial Implementation are detailed below.

Ultimate Project

SGL's historical TSF holdings in the West Rand can be divided into four Mining Rights; the Cooke, Ezulwini, Kloof and Driefontein Mining Rights. Each of these Mining Rights contains a number of historical TSFs which will ultimately be reclaimed during the life of the WRTRP:

- Kloof Mining Right area: Kloof 1 TSF, Kloof 2 TSF, Leeudoorn TSF, Libanon TSF, Venterspost North and Venterspost South TSFs. Venterspost North and South TSFs will be processed with the concurrent construction of Module 2 float and gold plants. The remainder of the TSFs will be processed once Module 3 of the CPP has been constructed;
- Driefontein Mining Right area: Driefontein 1, 2, 3, 4 and 5 TSF. Once the Driefontein 3 and 5 TSFs have been reclaimed, the remainder of the Driefontein TSFs, namely Driefontein 1, 2 and 4 TSFs, will be processed through the CPP;
- Cooke Mining Right area: Cooke TSF and the Millsite Complex (38, 39 and 40/41 and Valley) TSFs. Millsite Complex will be processed with the concurrent construction of Module 2 float and gold plants; and
- Ezulwini mining Right Area: Cooke 4 South (C4S) TSF, which will be processed subsequent to Driefontein 3 and 5 TSFs and in parallel with the Cooke TSF.

Once commissioned the project will initially reclaim and treat the TSFs at a rate of 1.5 Mt/m (1Mt/m from Driefontein 3 TSF, followed sequentially by Driefontein 5 and C4S TSFs and 0.5 Mt/m from Cooke TSF). Reclamation and processing capacity will ultimately ramp up to 4 Mt/m over an anticipated period of 8 years. At the 4 Mt/m tailings retreatment capacity, each of the Mining Right areas will be reclaimed and processed simultaneously.

The ultimate WRTRP involves the construction of a large-scale CPP for the recovery of gold, uranium and sulfur from the available resources. The CPP, centrally located to the West Rand resources, will be developed in phases/modules to eventually treat up to 4 Mt/month of tailings inclusive of current underground arisings. The resultant tailings will be deposited on a TSF with a modern engineering design called the RTSF.

The tailings material will be centrally treated in the CPP. In addition to gold and uranium extraction, sulfur will be extracted to produce sulphuric acid, an important reagent required for uranium leaching. The CPP footprint will ultimately occupy approximately 75 hectares when fully constructed. The Plant will be developed in phases to eventually treat up to 4 Mt/month of tailings and current underground arisings. The CPP will eventually be comprised of the following:

- Gold Plants;
- Float plants and associated infrastructure;
- Uranium Processing Plants;
- Multiple Roasters and associated infrastructure;
- Acid Plant and associated infrastructure;
- Uranium and sulphide concentrate storage facilities;
- Loading facilities for uranium concentrate; and
- Water storage facilities.

A new deposition site for the residue from the CPP will be located in an area that has been extensively studied as part of the original WWP and CUP (the proposed Geluksdal TSF is associated with the CUP). The “deposition area” on which the project is focussing, has been termed the RTSF and is anticipated to accommodate the entire tonnage from the district. The RTSF will be one large facility as opposed to the two independent deposition facilities proposed by the WWP and CUP respectively.

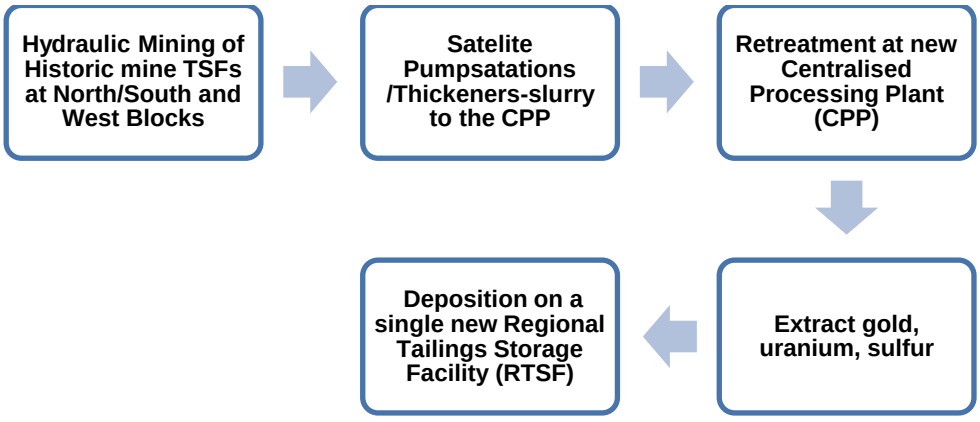

Figure II: Summary of WRTRP

Initial Implementation

To ensure the successful start-up phase, the upfront capital required for the WRTRP will be limited; only essential infrastructure will be developed during Initial Implementation. This entails the design and construction of;

- The hydraulic mining infrastructure at the Driefontein 3 and 5 TSFs, C4S TSF, including Slurry and water pump stations;
- Driefontein and Cooke Mining Right area overland inter connecting pipe works and thickeners;
- Process water supply and storage; and
- The CPP Module 1 comprising:
  - Gold Plant;
  - Floatation Plant;
  - Uranium Plant,
  - Acid Plant; and
  - A roaster.
- The RTSF, RWD and AWTF.

This first module of the CPP will receive two reclaimed slurry streams and will retreat up to 1.0 Mt/m from the Driefontein 3 and 5 TSFs, C4S TSF in sequence over 11 years. In addition to and concurrently with the Driefontein 3 and 5 and C4S TSFs, up to 0.5 Mt/m from the Cooke TSF will be mined for a period of 16 years. The resultant tailings from the CPP will be deposited onto the first phase of the new RTSF.

A high grade uranium concentrate, produced at the CPP, will be transported to Ezulwini (50 k tonnes per month) for the extraction of uranium and gold. The tailings from this process will be deposited on the existing operational Ezulwini North TSF.

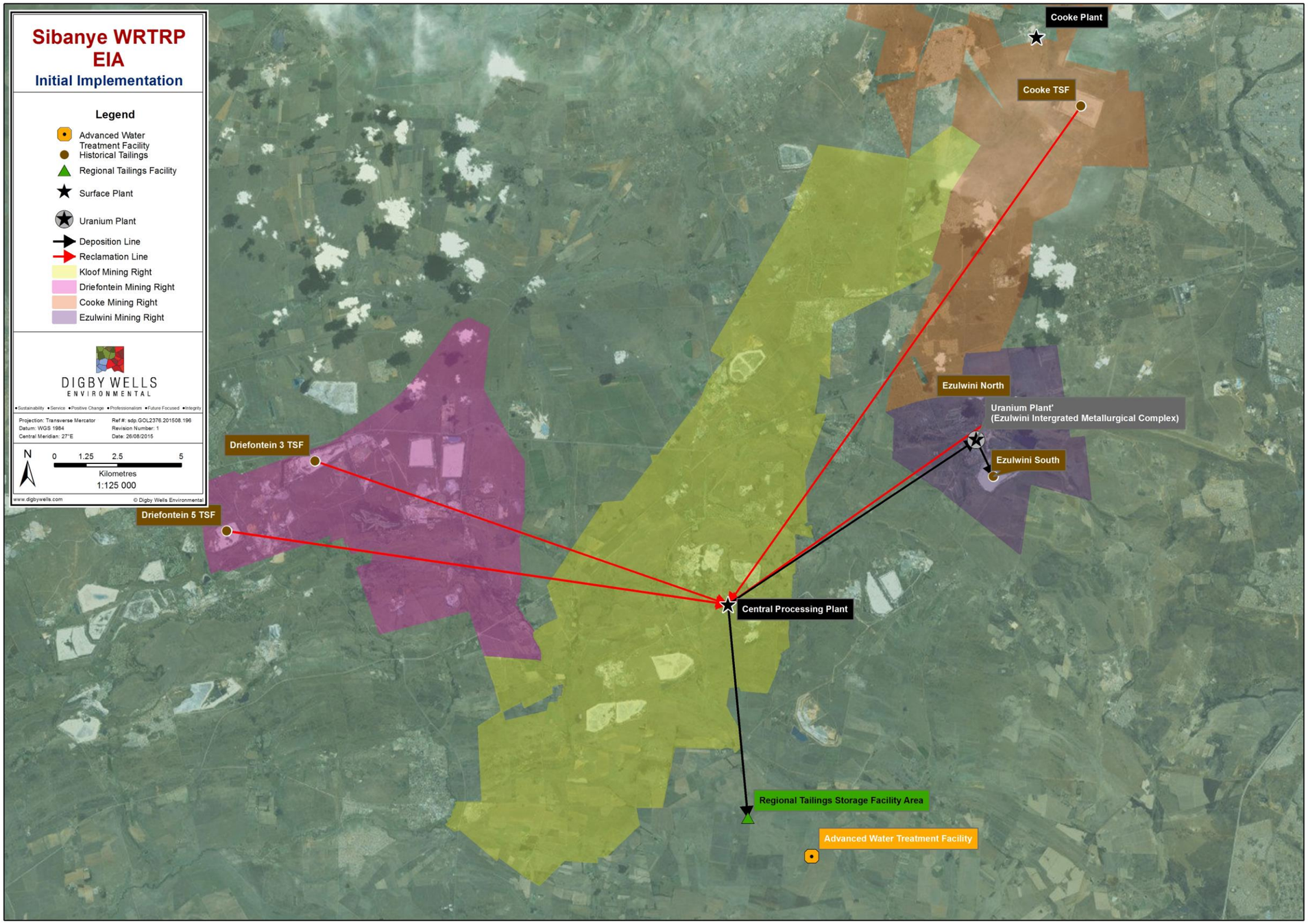

Figure III: Initial Implementation Phase

Ezulwini Mining Right Area

This application relates to the environmental authorisation relevant to the proposed activities at the Ezulwini Mining Right Area which includes:

- Transportation of concentrated tailings from the CPP to the Ezulwini Plant;
- Metallurgical processing of concentrated tailings material to remove gold and uranium; and
- Deposition of the final tailings onto the operational Ezulwini North TSF.

The high grade uranium concentrate that will be produced at the CPP (approximately 50 000 t/m) will be transported via a pipeline to the existing Ezulwini plant for uranium and gold extraction. Once processed at the Ezulwini Plant, the slurry generated from this process will be deposited into the operational Ezulwini North TSF. The Ezulwini Plant has a design capacity, and is approved, to process 100 kt/m, however currently it only processes 30 to 50 kt/m. The additional 50 kt/m from the CPP will bring it up to design capacity. The Ezulwini north TSF was also designed to receive 100 kt/m of tailings material. Therefore the only authorisation required is for the pipeline transporting the concentrated tailings material from the CPP to the Ezulwini Plant.

This report is in support of the amendment of the Ezulwini EMP (2013) supporting the Ezulwini Mining Right GP (38) MR to include the pipeline.

Project Alternatives

Alternatives for the various aspects of the WRTRP have been assessed during the pre-feasibility of the Project. The alternatives considered includes location, technology and processes of the CPP, RTSF and associated RWD and AWTF, the pipeline dimensions and routes, the location and capacities of the BWSFs, thickeners and reclamation of the TSFs. The alternatives for the above activities have been detailed in the scoping reports for the respective Mining Right areas. This scoping report only details the alternatives considered specifically for the Ezulwini Mining Right area.

Site Alternatives

No site alternatives were considered as the Ezulwini Plant and Ezulwini North TSF are existing infrastructure.

Pipeline Route Alternatives

The concentrated tailings pipeline is proposed to run from the western boundary of the C4S TSF and westwards across the R28 and an unnamed tributary. The pipeline continues in a westerly direction, south of the South Deep TSF and finally stretches in a north westerly direction to reach the CPP. The only alternatives considered were minor alignments with to optimise the route in terms of the local topography.

The Option of not implementing the Activity

In terms of the "No-go" option, the primary land uses for the region are mining, agriculture, and in some areas, residential. Should the project not be implemented, the Driefontein 3 and 5 TSFs will not be reclaimed; the TSFs will remain *in situ* and continue to impact on the environmental and social landscapes, as per the status quo. None of the envisioned benefits of the project will come to fruition, such as. environmental clean-up, job opportunities, investment into the economy, treatment of currently impacted water and a reduction in the health impacts posed by the historical TSFs. The existing impacts include:

- Leaching contaminants e.g. uranium and sulfur, into the sensitive dolomitic aquifers;
- Risk to community health and an increased potential for AMD in the Western Basin;
- Further weakening of the West Rand's economy as mining declines; and
- The AWTF will not be funded.

The infrastructure associated with the Driefontein Mining Right area, such as the WBT, BWSF and associated pipelines, roads and transmission lines are required for the efficient implementation of the WRTRP. If any component of it is not approved, the entire project will be abandoned.

Public Participation Process

Stakeholders identified who are affected by, or interested in, the proposed project included government departments, parastatals, land owners and occupiers, communities, non-government institutions as well as business and industry. The stakeholders identified as part of the WWP and CUP (Geluksdal TSF) projects were also informed as the WRTRP effectively combines the WWP and CUP projects.

Consultation already undertaken prior to announcing the project (pre-application) includes telephonic discussions, one-on-one meetings and focus group meetings. Stakeholders were provided with project information at these meetings which were also distributed via email, post and hand delivery.

All comments raised by stakeholders during the pre-application phase have been captured in the Comment and Response Report (CRR) and provided to the various specialists. These were used to inform the scope of work for the specialist studies. Responses to the stakeholder comments are also provided in line with the overall project scope and available information.

During the scoping phase further consultation will take place by placing all scoping documents into the public domain for review, having open house meetings, focus group meetings and one-on-one consultations (as necessary). It is envisaged that a total of 6 stakeholder meetings in the form of focus group and open house meetings.

The Public Participation (PP) process for the EIA phase will be similar to the process undertaken for the scoping phase. The premise is to ensure that the various legislative

requirements for PP are met and that a single, integrated process is followed. This will limit stakeholder fatigue and ensure that stakeholders are presented with a single view of the full project and EIA information.

Potential Impacts

The scoping phase has allowed for the identification of potential impacts associated with the proposed project activities as the Ezulwini Mining Right area. As part of the EIA phase, th impacts identified below will be assessed and evaluated to determine their significance, as well as cumulative impacts identified and qualitatively assessed. These potential impacts include:

- Noise
  - Potential noise generated from the reclamation activities at the C4S TSF may impact on the surrounding farms and communities
- Wetlands
  - Contaminated surface water runoff generated as a result of the reclamation activities at the South TSF could seep into surrounding wetlands systems. This could cause impacts to the wetlands such as loss of wetland integrity and function
- Surface Water
  - A positive impact of removing the historical TSF will be restoration of the natural drainage pattern, this increases the catchment runoff yield into the river systems
  - Another positive impact is the increased quality in the surface water runoff as a result of the removal of the historical TSF. The sulphur and uranium concentrations are reduced, and subsequently, AMD potential is reduced.
  - Surface runoff from the reclamation process could potentially contaminate surrounding rivers. This may result in the degradation of the Upper Vaal WMA 08.
- Aquatic
  - Increase surface water runoff as a result of the removal of the historical TSF. This subsequently results in positive impacts on the aquatic systems in the associated sub quaternary reaches.
  - Surface runoff from the reclamation process could potentially contaminate and degrade the surrounding rivers and associated aquatic systems.

- Air Quality
  - Transportation of tailings from the Ezulwini Plant to the Ezulwini North TSF could cause dust suspension during the transportation process
  - The deposition of the tailings into the Ezulwini North TSF could generate fugitive emissions as a result of wind erosion
- Soil
  - Compaction of soils on maintenance roads as a result of vehicle use could lead to surface runoff. This could potentially result in soil erosion.
- Visual
  - Since the quantity of tailings material deposited into the Ezulwini North TSF is to increase, the rate of rise at the dump is expected to increase thus causing a visual impact for the surrounding communities
- Heritage
  - The potential for exposure of heritage resources located beneath historical TSFs is high.
- Socio-Economics
  - The removal of the TSF results in negative impacts for the surrounding community during the reclamation activities. This activity is anticipated to result in significant dust emissions and increased runoff which may potentially contaminate the surrounding streams.

Specialist Studies

To investigate and assess the impacts of the Initial Implementation of the proposed WRTRP project the following specialist studies have been proposed for the EIA phase:

- Surface water assessment, including:
  - Surface water quality; and
  - Surface water quantity
- Characterisation of the social environment;
- Radiation study;
- Ecological assessment, including:
  - Wetland investigation;
  - Fauna & flora assessment; and
  - Aquatic assessment.

- Geohydrological assessment;
- Archaeology and heritage assessment;
- Economic analysis;
- Soil and land capability assessment; and
- Air quality assessment.

Environmental Consultants

Digby Wells Environmental (Digby Wells) was appointed by SGL as the independent Environmental Assessment Practitioner (EAP) to undertake the Scoping and Environmental Impact Assessment (EIA) processes. The contact details for Digby Wells are set out in Table II.

Table II: Contact Details for Digby Wells

Company name:	Digby Wells Environmental
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Information Required To Be Included In A Scoping Report In Terms of the National Environmental Management Act, 1998 (Act 107 Of 1998)

Content	Reference
a) Details of – (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures.	Chapter 2
b) Description of the proposed activity	Chapter 1
c) A description of any feasible and reasonable alternatives that have been identified	Chapter 9
d) A description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is – (i) A linear activity, a description of the route of the activity; or (ii) An ocean-based activity, the coordinates where the activity is to be undertaken.	Chapter 3

Content	Reference
e) A description of the environment that may be affected by the activity and the manner in which the activity may affect the environment.	Chapter 6
f) An identification of all legislation and guidelines that have been considered in the preparation of the scoping report.	Chapter 6
g) A description of environmental issues and potential impacts, including cumulative impacts that have been identified.	Chapter 9
h) Details of the Public Participation Process conducted in terms of regulation 27(a), including – (i) The steps that were taken to notify potentially interested and affected parties of the application (ii) Proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given. (iii) A list of all persons or organisations that were identified and registered in terms of Regulation 55 as interested and affected parties in relation to the application (iv) A summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues	Chapter 9
i) A description of the need and desirability of the proposed activity.	Chapter 7
j) A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity	Chapter 9
k) Copies of any representations any comments received in connection with the application or the scoping report from interested and affected parties.	Chapter 9
l) Copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants.	Appendix 5
m) Any responses by the EAP to those representations and comments and views.	Appendix 5
n) A plan of study for the environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include – (i) A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes and the manner in which such tasks will be undertaken (ii) An indication of the stages at which the competent authority will be consulted	Chapter 10

Content	Reference
(iii) A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and (iv) Particulars of the public participation process that will be conducted during the environmental impact assessment process.	
o) Any specific information required by the competent authority.	Chapter 12
p) Any other matters required in terms of Section 24(4)(a) and (b) of the Act.	Chapter 12

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1 Introduction

Digby Wells Environmental (Digby Wells) was appointed by Sibanye Gold Limited (SGL) to conduct the Environmental Impact Assessment (EIA) process, which includes the compilation of an EIA and Scoping Report, for the West Rand Tailing Retreatment Project (WRTRP) in the Gauteng Province, South Africa, as shown in Plan 1.

1.1 Company Background

GFI Mining South Africa (Pty) Limited, Registration Number 2002/031431/07) was, prior to February 2013, a subsidiary within the Gold Fields Group. In early 2013 Gold Fields unbundled its Kloof Driefontein Complex (KDC) and Beatrix gold mines in the Free State to create a separate entity in SGL and listed SGL as a fully independent company on both the JSE and the NYSE Stock Exchanges.

Subsequently, in October 2013, SGL purchased the interest held by Gold One International Limited (Gold One) in Rand Uranium Limited (Rand Uranium) and Ezulwini Mining Company Limited (Ezulwini). These interests were held through a 74% shareholding in Newshelf 1114 (Pty) Limited (Newshelf), which owns 100% of Rand Uranium and Ezulwini. The purchase consideration was 150 million SGL shares, amounting to a shareholding of about 17%. The transaction was subject to various conditions, including the approval of the Competition Commission and the approval of the Minister of Mineral Resources. These approvals have been granted and the merger is now unconditional. The Gold One assets which have become part of Sibanye included the Cooke Operations (underground mining and surface reclamation operations) for gold and uranium production, and after completion of the transaction, SGL consolidated all of its and Gold One's operations for the reclamation of tailings to produce gold, uranium and sulphur on the West Rand.

1.2 Project History

The treatment of historical tailings in the West Rand area has a long history with Gold Fields, Rand Uranium, Harmony Gold Mining Company Limited (Harmony), Gold One and SGL completing a number of parallel, independent studies relating to the treatment of these historical tailings.

In late 2009 Gold Fields and Rand Uranium met to evaluate the potential synergy of an integrated flow sheet for the Cooke Uranium Project (Rand Uranium) and the West Wits Tailings Treatment Project (Gold Fields), both of which were nearing feasibility completion. A significant amount of re-engineering and confirmatory test work would have been required to achieve this and, given the momentum of the respective projects, it was agreed that the investment would not be justified at that point in time. After the completion of the respective projects they were put on hold because of economic circumstances at the time.

From 2010 through to 2012, Rand Uranium completed the Cooke Uranium Project (CUP) and the Cooke Optimisation Project (COP) for which various applications were made to the authorities with authorisation on certain aspects being received and others remain pending.

In 2012 Gold One acquired Rand Uranium and in the same year acquired the Ezulwini Mining Company (Pty) Ltd (Ezulwini) in an agreement with First Uranium Corporation. The company, during the same year, completed an application and relevant studies for the Geluksdal TSF Project Geluksdal.

In early 2013 Gold Fields unbundled its Kloof Driefontein Complex (KDC) and Beatrix gold mines to create Sibanye Gold.

1.3 Project Description

The broader West Rand area[2] contains an estimated 1.3 billion tonnes of surface gold and uranium tailings, with approximately 170 million pounds of recoverable uranium and 11 million ounces of recoverable gold. SGL, as the current majority owner of these resources, plans to exploit it to develop a strong, long life and high yield surface mining business. Key to the successful execution of this development strategy is the WRTRP. The concept of the WRTRP is well understood with an 8 year history of extensive metallurgical test work, feasibility studies and design by a number of major mining houses. A pre-feasibility study (PFS) completed during 2013 for the WRTRP has confirmed that there is a significant opportunity to extract value from the SGL surface resources in a cost effective sequence.

The ultimate WRTRP or “Ultimate Project” involves the construction of a large-scale Central Processing Plant (CPP) for the recovery of gold, uranium and sulfur from the available resources. The CPP, centrally located to the West Rand resources, will be developed in phases to eventually treat up to 4 Mt/month of tailings inclusive of current underground arisings. The resultant tailings will be deposited on a Tailings Storage Facility (TSF) with a modern engineering design called the Regional TSF (RTSF). The regional and local project settings are indicated on Plan 1 and Plan 2 below. These setting plans are also included in Appendix 3 of this report.

The Ultimate Project will be implemented in a number phases. Of these phases, phase 1 or the “Initial Implementation”, entails the reclamation of certain TSFs as well as the construction and operation of the first phase section of the RTSF, Gold Module 1 of the CPP and the first uranium roaster and acid plants. The Ultimate Project and Initial Implementation are explained in more detail below (Plan 3).

[2] The broader West Rand area includes Carletonville in the far west, Westonaria and Randfontein in the northeast.

Plan 1: Regional Setting

Plan 2: WRTRP Primary Infrastructure Layout

1.3.1 Ultimate Project

Simplistically, SGL's historical TSF holdings in the West Rand can be divided into four Mining Right areas; the Kloof, Driefontein, Cooke and the Ezulwini Mining Right areas, as shown in a – Plan 4c. Each of these Mining Right areas contains a number of historical TSFs as detailed below:

- Kloof Mining Right area: Kloof 1 TSF, Kloof 2 TSF, Leeudoorn TSF, Libanon TSF, Venterspost North and Venterspost South TSFs. Venterspost North and South TSFs will be processed with the concurrent construction of Module 2 float and gold plants. The remainder of the TSFs will be processed once Module 3 of the CPP has been constructed;
- Driefontein Mining Right area: Driefontein 1, 2, 3, 4 and 5 TSF. Once the Driefontein 3 and 5 TSFs have been depleted the remainder of the Driefontein TSFs, namely Driefontein 1, 2 and 4 TSFs, will be processed through the CPP;
- Cooke Mining Right area: Cooke TSF and the Millsite Complex (38, 39 and 40/41 and Valley) TSFs. Millsite Complex will be processed with the concurrent construction of Module 2 float and gold plants; and
- Ezulwini Mining Right area: C4S TSF, which will be processed subsequent to Driefontein 3 and 5 TSFs and in parallel with the Cooke TSF.

Each of the Mining Right areas will be reclaimed in a phased approach (Plan 3). The Driefontein 3 TSF, concurrently with the Cooke TSF will be reclaimed first. Following reclamation of Driefontein 3 TSF, Driefontein 5 TSF and Cooke 4 Dam south (C4S) will be reclaimed.

Once commissioned the project will initially reclaim and treat the TSFs at a rate of 1.5 Mt/m; 1 Mt/m from Driefontein 3 TSF, followed sequentially by Driefontein 5 and C4S TSFs and 0.5 Mt/m from Cooke TSF. Reclamation and processing capacity will ultimately ramp up to 4 Mt/m over an anticipated period of 8 years. At the 4 Mt/m tailings retreatment capacity, each of the Mining right Areas TSFs will be reclaimed and processed simultaneously as well as the underground arisings being accommodated.

The tailings material will be centrally treated in a CPP. In addition to gold and uranium extraction, sulfur will be extracted to produce sulphuric acid which in turn will be re used in the uranium plant leach section.

To ensure the economic viability of the project the upfront capital required for the WRTRPwill be minimised, only essential infrastructure will be developed during Initial Implementation. Use of existing and available infrastructure may be used to process gold and uranium until the volumetric increase in tonnage necessitates the need to expand the CPP.

The authorisation, construction and operation of a new deposition site for the residue from the CPP will be located in an area that has been extensively studied as part of the original Gold Fields WWP and the Rand Uranium CUP and Geluksdal TSF. The “deposition area” on which the project is focussing, has been termed the RTSF and is anticipated to accommodate the entire tonnage from the district. The RTSF if proved viable will be one large facility as opposed to the two independent deposition facilities proposed by the WWP and CUP respectively.

SGL has various authorisations and approvals for elements of the WWP and CUP projects, with authorisations and approvals for certain aspects of the respective projects still outstanding. The WRTRP aims to combine the WWP and CUP projects, as per stakeholder concerns and suggestions based on the WWP and CUP projects. Should the WRTRP not proceed, SGL will continue with the CUP and WWP projects for activities that have been authorised, as well as proceeding with the application process for the outstanding authorisations.

Plan 3: Initial Implementation

Plan 4a: Kloof Mining Right Area

Plan 4b: Driefontein Mining Right Area

Plan 4c: Cooke Mining Right Area

Plan 4d: Ezulwini Mining Right Area

1.3.1.1 Water Sources

A number of mine impacted water sources have been identified and from which water can be supplied to the reclamation operations. SGL has recognised that water is a scarce and strategic commodity and hence currently impacted mine water will be used preferentially over Rand Water or other higher quality sources. Water will be supplied to the reclamation areas from the identified sources via pipelines and bulk water storage facilities (BWSF).

Once the impacted mine water, supplemented by recovered water from the various thickeners has been used in the hydraulic reclamation process, it will find its way to the RTSF as carrier water for the retreated tailings. As process and rain water builds up on the RTSF it will be drained to the Return Water Dam (RWD) and treated through the AWTF.

1.3.1.2 Reclamation of Tailings

The tailings reclamation process is essentially a water hydraulic mining operation, where the TSFs will be hydraulically reclaimed to the natural ground level in nominal 12 – 15 m benches and the foot print rehabilitated to a suitable end land use.

Water will be supplied to the various reclamation sites, from existing impacted mine water sources, and then pressurised through a high pressure pumping system before reporting to the monitoring guns at the top of the historical TSFs. Monitoring guns will be used at the reclamation site mining face to slurry the tailings material.

The reclaimed material, in the form of slurry, will flow through open channels over screens to remove oversized debris from the slurry before it enters a tank. A series of pumps will then pump the slurry from the tanks via thickeners to the CPP for gold, uranium and sulfur extraction. The historical TSFs proposed for reclamation cover a total of approximately 1 660 ha, as shown in Table 1-1. The RTSF footprint will be approximately 1 350 ha, liberating a nett 310 ha of currently sterilised land.

Table 1-1: Total Area Covered by the TSFs that will be reclaimed

Block	Name	Area (ha)	Block	Name	Area (ha)
Northern Block	Venterspost N TSF	60.68	Western Block	Driefontein 1 TSF	87.15
	Venterspost S TSF	30.51		Driefontein 2 TSF	85.26
	Millsite Complex	315.47		Driefontein 3 TSF	72.76
	Cooke TSF	178.99		Driefontein 4 TSF	165.66
	Total	**585.65**		Driefontein 5 TSF	67.72
Southern Block	Kloof 2 TSF	72.76		Libanon TSF	93.64
	Kloof 1 TSF	86.99		**Total**	**572.19**
	Leeudoorn TSF	186.27			

Block	Name	Area (ha)	Block	Name	Area (ha)
	Ezulwini South	157.99	Potential future TSFs[3]	South shaft and Twin shaft TSFs	107.66
	Total	**504.01**			

1.3.1.3 Pipelines

The overland slurry and water piping required for the project will ultimately consist of approximately 120 km of pipeline (many of which will be parallel and in the same servitude). Existing mine servitudes will be utilised as far as possible for the overland piping. The following pipelines will be required:

- Water supply pipelines (from K10 shaft to the west BWSF, Cooke 1 and 2 water to the Cooke BWSF, Cooke 4 shaft to the south BWSF and from the respective BWSFs to the historical TSFs);
- Slurry pipelines (from the historical TSFs to the West Block Thickener (WBT), North block Thickener (NBT) and Cooke Thickener);
- Thickened slurry pipeline (from the WBT, SBT and Cooke Thickener to the CPP.);
- Uranium and sulfide rich slurry pipeline (from the CPP to Ezulwini);
- Tailings pipeline (from the CPP to the RTSF); and
- Treated water pipeline (from the AWTF to a discharge point on the Leeuspruit).

1.3.1.4 Thickeners

A WBT, NBT and Cooke Thickener will be constructed for the respective Mining Right areas. The thickeners will be used to thicken reclaimed tailings from the TSFs before it is pumped to the CPP for processing. The thickeners provide slurry of consistent density to the CPP, and are critical in the optimisation of the operating of the plant. The thickeners also aid in minimising pumping costs by optimising the amount of water pumped around the circuit.

1.3.1.5 The Central Processing Plant

The anticipated location for the CPP is mid-way between Kloof main and Kloof 4 shaft central to all the resources, water and power supply as well as existing and planned infrastructure (Plan 4a). The Plant will be developed in phases to eventually treat up to 4 Mt/month of historical tailings and current underground arisings. The CPP will eventually be comprised of:

- Gold Plant Modules (3);
- Float plants and associated infrastructure (one associated with the uranium plants);

[3] The South Shaft and Twin Shaft TSFs will be part of a future application.

- Roasters and associated infrastructure;
- Acid plants and associated infrastructure;
- Uranium processing plants (2);
- Bulk sulfuric acid storage facility;
- Loading facilities for uranium concentrate, bulk sulfuric acid and reagents;
- Bulk Water storage facilities; and
- Pollution control dams.

1.3.1.6 Regional Tailings Storage Facility

This RTSF has been positioned and sized as a facility that can cater for both the tailings generated by the WRTRP as well as other tailings located in the region approximating 1.3 billion tonnes.

During the pre-feasibility study (PFS) the use of the DEA/GDARD/NEMA authorised Gold Fields CTSF and the Gold One Geluksdal TSF were considered for the WRTRP. Following an optimisation exercise requiring an ultimate deposition rate of 4 Mt/m, it was recognised that the CTSF and Geluksdal sites alone and collectively were insufficient to accommodate the desired tonnage profile for the project, both in deposition rates and in tonnage capacity for the proposed RTSF. The optimal location of the RTSF has been positioned between these two facilities, an area that has been extensively studied by the WWP and CUP but requires further investigation (Plan 5). It is likely that the construction of the RTSF will be phased to suit the envisaged tonnage build up. The RTSF will be sized, assessed and permitted on the basis of accommodating the long term requirements for the region and replaces the numerous TSFs scattered throughout the West Rand.

1.3.1.7 Return Water Dam

The design and management of the RTSF Return Water Dam (RWD) will need to be undertaken in line with the requirements of the GN 704 regulations. The RWD has therefore been sized to ensure that it is unlikely to spill into any clean water system more than once in 50 years, given a certain return water and/or water treatment rate.

The ultimate RWD arrangement, which will consist of a series of compartments due to the phased development of the RTSF, will require a total storage capacity of at least 3.5 million m3 and is likely to have outer wall heights of 5 m to 10 m. To limit seepage of process water, the RWD will be lined with a geocomposite liner consisting of a geomembrane underlain by a 300 mm thick layer of clayey material won from site. A seepage collection system will also be provided to intercept and identify any leakage.

1.3.1.8 Advanced Water Treatment Facility

The design by Watercare Mining (WCM) consists of a multiple stage softening and membrane separation process. The method of softening uses a Crystalactor® process for softening which reduces the incoming water hardness by the precipitation of calcium pellets. Through pH control and a feed crystal source of fine quartz sand, precipitation is controlled and creates fine pellets which are highly stable and easy to handle. This effectively combines the softening and clarifying stage in one process. This is followed by GAC (granular activated carbon) and Nano-filtration to remove all solids as well as organic compounds to protect the Reverse osmosis (RO) membranes from damage and fouling. The filtrate from the first stage membranes is below the prescribed quality and the brine is sent to a secondary Crystalactor® for softening again and follows the same processes as described by Stage 1. Three stages are used to create an overall water recovery of 93% with the solid waste discharged as stable pellets at an approximate water content of only 5%. Each stage of RO membrane recovery ranges from 65% to 50%, with each consecutive stage being lower recovery due to the saturation limit as well as the operating pressure being kept as low as possible to conserve energy.

The options for disposal of the pellets is either by creating a slurry that is pumped to the RTSF, or it needs to be collected on a drying bank and collected with a tipper and driven to the RTSF for disposal. The footprint of the proposed plant is approximate area of 3 600 ha and will cater for the scope of the Ultimate Project.

Plan 5: CPP Location

Plan 6: CPP Layout

Plan 7: RTSF Location

1.3.1.9 Mining Rights Concerned

1.3.1.9.1 Cooke Mining Right Area

Rand Uranium holds 2 mining rights (GP 7 MR and GP 173 MR) and two prospecting rights (GP 241 PR and GP 238 PR). These rights relate to the Cooke operations (1, 2 & 3) and Old Randfontein. This, after the prospecting rights have been converted into mining rights, will be referred to as the Cooke Mining Right Area.

1.3.1.9.2 Ezulwini Mining Right Area

Ezulwini holds a mining right with reference GP 38 MR.

1.3.1.9.3 Kloof Mining Right Area

Kloof holds in its own right, GP 66 MR (within which the CPP, RTSF and K10 water supply will from part), and adjacent to it are Venterspost TSFs (North and South) that will be incorporated into the right as part of this application.

1.3.1.9.4 Driefontein Mining Right Area

Driefontein holds mining right GP 51 MR. Currently the Driefontein No 4 TSF lies outside of the MR area and needs to be incorporated through a Section 102 amendment process. This is the Driefontein Mining right Area. Table 1-3 provides a summary of the ultimate project and Figure 1-1 shows the geographical extent of the ultimate project.

Table 1-2: Scheduled Activities of the WRTRP – Ultimate Project

Proposed Construction Date*	**2016**	**2018**	**2020**
Operation Date	**2019**	**2021**	**2024**
Activities	▪ Treat Driefontein 3 and 5, C4S TSF (@1Mt/m) and Cooke TSFs at 0.5Mt/m totalling 1.5 Mt/m through Gold Module 1, uranium roaster and acid plants of the new Central Processing Plant (CPP) with deposition onto the Regional Tailings Storage Facility (RTSF). ▪ High grade uranium concentrate (50 kt/m) transported and treated at Ezulwini uranium plant.	▪ Kloof 1 and 2 TSFs and current arisings ▪ Reclaim Leeudoorn and associated Mine Dumps ▪ Potentially South Deep Mine Dumps (future) and current arisings tail will go through CPP (high Uranium) ▪ Reclaim Millsite TSF	▪ Continue to reclaim Millsite TSF (39, 40, 41 and Valley) ▪ Reclaim Venterspost North and South Mine Dumps
Existing infrastructure to be leveraged	▪ Ezulwini Uranium Plant (50 kt/m) to treat concentrate from the CPP		

New infrastructure required	▪ CPP Gold Module I (footprint of full capacity to be authorised):
	  ▪ Gold Plant I
	  ▪ Sulphide and oxide Floatation Plant
	  ▪ Uranium Plant 1
	  ▪ Acid Plant
	  ▪ Roaster 1
	▪ RTSF (footprint of full capacity to be authorised)
	▪ West Block Thickener (WBT) and bulk water storage
	▪ Pipelines between D3, D5, C4S, Cooke TSF, WBT, CPP and RTSF
		▪ CPP Gold Module II:
		  ▪ Gold Plant II
		  ▪ Pipelines, roads and pumps
		  ▪ Thickener
			▪ CPP Gold Module III:
			  ▪ Gold Plant III
			  ▪ Uranium Plant II
			  ▪ Pipelines, roads and pumps
			  ▪ Thickener

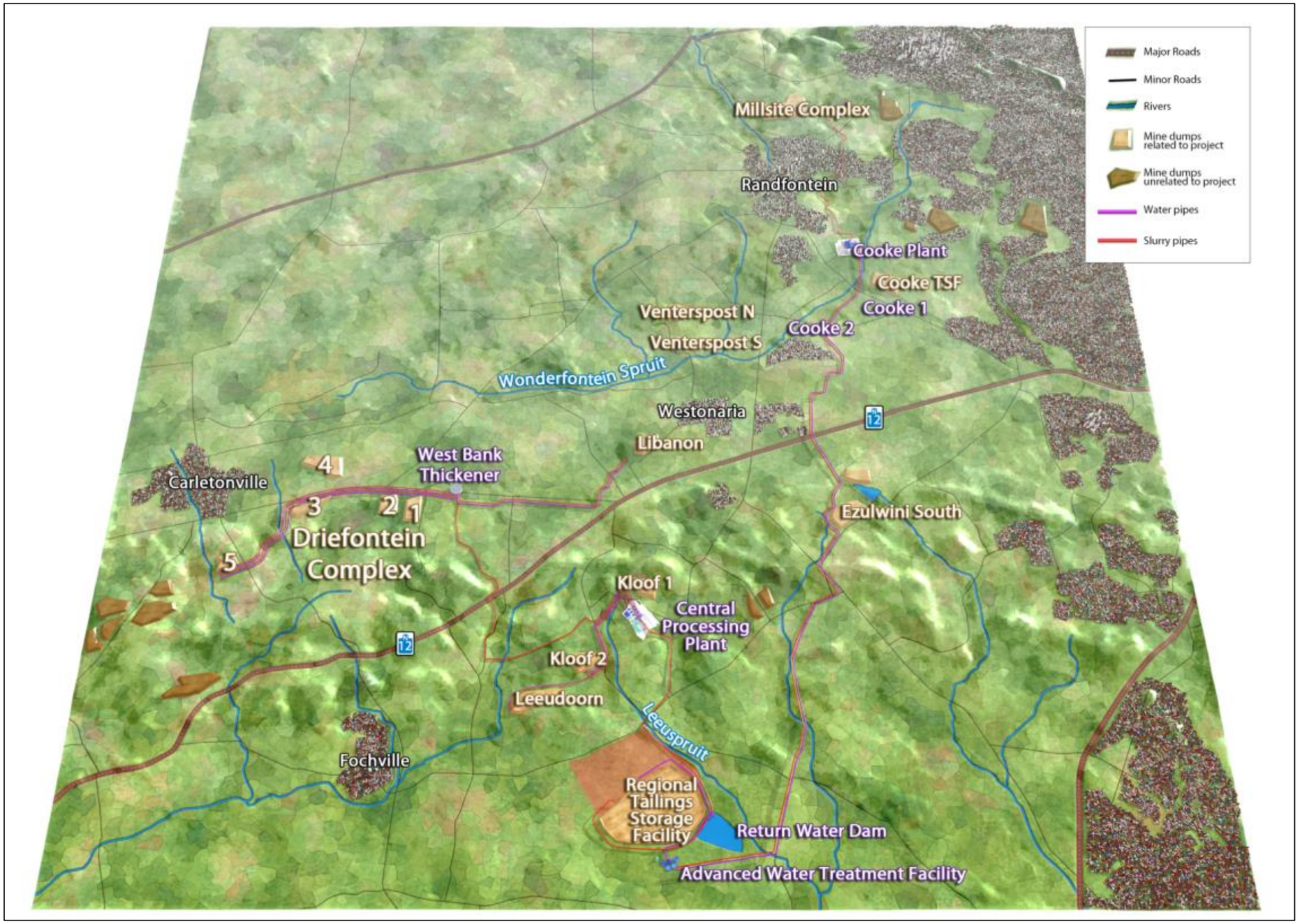

Figure 1-1: Geographical extent of the Ultimate Project - WRTRP

1.3.2 Initial Implementation

Due to commercial imperatives in developing a project of this magnitude, it needs to be implemented over time. The initial investment and development will be focused on those assets that will put the project in a position to partially fund the remaining development.

This entails the design and construction of the initial components of the CPP (gold module, floatation plant, uranium plant, acid plant and a roaster), to retreat up to 1.5 Mt/m concurrently from the Driefontein 3 and 5 TSFs, C4S TSF (1Mt/m) and the Cooke TSF (0.5Mt/m). Driefontein 3, 5 and C4S TSFs will be mined sequentially over 11 years, whilst the Cooke TSF will be mined concurrent to these for a period of 16 years. The resultant tailings will be deposited onto the first stage of the new RTSF.

A high grade uranium concentrate, produced at the CPP, will be transported to Ezulwini (50 k tonnes per month) for the extraction of uranium. The tailings from this process will be deposited on the existing operational Ezulwini North TSF.

Figure 1-2 provides a high-level overview of the process to be undertaken Initial Implementation of the WRTRP whilst Plan 3 provides a visual overview of the project to be implemented in the various phases.

Figure 1-2: Initial Implementation Process Summary

The CPP and RTSF are likely to be the two components of the project with the most significant potential environmental impacts and will be developed as the project progresses. The CPP will be developed over a period of approximately eight years, however this application is for the entire CPP site i.e. Modules I, II and III, Uranium plants, roasters and acid plant. The decision to take this approach, as opposed to authorising it in stages over eight years, is to provide the regulators and the public with an impact assessment that takes the whole project into consideration. The same logic is applied to the RTSF. It will be developed in two phases over the life of the project, however, the entire footprint is assessed from an environmental impact perspective. Thus, the cumulative impacts associated with the Ultimate Project can be assessed, as opposed to activity specific impacts, as well as avoiding incremental decision making by the authorities.

The primary activities to take place during the Initial Implementation of the WRTRP are listed in Table 1-3.

Table 1-3: Primary Activities of the WRTRP initial implementation

Category	Activity
Kloof Mining Right area	
Infrastructure	Pipeline Routes (residual tailings).
	Central processing Plant (CPP) incorporating Module 1 float and gold plants and No1 uranium, roaster and acid plants) and Regional Tailings Storage Facility (RTSF).
	RTSF Return Water Dams (RWD) and the Advanced Water Treatment Facility (AWTF) complex.
Processes	Abstraction of water from K10 shaft
	Disposal of the residue from the AWTF.
	Gold, uranium and sulfur extraction at the CPP (tailings to RTSF)
	Water distribution at the AWTF for discharge or sale.
Pumping	Pumping of up to 1.5 Mt/m of tailings to the RTSF.
	Pumping water from the RTSF return water dams to the AWTF.
	Discharging treated water to the Leeuspruit.
	Pumping residue from the AWTF to the RTSF.
Electricity supply	Power supply from Kloof 1 substation to the CPP.
	Power supply from Kloof 4 substation to the RTSF and AWTF.
Driefontein Mining Right area	
Infrastructure	Pipeline Routes (water, slurry and thickened tailings).
	WBT and BWS complex.

Category	Activity
	Collection sumps and pump stations at the Driefontein 3 and 5 TSFs
Processes	Hydraulic reclamation of the TSFs at Dri3 and CD (which include temporary storage of the slurry in a sump).
Pumping	Pumping water from K10 to the BWSF located next to the WBT.
	Pumping water from the BWSF to the Driefontein TSFs that will be reclaimed.(Dri3 & 5 TSFs)
	Pumping slurry from the TSF sump to the WBT (for Driefontein 3 and 5 TSFs).
	Pumping the thickened slurry from the WBT to the CPP (2 pipeline route options).
Electricity supply	Power supply from West Driefontein 6 substation to Driefontein 3 TSF.
	Power supply from West Driefontein Gold substation to Driefontein 5 TSF.
	Power supply from East Driefontein Shaft substation to WBT and BWSF.
Cooke Mining Right area	
Infrastructure	Pipeline Routes (water, slurry and thickened tailings).
	Cooke and NBT thickener.
	Collection sumps and pump stations at the Cooke TSF.
Processes	Abstraction of water Cooke 1 and 2 and Cooke No. 4 shaft
	Hydraulic reclamation of the Cooke TSF (which include temporary storage of the slurry in a sump).
Pumping	Pumping 500 kt/m of tailings from the Cooke Dump to the Cooke thickener.
	Pumping from the Cooke thickener to the CPP via Ezulwini.
Electricity supply	Power supply from the Cooke substation to the Cooke thickener.
	Power supply from the Cooke Plant to the Cooke TSF
Ezulwini Mining Right area	
Infrastructure	Ezulwini floatation plant
Processes	Uranium extraction at Ezulwini (tailings to Ezulwini North Dump).
Pumping	Pumping water from the Pieter write dam to C4S TSF that will be reclaimed
	Pumping tailings from C4S TSF to the
	Pumping slurry from Ezulwini plant to Ezulwini North Dump
Electricity supply	Power supply from Ezulwini plant to the C4S TSF

Table 1-4: Pipeline Route Lengths

Name	Length (m)	Type
DRI3 to WBT	7 665	Slurry Pipeline -dilute
DRI5 to DRI3	6 646	Slurry Pipeline -dilute
WBT to CPP	17 473	Slurry Pipeline -thickened
Cooke TSF to Cooke Thickener	TBC	Slurry Pipeline-dilute
Cooke Thickener to CPP	TBC	Slurry Pipeline-thickened-existing approved route GDARD,NNR
Ezulwini South TSF to CPP	TBC	Slurry Pipeline-thickened
CPP to RTSF	17 908	Tailings Pipeline – thickened (alternate routes)
CPP to Ezulwini	18 502	Tailings Pipeline (Uranium Rich) - dilute
BWSF to DRI3	7 699	Water Pipeline
BWSF to DRI5	14 168	Water Pipeline
K10 to west BWSF	10 477	Water Pipeline
Cooke shafts to Cooke TSF	TBC	Water Pipeline – existing approved route GDARD , NNR
Cooke 4 shaft to C4S TSF	TBC	Water Pipeline
RWD to AWTF	1 960	Water Pipeline
WBT to CPP (Alternative Route)	13 284	Slurry Pipeline (Alternative Route)

Amendments to various MWPs and EMPs will be applied for in due course pending the inclusion of additional TSFs as the WRTRP expands to process 4 Mt/m. The RTSF and CPP will be assessed for the complete footprint to ensure suitability for all future deposition requirements and envisaged process plant requirements in the CPP area. This application, however, deals with the amendment of the Ezulwini Mining Right to include the Initial Implementation activities occurring within or associated with this right.

1.3.3 Amendment of the Ezulwini Mining Right

This application relates to the environmental authorisation relevant to the proposed activities at the Ezulwini Mining Right Area which includes:

- Transportation of concentrated tailings from the CPP to the Ezulwini Plant;
- Metallurgical processing of concentrated tailings material to remove gold and uranium; and

- Deposition of the final tailings onto the operational Ezulwini North TSF.

The high grade uranium concentrate that will be produced at the CPP (approximately 50 000 t/m) will be transported via a pipeline to the existing Ezulwini plant for uranium and gold extraction. Once processed at the Ezulwini Plant, the slurry generated from this process will be deposited into the operational Ezulwini North TSF. The Ezulwini Plant has a design capacity, and is approved, to process 100 kt/m, however currently it only processes 30 to 50 kt/m. The additional 50 kt/m from the CPP will bring it up to design capacity. The Ezulwini north TSF was also designed to receive 100 kt/m of tailings material. Therefore the only authorisation required is for the pipeline transporting the concentrated tailings material from the CPP to the Ezulwini Plant.

This report is in support of the amendment of the Ezulwini EMP (2013) supporting the Ezulwini Mining Right GP (38) MR to include the pipeline. The activities associated with the Ezulwini Mining Right amendment application are detailed in Table 1-5.

Table 1-5: Ezulwini Activities

Category	Activity
Ezulwini Mining Right area	
Infrastructure	Ezulwini Plant
	Pipeline from the CPP to Ezulwini Plant
Processes	Processing at Ezulwini Plant (tailings to Ezulwini North TSF).
Pumping	Pumping slurry from Ezulwini Plant to Ezulwini North TSF
	Pumping water from the Cooke 4 shaft to C4S TSF for reclamation
Electricity supply	Power supply from Ezulwini plant to the C4S TSF

2 Project Applicant

SGL has appointed Digby Wells as the independent Environmental Assessment Practitioner (EAP) to conduct the EIA and associated specialist studies for the WRTRP, as well as the required Public Participation Process (PPP).

2.1 Item 2(a)(i): Details of EAP

Table 2-1 below provides the details of the Environmental Assessment Practitioner (EAP) working on the proposed Project.

Table 2-1: Contact details of the EAP

Name of Practitioner:	Mr Marcelle Radyn
Telephone:	+27 11 789 9495
Fax:	+27 11 789 9498
Email:	marcelle.radyn@digbywells.com

2.2 Item 2(a)(ii): Expertise of the EAP

2.2.1 The Qualifications of the EAP

Marcelle completed his BSc at the University of the Witwatersrand. He then completed a BSc (Hons) through the University of South Africa. Refer to Appendix 1 for proof of these qualifications.

2.2.2 Summary of the EAP's Past Experience

Marcelle is a Senior Environmental Consultant at Digby Wells within the Environmental Management Services Department. Marcelle has been with Digby Wells since 2012 and has managed many projects within South Africa. During his employment at Digby Wells, Marcelle has been extensively involved in the management of the Environmental Impact Assessment (EIA) process as well as with the compilation of Environmental Management Programmes (EMPr). This includes the completion of the EIA/EMPs for mining related projects in accordance with the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). The projects involved managing the Public Participation Process (PPP), Project Meetings and resource allocation and management. He has also compiled numerous Prospecting Right Applications and Water Use License Applications (WULA). In addition he possesses experience in conducting due diligence investigations and EMP compliance auditing.

Refer to Appendix 2 for Marcelle's Curriculum Vitae (CV).

3 Item 2(b): Description of the Property

The property details relating to the proposed activities at the Cooke TSF are set out in the table below. The properties on which the proposed activities are to occur and infrastructure will be constructed are illustrated in Table 3-1 below.

Table 3-1: Property Details for Cooke TSF

Farm Name:	Portions 4, 6 and 13 of the farm Waterpan 292, Portion 41 of the farm Jachtfontein 344 and Portion 24 of the farm Modderfontein 353
Application Area (Ha):	The Ezulwini project boundary is made up of 3 718 ha of the farm portions mentioned above
Magisterial District:	West Rand District Municipality
Distance and direction from nearest town:	The nearest town to the Ezulwini project area is Hillshaven which is located approximately 5 km west of Ezulwini. With regards to the major towns however, Westonaria is located approximately 8 km in a north west direction and Lenasia is situated approximately 14 km north east of Ezulwini project area.
21 digit Surveyor General Code for each farm portion:	

Plan 8: Land Tenure

4 Item 2(c): Locality Map

The WRTRP ultimate scope is located across the West Rand District Municipality (WRDM) in Gauteng Province. The WRDM includes four local municipalities (LMs): Mogale City, Westonaria, Randfontein and Merafong City. Towns and larger settlements located in the broader project area include Randfontein, Toekomsrus, Fochville, Carletonville, Westonaria, Venterspost, Modderfontein, Rietvallei, Bekkersdal and Mohlakeng.

Although sections of the RTSF pipeline route traverse the Merafong City Local Municipality (LM), the Kloof Mining Right area falls predominantly within the Westonaria City Local Municipality. Land uses in the Westonaria LM can be categorised in three main divisions, i.e. agriculture, mining, and residential. Agriculture is the dominant land use in the LM, followed by mining and residential land uses, with the latter accounting for approximately 8% of the total land area of the LM. The municipality's human settlements are relatively scattered due to the mining activities taking place. The LM's residential development is generally dispersed with the dominant townships including:

- Westonaria;
- Bekkersdal;
- Hillshaven;
- Glenharvie;
- Venterspost;
- Simunye; and
- Mining towns such as Libanon and Waterpan.

The most significant land uses within the project area are mining, agriculture, residential and businesses. Of these, agriculture covers the largest portion of the area, followed by mining and residential uses. The area includes a large number of both historical and existing mining activities.

5 Item 2(d): Description of the Scope of the Proposed Overall Activity

The Ultimate Project is detailed in Section 1.3.1, with the required environmental authorisations for the Initial Implementation relevant to envisaged activities pertaining to the Ezulwini Mining Right Area including the following:

- The construction of a 18.5 km tailings pipeline running from the CPP to the Ezulwini Plant;
- Transporting 50 000 t/m of concentrated tailings from the CPP to the Ezulwini Plant for processing;

- Processing 50 000 t/m of concentrated tailings at the Ezulwini Plant. The Ezulwini Plant is proposed to use its full capacity of 100 000 t/m of tailings;
- The disposal of residue slurry at the Ezulwini North TSF, thus enabling the TSF to operate at its full design capacity of 100 000 t/m; and
- Abstraction of 20 ML/day of water from the Cooke 4 Shaft.

The activities listed above are described in more detail in Section 5.2. The listed activities specific to the construction and operation of the CPP and RTSF are included as part of the Kloof Mining Right area applications.

5.1 Listed and Specified Activities

5.1.1 Environmental Authorisation

The primary authorisation to consider will be an Environmental Authorisation to be granted in accordance with the Environmental Impact Assessment Regulations, 2014 (the EIA 2014 Regulations) promulgated in terms of the provisions of the National Environmental Management Act, 1998, as amended (NEMA). NEMA identifies two classes of activities requiring authorisation, those of a less significant nature requiring evaluation by what is described as a Basic Assessment process (BA), and those with substantial impact with require a more detailed scoping and environmental impact assessment (S&EIA) process. In addition to the EIA 2014 Regulations, the Minister of Environmental Affairs (DEA) has published two notices identifying activities that require a BA process (Listing Notice 1) and a full Environmental Impact Assessment process (Listing Notice 2). The proposed activities should be assessed against the activities listed in the two listing notices to determine what which of the Listed Activities will be triggered. As this project triggers activities under both Listing Notice 1 and 2, a Full EIA process will be undertaken.

The listed and specified activities are set out in Table 5-1 below.

Part 3 of Chapter 4 of the EIA 2014 Regulations sets out the timeframe for applying for and obtaining an Environmental Authorisation (EA). In brief, this requires:

- Compilation of a Scoping Report: within 44 days from date of submission of the application for the EA, a Scoping Report must be submitted to the competent authority;
- Consideration of the Scoping Report by the competent authority: the competent authority must reach a decision on the Scoping Report within 43 days and either accepts it and directs the applicant to proceed with the EIA, or refuse it under defined circumstances;
- Preparation of the EIA: the applicant must prepare a detailed EIA and an Environmental Management Programme (EMPr)in accordance with the Scoping Report and submit it to the competent authority within 106 days after being directed to do so; and

- Decision on the application: the competent authority must reach a decision on the EIA and the EMPr and either grant authorisation or refuse it.

5.1.2 Waste Management

The Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015 were published on Friday 24 July 2015 in GN R632 in GG 39020. These Regulations provide the framework for the management of TSFs in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA), in place of the Regulations previously in place in terms of the MPRDA. Although the DMR will remain the competent authority, residue stockpiles and residue deposits will now be governed by the new NEM:WA Regulations.

The implications in brief are as follows:

- The identification and assessment of environmental impacts arising from residue stockpiles and residue deposits must be done as part of the environmental impact assessment;
- The management of residue stockpiles and residue deposits must be in accordance with any;
- conditions and management measures in the EMP and waste management licence;
- A risk analysis based on the identified characteristics and the classification must be used to determine the appropriate mitigation and management measures;
- Residue stockpile and residue deposit must be characterised to identify any potential risk to health, safety and environmental impacts that may be associated with the residue when stockpiled or deposited, in terms of its physical characteristics, chemical characteristics and mineral content; and
- The required pollution control barrier system shall be defined by the National Norms and Standards for the Assessment of Waste for Landfill Disposal and the National Norms and Standards for Disposal of Waste to Landfill.

As far as the design of TSFs is concerned, the Regulations provide that the design must be undertaken by a professional civil or mining engineer, an assessment of the typical soil profile on the site is required for all residue stockpile and residue deposit must be made and the design of a residue stockpile and residue deposit must take into account all phases of the life cycle of the residue stockpile and residue deposit, from construction through to post closure

The List of waste management activities that have, or are likely to have, a detrimental effect on the environment published in GN 921 in GG 37083 of 29 November 2013 have been amended in terms of GN R633 in GG 39020 of 24 July 2015 to include residue deposits and residue stockpiles.

Further details pertinent to the policy and legislative context of this project is set out in Section 6 of this report.

Table 5-1 provides the listed and specified activities to be employed within the Ezulwini Mining Right area.

Table 5-1: Project Activities

Listed Activity		Description of Activity	Aerial extent of the Activity
Listing notice GNR 983 (Basic Assessment) (NEMA)			
Activity 10	The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more	The transportation of tailings concentrate (50 000 t/m) from the CPP to the Ezulwini Plant for processing.	8 500 m^2
Activity 12	The development of - (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such a development occurs - (a) within a watercourse	The 18 500.00 m long pipeline route from the CPP to the Ezulwini Plant crosses a number of water courses.	8 500 m^2
Activity 19	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse;	Should the pipeline cross over a wetland, this activity will be triggered	8 500 m^2

Listed Activity		Description of Activity	Aerial extent of the Activity
Activity 46	The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure – (i) has an internal diameter of 0.36 meters or more;	The construction of the 18 502.62 m long pipeline with an internal diameter of at least 0.36 m for the bulk transportation of concentrated tailings from the CPP to the Ezulwini Plant.	8 500 m^2
Listing notice GNR 984 (Full Scoping and EIA) (NEMA)			
Activity 7	The development and related operation of facilities or infrastructure for the bulk transportation Notice: of dangerous goods- (ii) in liquid form, outside an industrial complex, using pipelines, exceeding 1000 metres in length, with a throughput capacity of more than 50 cubic metres per day	The transportation of Uranium Concentrate (50 000 t/m) from the CPP to the Ezulwini Plant for processing using a 18 500.00 m long pipeline.	8 500 m^2
Activity 21	Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening, and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies	The processing of an additional 50 000 t/m of concentrated tailings at the Ezulwini Plant. Once processed, the slurry is to be deposited at the Ezulwini North TSF.	To be Confirmed

5.2 Description of the Activities to be undertaken

Table 5-2 below provides as summary of new infrastructure to be constructed as part of the proposed project compared to existing infrastructure that will be utilised. A more detailed description of the activities to be undertaken follows. A plan illustrating the infrastructure at the Ezulwini Mining Right is provided as Table 5-2 below.

Table 5-2: Summary of new vs. existing infrastructure for the Ezulwini Mining Right area

New infrastructure	Existing infrastructure
Concentrated tailings pipeline (from CPP to Ezulwini Plant)	Slurry pipeline (from C4S TSF to Ezulwini North TSF)
	Ezulwini North TSF
	Ezulwini Plant
	Cooke 4 Shaft

5.2.1 Mineral to be processed

Upon reclaiming the tailings material from the historical TSFs at the Driefontein Mining Right area, they will be transported through to the CPP via the slurry pipelines where gold and uranium will be extracted. Concentrated tailings will then be transported via the 18.502 km long pipeline to the existing Ezulwini Plant. The Exuwlini Plant will be used to recover uranium and residual gold from the concentrate received from the CPP. The tailings from the CPP to the Ezulwini Plant, being approximately 50 000 t/m, will be mixed with the current plant tailings and disposed of at the currently operational Ezulwini North TSF. It should be noted that the process described under this section only encompasses the Ezulwini Mining Right area as is the aim of this report.

5.2.2 Ezulwini Plant

The Ezulwini Plant was constructed in 2007 with a design capacity of 100 000 t/m at planned uranium feed grade of 0.5 kg/t and golf processing of 200 000t/m at a head grade of 3 g/t.

The uranium capacity which has been operating thus far is less than half of its full design capacity of 100 000 t/m. However, the current proposed activities entail transporting an additional 50 000 t/m of concentrated tailings material from the CPP to the Ezulwini Plant for processing. This means that the Uranium Plant will be operating to its maximum design capacity of 100 000 t/m. The tailings produced from this process will be deposited on the existing operational Ezulwini North TSF.

5.2.3 Plant Residue

Ezulwini consists of two TSFs, of which the Ezulini North TSF is operational and the C4S TSF is dormant. This TSF is termed Cooke 4 South and is not included in the existing mining licence. The gold tailings which have been deposited onto this TSF are proposed to be reclaimed under the Cooke Mining Right operations as part of the Initial Implementation WRTRP.

The operational TSF (Ezulwini North TSF) has a deposition rate of 100 000 t/m with a Life of Mine (LoM) of 17 years. The TSF was designed to operate 24 hours a day, 7 days a week. During that period, it is designed to accommodate an average dry density of 1.45 t/m^3 and a slurry density of 1.4 t/m^3. The capacity required in the TSF is 20.7 x 106 m³.

5.2.4 Water Supply

The Cooke 4 shaft, which is north east of the C4S TSF, is proposed to supply water for the reclamation activities proposed at the C4S TSF. It is proposed that approximately 20 ML/day of water will be abstracted from the Cooke 4 shaft to be used for reclamation purposes. The abstraction from the Cooke 4 shaft will form part of this application however the reclamation of C4S forms part of the Cooke Mining Right.

The WRTRP has recognised that water is a scarce and strategic commodity and hence mine impacted water will be used preferentially over Rand Water or other higher quality sources. Once the impacted mine water has been used in the hydraulic reclamation process, it will find its way to the RTSF. As water builds up in the RTSF it will be drained to the Return Water Dam (RWD) and treated through an advanced water treatment. The water will be treated to potable standards and discharged. It should be noted however that this will not be included as part of this application but the Kloof application.

5.2.5 Pipeline Route

The tailings pipeline transporting the tailings concentrate from the CPP to the Ezulwini Plant requires authorisation in terms of NEMA as detailed in the listed activities table above (Table 5-3). The pipeline to be constructed from the Cooke 4 Shaft to pump water to the C4S TSF will also require NEMA authorisation. The new pipeline lengths are provided below.

Table 5-3: Pipeline Route Lengths

Name	Length (m)	Type
Cooke 4 shaft to C4S TSF	1 218	Water Pipeline (part of Cooke Mining Right)
CPP to Ezulwini Plant	18 502	Concentrated tailings pipeline

6 Item 2(e): Policy and Legislative Context

This section aims to provide a description of the policy and legislative context within which the project is being proposed. The legislative context detailed below is only applicable to the proposed activities at the Ezulwini Mine as proposed in this Scoping Report. This section has been divided into national and provincial legislation and policies, plans, guidelines and development planning frameworks and tools.

Table 6-1: Relevant National Legislation

Applicable legislation and guidelines used to compile the report	Reference where applied
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) Under Section 24 of the Constitution of the Republic of South Africa, it is clearly stated that: *Everyone has the right to (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -* *(i) Prevent pollution and ecological degradation;* *(ii) Promote conservation; and* *(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	An EIA process is being undertaken to determine the impacts associated with the project. As part of the EIA process, mitigation measures and monitoring plans will be recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.

Applicable legislation and guidelines used to compile the report	Reference where applied
National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and EIA Regulations (December 2014) The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA), as amended was set in place in accordance with Section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that: *The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.* The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R 983 (Listing Notice No. 1), GN 984 (Listing Notice No. 2) and GN R 985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended.	The EIA process will be undertaken in accordance with the principles of Section 2 of NEMA as well as with the EIA Regulations, promulgated in terms of NEMA. These Listed Notices have been reviewed against the project activities to determine the likely triggers. The listed activities which are potentially triggered under the Listing Notices are provided in Table 5-1. Based on the activities listed, it has been identified that a full EIA process is required for the project. An application for the listed activities will be submitted to the DMR who is the relevant Competent Authority in terms of this application for Environmental Authorisation.

Applicable legislation and guidelines used to compile the report	Reference where applied
GN R. 982 National Environmental Management Act, 1998 (Act No. 107 of 1998): Environmental Impact Assessment Regulations, 2014 These three listing notices set out a list of identified activities which may not commence without an Environmental Authorisation from the relevant Competent Authority through one of the following processes: ▪ Regulation GN R. 983 - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation and which must follow a basic assessment process. ▪ Regulation GN R. 984 – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation and which must follow an environmental impact assessment process. ▪ Regulation GN R. 985 – Listing Notice 3: This notice provides a list of various environmental activities which have been identified by provincial governmental bodies which if undertaken within the stipulated provincial boundaries will require environmental authorisation. The basic assessment process will need to be followed.	Please refer to Table 5-1 above for the listed activities which could potentially be triggered by the proposed project.

Applicable legislation and guidelines used to compile the report	Reference where applied
National Water Act, 1998 (Act No. 36 of 1998) (NWA) The National Water Act (Act No. 36 of 1998) (NWA) provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. **GN R704 National Water Act, 1998 (Act No. 36 of 1998)** Regulations 4 and 5 of the regulation on use of water for mining and related activities aimed at the protection of water resources, Government Notice Regulation 704 (GN R No. 704) published in June 1999, states the following: ▪ Regulation 4: No residue deposit, reservoir or dam may be located within the 1:100 year flood line, or less than a horizontal distance of 100 m from the nearest watercourse. Furthermore, person(s) may not dispose of any substance that may cause water pollution ▪ Regulation 5: No person(s) may use substances for the construction of a dam or impoundment if that substance will cause water pollution. Regulation 6 is concerned with the capacity requirements of clean and dirty water systems, while Regulation 7 details the requirements necessary for the protection of water resources.	The IWULA and IWWMP will be compiled and submitted to the Department of Water and Sanitation (DWS) as the decision making authority. The water uses which may be triggered under Section 21 of the NWA in relation to the proposed project are listed below: ▪ S21(c) – Impeding or diverting the flow of water in a watercourse; and ▪ S21(i) – Altering the bed, banks, course or characteristics of a watercourse.

Applicable legislation and guidelines used to compile the report	Reference where applied
Mineral and Petroleum Resource Development Act. 2002 (Act No. 28 of 2002) (MPRDA) A Mining Right Application submitted to the Department of Mineral Resources (DMR) in terms of the Mineral and Petroleum Resources Act, 2002 (Act No.28 of 2002) (MPRDA) must be succeeded by various documents including a Scoping Report, EIA Report and an EMP. The MPRDA requires that mining companies assess the socio-economic impacts of their activities from start to closure and beyond. Companies must develop and implement a comprehensive Social and Labour Plan (SLP) to promote socio-economic development in their host communities and to prevent or lessen negative social impacts.	An EIA process is being undertaken as per the proposed project scope of work to meet the MPRDA requirements. Furthermore, in support of the MRA, a SLP and MWP has been submitted to the DMR with the MRA.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. This Act works in accordance to the framework set under NEMA. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance: ▪ Alien and Invasive Species Lists, 2014 published (GN R599 in GG 37886 of 1 August 2014) ; ▪ National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations; ▪ National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GN 1002, 9 December 2011).	As part of this project, a flora, fauna, wetlands and aquatic assessment will be undertaken to determine the current status of the environment and to determine any potential ecological sensitivities to be avoided and/or mitigated. There are currently no applications submitted in terms of NEM:BA for the project. This will be confirmed during the detailed specialist investigations.

Applicable legislation and guidelines used to compile the report	Reference where applied
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA) According to the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA) the Department of Environmental Affairs (DEA), the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEM: AQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEM: AQA is the establishment of National Ambient Air Quality Standards (NAAQS) (GN R 1210 of 2009). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans is measured.	An Air Quality Assessment will be undertaken to determine the baseline conditions of the air prior to the implementation of the proposed activities at the Ezulwini Mine. The project activities will be set out to abide by the NEM: AQA and standards set out in the National Ambient Air Quality Standards. The required measures will be included in the EMPr.
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is the overarching legislation that protects and regulates the management of heritage resources in South Africa. The Act requires that Heritage Resources Agency's in this case the South African Heritage Resources Agency (SAHRA) and Limpopo Provincial Heritage Resources Authority (LIHRA), be notified as early as possible of any developments that may exceed certain minimum thresholds. This act is enforced through the National Heritage Regulations GN R 548 (2000).	A Notice of Intent to Develop (NID) will be submitted, as part of this report, to the Gauteng Provincial Heritage Resources Authority (PHRA-G) and the South African Heritage Resources. Furthermore, a Heritage Impact Assessment (HIA) will be undertaken.
Environmental Conservation Act, 1989 (ECA), (Act No. 73 of 1989) - National Noise Control Regulations, GN R.154 (10 January 1992) These regulations make provision for guidelines pertaining to noise control and measurements. The regulations make reference to the use of the South African National Standards 10103:2008 (SANS) guidelines for the Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication. The National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004) also provides for noise control.	A Noise Impact Assessment will be undertaken as part of the EIA process to understand the impacts that the proposed activities to be undertaken at the Ezulwini Mine have on the ambient noise environment.

Table 6-2: Local By-Laws

Applicable legislation and guidelines used to compile the report	Reference where applied
The Provincial Heritage Resources Authority Gauteng (PHRA-G) The Provincial Heritage Resources Authority Gauteng (PHRA-G) is responsible for the identification, conservation and management of heritage resources throughout the province. The Agency was established in terms of the National Heritage Resources Act, Act 25 of 1999.	A Heritage Impact Assessment will be undertaken in respect of these regulations to determine whether a permit will be required as a result of the proposed activities.

7 Item 2(f): Need and Desirability of the Proposed Activities

The objectives of the WRTRP is to reprocess historical TSFs to economically recover gold, uranium and sulfur, while implementing concurrent rehabilitation of their footprints for long term sustainability. By removing the existing historical TSF liabilities located on ecologically sensitive dolomitic structures, sulfur and uranium constituents will reduce significantly and will consequently reduce any future pollution potential and Acid Mine Drainage (AMD), as wells as eliminate cyanide trapped in the historical TSFs. The following benefits are envisioned as a result of the implementation of the WRTRP:

- Investment of approximately R 9 billion into the West Rand District Municipality's economy;
- Significant job creation; it is estimated that 2 000 temporary opportunities will be created during the construction phase, with an estimated 500 sustainable employment opportunities once the project is operational;
- Protection of sensitive dolomitic aquifers and water resources through:
  - The removal of the historical TSFs, currently located on the dolomites.
  - The deposition of the reclaimed and reprocessed tailings onto the RTSF, which is to be constructed on impermeable bedrock, away from sensitive dolomitic areas.
- Removal of impacts associated with existing historical gold tailings facilities by reducing sulfur and uranium concentrations. The reduction in sulfur concentrations will in turn lower the risk of AMD;
- Reduction of health risk to surrounding communities by addressing persistent dust fallout from TSF's spread over a vast area, into a single well-managed best practice designed RTSF;
- Release of valuable land under the historical TSFs for residential, commercial, and agricultural needs. The final land uses of the TSF footprints will be determined based on a Closure Plan for the respective Mining Right areas ;

- Treatment of currently impacted water with the proposed AWTF, which could potentially provide potable water for domestic and agricultural users, mitigating existing shortages.

7.1 Ezulwini Specific Components

7.1.1 Cooke 4 Shaft

The water abstracted from the Cooke 4 shaft will be used for the reclamation activities proposed to occur at the C4S TSF. Cooke 4 shaft is an existing shaft through which underground mining operations were accessed in the past. Thus, using the mine affected water found in the shaft will prevent SGL from having to utilise Rand Water or any other high quality water sources.

In addition to this, the seeing as the Cooke 4 shaft is located north of the C4S TSF, it is positioned in such a way that the pipeline required to be constructed from the shaft to the C4S TSF would run within the mine infrastructure complex thus reducing the environmental footprint. The water pipeline proposed to transport water from the Cooke 4 Shaft runs adjacent to the tailings pipeline.

8 Item 2(g): Period for which the Environmental Authorisation is required

To allow for the full reclamation of all reclaimed mine dumps and to promote the sustainability of the WRTRP, the environmental authorisation must be valid for a period of at least 30 years.

9 Item 2(h): Description of the Process Followed to Reach the Proposed Preferred Site

9.1 Item 2(h)(i): Details of all Alternatives Considered

This section provides the details of the alternatives considered as part of this project. the alternatives considered are with regards to the site layout, the type of activity undertaken, the property on which the activity will occur, the technology to be used in the activity, the operational aspects of the activity and the option of not implementing the activity at all.

9.1.1 The property on which or location where it is proposed to undertake the activity

The proposed activities detailed as part of this application including the abstraction of mine affected water from the Cooke 4 Shaft for the reclamation of the C4S TSF, the processing of concentrated tailings at the Ezulwini Plant and the disposal of the resultant tailings at the Ezulwini North TSF. The Ezulwini Plant, the Cooke 4 shaft and the Ezulwini North TSF are

all existing infrastructure. Therefore, there are no alternatives considered for the proposed location of the activities.

9.1.2 The type of activity to be undertaken

The activities proposed to be employed at the Ezulwini Mining Right area, as detailed above, includes the abstraction of mine affected water from the Cooke 4 shaft, the transport of an additional 50 000 t/m of concentrated tailings from the CPP to the Ezulwini Plant for processing and the deposition of the slurry at the operational Ezulwini North TSF.

An alternative to abstracting water from the Cooke 4 shaft is to use the water from the Peter Wright Dam. This alternative however is least preferred due to the fact that SGL would be making use of a high quality water source for reclamation purposes. Considering that there is a mine shaft within the Ezulwini Mining Right area with water which can be used for reclamation processes, it would not be environmentally feasible to start abstracting clean water from the environment.

The only alternative to piping the concentrated tailings from the CPP to the Ezulwini Plant is to truck it. This is not viable as it is highly costly and poses more risks to the environment.

9.1.3 The design or layout of the activity

9.1.3.1 Pipeline Routes

There is only on pipeline proposed for the Ezulwini operations which is the concentrated tailings pipeline from the CPP to the Ezulwini Plant.

The concentrated tailings pipeline is proposed to run from the CPP to the western boundary of the C4S TSF across the R28 and an unnamed tributary. The pipeline continues in a westerly direction, south of the South Deep TSF and finally stretches in a north westerly direction to reach the CPP. The alternatives considered here were primarily related to the alignment and topography of the area.

9.1.4 The technology to be used in the activity

There are no alternatives as to the technology proposed to be used for the activities at the Ezulwini Mining Right area are existing and already implemented.

9.1.5 The operational aspects of the activity

There are no alternative operational aspects of the proposed activities at the Ezulwini Mining Right area.

9.1.6 The option of not implementing the activity

The option of not implementing the proposed activity, also known as the “No-go option” refers to the historical TSFs not being reclaimed through hydraulic mining activities. If the TSFs were to not be reclaimed as part of the WRTRP, the potential contamination from the

historical TSF restricts the possibility of viable alternative land uses. The TSFs would remain in the present location and leachates emanating from them could potentially seep into the adjacent watercourses thus compromising their quality. Subsequently, the downstream water users would also be affected by this. None of the envisioned benefits (described in Section 7) will come to fruition, such as. environmental clean-up, job opportunities, investment into the local and regional economy, treatment of currently impacted water and a reduction in the health impacts posed by the historical TSFs. The potential for Acid Mine Drainage within the area would also increase as a result of the activity not being implemented.

9.2 Item 2(h)(ii): Details of the Public Participation Process Followed

The Stakeholder Engagement process has been developed to ensure compliance with environmental regulatory requirements and to provide Interested and Affected Parties (I&APs) with an opportunity to evaluate the proposed project, to provide the needed inputs and to receive feedback from the project team and/or proponent.

9.2.1 Stakeholder Identification

To ensure a proper representation of all stakeholders, the following identification methods were utilised to develop a comprehensive stakeholder database:

- Conduct Windeed searches for farm portions in and around the project site to verify land ownership and obtain contact details;
- Use of existing stakeholder databases available from SGL, Digby Wells and Gold Fields;
- Desktop and online research; and
- Stakeholder networking and discussions to source additional stakeholder details.

Stakeholders identified who are effected by or interested in the proposed project were grouped into the following broad categories:

- **Government:** National, Provincial, District and Local Authorities;
- **Parastatals:** Various semi-Government entities;
- **Landowners:** Directly or indirectly affected and adjacent;
- **Land occupiers:** Directly or indirectly affected and adjacent;
- **Communities:** Directly affected and adjacent communities;
- **Agriculture:** Farmers associations;
- **Non-Governmental Organisations (NGOs):** Environmental organisations, community-based organisations; and
- **Business and industry:** small to medium enterprises, mines, industrial and large business organisations.

A detailed description of the various stakeholder categories are provided in further detail in the Public Participation Report and a full list of stakeholders is categorised and included in the stakeholder database.

9.2.1.1 Directly Affected Landowners

The following directly affected landowners have been identified, as per Table 9-1, and included into the stakeholder database.

Table 9-1: Landowners and Properties Directly Affected

Farm	Portion	Registered Landowner
WATERPAN 292-IQ	RE/4	Rand Uranium – Sibanye Gold
WATERPAN 292-IQ	24	Rand Uranium – Sibanye Gold
WATERPAN 292-IQ	26	Rand Uranium – Sibanye Gold
WATERPAN 292-IQ	13	Rand Uranium – Sibanye Gold
MODDERFONTEIN 345-IQ	24	Rand Uranium – Sibanye Gold
MODDERFONTEIN 345-IQ	23	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	RE	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	28	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	10	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	63	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	30	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	41	South Deep (Goldfields)
DOORNPOORT 347-IQ	12	South Deep (Goldfields)
DOORNPOORT 347-IQ	2	South Deep (Goldfields)
RIETFONTEIN 349-IQ	41	Kloof Gold Mining Company Limited (Sibanye)
MODDERFONTEIN 345-IQ	44	South Deep (Goldfields)
DOORNPOORT 347-IQ	7	South Deep (Goldfields)
RIETFONTEIN 349-IQ	35	Kloof Gold Mining Company Limited (Sibanye)
RIETFONTEIN 349-IQ	73	Kloof Gold Mining Company Limited (Sibanye)
RIETFONTEIN 349-IQ	34	Kloof Gold Mining Company Limited (Sibanye)
DOORNPOORT 347-IQ	39	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	3	South Deep (Goldfields)
DOORNPOORT 347-IQ	26	Kloof Gold Mining Company Limited (Sibanye)

Farm	Portion	Registered Landowner
RIETFONTEIN 349-IQ	42	Kloof Gold Mining Company Limited (Sibanye)
DOORNPOORT 347-IQ	40	South Deep (Goldfields)
DOORNPOORT 347-IQ		South Deep (Goldfields)
MODDERFONTEIN 345-IQ	52	South Deep (Goldfields)
MODDERFONTEIN 345-IQ	45	Western Areas Ltd / Barrick Gold South Africa Pty Ltd (Goldfields)
DOORNPOORT 347-IQ	35	South Deep (Goldfields)
DOORNPOORT 347-IQ	29	Private Person
MODDERFONTEIN 345-IQ	69	South Deep (Goldfields)

9.2.1.2 Adjacent Landowners

The various adjacent landowners for the project are reflected in Table 9-2 below.

Table 9-2: Landowners and Properties Indirectly Affected

Farm	Portion	Registered Landowner
JACHTFONTEIN 344-IQ	41	Rand Uranium – Sibanye Gold
MODDERFONTEIN 345-IQ	60	Interstate Logistics CC
MODDERFONTEIN 345-IQ	65	South Deep (Goldfields)

9.2.1.3 Authorities

As indicated in Table 9-3, various authorities are listed who have been engaged during the pre-application phase.

Table 9-3: Authorities Engaged

Authority	Representative
Department of Water Affairs and Sanitation (DWS)	Marius Keet Acting Provincial Head
	Bashan Govender Water Quality Manager
Department of Mineral Resources (DMR)	Dimakatso Ledwaba Acting Regional Manager
	Jimmy Sekgale Assistant Director

Authority	Representative
	Rudzani Mabogo Assistant Director
	Moleseng Tlaila Assistant Director
Gauteng Department of Agriculture and Rural Development (GDARD)	Jacob Legadima Director - Air Quality Management
	Dan Motaung Deputy Director: EIA
National Department of Environmental Affairs (DEA)	Lucas Mahlangu Deputy Director: Licensing Systems Management
National Nuclear Regulator (NNR)	Patle Mohajane Manager: Naturally Occurring Radioactive Material(NORM)
West Rand District Municipality	Musa Zwane Environment and Green Manager
	Suzan Stoffberg Environmental Specialist

9.2.2 Land Claimants

A formal enquiry, which contained all the directly and indirectly affected land portions, was submitted via letter to Ms Rachel Masango of the Gauteng Department of Rural Development and Land Reform, Land Claims Commission, on Friday, 13 February 2015. Feedback was received by means of letter on Friday, 13 March 2015 which indicated that no existing land claims reside over the direct affected and adjacent land portions.

9.2.3 Consultation with I&APs to Date

A summary of consultation activities is provided in Table 9-4 and provides an overview of the various consultation methods already undertaken as part of the Pre-Application Phase. Consultation with stakeholders was focussed toward one-on-one meetings and focus group meetings with authorities, landowners and NGOs.

The needed verbal translation has been and will continue to be given during the various stakeholder meetings. All comments raised by stakeholders pre-application up unto the end of the scoping report public review period will be captured in the Comment and Response Report (CRR). The CRR is provided to the various specialists for incorporation into the EIA phase. It is also provide to the competent authority to enable informed decision making. Responses to comments are provided in line with the overall project scope and available information.

Consultation prior to the application was submitted was aimed at providing stakeholders with an overview of the WRTRP. This was driven by SGL, with support from Digby Wells. One-on-one and focus group meetings were held along with telephonic discussions with invited stakeholders that could not attend. Engagement with the authorities also aimed to obtain an understanding of the regulatory requirements in lieu of the changes promulgated in December 2014. Table 9-4 details activities that formed part of the Pre-Application Phase.

Table 9-4 Summary of PP Activities during the Pre-Application Phase

Activity	Details	Reference in PP Report
Pre-Application Phase		
Identification of stakeholders	Stakeholders, with associated details, were identified by means of Windeed searches, available existing information, stakeholder networking and research for the compilation of a database.	**PP Report Appendix 5** Stakeholder database.
Identification of land claims	A request to identify potential land claims over affected land portions was submitted to the Development and Land Reform, Land Claims Commission on 13 February 2015 and for additional projects on 4 June 2015 feedback indicated there are land claims on the following properties Doornkloof 350 Ptn 5, Leeuwpoort 356 Ptn 71, Leeuwpoort 356 Ptn 70, Gemspost 288 Ptn 19, Doornfontein 522 Ptn 15, Waterpan 292 Ptn 4, Kalbasfontein 365 Ptn 4. We are still awaiting response on some of the properties.	**PP Report Appendix 5** Land claims letters.
Development of information materials	Various material pieces were developed to be used as part of stakeholder meetings and for ad-hoc requests to provide project details.	**PP Report Appendix 5** Pre-application information materials

Activity	Details	Reference in PP Report
Stakeholder meetings	Meetings with stakeholders were arranged as one-on-one meetings and focus group meetings. These are listed below: ▪ One-on-one Authorities Meetings ▪ Department of Water and Sanitation – 2 & 11 December 2014 ▪ National Nuclear Regulator – 2 December 2014 ▪ Department of Environmental Affairs – 2 December 2014 ▪ Gauteng Department of Agriculture and Rural Development – 3 & 11 December 2014 ▪ West Rand District Municipality – 3 December 2014 ▪ Department of Mineral Resources – 10 December 2014 ▪ Section 80 Committee, West Rand District Municipality (Environmental Portfolio) – 3 February 2015 & 15 April 2015 ▪ Focus Group Meeting with Authorities – 16 April 2015 ▪ Focus Group Meeting with Landowners – 16 April 2015 ▪ Focus Group Meeting with Environmental NGOs – 21 April 2015 A high level overview of the full project was mainly discussed and stakeholder inputs captured. All stakeholder comments have been responded to in the CRR.	**PP Report Appendix 5** Comment and Response Report.

Stakeholders were provided with project information as part of the engagement process which were distributed via email, post and hand delivery or presented at stakeholder meetings. An overview of each are detailed below.

- **Positioning document:** this document was the first piece of information distributed to stakeholders. It contained the project intension, a broad overview of the various components and highlighted project benefits.
- **Letters:** various letters were distributed to stakeholders and were mainly for invitations to meetings and providing brief details about the project and relevant contact details. Letter were also accompanied by meeting agendas where required.
- **Information pack:** the following documents were included as part of the pack:
  - ***Project description document:*** the project description provided details of the project intention, background and history, regional location by means of a map, various project components, reclamation process with individual components, next steps in the process and contact details. These details were depicted in the text format but also through visual illustrations; and
  - ***Invitation letter with registration and comment form and agenda:*** information sent to stakeholders via email was provided in print also.
- **Maps:** illustrative maps were displayed at the stakeholder meetings which provided context to the regional setting of the full project. A land tenure map was also made available at the landowners meeting.
- **Animation:** the animation is a dynamic representation of the reclamation process with its associated individual components and infrastructures.
- **Presentations:** the presentation used as part of the various stakeholder meetings varied. The presentation for meetings held in December 2014 included a map detailing the various project components and regional setting. Information contained in the presentations made to the Section 80 Committee were limited to project-only details due to time constraints and the content of the Application presentation included more refined content on the following:
  - Project history and motivation;
  - Overview of full project with various phases;
  - Regional locality of the full project;
  - Different infrastructure and process flow of reclamation;
  - Applicable legislation for the various licence applications;
  - List of specialist studies to be undertaken;
  - Timing of the environmental regulatory process; and
  - Contacts details for Digby Wells and SGL Gold.

- **Background Information Document:** the BID provides a detailed description of the full WRTRP, regional setting map, EIA process, specialist studies to be undertaken, PP process and relevant contact details.
- **Site notice and advertisement:** similar to the BID, the site notice and advertisement provides an overview of the project and highlights the applicable legislation for the EIA process. It also stipulates the competent authority, PP process and where relevant information can be obtained from.

9.2.4 Consultation during the Scoping Phase

The aim of consultation during the Scoping Phase is centred on the formal EIA process, specialist impact studies and addressing stakeholder comments already submitted. A combination of focus group meetings and an open house will be prominent methods to facilitate stakeholder dialogue between the project team and landowners, authorities, NGOs and communities.

In Table 9-5 below PP activities that will be undertaken as part of the Scoping Phase have been detailed.

Table 9-5 Summary of PP Activities during the Scoping Phase

Activity	Details	Reference in PP Report
Scoping Phase		
Update of stakeholder information	The stakeholder database will be updated with new I&APs who formally register, attend stakeholder meetings or submit comments.	**PP Report Appendix 5** Stakeholder database.
Distribution announcement materials	A BID, announcement letter with registration and comment form was email and posted to stakeholders on *Tuesday, 1 September 2015*. *An SMS to announce the project was sent to the full database on Tuesday, 1 September 2015.* The Background Information Document was also available on www.digbywells.com (under Public Documents) on *Tuesday, 1 September 2015.* The announcement letter also included information of the stakeholder meetings that will be held, where the Scoping Reports will be available for comment and the allowed public comment period.	**PP Report Appendix 5** BID, letter with registration and comment form.
Placing of advertisements	Advertisements were placed in the following newspapers: ▪ Randfontein Herald (Local Newspaper), Friday, 11 September 2015 ▪ Carletonville Herald (Local Newspaper), Thursday, 3 September 2015 ▪ Roodepoort Record (Local Newspaper), Friday, 4 September 2015	**PP Report Appendix 5** Advertisement.

Activity	Details	Reference in PP Report
Placing of site notices	Site notices were put up at various places within proposed project site, local libraries and publically accessible venues within close proximity of the project area on *Tuesday, 1 September 2015.* These places are: ▪ City of Johannesburg Metropolitan Library ▪ Emfuleni Local Municipality ▪ Merafong City Local Municipality ▪ Mogale City Local Municipality Library ▪ Randfontein Public Library ▪ MPCC Public Library ▪ Wedela Public Library ▪ Glenharvie Public Library ▪ Westonaria Public Library ▪ Toekomsrus Public Library ▪ Fochville Public Library ▪ Carletonville Public Library ▪ Bekkersdal Community Library ▪ Bekkersdal Public Library ▪ Hillshaven Public Library ▪ Olievenhoutbosch Library A site notice placement report and map has been developed, indicating the exact locations where site notices were placed, with photos and GPS coordinates.	**PP Report Appendix 5** Site notice map and placement report.

Activity	Details	Reference in PP Report
Placement of Scoping Reports	The Scoping Reports has been made available to stakeholders at the following public places: ▪ City of Johannesburg Metropolitan Library ▪ Emfuleni Local Municipality ▪ Merafong City Local Municipality ▪ Mogale City Local Municipality Library ▪ Randfontein Public Library ▪ MPCC Public Library ▪ Wedela Public Library ▪ Glenharvie Public Library ▪ Westonaria Public Library ▪ Toekomsrus Public Library ▪ Fochville Public Library ▪ Carletonville Public Library ▪ Bekkersdal Community Library ▪ Bekkersdal Public Library ▪ Hillshaven Public Library ▪ Olievenhoutbosch Library The Scoping Reports are also available on the Digby Wells website www.digbywells.com (under Public Documents) and will also be available at the various stakeholder meetings. *(Public comment period: 15 September to 15 October 2015)*	**PP Report Appendix 5** Placement map.

Activity	Details	Reference in PP Report
Stakeholder Meetings	A series of stakeholder meetings will be held early in October 2015. It is scheduled that focus group meetings be held with authorities, landowners and occupiers, NGOs and communities. An open house meeting is also scheduled and all stakeholders on the database will be invited to attend. All comments received at these meetings will be captured and responded to in the CRR.	**PP Report Appendix 5** Comment and Response Report.
Announcement of the updated Scoping Reports	A letter will be emailed and posted to the full database to announce availability of the updated Scoping Reports so that stakeholders can confirm that their comments have been addressed. *An SMS to notify stakeholders that the updated Scoping Reports are available for comment will be sent to the full database.*	**PP Report Appendix 5** Updated Scoping Reports announcement letter. This will only be done after the comment period has passed.

Activity	Details	Reference in PP Report
Placement of updated Scoping Reports	The updated Scoping Reports will be made available on 26 October 2015 at the following public places: ▪ City of Johannesburg Metropolitan Library ▪ Emfuleni Local Municipality ▪ Merafong City Local Municipality ▪ Mogale City Local Municipality Library ▪ Randfontein Public Library ▪ MPCC Public Library ▪ Wedela Public Library ▪ Glenharvie Public Library ▪ Westonaria Public Library ▪ Toekomsrus Public Library ▪ Fochville Public Library ▪ Carletonville Public Library ▪ Bekkersdal Community Library ▪ Bekkersdal Public Library ▪ Hillshaven Public Library ▪ Olievenhoutbosch Library The updated Scoping Reports will include the amended CRR, which contains new stakeholder comments and responses, and the inclusion of new PP activities undertaken as part of the Scoping phase. The updated Scoping Reports will also be available on the Digby Wells website www.digbywells.com (under Public Documents).	**PP Report Appendix 5** Placement map.

9.3 Item 2(h)(iii): Summary of Issues Raised by I&APs

This section, and Table 9-6 to Table 9-8, discusses the primary comments that have arisen from the PPP thus far.

Table 9-6: Interested and Affected Parties

Interested and Affected Parties		Date of comments received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc.)
Name of Individual	**Consulted**				
Landowners, Lawful occupier/s of the land, Landowners or lawful occupiers on adjacent properties					
Nicci Simpson	Yes	25 March 2015, 17 April 2015	It is requested that more effort be made to inform landowners for the attendance of stakeholder meetings, specifically previously disadvantaged farmers. The Public Participation process must also be managed in a more transparent manner.		
Peet Bornman, Jaco Taute	Yes	16 April 2015	When the west wind blows the whole area is white with dust and trucks do not always water for dust suppression. Breathing in the dust causes health issues.		
Piet Rheeder, Armand de Villiers	Yes	16 April 2015	Pollution of groundwater and surface sources, specifically the Leeuspruit, is a concern. This will also disturb the water balance of our water.		
Peet Bornman, Piet Rheeder	Yes	16 April 2015	The Regional Tailings Storage Facility (RTSF) will have a negative impact on surrounding fauna; nothing will be left e.g. fish and cattle		
Dre Schalekamp, Nicci Simpson	Yes	16 April 2015	Why pollute new agricultural land? Other Tailings Storage Facilities (TSFs) can be used. Sibanye need to do what is good for the community.		
Armand de Villiers	Yes	16 April 2015	Will mined areas be rehabilitated and if so, what are the timelines?		
Coetsee Badenhorst, Alf Rudman	Yes	16 April 2015	How will compensation be managed for the project, since no agreements have been put in place yet?		
Barry van Wyk, Peet Bornman	Yes	16 April 2015	Cattle's meat will be contaminated as a result of the project and people have been very ill as a result of drinking contaminated water.		
Sarel Cilliers, Barry van Wyk	Yes	16 April 2015	We are not in support of the proposed project and object to it strongly. Promises are being made and nothing is delivered. Our environment and lives are destroyed because of the mines.		
Municipal councillor					
Clr Vincent Mfazi *West Rand District Municipality, Section 80 Committee*	Yes	3 February 2015	The reclamation process uses water, but Acid Mine Drainage (AMD) is a concern and will be used as part of the process.		

Interested and Affected Parties		Date of comments received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc.)
Name of Individual	**Consulted**				
Clr Vincent Mfazi *West Rand District Municipality, Section 80 Committee*	Yes	3 December 2014, 15 April 2015	The clay structure will collapse during the reclamation process and new chemical structures will be formed which can be harmful to people and the environment.. How will the particulates be prevented from floating into the air once the clay structure is destroyed?		
Municipality					
Susan Stoffberg *West Rand District Municipality,*	Yes	3 December 2014	What are the potential land uses that can be considered? This will assist the West Rand District Municipality for future development and associated planning.		
Olivia Calderia *West Rand District Municipality, Section 80 Committee*	Yes	15 April 2015	There are a lot of health issues because of the amount of dust and this is an issue/concern. A lot of watering will need to be done.		
Tokky Mosolo *Westonaria Local Municipality*	Yes	16 April 2015	Ad hoc projects for community development originating from other mining houses in the area are underway and a consolidated Social and Labour Plan (SLP) for the area and the project should be developed (incorporating other mining houses in the area).		
Organisations of state (Responsible for Infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.)					
Will be consulted during the Scoping and EIA phases.					
Communities					
Lucas Misapitso *Interested Community Member*	Yes	21 April 2015	Some of the communities are irresponsible and uses AMD water to irrigate crops and are also using sludge to manufacture bricks. It is a huge problem and a health risk. Communities need to be educated and mitigation measures put in place.		
Lucas Misapitso *Interested Community Member*	Yes	21 April 2015	Which mitigation strategies will Sibanye use to reduce the radiation levels? The Westrand already has high level of radiation.		
Traditional Leaders					
No traditional leaders are involved in the project.					
Department of Land Affairs					
Will be consulted during the Scoping and EIA phases.					

Interested and Affected Parties		Date of comments received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc.)
Name of Individual	**Consulted**				
Department of Environmental Affairs					
Lucas Mahlangu	Yes	2 December 2014	For listed activities it needs to be ensured that the correct department or level is consulted.		
Majalele Pholudi	Yes	16 April 2015	Environmental liability is important; who will be held responsible?		
Other Competent Authorities Affected					
Victor Nkuna, Portia Chawane, Bashan Govender *Department of Water and Sanitation*	Yes	2, 11 December 2014, 4 June 2015	How will water use be managed or treated and where will water be sourced from used for reclamation?		
Patle Mahonjane *National Nuclear Regulator*	Yes	2 December 2014	A radiation protection function needs to be integrated as part of the EIA and associated processes.		
Mwinsa Mpundu *National Nuclear Regulator* Rina Taviv, Christopher Rakuambo *Gauteng Department of Agriculture and Rural Development*	Yes	2, 3 December 2014	Are there other options for the project? For example decentralised plants, rather expanding the existing ones e.g. Geluksdal Central Tailings Storage Facility (CTSF)?		
Moleseng Tlaka *Department of Mineral Resources*	Yes	10 December 2014	Will the RTSF be able to accommodate all the tailings facilities in the area and will it be jointly owned by Sibanye Gold and Gold Fields?		
Bashan Govender *Department of Water and Sanitation*	Yes	11 December 2014	The Department of Water and Sanitation look to address issues coming from underground/surface water AMD experienced currently.		
Dan Motaung *Gauteng Department of Agriculture and Rural Development* Marius Keet *Department of Water and Sanitation*	Yes	11 December 2014, 4 June 2015	Concern is that the new area is in a rural setting used for farming and this will be removing agricultural land in Gauteng.		
Bashan Govender *Department of Water and Sanitation* Rudzani Mabogo *Department of Mineral Resources*	Yes	11 December 2014, 16 April 2015	Close consideration must be given to the liner option or rather how to go about securing that water does not leak into the underground water resources e.g. High Density Polyethylene (HDPE) liner		

Interested and Affected Parties		Date of comments received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc.)
Name of Individual	**Consulted**				
Eric Mulibana, *Gauteng Department of Agriculture and Rural Development* Portia Chawane, Victor Nkuna *Department of Water and Sanitation*	Yes	2 December 2014,16 April 2015	Where will the water to be used for reclamation be sourced from? It is proposed that existing mine water for the reclamation process.		
Wilcot Speelman *National Nuclear Regulator*	Yes	16 April 2015	Clarity on the full project needs to be provided, not just phase one. The WRTRP must be well thought through considering that it will be a 25 year project sot that potential negative impacts do not become a reality in the future and is irreparable.		
Dan Motaung *Gauteng Department of Agriculture and Rural Development*	Yes	16 April 2015	How will rehabilitation for the project and RTSF be managed?		
Marius Keet *Department of Water and Sanitation*	Yes	4 June 2015	Sibanye can potentially assist in supplying water to people in the broader region.		

Table 9-7: Other Affected Parties

Other Affected Parties		Date of comments received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and/or responses were incorporated
Name of Individual	**Consulted**				
No other affected parties have commented.					

Table 9-8: Interested Parties

Interested Parties		Date of comments received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and/or responses were incorporated
Name of Individual	**Consulted**				
Mariette Liefferink *Federation for a Sustainable Environment*	Yes	21 April 2015	What type of water treatment will be used and how many megalitres will be treated a day?		

Interested Parties		Date of comments received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and/or responses were incorporated
Name of Individual	**Consulted**				
Mariette Liefferink *Federation for a Sustainable Environment*	Yes	21 April 2015	Communities in the area need to be educated on the issues associated with AMD in order to assist in awareness creation. There must be mitigation measures put in place when the mine is busy with reclamation		
Emily Taylor *Endangered Wildlife Trust (EWT)*	Yes	21 April 2015	The EWT would like to be involved and assist with information relating to the identification of species, where possible.		
Mariette Liefferink *Federation for a Sustainable Environment*	Yes	21 April 2015	The DMR's regional mine closure strategies needs to be closely considered and the required closure funds needs to be available. While the FSE is in support of the re-mining of historical tailings storage facilities and reclamation, a precautionary approach needs to be adopted and consideration should be given to risks when determining re-mining, rehabilitation, closure and financial provisions for rehabilitation and closure. The primary objective of regional TSFs and regional mine closure must be to prevent or minimize adverse long term environmental and socio-economic impacts, and to leave the environment in a state where sustainable development can take place.		
Mariette Liefferink *Federation for a Sustainable Environment*	Yes	21 April 2015	Radiometric surveys over previously reprocessed mine residue deposit footprints have, in some cases, shown elevated levels of residual radioactivity in soils.		
Mariette Liefferink *Federation for a Sustainable Environment* Judith Taylor *Earthlife Africa* Bashan Govender *Department of Water and Sanitation*	Yes	21 April 2015, 4 June 2015	Social and economic benefits are very important and communities need to benefit, and not just in terms of jobs, but benefits must be applicable to communities over the long term. They need to be involved to ensure short to long term benefits that are sustainable.		

9.4 Item 2(h)(iv): The Environmental Attributes Associated with the Sites

This section describes the baseline environmental conditions prior to the proposed project commencing. Furthermore, this section also contains a description of the current land uses and specific environmental features relevant to the project area.

9.4.1 Baseline Environment: Type of Environment Affected by the Proposed Activity

9.4.1.1 Air Quality

9.4.1.1.1 Climate

Ambient air quality in this region of South Africa is strongly influenced by regional atmospheric movements, together with local climatic and meteorological conditions. The most important of these atmospheric movement routes are the direct transport towards the Indian Ocean and the recirculation over the sub-continents.

The country experiences distinct weather patterns in summer and winter that affect the dispersal of pollutants in the atmosphere. In summer, unstable atmospheric conditions result in mixing of the atmosphere and rapid dispersion of pollutants. Summer rainfall also aids in removing pollutants through wet deposition. In contrast, winter is characterised by atmospheric stability caused by a persistent high pressure system over South Africa. This dominant high pressure system results in subsidence, causing clear skies and a pronounced temperature inversion over the Highveld. This inversion layer traps the pollutants in the lower atmosphere, which results in reduced dispersion and a poorer ambient air quality. Preston-Whyte and Tyson (1988) describe the atmospheric conditions in the winter months as highly unfavourable for the dispersion of atmospheric pollutants.

Site specific MM5 modelled meteorological data set for full three calendar years (2012 – 2014) was obtained from the Lakes Environmental Consultants in Canada to determine local prevailing weather conditions. This dataset consists of surface data, as well as upper air meteorological data that is required to run the dispersion model.

Modelled meteorological data for the period January 2012 to December 2014 was obtained for a point in the proposed project area near Westonaria (26.317775°S, 27.650683° E).

9.4.1.1.2 Wind

Dispersion of atmospheric pollutants is a function of the prevailing wind characteristics at any site. The vertical dispersion of pollution is largely a function of the wind field. The wind speed determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is similarly a function of the wind speed, in combination with the surface roughness.

The amount of particulate matter generated by wind is highly dependent upon the wind speed. Below the wind speed threshold for a specific particle type, no particulate matter is liberated, while above the threshold, particulate matter liberation tends to increase with the wind speed. The amount of particulate matter generated by wind is also dependent on the material's surface properties. This includes whether the material is crusted, the amount of non-erodible particles and the particle size distribution of the material.

The spatial and annual variability in the wind field for the proposed project area calculated from the modelled data is clearly evident in Figure 9-1. The predominant winds are coming from north northeast and north with an average wind speed of 3.86 m/s. Wind class frequency distribution per sector (wind direction) is given in Table 9-9.

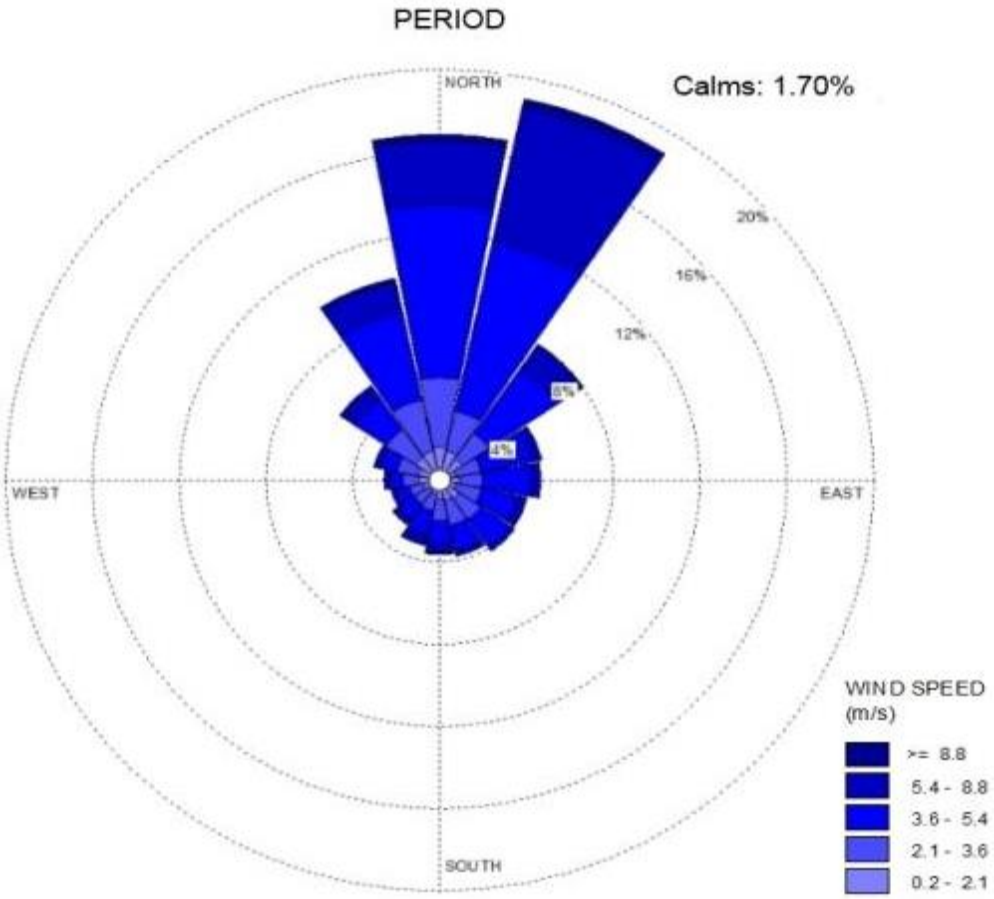

Figure 9-1: Surface Wind Rose for Sibanye Project Area

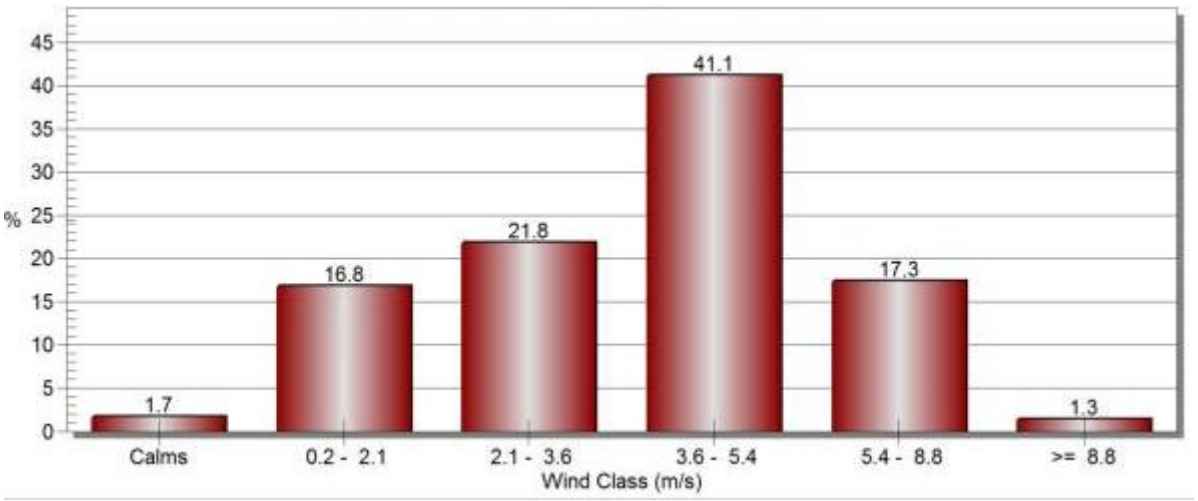

Figure 9-2: Wind Class Frequency Distribution

Table 9-9: Wind Class Frequency Distribution per Direction

No.	Directions	0.2 -2.1	2.1 -3.6	3.6 -5.4	5.4 -8.8	>= 8.8	Total (%)
1	N	1.6	3.4	8.4	3.1	0.4	16.8
2	NNE	1.5	2.0	8.4	6.6	0.4	18.9
3	NE	1.3	1.5	3.8	1.4	0.1	8.0
4	ENE	0.8	1.2	2.4	0.4	0.0	4.8
5	E	0.9	1.0	2.2	0.5	0.0	4.7
6	ESE	0.8	1.2	1.7	0.4	0.0	4.1
7	SE	1.1	1.2	1.6	0.3	0.0	4.2
8	SSE	1.0	1.2	1.2	0.3	0.0	3.8
9	S	0.9	1.0	1.1	0.5	0.1	3.6
10	SSW	0.7	0.8	1.2	0.5	0.0	3.2
11	SW	0.6	0.8	0.8	0.4	0.0	2.6
12	WSW	0.8	0.7	0.6	0.2	0.0	2.3
13	W	1.0	0.7	0.6	0.2	0.0	2.6
14	WNW	1.0	1.0	0.8	0.3	0.0	3.1
15	NW	1.3	1.6	1.8	0.7	0.1	5.6
16	NNW	1.5	2.5	4.4	1.5	0.2	10.0
Sub-Total		**16.8**	**21.8**	**41.1**	**17.3**	**1.3**	**98.3**
	Calms						1.7
	Missing/Incomplete						0
Total							**100**

9.4.1.1.3 Temperature

Air temperature is important, both for determining the effect of plume buoyancy (the larger the temperature difference between the plume and the ambient air, the higher the plume is able to rise), and determining the development of the mixing and inversion layers.

The monthly distribution of average daily maximum temperatures indicate that the average midday temperatures for Westonaria range from 16.6°C in June to 26.7°C in January. The region is the coldest during July with temperatures of 0.1°C on average during the night.

9.4.1.1.4 Relative Humidity

The data in Table 9-10 is representative of the relative humidity for the proposed WRTRP area. The annual maximum, minimum and average relative humidity is given as 66.4%, 61.6% and 63.8%, respectively. The daily maximum relative humidity remains above 60 % for most of the year, and range from 57.9 % in November to 74.2 % in March. The daily minimum relative humidity on the other hand is above 56 % for the whole year, with the highest minimum (67.2 %) observed in June and the lowest (55.6 %) occurring in November.

Table 9-10: Monthly Average Relative Humidity Values

Relative Humidity (%)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Monthly Max.	67.1	65.6	74.2	63.3	64.0	72.2	69.9	67.7	67.7	64.0	57.9	63.8	66.4
Monthly Min.	62.1	60.9	60.6	62.5	61.5	67.2	63.0	63.6	61.8	60.8	55.6	59.1	61.6
Monthly Ave.	64.5	63.1	66.5	62.8	62.6	69.1	66.7	65.2	64.1	62.0	56.5	62.2	63.8

9.4.1.1.5 Precipitation

As shown in Table 9-11, for the three years data considered, the total monthly rainfall (max) and average total monthly rainfall are reported. The annual totals, maximum and average of 1 065 mm and 591 mm are reported.

Table 9-11: Total Monthly and Average Precipitation Values

Precipitation (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Total Monthly Rainfall (Max).	204.2	115.1	70.9	46.2	6.9	4.1	0.5	8.6	53.1	178.3	148.6	228.1	1065
Average Total Monthly Rainfall	122.0	64.1	35.8	25.1	2.6	1.4	0.3	5.8	19.2	72.9	99.1	142.5	591

9.4.1.1.6 Evaporation

As shown in Table 9-12, the annual averages for maximum, minimum and mean monthly evaporation rates for Westonaria area are 263 mm, 113 mm and 178 mm, respectively. The highest monthly maximum evaporation (322 mm) occurred in October. The rate decreases to the lowest in 68 mm in April. The monthly minimum evaporation ranges between 68 mm (April) and 180 mm in October.

Table 9-12: Monthly Evaporation Rates for Westonaria

Evaporation (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Monthly Max.	289	262	224	190	223	244	257	261	288	322	277	320	263
Monthly Min.	88	120	93	68	79	70	85	111	155	180	178	128	113
Monthly Mean	206	177	171	141	124	109	126	170	224	253	224	212	178

9.4.1.1.7 Emissions and Particulates

Dust deposition results confirm that the area experiences dust deposition rates that are generally within the recommended residential limit specified by the National Dust Control Regulations (NDCR, 2013). Some sites were observed to be in violation of the recommended frequency of exceedance. At some sites, three or more sequential months are in exceedance, which violates the two permissible and non-sequential months allowed in a year (NDCR, 2013).

Dust deposition rates measured between 2010 and 2013 were compliant at all sites, with the exception of August and September 2010 (two sequential months that exceeded the standard - 600 mg/m^2/day (NDCR, 2013). In 2014, all sites (Venterspost Primary, Manyano Shaft, Ikamva Shaft Thuthukane Shaft, Bekkersdal Community Clinic and Hill Shaven) were in violation of the permissible frequency of exceedance (two within a year). These sites exceeded the recommended standard for four sequential months. A detailed dust deposition baseline for the project area will be provided as part of the Air Quality Impact Assessment report to be attached as an appendix to the EIA report.

9.4.1.2 Geology

9.4.1.2.1 Regional Geology

The geological map of the area indicates that the site is covered with Quaternary age sediment (Plan 9). However, the quaternary sediment was only found partially on site while shale and diabase outcrop are common.

The regional geology of the area is illustrated on the 1:250 000 Geological Map 2626 West Rand series, published by the Council for Geoscience. The surface geology comprises of Pretoria Group lithologies of the Transvaal Supergroup of the Vaalian Erathem. The Pretoria Group sediments comprise of shale, slate, quartzite, siltstone and conglomerate of approximately 2 200 million years of age. The Pretoria Group lithologies form prominent east-west trending ridges in the vicinity of the study area. Diabase sills of a younger geological age (Monkolian 1 000 to 2 050 million years) are intruded into the Pretoria Group sediments.

The area is underlain by a gentle sloping stratum, generally dipping to the south at 10 to 20º.

The oldest rocks of the Central Rand, Klipriviersberg and Chuniespoort Groups (3 100-2 200 My) outcrops to the north of study area with progressively younger rocks outcropping in the south.

Extensive diabase sill intrusions, as characterised by their highly positive magnetic signature in the aeromagnetic survey, are evident as intrusions in the Silverton shale and Timeball Hill siltstone-shale sequences.

9.4.1.2.2 Local Geology

The local geology is obtained from percussion-drilled borehole logs. Twenty eight percussion boreholes were drilled in the vicinity of the RTSF during this study. During previous studies in the area, boreholes were also drilled (Golder (2009)).

The geological profiles of the boreholes show that the footprint area of the proposed RTSF is underlain (from north to south) by Strubenkop shale, Daspoort quartzite and Silverton shale units of the Pretoria Group (2 200-2 050 My).

In addition to shales, sills of diabase intrusions were also encountered in some boreholes. No dolomite was encountered in any of the boreholes. The dolomite is expected to be more than 1 500 km below the surface of the proposed RTSF, based on deep exploration boreholes drilled at the Goldfields TSF site.

The depth of weathering over the shale is in the order of 20 m to 26 m, with the deepest weathering along the watercourse. The depth of weathering over the diabase is approximately 20 m to 25 m, with the deepest weathering also encountered along the watercourse.

9.4.1.3 Groundwater

The groundwater baseline environment described in this report is taken from the existing Ezulwini EMP Review and Update compiled by Gold One Cooke operations (2013). The depth of the water table

9.4.1.3.1 Current Groundwater Usage

The water use identified at the Ezulwini Mining Right area was that which the farmers use for agricultural purposes.

9.4.1.3.2 Groundwater Depth

It is assumed that the depth of the water table over the vast area varies due to the dolomitic under layer and the dewatering cone which has developed towards the central portion of the compartment (Gold One Cooke Operation, 2013). It was noted that the depth of the water table in the southern section was between 17 m and 18 m below the surface, while the northern section was noted to have a water table ranging between 17 m and 60 m below the surface. A significant portion of the groundwater levels were found to lie within the shallow weathered aquifer (Gold One Cooke Operation, 2013).

Most of the water stored in the main dolomitic aquifer occurs in the top 100 m below the water level. Previous studies within this areas show that the dolomite is similar to the traditional fractured rock aquifer in terms of depth where dissolution has been pronounced.

The effective base of this aquifer has a depth ranging between 150 m and 200 m below the surface. The dolomite is up to 900 m or 1 100 m thick, however, it is unlikely that vast amounts of groundwater flow occur below this depth except along intersecting structural conduits to the underlying mine workings (Gold One Cooke Operation, 2013).

9.4.1.3.3 Baseline Groundwater Quality

No boreholes are available to monitor groundwater levels and quality at the proposed Uranium plant site. However, up to 20 boreholes are monitored in the vicinity of the Cooke Dump and indicate groundwater levels are between 12 m and 20 m below ground level at the uranium plant and acid plant site and Cooke Dump. Groundwater is generally expected to follow the topography and will therefore flow towards the Wonderfonteinspruit (Golder and Associates, 2010).

Groundwater samples were collected from the groundwater monitoring boreholes in 2011. The water samples collected were compared to the South African National Standards (SANS) 241 drinking water standards.

Table 9-13: Groundwater Quality Monitoring Positions

Position Number	Description	Comment
EZM1	Borehole NE of TSF	Receptor indicator
EZM2	Borehole SW of TSF	Receptor indicator
EZM3	Borehole SE of TSF	Receptor indicator
EZM5	Borehole North of TSF	Receptor indicator
EZM6	Borehole SE of plant / shaft	Source indicator
SRK	Borehole South of TSF	Receptor indicator

The groundwater quality samples taken at the Ezulwini complex in September 2011 were analysed. It was found that the groundwater quality at boreholes EZM1, EZM2 and EZM3 was reasonably good considering close proximity to a TSF (Ezulwini North TSF). Sample EZM6 on the other hand showed definite contamination that is suspected to originate from the plant area. Water from EZM6 was not fit for human consumption. Chemical parameters that fall within or exceed the Class 2 standard include EC4, SO4, NO3, Ca, MG, Mn, Fe, Al, Zn, Ca and Ni.

Plan 9: Geology

Plan 10: Hydrocensus

9.4.1.4 Noise

9.4.1.4.1 Current Ambient Environment

The current noise soundscape of the study area has been characterised by means of baseline noise measurements near the major noise emitting components from the WRTRP. The measurements were carried out in accordance with the Gauteng Noise Control Regulations. The measured baseline will be compared to the guidelines of the SANS 10103:2008 which compares environmental noise with respect to annoyance and speech communication (refer to Table 9-15).

Table 9-14: Acceptable Rating Levels for Noise in Districts (SANS 10103, 2008)

Type of District	Equivalent continuous rating level ($L_{Reg.T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}$ [a]	$L_{Req,d}$ [b]	$L_{Req,n}$ [b]	$L_{R,dn}$ [a]	$L_{Req,d}$ [b]	$L_{Req,n}$ [b]
RESIDENTIAL DISTRICTS						
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
NON-RESIDENTIAL DISTRICTS						
d) Urban districts with some workshops, with business premises, and with main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50
NOTE 1 If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table might result.						
NOTE 2 If the spectrum of the sound contains significant low frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken and specialist advice should be obtained. In this case the indoor sound levels might significantly differ from the values given in columns 5 to 7.						
NOTE 3 In districts where outdoor $L_{R,dn}$ exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor $L_{Req,T}$ values in line with those given in table 1.						

Type of District	Equivalent continuous rating level ($L_{Reg.T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}$ [a]	$L_{Req,d}$ [b]	$L_{Req,n}$ [b]	$L_{R,dn}$ [a]	$L_{Req,d}$ [b]	$L_{Req,n}$ [b]
NOTE 4 For industrial districts, the $L_{R,dn}$ concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24 h day/night cycle, LReq,d = LReq,n =70 dBA can be considered as typical and normal.						
NOTE 5 The values given in columns 2 and 5 in this table are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.						
NOTE 6 The noise from individual noise sources produced, or caused to be produced, by humans within natural quiet spaces such as national parks, wilderness areas and bird sanctuaries, should not exceed a maximum Weighted sound pressure level of 50 dBA at a distance of 15 m from each individual source.						
a The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness of the noise and the time of day.						
b The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness.						

The criteria used to site the measurement locations are (refer to Plan 10):

- The locations nearest noise sensitive receptors to the Driefontein TSF 5 and Driefontein TSF 3, as well as nearest to the proposed CPP and RTSF; and
- The locations served as suitable reference points for the measurement of ambient sound levels surrounding the proposed project area. The noise measurement locations cover rural as well as suburban and urban areas that represent a comprehensive soundscape of the area.

The list of noise measurement locations can be seen in Table 9-15.

Table 9-15: Noise Measurement Locations

Site ID	Farm/location	Category of Receiver	GPS Coordinates
N1	Leslie Williams Private Hospital	Urban/industrial	26° 24.077'S & 27° 25.322'E
N2	Wildebeestkuil 360 IQ portion 6	Rural	26° 28.459'S & 27° 36.615'E
N3	Letsatsing Village	Suburban	26°15'17.95"S & 28°29'22.04"E
N4	Rietfontein 349 IQ portion 42	Rural	26° 25.346'S & 27° 37.832'E

The results from the noise meter recordings for all the sampled points as well as the rating limits according to the SANS 10103:2008 guidelines are presented in Table 9-16.

Table 9-16: Results of the Baseline Noise Measurements

Sample ID	SANS 10103:2008 Rating Limit					
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$ dBA	Maximum/Minimum dBA	Date
N1	Urban	Daytime	60	52	80/ 39	23/02/2015
		Night time	50	52	68 / 41	23/02/2015
N2	Rural	Daytime	45	51	87 / 29	26/02/2015
		Night time	35	43	67 / 28	26/02/2015
N3	Suburban	Daytime	50	44	77 / 38	02/03/2015
		Night time	40	40	66 / 37	02/03/2015
N4	Rural	Daytime	45	45	72 / 29	05/03/2015
		Night time	35	48	70 / 37	05/03/2015
	Indicates current $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit					

Plan 11: Noise Monitoring Points

9.4.1.5 Soils

The land type data gathered during the scoping phase suggested the following dominant soils:

- Red well-drained soils on foot slopes of Land Type Ab.
- Shallow rocky soils on the steep escarpment of Land Type Fb.
- Red soils and rocky soils on crests of Land Type Ba and,
- Various hydromorphic and shallow soils on rock in midslopes and foot slopes of Land Type Bb.

9.4.1.5.1 Land Type Data

The soils found in the project area are represented by four possible land types as summarised in Table 9-17 and shown in Plan 13. The land uses and land capabilities are shown in Plan 14 and Plan 15 respectively.

Table 9-17: Dominant Soil Types and Slopes occurring within the Project Area

Dominant Land Type	Description	Dominant soil types	Dominant Land Capability	Potential occurrence % per land type
Ab	Land Type Ab is dominated by the foot slope landscape position (82%). Red well drained soils are common in this landscape position.	Red well drained soils for example Hutton soils.	II	90
Fb	Land Type FB is dominated by midslope (33%) and footslope (42%) positions but also contains scarp (5%) landscape positions due to the presence of rocky outcrops.	Shallow stony soils and rocks are common in this Land Type.	VI	59
Ba	Land Type Ba is dominated by crest (30%) and midslope (55%) landscape positions. The crest positions are dominated by red soils but also contain a fair amount of rock outcrops.	Deep red and shallow stony soils for example Hutton and Mispah soils respectively.	III	47
Bb	Land Type Bb is dominated by midslope (38%) and footslope positions (42%).	This Land Type is characterised by mixed soils such as shallow Mispah soils, wet soil such as Longlands and Wasbank soils as well as heavy clay soils such as Valsrivier and Sterkspruit soils.	III	59

Plan 12: Land Types

Plan 13: Land Use

Plan 14: Land Capability

9.4.1.6 Surface Water

South Africa is divided into 19 Water Management Areas (WMA), managed by its respective water boards. Each of the WMAs are made up of quaternary catchments, which relate to the drainage regions of South Africa. Each of the quaternary catchments have associated hydrological parameters including area, Mean Annual Precipitation (MAP), Mean Annual Evaporation (MAE) , and Mean Annual Runoff (MAR).

9.4.1.6.1 Regional Hydrology

The WRTRP is situated in the Upper Vaal Water Management Area (WMA) 8 within the quaternary catchments C23E, C23J, C23D, C22J and A21D (Plan 16).

The surface water attributes of the affected catchments namely the MAR in million cubic meters (Mm^3), MAP (mm) and MAE (mm) are summarised in Table 9-18 (WRC, 2005).

Table 9-18: Summary of the Surface Water Attributes for Quaternary Catchments

Quaternary Catchment	Total Area (km^2)	MAP (mm)	MAR (Mm^3)	MAE (mm)
A21D	761	714	17.78	1700
C22J	669	633	11.81	1650
C23D	510	664	9.12	1650
C23E	850	631	13.41	1675
C23J	890	620	18.49	1670

Runoff from the A21D quaternary catchment drains in a north easterly direction away from the WRTRP area via the Rietspruit River. The Rietspruit River is the largest river within the quaternary catchment.

Runoff emanating from quaternary catchment C23D drains in a south westerly direction into the Mooirivierloop River, which is the largest river in the quaternary catchment. The C23D quaternary catchment is a contributing catchment to C23E and consequently all runoff from C23D eventually drains to the outlet of C23E.

Runoff emanating from quaternary catchment C23D drains in a south westerly direction via the Mooirivierloop River. The C23E quaternary catchment is also made up of urban areas which are greater than 5 km^2.

The C23J quaternary catchment area is 890 km^2 and has an MAR of 18.49 Mm^3. Runoff emanating from quaternary catchment C23J drains in a south westerly direction via the Loopspruit River.

The C22J quaternary catchment area is 669 km^2 and has an MAR of 11.81 Mm^3. Runoff emanating from quaternary catchment C22J drains in a southerly direction, also via the Leeuspruit River.

Plan 15: Catchment Area

9.4.1.6.2 Water Quality

Surface water quality samples were collected from the rivers and dams within and around the project area to determine the baseline water quality for the project area. The sampled rivers include the Leeuspruit, Loopspruit and other unnamed rivers around the project area.

Samples were submitted to Aquatico Laboratory (Pty) Ltd, a SANAS accredited laboratory in Pretoria for analysis of their physical and chemical quality status.

Water quality results have been benchmarked against the SANS 241-1: 2011 drinking water standards. This part of SANS 241 specifies the quality of acceptable drinking water, defined in terms of microbiological, physical, aesthetic and chemical determinants, at the point of delivery. Water that complies with this part of SANS 241 is deemed to present an acceptable health risk for lifetime consumption (this implies an average consumption of 2 L of water per day for 70 years by a person that weighs 60 kg).

The results were also benchmarked with the with the In-stream Water Quality Guidelines for the Vaal Dam Catchment. This is due to the fact that the project area lies within the Vaal Dam drainage region/catchment.

The Resource Water Quality Objectives (RWQOs) are defined by the NWA as “clear goals relating to the quality of the relevant water resources” (DWAF, 2006a). In South Africa, the South African Water Quality Guidelines (SAWQG) has been developed as discrete values that set out the change from one category of fitness for use to another (DWAF, 1996).

The water quality guidelines describe the “fitness for use” of a water resource, while the Water Quality Objectives defines “what management action is required” for a water resource. The fitness for use of water defines how suitable the quality of water is for its intended use. The following fitness for use categories are linked to the SAWQGs:

- **Ideal** – the use of water is not affected in any way; 100% fit for use by all users at all times; desirable water quality (TWQR);
- **Acceptable** – slight to moderate problems encountered on a few occasions or for short periods of time;
- **Tolerable** – moderate to severe problems are encountered; usually for a limited period only; and
- **Unacceptable** – water cannot be used for its intended use under normal circumstances at any time (DWAF, 2006c).

The water quality results are set out in Table 9-19 (benchmark against drinking standards) and 9-20 (benchmark for in-stream quality)

Table 9-19: Water quality results benchmarked against the SANS 241-1:2011 drinking water quality standards

Sample ID			pH-Value at 25° C	Conductivity at 25° C in mS/m	Total Dissolved Solids	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Chlorides as Cl	Sulphate as SO_4	Nitrate NO_3 as N	Fluoride as F	Aluminium as Al	Iron as Fe	Manganese as Mn	Free and Saline Ammonia as N
SANS241-1:2011	(Aesthetic quality Recommended)		5-9.5	<170	<1200	<150	<70	<200	<50	<300	<250	<10	<1	<0.3	<0.3	<0.1	<1.5
	(Drinking water quality Max. Allowable)		4-5 or 9.5-10	370	2400	300	100	400	100	600	500	11	1.5	0.5	2	0.5	2
	Exposure Duration (years)		70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs
		Date	pH	EC mS/m	TDS mg/l	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	Cl mg/l	SO4 mg/l	NO3-N mg/l	F mg/l	Al mg/l	Fe mg/l	Mn mg/l	N_Amonia mg/l
LP002		03/03/2015	6.9	8	34	7	5	5	0	5	7	0	0.2	0.1	0.0	0.0	0.00
LP004		03/03/2015	7.2	92	688	95	31	75	0	31	95	1	0.4	0.0	0.0	0.0	0.00
LP005		03/03/2015	7.5	93	708	96	31	75	0	31	96	1	0.4	0.0	0.0	0.0	0.00
LP006		03/03/2015	8.0	101	754	106	36	78	0	36	106	1	0.4	0.0	0.0	0.0	0.00
LU014		02/03/2015	7.5	113	970	124	50	65	0	50	124	0	0.4	0.0	0.0	0.0	0.00
DSW9	50th Percentile	2013 to 2015	8.3	90	662	183	212	52	0	42	278	1	0.3	0.1	0.0	0.0	0.0
	95th Percentile		8.8	101	1009	224	225	61	0	49	304	2	0.6	0.1	0.1	0.1	0.1
DSW42	50th Percentile	2013 to 2015	8.3	74	520	158	192	26	0	35	143	1	0.1	0.1	0.0	0.0	0.0
	95th Percentile		8.5	80	579	175	207	29	0	38	149	1	0.2	0.1	0.1	0.0	0.1
L1	50th Percentile	Jan 2013-March 2015	7.7	90	743	96	41	32	0	19	428	2	0.5	0.0	0.0	0.1	2.9
	95th Percentile		8.2	100	933	125	55	53	0	29	502	5	0.7	0.1	0.0	0.4	6.1
L2	50th Percentile	Jan 2013-March 2015	7.5	88	696	84	48	37	0	17	387	1	0.6	0.0	0.0	0.1	0.2
	95th Percentile		8.0	94	889	155	62	44	0	24	410	1	1.1	0.0	0.0	0.3	0.4
L3	50th Percentile	Jan 2013-March 2015	7.6	114	877.0	119	38	76	0	70	415	2	0.4	0.0	0.0	1.2	2.1
	95th Percentile		8.0	173	1480.0	186	54	144	0	97	719	5	0.7	0.1	0.0	9.7	4.6
W12	50th Percentile	Jan 2013-March 2015	7.8	75	460.0	59	18	57	0	36	415	75	0.4	0.0	0.1	1.4	4.0
	95th Percentile		8.1	82	538.2	116	22	85	0	50	719	215	0.7	0.1	0.1	3.7	18.4
W13	50th Percentile	Jan 2013-March 2015	7.8	75	474.0	55	19	57	0	40	82	8	0.4	0.0	0.0	1.3	4.8
	95th Percentile		8.1	82	606.0	119	25	92	0	52	236	14	0.5	0.1	0.0	3.0	19.8

Sample ID			pH-Value at 25° C	Conductivity at 25° C in mS/m	Total Dissolved Solids	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Chlorides as Cl	Sulphate as SO_4	Nitrate NO_3 as N	Fluoride as F	Aluminium as Al	Iron as Fe	Manganese as Mn	Free and Saline Ammonia as N
SANS241-1:2011	(Aesthetic quality Recommended)		5-9.5	<170	<1200	<150	<70	<200	<50	<300	<250	<10	<1	<0.3	<0.3	<0.1	<1.5
	(Drinking water quality Max. Allowable)		4-5 or 9.5-10	370	2400	300	100	400	100	600	500	11	1.5	0.5	2	0.5	2
	Exposure Duration (years)		70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs	70yrs
		Date	pH	EC mS/m	TDS mg/l	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	Cl mg/l	SO4 mg/l	NO3-N mg/l	F mg/l	Al mg/l	Fe mg/l	Mn mg/l	N_Amonia mg/l
W15	50th Percentile	Jan 2013-March 2015	8.0	94	692.0	86	28	73	0	50	267	5	0.3	0.0	0.1	0.0	3.6
	95th Percentile		8.3	107	853.6	128	48	105	0	64	310	9	0.6	0.0	0.2	0.6	6.7
DP006		02/03/2015	7.7	11	82	27	11	6	0	4	6	0	0.0	6.6	0.0	0.2	0.2
DP003		02/03/2015	7.0	36	306	95	33	14	0	65	14	0	0.0	23.1	0.0	0.2	0.2
LU009		02/03/2015	7.6	114	896	0	226	63	0	112	386	1	0.0	133.0	55.0	0.0	0.1
GOL2376-SW1		25/03/2015	7.0	5	32	3	3	3	1	5	1	0	0.3	-0.003	0.115	-0.001	0.1
GOL2376-SW2		25/03/2015	7.7	57	358	49	28	36	5	42	78	0	0.3	-0.003	-0.003	0.003	0.2
GOL2376-SW3		25/03/2015	7.9	120	764	149	50	72	11	98	417	1	0.4	-0.003	-0.003	-0.001	0.2
GOL2376-SW4		25/03/2015	8.3	119	826	156	50	67	10	90	454	2	0.3	-0.003	-0.003	-0.001	0.1
GOL2376-SW5		25/03/2015	7.8	123	862	157	46	70	13	83	494	3	0.3	-0.003	-0.003	-0.001	0.1
GOL2376-SW6		25/03/2015	8.1	101	654	102	41	81	8	90	315	1	0.4	-0.003	-0.003	-0.001	0.2
GOL2376-SW7		25/03/2015	7.6	7	48	4	4	3	1	6	1	0	0.2	-0.003	-0.003	-0.001	0.1
GOL2376-SW8		10/07/2015	8.4	110	777	107	43	81	5	88	362	1	0.3	-0.002	-0.004	-0.002	0.1
GOL2376-SW9		10/07/2015	8.3	111	790	109	44	84	6	90	372	1	0.3	-0.002	-0.004	0.196	0.1
GOL2376-SW13		10/07/2015	8.2	91	616	82	28	77	6	70	283	4	0.5	-0.002	-0.004	-0.002	0.1
GOL2376-SW21		10/07/2015	8.8	89	628	70	42	66	2	55	343	2	0.6	-0.002	-0.004	-0.002	0.0
GOL2376-SW23		10/07/2015	7.8	131	985	142	58	77	6	95	490	10	0.4	-0.002	-0.004	0.060	0.0
GOL2376-SW26		10/07/2015	8.3	117	810	126	48	73	7	109	358	1	0.4	-0.002	-0.004	-0.002	0.0

Table 9-20: Water quality results benchmarked against the in-stream water quality guidelines for the Vaal Dam Catchment

Sample ID			Nitrate NO_3 as N	Chlorides as Cl	Total Alkalinity as $CaCO_3$	Sulphate as SO_4	Conductivity at 25° C in mS/m	pH-Value at 25° C	Free and Saline Ammonia as N	Fluoride as F	Phosphate as PO_4
In-stream Water Quality Guidelines for the Vaal Dam Catchment		Ideal	<0.1	<25	<40	<20	<10	6.5-8.5	<0.2	<0.05	<0.05
		Acceptable	0.1-0.2	25-50	40-75	20-45	11232	-	0.2-0.5	0.05-0.20	0.05-0.25
		Tolerable	0.2-0.3	50-75	75-120	45-70	30-45	-	0.5-1.0	0.2-0.4	0.25-0.50
		Unacceptable	>0.3	>75	>120	>70	>45	<6.5;>8.5	>1	>0.4	>0.5
		Dates									
LP002		03/03/2015	18.0	4.9	0	7.2	8.3	6.9	0.0	20.0	0.2
LP004		03/03/2015	237.0	31.0	0	94.8	91.7	7.2	0.0	127.1	0.4
LP005		03/03/2015	240.0	30.8	0	96.0	93.3	7.5	0.0	126.3	0.4
LP006		03/03/2015	265.0	35.8	0	106.0	101.0	8.0	0.0	147.8	0.4
LU014		02/03/2015	310.0	49.8	0	124.0	113.0	7.5	0.0	204.2	0.4
DSW9	50th Percentile	2013 to 2015	1.5	42.5	0	278.0	89.8	8.3	0.0	0.3	0.1
	95th Percentile		2.0	49.1	0	303.8	100.9	8.8	0.1	0.6	0.1
DSW42	50th Percentile	2013 to 2015	1.2	35.0	0	143.0	74.1	8.3	0.0	0.1	0.3
	95th Percentile		1.3	38.3	0	148.8	80.2	8.5	0.1	0.2	0.3
L1	50th Percentile	Jan 2013-March 2015	2.3	19		428	90	7.7	2.9	0.45	
	95th Percentile		5.3	29.2		502	99.8	8.24	6.1	0.74	
L2	50th Percentile	Jan 2013-March 2015	0.6	16.5		387	87.5	7.5	0.2	0.6	
	95th Percentile		0.775	24		410	93.75	7.975	0.37	1.05	
L3	50th Percentile	Jan 2013-March 2015	1.9	70		415	114	7.6	2.1	0.43	
	95th Percentile		5.45	97.4		718.8	172.8	8.04	4.6	0.745	
W12	50th Percentile	Jan 2013-March 2015	74.5	36		415	75	7.8	4	0.4	
	95th Percentile		215.25	50.2		718.8	82.4	8.1	18.4	0.725	

Sample ID			Nitrate NO_3 as N	Chlorides as Cl	Total Alkalinity as $CaCO_3$	Sulphate as SO_4	Conductivity at 25° C in mS/m	pH-Value at 25° C	Free and Saline Ammonia as N	Fluoride as F	Phosphate as PO_4
W13	**50th Percentile**	**Jan 2013-March 2015**	7.8	40		82	75	7.8	4.8	0.4	
	95th Percentile		14.2	52.2		235.8	82.2	8.12	19.8	0.525	
W15	**50th Percentile**	**Jan 2013-March 2015**	5.2	50		267	94	8	3.6	0.3	
	95th Percentile		8.74	64		310	107	8.3	6.74	0.56	
DP006		**02/03/2015**	0.3	3.56		5.72	10.8	7.67	0.15	0	
DP003		**02/03/2015**	0.3	64.7		13.5	36	7.02	0.22	0	
LU009		**02/03/2015**	1.4	112		386	114	7.63	0.08	0	
GOL2376-SW1		**25/03/2015**	0.24	5.48	19.2	0.53	5.25	6.97	0.11	0.25	0.08
GOL2376-SW2		**25/03/2015**	0.21	41.5	205	78	56.5	7.72	0.22	0.34	0.06
GOL2376-SW3		**25/03/2015**	0.84	97.7	149	417	120	7.89	0.22	0.39	0.06
GOL2376-SW4		**25/03/2015**	1.52	89.9	139	454	119	8.28	0.13	0.32	0.06
GOL2376-SW5		**25/03/2015**	2.53	82.8	133	494	123	7.76	0.1	0.3	0.08
GOL2376-SW6		**25/03/2015**	1.16	90.1	131	315	101	8.14	0.15	0.41	0.44
GOL2376-SW7		**25/03/2015**	0.17	5.83	24.5	0.9	6.5	7.55	0.11	0.22	0.07
GOL2376-SW8		**10/07/2015**	0.833	88.2		362	110	8.35	0.079	0.319	0.017
GOL2376-SW9		**10/07/2015**	0.554	90.1		372	111	8.29	0.083	0.337	-0.002
GOL2376-SW13		**10/07/2015**	4	70		283	91	8.17	0.068	0.457	0.509
GOL2376-SW21		**10/07/2015**	1.55	54.6		343	89.4	8.8	0.006	0.633	-0.002
GOL2376-SW23		**10/07/2015**	9.86	95.1		490	131	7.82	0.009	0.353	-0.002
GOL2376-SW26		**10/07/2015**	1.19	109		358	117	8.34	0.031	0.372	-0.002

9.4.1.7 Fauna & Flora

The project area falls within four vegetation types according to (Mucina and Rutherford, 2006) as described below and shown in Plan 17. The sections below also discuss the fauna and flora of the area.

9.4.1.7.1 Carletonville Dolomite Grassland

This vegetation unit mainly occurs in the North-West Province but also in Gauteng and marginally into the Free State Province. It is distributed in the region of Potchefstroom, Ventersdorp and Carletonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng Province.

This vegetation occurs on slightly undulating plains dissected by prominent rocky chert ridges. It forms a complex mosaic pattern dominated by many species. Grasses such as: *Loudetia simplex* (Common Russet Grass), *Hyparrhenia hirta* (Common Thatching Grass), *Brachiaria serrata* (Velvet Signal Grass) and *Heteropogon contortus* (Spear Grass) are prominent while shrubs such as: *Euclea undulata* (Common Guarri), *Searsia magalismontana* (Berg Taaibos), *Zanthoxylon capense* (Small Knobwood) and *Diospyros lycioides* (Bluebush) are scattered in protected places (e.g. among rocks and boulders). The geology of this vegetation unit consists of dolomites and cherts of the Malmani subgroup from the Transvaal super group.

Conservation status is currently considered vulnerable, with only a small extent conserved in statutory reserves (Sterkfontein Caves— part of the Cradle of Humankind World Heritage Site, Oog Van Malmani, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, Groenkloof) and in at least six private conservation areas. Almost a quarter of the vegetation type has already been transformed by cultivation, urban sprawl or by mining activity as well as the building of the Boskop and Klerkskraal Dams. Erosion is considered to be very low (84%) and low (15%).

9.4.1.7.2 Gauteng Shale Mountain Bushveld

This vegetation unit occurs in Gauteng and North-West Provinces, mainly on the ridge of the Gatsrand south of Carletonville–Westonaria–Lenasia. It occurs on low broken ridges varying in steepness and generally with a high surface rock cover. The vegetation is a short, semi-open thicket, dominated by a variety of woody species such as: *Acacia caffra*, *Searsia leptodictya*, *Cussonia spicata* and *Englerophytum magalismontanum*. The understory is dominated by grasses such as: *Cymbopogon pospischilii* and *Digitaria eriantha*. Some of the ridges form plateaus that carry scrubby grassland. The geology consists of shale and andesite from the Pretoria group (Transvaal supergroup).

Conservation status is currently considered to be Vulnerable, statutorily conserved in Skanskop and Hartebeesthoek Nature Reserves, Magaliesburg Nature Area and Groenkloof National Park.

9.4.1.7.3 Rand Highveld Grassland

Rand Highveld Grassland is found in the highly variable landscape with extensive sloping plains and ridges in the Gauteng, North-West, Free State and Mpumalanga Provinces. The vegetation type is found in areas between rocky ridges from Pretoria to Witbank, extending onto ridges in the Stoffberg and Roossenekal regions as well as in the vicinity of Derby and Potchefstroom, extending southwards and north-eastwards from there. The vegetation is characterised by species rich, sour grassland alternating with low shrubland on rocky outcrops. The most common grasses on the plains belong to the genera *Themeda, Eragrostis, Heteropogon* and *Elionurus*. High numbers of herbs belonging to the Asteraceae family are also found. In rocky areas, shrubs and trees also prevail and are mostly *Protea caffra, Acacia caffra, Celtis africana* and *Searsia* spp.

Due to the low conservation status, this vegetation type is classified as Endangered. Almost half of the vegetation type has been transformed by cultivation, plantations, urbanisation or dam-building. Scattered aliens (most prominently *Acacia mearnsii*) are present in the unit.

9.4.1.7.4 Soweto Highveld Grassland

This vegetation unit occurs in Mpumalanga, Gauteng (and to a very small extent also in neighbouring Free State and North-West) Provinces. It lies in a broad band roughly delimited by the N17 road between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River (border with the Free State) in the south. It extends further westwards along the southern edge of the Johannesburg Dome (including part of Soweto) as far as the vicinity of Randfontein. In southern Gauteng it includes the surrounds of Vanderbijlpark and Vereeniging as well as Sasolburg in the northern Free State.

The vegetation occurs on gently to moderately undulating landscape on the Highveld plateau supporting short to medium high, dense, tufted grassland dominated almost entirely by *Themeda triandra* (Rooi grass) and accompanied by a variety of other grasses such as *Elionurus muticus* (Wire grass), *Eragrostis racemosa* (Small heart grass), *Heteropogon contortus* (Spear grass) and *Tristachya leucothrix* (Trident grass).

Only small scattered wetlands, narrow streams and occasional ridges or rocky outcrops interrupt the continuous grassland cover. The geology of the Soweto Integration consists mainly of shale, sandstone or mudstone of the Madzarinwe formation (Karoo supergroup).

The conservation status is currently considered to be Endangered, only small areas are statutorily conserved (Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, and Rolfe's Pan Nature Reserves) or privately conserved (Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site). Almost half of the area already transformed by cultivation, urban sprawl, mining and building of road infrastructure. Some areas have been flooded by dams (Grootdraai, Leeukuil, Trichardtsfontein, Vaal and Willem Brummer dams). Erosion is generally very low (93%).

Plan 16: Vegetation Types

9.4.1.7.5 Possible Floral Species of Special Concern

The project area lies within three Quarter Degree Square (QDS) grids, namely 2627AD and 2627BC and 2627DA. According to the PRECIS, no Red Data species are expected to occur for the QDS for each of the sites.

The Plants of South Africa (http://posa.sanbi.org) website list was obtained from the South African National Biodiversity Institute (SANBI) website; it lists all the Red Data plant species officially recorded by SANBI for Quarter degree square grid. In order for a plant species to be included in this list, a specimen collected in this grid must be supplied to SANBI. This list is therefore not a comprehensive list representing only those species that may occur in these grids, but rather a guideline as to what is likely to occur here. The sites sampled are also only a very small portion of the whole grid and habitats suitable for certain species in these Plants of South Africa (POSA) lists may not be present at the sites sampled. It is therefore not unusual for species in the POSA list to be absent from the sampling sites.

Certain species included in the below list was confirmed by scrutinising previous specialist studies that were undertaken in the past. Species of Special Concern (SSC) likely to occur on site are listed in Table 9-21.

Table 9-21: Plant SSC likely to occur on site

Plant species	Status
Kniphofia typhoides	NT (confirmed)
Trachyandra erythrorrhiza	NT (confirmed)
Hypoxis hemerocallidea	Declining (confirmed)
Eucomis autumnalis subsp. clavata	Not Evaluated (confirmed)
Boophone disticha	*Declining*
Adromischus umbraticola subsp. umbraticola	NT
Drimia sanguinea	NT
Khadia beswickii	VU

Fauna expected to occur on site include assemblages within terrestrial and wetland ecosystems: mammals, birds, reptiles, amphibians and invertebrates. Each of these assemblages occurs within unique habitats and the ecological state of these habitats directly relates to the number of species found within them. The main habitats occurring in the project area are grassland plains and pans, with little altitudinal variation.

9.4.1.7.6 Amphibians

Amphibians are viewed as good indicators of changes to the whole ecosystem because they are sensitive to changes in the aquatic and terrestrial environments (Waddle, 2006). Most species of amphibians are dependent on the aquatic environment for reproduction (Duellman and Trueb 1986). Additionally, amphibians are sensitive to water quality and ultra violet radiation because of their permeable skin (Gerlanc and Kaufman 2005). Activities such as feeding and dispersal are spent in terrestrial environments (Waddle, 2006). According to Carruthers (2001), a number of factors influence the distribution of amphibians, but because amphibians have porous skin they generally prosper in warm and damp habitats. The presence of suitable habitat within the study area should provide a number of different species of amphibians.

According to Carruthers (2001), frogs occur throughout southern Africa. A number of factors influence their distribution, and they are generally restricted to the habitat type they prefer, especially in their choice of breeding site. The choices available of these habitats coincide with different biomes, these biomes in turn, are distinguished by means of biotic and abiotic features prevalent within them. Therefore a collection of amphibians associated with the Grassland biome will all choose to breed under the prevailing biotic and abiotic features present. Further niche differentiation is encountered by means of geographic location within the biome, this differentiation includes, banks of pans, open water, inundated grasses, reed beds, trees, rivers and open ground, all of which are present within the area of interest. No previous records of amphibians that occur on site were found on the South African Reptile Conservation Assessment (SARCA) website (http://sarca.adu.org.za/). The Near threatened Giant Bullfrog (*Pyxicephalus adspersus)* is expected on site due to available habitat.

9.4.1.7.7 Avifauna

Birds have been viewed as good ecological indicators, since their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological condition are linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. According to the South African Bird Atlas Project (SABAP2), 324 species of birds have been identified in the area; the majority of these birds are comprised of Grassland species. All birds that could be present within QDS 2627 AD, 2627 BC and 2627 DA. Of these species, 10 have been assigned an international Red Data status with one Endangered, six Near Threatened, and three Vulnerable species recorded. These species are listed in Table 9-22 below.

Table 9-22: Red data bird species

Common Name	Scientific Name	Red Data Status
Maccoa duck	*Oxyura maccoa*	Near threatened
Lesser flamingo	*Phoenicopterus minor*	Near threatened
Grass owl	*Tyto capensis*	Vulnerable
Black winged pratincole	*Glareola nordmanni*	Near threatened
Blue Korhaan	*Eupodotis caerulescens*	Near threatened
European Roller	*Coracias garrulus*	Near threatened
Pallid Harrier	*Circus macrourus*	Near threatened
White Backed Vulture	*Gyps africanus*	Endangered
Cape Vulture	*Gyps coprotheres*	Vulnerable
Secretarybird	*Sagittarius serpentarius*	Vulnerable

9.4.1.7.8 Invertebrates

Butterflies are a good indication of the habitats available in a specific area (Woodhall 2005). Although many species are eurytropes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope (specific habitat requirements with populations concentrated in a small area) species which may be very specialised (Woodhall 2005). Butterflies are useful indicators as they are relatively easy to locate and catch, and to identify. Red Data species expected to occur on site are the Marsh sylph (*Metisella meninx*), Roodepoort Copper (*Aloeides dentatis dentatis VU*) and Highveld Blue (*Lepidochrysops praeterita EN*).

9.4.1.7.9 Mammals

A database search for mammal species that have been recorded in the three QDS grids (2627 AD, 2627 BC and 2627 DA) on the virtual museum of the Animal Demography Unit (ADU) (http://www.adu.org.za). This database forms part of the Department of Biological Science at the University of Cape Town. No recent records of mammals have been recorded in the study area. Mammal species that have been recorded in the Gauteng Province, and could possibly occur in the area of interest are discussed below.

Mammal species expected to occur in the area of interest include 5 species Table 9-23 as per ADU database searches. The variety of vegetation types occurring in the area of interest ensures an ecologically diverse assemblage of plant species which in turn could support a variety of mammal species; therefore the current expected species list could be more extensive than is currently thought.

Table 9-23: Expected Mammal Species

Family	Genus	Common name	Red list category
Sciuridae	*Xerus (Geosciurus) inauris*	South African Ground Squirrel	LC
Bovidae	*Taurotragus oryx*	Eland	LC
Bovidae	*Hippotragus niger*	Sable	LC
Bovidae	*Antidorcas marsupialis*	Springbuck	LC
Bovidae	*Kobus ellipsiprymnus*	Water Buck	LC

9.4.1.7.10 Reptiles

Reptiles are ectothermic (cold-blooded) meaning they are organisms that control body temperature through external means. As a result reptiles are dependent on environmental heat sources. Due to this many reptiles regulate their body temperature by basking in the sun, or in warmer areas. Substrate is an important factor determining which habitats are suitable for which species of reptile. The presence of few rocky out crops within the study area is could mean few reptile species are present.

According the Animal demography unit's virtual museum a total of 40 species have been recorded in this QDS in the past (http://sarca.adu.org.za/). These species are listed in Table 9-24. Four species in this list are designated as endemic.

Table 9-24: Expected Reptiles

Genus	Species	Common name	Status	Endemic
Agama	*Aculeate, distanti*	Distant's Ground Agama	NE	Yes
Agama	*atra*	Southern Rock Agama	NE	0
Aparallactus	*capensis*	Black-headed Centipede-eater	NE	0
Rhinotyphlops	*lalandei*	Delalande's Beaked Blind Snake	NE	Yes
Crotaphopeltis	*hotamboeia*	Red-lipped Snake	NE	0
Boaedon	*capensis*	Brown House Snake	NE	0
Dasypeltis	*scabra*	Rhombic Egg-eater	NE	0
Lamprophis	*aurora*	Aurora House Snake	NE	Yes
Pachydactylus	*affinis*	Transvaal Gecko	NE	Yes
Pachydactylus	*capensis*	Cape Gecko	NE	0
Gerrhosaurus	*flavigularis*	Yellow-throated Plated Lizard	NE	0

9.4.1.8 Aquatics

Within the quaternary catchments (as identified in the surface water baseline section), a total of nine river systems will be affected by the proposed project and a total of 13 Sub Quaternary Reaches (SQRs).

Based on the findings of the specific baseline information for each SQR potentially affected by this project, the majority of river systems are largely modified with the Present Ecological State (PES) of these systems ranging from Class D to Class E. The modification of these systems is largely attributed to the location of the sources of the associated river systems. The sources of the river systems are located within urban and industrial areas and as such, associated impacts to instream and riparian conditions have resulted in the large modification of the systems. Consequently, aquatic biota is considered to be of low importance with low sensitivities within these systems.

Dominant existing instream impacts within the project area include impoundments, water quality modification (industrial runoff), sewage effluent and solid waste disposal. Riparian impacts in the included vegetation removal, channel and bed modification and urban/industrial encroachment. Overall, only moderately important and sensitive aquatic ecosystems were found (based on desktop information) with no red data aquatic taxa excepted to be present.

9.4.1.9 Wetlands

The WRTRP area spans over several quaternary catchments and therefore is characterised by several different watercourses as summarised in the surface water section above. There are several information layers that have fed into the desktop analysis of the wetlands for the WRTRP. The area is found to have many valley bottom systems which mostly correlate to the rivers and their tributaries. These systems are both channelled and unchannelled. There are also multiple pan systems occurring at multiple parts in the landscape.

The majority of river systems associated with the project area are largely modified. The modification of these systems is largely attributed to the location of the sources of the associated river systems, which are located within urban and industrial areas and associated impacts to instream and riparian conditions have resulted in the large modification of the systems. The project area is characterised by the valley bottom systems associated with the Wonderfonteinspruit, Leeuspruit, Loopspruit and other tributaries. In addition, in the midslopes and valley heads of the catchments, there are pan and seep systems associated with the landscapes. The NFEPA wetlands within the project area are shown in Plan 17 and the wetlands in and around the RTSF site are shown in Plan 18.

Plan 17: NFEPA Wetlands

Plan 18: RTSF Wetlands

9.4.1.10 Heritage

Geologically, the project area is largely underlain by dolomitic rock that has the potential for karst topography. Karst topography refers to landscapes formed from the dissolution of soluble rocks, including dolomite and limestone. Karst topography is characterised by underground drainage systems with sinkholes, dolines and caves. This geological phenomenon creates karst caves that can be filled with fine to coarse-grained alluvium during periodic flooding. The alluvium may be represented by bodies of breccia, sandstone and siltstone which have an increased potential to contain archaeological material. This geological feature is one of the motivating factors in implementing the proposed project. Many of the historical TSFs are at risk as the potential for sinkholes is high in some areas.

Archaeologically, Stone Age and Late Farming Community sites have been recorded within the larger area under consideration here. Stone Age lithics recorded have been found as surface scatters outside of any discernible context thereby limiting the information potential and overall significance of these resources. Late Farming Community sites within the region have primarily been identified as stone walled settlements classified as Type N and Klipriviersberg. Only one potential stonewalled site has been identified in the routing option for the powerlines on the farm Doornpoort 347 IQ Portion 73. No other archaeological sites have been identified within the development footprint of the proposed infrastructure.

Within regional, local and site specific contexts the project is located in historically significant mining-industrial and agricultural-rural cultural landscapes. In terms of the mining landscape, there are several features and markers such as many of the historical TSFs created by the original mines established during the first half of the 20th century. The agricultural landscape is represented in turn by several structures and werwe that were recorded during the scoping survey completed on 16 February 2015. The potential impacts to these will be assessed during the Impact Assessment phase of the project.

9.4.1.11 Socio-Economic

The West Rand DM encompasses 2 442 km^2 of the province's land mass and is predominantly rural. The main economic hubs in the DM are Krugersdorp, Randfontein, and Westonaria; the dominant land uses in the region include mining, residential, and agriculture. Developments of residential settlements are concentrated towards the east of the district, and are reflective of current developmental dynamics and historical patterns and trends. As a result of the mining activities, and due to the dolomitic nature of the land in the district, land use patterns are often dispersed. This has meant that major economic centres in the district take on a fragmented form. In addition to the significant impact mining has had on the district, tourism and conservation opportunities exist to the north and north-east of the district, while agricultural holdings in the western side of the district represent possibility for development of the agricultural sector in the region.

The dispersed main economic centres are linked by various roads and rail routes, which also provide links to areas beyond the DM. The N14 and N12 form a strong south-east and north-west linkage, while the R500 provides road connection to the north via the linkage with the N14. The R512 is the access road to Lanseria airport, and the R559 links Soweto and Randfontein.

Plan 19: Heritage Sensitivity

9.4.1.11.1 Towns, Resources and Land Capabilities

The Westonaria LM is bordered by the Randfontein LM, Johannesburg Metropolitan Municipality, Merafong City LM, Sedibeng DM, and Emfuleni LM. The LM's residential development is generally dispersed with the dominant townships including (Plan 20):

- Westonaria;
- Bekkersdal;
- Hillshaven;
- Glenharvie;
- Venterspost;
- Simunye; and
- Mining towns such as Libanon and Waterpan.

The only significant business node occurs within Westonaria town's Central Business District (CBD); the rest of the Westonaria LM is characterised by scattered residential areas and various mining developments. The main reason for the perceived low population density in the LM is due to the dolomitic conditions in the region. Westonaria town is linked to Johannesburg via the N12; the prominent entrance point into Johannesburg from Gauteng, various developments are planned for along this route to take advantage of its strategic positioning.

The only notable agricultural holdings areas in the LM are located to the north-eastern and central parts of the district. The local government, based on the vision of a global city, or the Unicity, supports future development to the west of the LM. Development on this side of the LM would mean that the area's development follows the natural market forces, ensuring that commercial and industrial developments remain close to the current and future workforces.

The Westonaria LM's Spatial Development Framework makes mention of the fact that apart from the development potential to the west of the LM, as discussed above, the south of the LM has been demarcated for mining and conservation. The dolomitic nature of the areas located to the north of the LM make the land primarily suitable for the agricultural and mining activities. In addition to mining, the northern regions of the LM have potential for the development of small-scale or subsistence farming opportunities.

Land uses in the Merafong City LM can be categorised in three main divisions, i.e. agriculture, mining, and residential. Agriculture is the dominant land use in the LM, followed by mining and residential land uses, with the latter accounting for approximately 8% of the total land area of the LM.

Plan 20: Local Municipalities

The municipality's human settlements are relatively scattered due to the mining activities taking place, the prominent settlements are:

- Fochville;
- Carletonville;
- Weverdiend;
- Greenspark;
- Wedela;
- Blyplank;
- Khutsong; and
- Kokosi.

Carletonville is located to the north of the LM, which is also were the majority of the municipality's high value agricultural land is located. The Carletonville-Khutsong-Welverdiend area is also the LM's most populous region. The townships of Kokosi and Graanspark and the relatively wealthier Fochville is located to the South of the LM, with the central part of the LM being characterised by mining activities and the associated scattered housing developments. As with the rest of the Westrand mining belt, the LM's infrastructure development is hindered by the high occurrence of dolomite.

The economy of Merafong is dominated by the mining activities, which has led to the development of dispersed human settlements leading to a loss of purchasing power across the region as central town functions are not well developed in the LM.

9.4.1.11.2 Demographic Profile and Income Levels

Based on a combined population of 333 444, the Westonaria and Merafong City LMs comprise just about 40.1% of the West Rand DM's total population, which was estimated at 831 241 individuals in 2013. The average household size in the DM is 2.8. Based on Census 2011 (Stats SA, 2015), approximately 65% of households in the district are living in formal residential properties; the remaining 35% reside in informal or traditional dwellings. In South Africa, approximately 71% of households reside in formal residences (Stats SA, 2015). Traditionally, smaller household sizes are indicative of an increase in development, however, based on the relatively high number of households living in informal dwellings and considering the fact that the region is classed as a mining region it can be assumed that in this case the smaller household size is rather a result of migrant workers working or searching for opportunities, with the aim of sending money home to their families.

The male population of the West Rand DM exceeds the female population at 52% versus the 48% females residing in the region (Stats SA, 2015). The fact that 71% of the DM's population is of working age (Stats SA, 2015), i.e. between the ages of 15 and 65, could be seen as an additional indicator of the fact that the area attracts migrant workers. Moreover, in the two local municipalities within which Phase 2 of the project will be located an even

higher number of individuals are of working age with 73.3% in the Westonaria LM, and 72.6% in the Merafing City LM (Stats SA, 2015).

Within the Westonaria and Merafong City LM's, the proportion of the population aged 20 and older with no education is greater than in the district, with 6.2% and 6% versus the 5.0% observed in the DM (Stats SA, 2015). Furthermore, the percentages of individuals who have obtained a matric qualification in these local municipalities are also below that of the district, province, and even South Africa.

The average income within the Westonaria and Merafong City LMs were significantly lower than that of the other study areas at R5 597 and R6 625 per month (in 2011 in current prices), respectively (based on Stats SA, 2015).

9.4.1.11.3 Economy and Sectoral Structure

In 2013, the economies of the Westonaria and Merafong City LM's represented 35.8% of the total GDP of the West Rand DM, which was valued at R61 466 million (2013 current prices). Between 2003 and 2013, the West Rand DM economy has been growing at a Compounded Annual Growth Rate (CAGR) of 1.1% per year.

The West Rand economy is primarily based on the tertiary services with 66.7% of its GDP being generated by industries in this sector. Finance and personal services, as well as government services are the major contributors to the Western Rand economy. Its dependency on mining though is also quite substantial as the mining sector contributed 11.2% of GDP in the district. It should be noted that manufacturing is also quite prominent in the West Rand economy with 15.7% contribution to its GDP.

The Westonaria and Merafong City economies though are far more dependent on the mining industry than the district in general.

9.4.1.11.4 Labour Force and Employment Structure

In South Africa, the unemployment rate is defined as comprising of those individuals aged between 16 and 65 years old, actively looking for employment that are unable to find gainful opportunities; it therefore does not take into consideration discouraged job seekers. Based on Stats SA's Census 2011 data, the West Rand DM had 590 206 individuals of working age in 2011 with 3.3% of these individuals being discouraged job seekers. The situation was slightly worse in the Westonaria and Merafong City LMs, where 4.1% and 3.6% respectively of the working age population groups were discouraged job seekers; however, it was still better than at the national level where the figure was 5.5% (Stats SA, 2015).

The labour force participation rate in the West Rand DM was estimated at 56.9% in 2013. The unemployment rate in the West Rand DM was 24.4% in 2013. In the Westonaria LM, unemployment was recorded at 42.0%, while the Merafong City LM recorded an unemployment rate of 21.1%.

Between 2003 and 2013, the economy of Westonaria, due to the share decline in its mining sector's production output lost over 24 thousand employment opportunities. At the same

time, the Merafong City economy managed to increase its employment by over five thousand people during the same period, despite experiencing negative economic growth rate. This means that the losses in the mining sector's employment due to the contraction of that industry in the Merafong City LM were possible to offset by the increased employment in other industries.

In the West Rand DM, 75.3% of jobs are formal employment opportunities, while in the LMs formal employment opportunities comprise even a greater percentage, i.e. 81.5% and 80.5% in the Westonaria and Merafong City LMs, respectively (Quantec Research, 2015). At the same time, it is estimated that 2.4% of those employed in the West Rand DM are working in private households.

It is estimated that just about two thirds of all employment opportunities within the DM are created by the tertiary sector. Mining provides 15.0% of employment opportunities in the West Rand DM.

Within the Westonaria LM the importance of the mining sector for job security is significantly greater than in the district, as it provides 36.7% of opportunities in the LM's economy. It again shows the economy's reliance on the mining sector. In 2003, though, the mining sector contributes 74.2% of all jobs created in Westonaria; at the same time, though, the total employment in the local area was 51 409.

In the Merafong City LM, the employment structure was largely skewed towards the tertiary and mining industries. The mining sector created 42.7% of all employment opportunities in this economy in 2013 with the tertiary industries accounting for 48.8%. Unlike the situation observed in the Westonaria LM, employment in mining has increased between 2003 and 2013 despite the sector experiencing decline post 2008 period. Losses in employment in agriculture, manufacturing and finance and business service, though offset some of the employment gained during that period in mining and other industries.

9.4.2 Description of the Current Land Uses

9.4.2.1 Land Use

The present land use in the region is categorized as follows (refer Plan 13):

- Cultivated;
- Natural/Grazing;
- Mined; and
- Urban built-up.

These land uses will be verified in the field survey for the EIA phase of the study.

9.4.2.2 Land Capability

Land capability (refer Plan 14) is determined by a combination of soil, terrain and climate features. Land capability classes reflect the most intensive long term use of land under rain-

fed conditions. An indication is also provided about the permanent limitations associated with the different land use class definitions

The land capability of the pipeline routes and RTSF and CPP sites are as follows:

- Class II (Intensive cultivation);
- Class III (Moderate cultivation); and
- Class VI (Moderate grazing).

9.4.3 Description of Specific Environmental Features and Infrastructure on the Site

A summary of specific environmental features and infrastructure within the project area is set out below.

- Stone Age walls were found at the proposed CPP site;
- The proposed RTSF site is adjacent to wetlands (including some isolated pans within the footprint) and there are graves within the proposed footprint;
- The Wonderfonteinspruit has been significantly modified and flows within a pipeline for a portion of the river's length. It is colloquially known as the 1 m pipeline; ;
- According to SARCA, the Giant Bullfrog is expected to reside within the project area;
- Sensitive aquatic species are expected within some of the sub quaternary reaches; and
- According to the Gauteng Conservation Plan, there is an area on the western boundary of the proposed RTSF site that is considered as being an "Important Area".

9.4.4 Environmental and Current Land Use Map

Refer to the environmental and current land use maps; Plan 12 and Plan 13. Current land use is described in Section 0.

9.5 Item 2(h)(v): Impacts Identified

9.5.1 Potential Impacts

The impacts imposed onto the environment as a result of the proposed activities at the Ezulwini Mine were identified in the existing EMPR (2013). The EMPR (2013) covered the maximum capacity of the Uranium plant which is 100 000 t/m. The Ezulwini North TSF was designed to accommodate this volume (EMPR, 2013).

The potential impacts identified as a result of the proposed project are related to the pipeline which transports the concentrated tailings from CPP to the Ezulwini Plant for processing.

Table 9-25: Potential Impacts and Risks Associated with the Operations at Ezulwini Mining Right area during the Construction Phase

Project Activity(ies)	Aspect	Potential Positive and Negative Impact/s
Construction of the Pipeline	Soil	The construction of the pipeline will have a small impact on the soil environment since the pipelines will be constructed above ground.
	Surface water	Increase in sedimentation of surface water during construction caused by an increase in runoff from the cleared and stripped areas which is high in suspended solids;
		Increase of surface runoff and potentially contaminated water that needs to be maintained in the areas where site clearing and grubbing occur;
		Increase in sedimentation of surface water during construction caused by an increase in runoff from the cleared and stripped areas which is high in suspended solids;
		Increase of surface runoff and potentially contaminated water that needs to be maintained in the areas where site clearing and grubbing occur;
		Increase in turbidity of surface water runoff during construction caused by an increase in runoff from the cleared and stripped areas which is high in suspended solids

Table 9-26: Potential Impacts and Risks Associated with the Operations at Ezulwini Mining Right area during the Operational Phase

Project Activity/ies	Aspect	Potential Positive and Negative Impact/s
Transportation of concentrated tailings from the CPP to the Ezulwini Plant	Wetlands	The impact associated with the pipeline crossings over wetlands could disturb the functionality of the wetland systems.
	Surface water	The impact of disturbance of drainage lines as a result of pipeline river crossings could potentially cause flow changes in the downstream rive regime.

Table 9-27: Potential Impacts and Risks Associated with the Operations at the Cooke 4 complex during the Decommissioning Phase

Project Activity/ies	Aspect	Potential Impact
Decommissioning of the pipeline	Soil	Potential spillages from vehicles and machinery used during the decommissioning process
	Noise	The vehicles and machinery involved in the decommissioning process are proposed to be the main noise sources in the project area during this phase

Table 9-28: Potential Risks Associated with the Proposed Activities at the Cooke 4 complex

Project Activity/ies	Aspect	Potential Risk
Transportation of concentrated tailings from the CPP to the Ezulwini Plant	Wetlands	Potential spillages from the pipeline as a result of either poor seals or breaks. The gold tailings may spill and contaminate wetland systems thus resulting in the loss of wetland integrity and functioning
	Surface water	The impact associated with the operation of the pipeline would be the incident of potential spills or leaks associated with either poor seals or more significant faults such as breaks/bursts
	Soil	Potential pipeline leaks impacting on soil quality

9.5.2 Cumulative Impacts

Cumulative impacts are defined as impacts arising from the combined effects of two or more projects or actions. The importance of identifying and assessing cumulative impacts is that the whole is often greater than the sum of its parts – implying that the total effect of multiple stressors or change processes acting simultaneously on a system may be greater than the sum of their effects when acting in isolation. Cumulative impacts usually relate to large-scale rather than site-specific impacts and have a tendency to increase the intensity of impacts already predicted for the proposed project.

9.5.2.1 Air Quality

Cumulative impacts usually occur when the individual effects of many actions combine over time and/or space. To assess cumulative impacts, background level of different pollutants will be evaluated to which predicted concentrations will be added to establish impacts. Operation of the RTSF and the CPP will have a cumulative effect on particulate PM_{10} and $PM_{2.5}$ and the gaseous pollutants present in the ambient atmosphere prior and during operation of the project.

The cumulative impacts on air quality will take into account the existing activities in the region that contribute to air quality impacts, such as the TSF north of the proposed RTSF, the TSFs near South Deep, agricultural activities and coal burning in informal developments.

9.5.2.2 Heritage

A neutralising cumulative impact may occur with the establishment of a modern mining landscape through the construction of the RTSF and the reclamation and complete removal of the existing historical TSFs.

9.5.2.3 Socio-Economic

It should be noted that several of the aforementioned impacts (e.g. influx related impact) will not occur in isolation, but will combine with the current and expected impacts of other operations that are planned/operating within the greater study area. This scenario may result in several cumulative impacts.

More in-depth investigations would, however, need to be conducted during the impact assessment phase to determine if any project induced impacts will be enhanced or exacerbated by existing or planned projects.

9.6 Item 2(h)(vi): Methodology to be used in Determining the Significance of the Environmental Impacts

The significance rating process follows the established impact/risk assessment formula:

Significance = Consequence x Probability x Nature

Where

Consequence = Intensity + Extent + Duration

And

Probability = Likelihood of an impact occurring

And

Nature = Positive (+1) or negative (-1) impact

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 9-29. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this EIA/EMP Report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 9-30, which is extracted from Table 9-29. The description of the significance ratings is discussed in Table 9-31.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Table 9-29: Impact Assessment Parameter Ratings

Rating	Severity/Irreplaceability		Spatial scale	Duration/Irreversibility	Probability
	Environmental	Social, cultural and heritage			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage. The positive impact will result in a significant improvement to the initial/post disturbance environmental status and will benefit ecological and natural resources.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order. The positive impact will be of high significance which will result the improvement of the socio-economic status of a greater area beyond the boundary of the directly affected of the community and/or promote archaeological and heritage awareness and contribute towards research and documentation of sites and artefacts through phase two assessments.	International The effect will occur across international borders	Permanent: No Mitigation No mitigation measures of natural process will reduce the impact after implementation.	Certain/ Definite. The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem. The positive impact is of high significance which will result in a vast improvement to the environment such as ecological diversification and/or rehabilitation of endangered species	Irreparable damage to highly valued items of cultural significance or breakdown of social order. The positive impact will be of high significance and will result in the upliftment of the surrounding community and/or contribute towards research and documentation of sites and artefacts through phase two assessments	National Will affect the entire country	Permanent: Mitigation measures of natural process will reduce the impact.	Almost certain/Highly probable It is most likely that the impact will occur.

Rating	Severity/Irreplaceability		Spatial scale	Duration/Irreversibility	Probability
	Environmental	**Social, cultural and heritage**			
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate The positive impact will be moderately high and will have a long term beneficial effect on the natural environment	Very serious widespread social impacts. Irreparable damage to highly valued items The positive impact will be moderately high and will result in visible improvements on the socio-economic environment of the local and regional community, and/or promote archaeological and heritage awareness through mitigation	Cercle/ Region Will affect the entire Cercle or region	Project Life The impact will cease after the operational life span of the project.	Likely The impact may occur.
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year The positive impact on the environment will be moderate with visible improvement to the natural resources and regional biodiversity	On-going serious social issues. Significant damage to structures / items of cultural significance The positive impact on the socio-economic environment will be of a moderate extent and benefits should be experience across the local extent and/or potential benefits for archaeological and heritage conservation	Commune Area Will affect the whole municipal area	Long term 6-15 years	Probable Has occurred here or elsewhere and could therefore occur.

Rating	Severity/Irreplaceability		Spatial scale	Duration/Irreversibility	Probability
	Environmental	**Social, cultural and heritage**			
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month. The positive impact will be moderately beneficial to the natural environment, but will be short lived.	Ongoing social issues. Damage to items of cultural significance. The positive impact will be moderately beneficial for some community members and/or employees, but will be short lived and/or there will be a moderate possibility for archaeological and heritage conservation	Local Local extending only as far as the development site area	Medium term 1-5 years	Unlikely Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. The positive impacts will be minor and slight environmental improvement will be visible.	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected. Minor positive impacts on the social/cultural and/ or economic environment	Limited Limited to the site and its immediate surroundings	Short term Less than 1 year	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures

Rating	Severity/Irreplaceability		Spatial scale	Duration/Irreversibility	Probability
	Environmental	Social, cultural and heritage			
1	Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the environment. The positive impact on the environment will be insignificant and will not result in visible improvements	Low-level repairable damage to commonplace structures. The positive impact on social and cultural aspects will be insignificant	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month	Highly unlikely/None Expected never to happen.

Table 9-30: Probability/Consequence Matrix

Probability \ Significance	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Consequence

Table 9-31: Significance Rating Description[4]

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and / or social environment	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment	Low (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and / or social environment	Medium-low (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long-term change to the (natural and / or social) environment and result in severe changes.	Medium-high (negative) (-)
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	High (negative) (-)

[4] It is generally sufficient only to monitor impacts that are rated as negligible or minor

9.7 Item 2(h)(vii): The Positive and Negative Impacts that the Proposed Activity (in terms of the initial site layout) and Alternatives will have on the Environment and the Community that may be Affected

Table 9-32 summarises the anticipated positive and negative impacts anticipated as part of the project, which may also be relevant to the Ezulwini Mining Right EMP. Please refer to more detail on the anticipated impact in Section 9.5 above.

Table 9-32: Summary of negative and positive impacts

Aspect	Positive Impacts	Negative Impacts
Soils	None identified.	Potential soil erosion during construction of the pipeline.
Surface water	None identified.	Prior to final rehabilitation of the RTSF there will be a Loss of surface water runoff to the catchment.
Aquatics and wetlands	None identified.	Potential negative impacts localised around construction activities near, or within, watercourses.
Socio-economic	Economic injection into the District through employment creation. This will have a multiplier effect on the region. Through SGL's SLPs the project will also improve other aspects of community quality of life and wellbeing.	When the project is announced there will invariably be an influx of people looking for work. Often associated with this is an increase in health and safety risks and community tension.
Noise	None identified.	Increase in noise levels around the pumping activities.
Fauna and flora	None identified.	Disturbance of nationally protected vegetation types.

9.8 Item 2(h)(viii): The Possible Mitigation Measures that could be Applied and the Level of Risk

As the project is still in the scoping phase, this section only provides mitigation measures at a high level based on the anticipated impacts. Once fieldwork has been finalised, public participation fully implemented and impacts thoroughly assessed, more detailed and aspect specific mitigation measures can be developed and will be presented in the EIA/EMP Report.

9.8.1 Air Quality

9.8.1.1 Construction Phase

The anticipated activities during the construction phase of this project include site clearance and the construction of the proposed infrastructure (pipelines and pump station). Impacts such as poor air quality and increased loose particulate matter. The following mitigation measures are proposed:

- Application of wetting agents or dust suppressant on the dirt road and exposed areas;
- Limit activity to non-windy days;
- The area of disturbance must be kept to a minimum and no unnecessary clearing of vegetation must occur;
- Drop heights when loaders and offloading should be minimised;
- Vehicle travel speed and distances should be minimised

9.8.1.2 Decommissioning Phase

During the decommissioning phase, the removal of the pipeline and pump station and the rehabilitation of the old TSF footprint may have an impact on the ambient air quality. The proposed mitigation measures are as follows:

- Application of wetting agents or dust suppressant on the dirt road and exposed areas;
- The area of disturbance must be kept to a minimum;
- Drop heights when loaders rubbles should be minimised;
- Vehicle travel speed and distances should be minimised.

9.8.2 Noise

9.8.2.1 Construction Phase

The construction phase involves activities which may have an impact on the ambient noise levels. The proposed mitigation measures include:

- Restricting construction activities to daylight hours;
- machines and vehicles to be serviced to the designed requirements of the machinery/vehicles to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and
- Switching off equipment when not in use

9.8.2.2 Decommissioning Phase

Noise is anticipated to emanate from the machinery and vehicles operating during the decommissioning activities. The following mitigation measures were proposed:

- Restricting construction activities to daylight hours;
- machines and vehicles to be serviced to the designed requirements of the machinery/vehicles to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and
- Switching off equipment when not in use

9.8.3 Soil

9.8.3.1 Construction Phase

Loss of topsoil is one of the major impacts anticipated during the construction phase of this project. The proposed mitigation measures include:

- Ensure proper storm water management designs are in place;
- If any erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place;
- If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion;
- Only the designated access routes are to reduce any unnecessary compaction;
- Compacted areas are to be ripped to loosen the soil structure; and
- Implement land rehabilitation measures as defined in rehabilitation report.

9.8.3.2 Operational Phase

Loss of topsoil and land capability is anticipated during the operational phase. The proposed mitigation measures include:

- Ensure proper storm water management designs are in place;
- If erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place;
- If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion;
- Only the designated access routes are to be used to reduce any unnecessary compaction; and
- Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated.

9.8.3.3 Decommissioning Phase

Loss of topsoil as a result of compaction and erosion is anticipated during this phase for which the proposed mitigation measures are as follows:

- Ensure proper storm water management designs are in place;
- If erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place;
- If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion;
- Only the designated access routes are to be used to reduce any unnecessary compaction;
- Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated; and
- Implement land rehabilitation measures as defined in rehabilitation report.

9.8.4 Surface Water

9.8.4.1 Construction Phase

The activities occurring during this phase could result in increased sedimentation due to exposed surfaces, mixing of upstream clean water runoff and dirty water runoff from cleared site areas and from within infrastructure areas, and flooding of the pipeline at various areas, The mitigation measures include:

- Construct temporary ditches and a temporary storage area along downstream boundary of cleared areas to capture sediments. Water within temporary storage area can be used for construction and should be operated empty;
- Ensure that all pipelines are constructed above the 1:100 year flood elevation and/or designed to withstand exceptional rainfall;
- All dirty water channels must be constructed and placed within the dirty water infrastructure areas, such that all dirty water runoff emanating from these areas are captured and contained to a dirty water containment facility. The containment facility should be sized to accommodate the anticipated dirty water runoff as a result of the 1:50 year storm event.

9.8.4.2 Decommissioning Phase

of accidental spillages during the decommissioning of infrastructures. This could be mitigated through the following measures:

- Empty infrastructure before removal; and

- The durability and longevity of water management designs, e.g. provision of erosion protection for long-term control of erosion and potential pollution to water resources during decommissioning.

9.8.4.3 Post-closure Phase

Residual water pollution from rehabilitated infrastructure footprints is anticipated post-closure. The proposed mitigation measures include:

- It should be ensured that, the potential future impacts, for example, decant from the mine, have been identified; and
- The final mine topography should be planned, as far as possible, to be free-draining.

9.8.5 Aquatics

The impacts associated with the aquatic ecology include the contamination of the surrounding tributaries during the operation phase of this project. This can be mitigated by employing the following measures:

- Establish riparian buffer up to 500m (minimum 100m).
- Silt traps placed within clean water return channels.
- Surface and storm water management should capture and store dirty water and divert clean water. Mitigation actions provided in the surface water report (Digby Wells, 2015) should be used.
- Groundwater management according to the ground water study (Digby Wells, 2015).

9.8.6 Fauna and Flora

9.8.6.1 Construction Phase

The following impacts are expected during the construction phase pf this project:

- Direct loss of floral species/vegetation types and biodiversity;
- Loss of species of special concern (protected species); and
- Alien vegetation establishment.

The mitigation measures proposed for these impacts include:

- Limit degradation and destruction of natural environment to designated project areas by keeping the footprint of the disturbed areas to the minimum and within designated areas only. Re-vegetate open areas to limit erosion.
- Avoid known areas of faunal and floral SSC.
- Avoid sensitive landscapes such as riparian and ridge areas that were encountered on site.

- Manage nationally restricted alien invasive plant species by ensuring the removal of vegetation during construction and operation are controlled so that no open areas occur.
- Applications for permits for removal of certain plants, where required; and
- If alien vegetation is encountered, remove these plants in the correct way and timeously.

9.8.7 Wetlands

9.8.7.1 Construction Phase

Potential pollution and resultant negative impacts on wetlands is anticipated during the construction phase as a result of building pipelines over wetlands. The proposed mitigation measures include:

- Responsible construction to protect the surrounding environment will mitigate this impact. Vehicles must be in good working order. Construction should occur in the dry-season. Particular care must be taken when constructing the wetland crossings and no vehicles are to enter wetlands.
- In addition, the sections of pipe crossing wetlands should have no joins and must be fitted with steel sleeves.

9.8.7.2 Decommissioning Phase

The activities undertaken during this phase (decommissioning of the pipeline) will have some impact on the identified wetlands. The proposed mitigation measures for this include the following:

- The pipeline must be flushed clean and rendered safe for decommissioning as it will be left in situ indefinitely.

9.9 Item 2(h)(ix): The Outcome of the Site Selection Matrix and Final Layout Plan

9.9.1 Pipeline

A pipeline is proposed to be constructed from the CPP to the Ezulwini Plant (18.502 km) transporting concentrated tailings to be processed. This pipeline runs adjacent to the pipeline servitude running from the Cooke TSF to the CPP. The impacts associated with the construction of the pipelines within this region will therefore be concentrated within that servitude. Thus the environmental footprint will be reduced.

Premised on the primary requirement of the pipeline routes being selected being the shortest distance between the mining site resources pump stations, the thickener/booster stations, the CPP and the RTSF, alternative routes were considered which capitalised on the following:

- Following existing routes where possible;
- Avoiding identified environmental sensitive areas;
- Crossing existing impacted land;
- Maximising mine owned land; and
- Assessing the operating costs pertaining to topographical considerations on pumping costs.

9.10 Item 2(h)(x): Motivation where no Alternatives Sites were Considered

Refer to Section 9.1 of this document for details regarding the alternatives considered.

9.11 Item 2(h)(xi): Statement Motivating the Preferred Sites

The determination of a preferred site is not applicable for this project. Please refer to Section 9.1 above.

10 Item 2(i): Plan of Study for the Environmental Impact Assessment Process

10.1 Item 2(i)(i): Description of Alternatives to be Considered Including the Option of Not Going ahead with the Activity

The project as a whole addresses the legacy issue of historical placement of TSFs on dolomitic ground on the West Rand and its associate ongoing challenges with respect to AMD generation and management of water and air quality issues into perpetuity. The alternative to this project as a whole is that the TSFs will remain where they are and have to be managed in perpetuity with regard to water and air quality challenges.

Details regarding the alternatives considered for this project have been discussed in Section 9.1 above. The no-go alternative has also been discussed under this section.

10.2 Item 2(i)(ii): Description of the Aspects to be Assessed as part of the Environmental Impact Assessment Process

In order to investigate and assess the impacts of the proposed WRTRP project the following specialist studies have been proposed for the EIA phase:

- Surface water assessment, including:
  - Surface water quality; and
  - Surface water quantity
- Characterisation of the social environment;
- Radiation study;
- Ecological assessment, including:
  - Wetland investigation;
  - Fauna & flora assessment; and
  - Aquatic assessment.
- Geohydrological assessment;
- Archaeology and heritage assessment;
- Economic analysis;
- Soil and land capability assessment; and
- Air quality assessment.

10.3 Item 2(i)(iii): Description of Aspects to be Assessed by Specialists

The aspects to be assessed in terms of the Plan of Study (PoS) by the various specialists are detailed below.

10.3.1 Screening or Ultimate scope Assessment

The screening assessment will provide the authorities with a clear picture of the ultimate WRTRP. It also serves to eliminate perception that SGL is applying for the WRTRP incrementally. The screening assessment will be a desktop review of the ultimate project to identify potential fatal flaws for components that are not a part of the Initial Implementation. This will be done from an environmental and social perspective. All specialist studies will provide input into the screening assessment.

10.3.2 Air Quality Study

The air quality study will consider the following aspects:

- Baseline Assessment;

- Dust Fallout Monitoring;
- Emissions Inventory;
- Dispersion Modelling; and
- Air Impact Assessment.

10.3.3 Noise Study

The noise study will determine the significance of noise impacts on nearby receptors of the various developments.

10.3.4 Groundwater Study

The groundwater study will assess the following:

- Hydrocensus;
- Geophysical surveying;
- Borehole drilling; and
- Aquifer testing.

10.3.5 Soils Study

The soil assessment is to comprise of the following:

- Baseline Assessment; and
- Impacts Assessment.

10.3.6 Surface Water Study

The surface water assessment is to take note of the following aspects:

- A water quality baseline;
- Hydrological Impact Assessment;
- Mitigation and monitoring recommendations;
- Floodline assessments; and
- A water balance.

10.3.7 Aquatics Study

Following methods outlined by the River Health Programme, the aquatics study will consider the following aspects:

- Abiotic drivers (biophysical attributes of the system); and
- Biotic or biological responses.

10.3.8 Fauna & Flora Study

The floral assessment will include the following aspects:

- Vegetation classification, mapping of plant communities identified and the description thereof;
- Identification of any important and sensitive plant communities, floral species and biodiversity important species, communities and or ecosystems;
- Species list of each plant community;
- Dominant species of each plant community;
- Declared invaders and alien / exotic species (if present) for each plant community;
- Rare or endangered species, as well as all protected plants (if present) for each plant community;
- Ecological status;
- Biodiversity, biodiversity rich areas and sensitive areas; and
- Recommended species composition / mixture of species, included grasses, herbs, shrubs and trees to be used during rehabilitation as part of re-seeding and re-vegetation of rehabilitated and backfilled areas.

The faunal assessment will include the following aspects:

- Species list of mammals, birds, reptiles, amphibians and invertebrates;
- Dominant species;
- Exotic species (if present);
- Red data species, as well as any protected species; and
- Biodiversity, biodiversity rich areas and sensitive areas.

10.3.9 Wetlands Study

Aspects to be assessed as part of the wetlands study include:

- Delineation of wetlands;
- Wetland integrity; and
- Wetland functionality.

10.3.10 Heritage Study

Aspects to be considered as part of the heritage study includes:

- Archaeological resources protected under Section 35 of the NHRA;
- Built Structures protected under Section 34 of the NHRA;

- Burial Grounds and Graves protected under Section 36 of the NHRA.

10.3.11 Socio – Economic Study

Aspects to be considered as part of this study will include:

- Employment creation;
- Local economic and community development;
- Physical and economic displacement;
- Damage or disturbance to archaeological and cultural heritage; and
- Decrease quality of life due to nuisance effects.

10.4 Item 2(i)(iv): Proposed Method of Assessing the Environmental Aspects including the Proposed Method of Assessing Alternatives

10.4.1 Air Quality Study

10.4.1.1 Baseline Assessment

A baseline assessment will be carried out to determine the regional climate and to assess the local (site-specific) prevailing weather conditions, and its influence on the climatic and atmospheric dispersion and dilution potential of pollutants released into the atmosphere (if available).

Site-specific meteorological data will be obtained from the nearest South African Weather Service Automatic Weather Station and evaluated to determine local prevailing weather conditions.

Modelled MM5 meteorological data will be extracted for the point near the future operations. This dataset consists of surface data, as well as upper air meteorological data that is required to run the dispersion model. It is required if site specific surface and upper air meteorological data is not available.

10.4.1.2 Dust Fallout Monitoring

In order to determine the background dust fallout for the project area, prior to development, the current dust monitoring network, comprising at of eight single dust fallout buckets, will be established. It is proposed that an additional 6 Samplers be erected for the CPP and RTSF sites.

The use of the dust fallout results will make it possible to interpret the baseline dust levels at the relevant sensitive receptors around the reclamation, RTSF and plant areas. The results could also be used at a later stage to ascertain whether the activities at the mine and processing plant have an effect on the air quality of the area.

The results of dust fallout monitoring will be analysed and compared with the proposed acceptable rates as per the draft national dust control regulations, together with the analysis of available meteorological data.

10.4.1.3 Emissions Inventory

This phase of the study will require the establishment of an emissions inventory based on the CPP and ancillary activities. The sources of air emissions will need to be determined and the amount of emissions quantified to determine the contributions to PM_{10} and $PM_{2.5}$ that the CPP will make. This quantification will be done by completing dispersion modelling.

This information will also be used in the application for the Air Emissions License (AEL).

10.4.1.4 Air Quality Dispersion Modelling

Dispersion models compute ambient concentrations as a function of source configurations, emission strengths and meteorological characteristics, thus providing a useful tool to ascertain the spatial and temporal patterns in the ground level concentrations arising from the emissions of various sources. All emission scenarios would be simulated using the USA Environmental Protection Agency's Preferred/Recommended Models: AERMOD modelling system (as of December 9, 2006, AERMOD is fully promulgated as a replacement to ISC3 model). The dispersion modelling will be completed for all components of the Stage 2a process i.e. the reclamation sites, the CPP and the RTSF.

10.4.1.5 Impact Assessment - Analysis and Interpretation

The Report containing the impact assessment will be compiled and will contain:

- Identification of existing sources of emissions and characterisation of ambient air quality within the airshed using available monitoring data (Client to provide any existing ambient monitoring data if available);
- Review of the current South African legislative and regulatory requirements;
- Detailed literature review of emissions from all activities on site. Where information is not available on emission rates, US EPA AP42 emission factors or Australian NPI emission factors will be used. Other emission sources in the area will also be included in the emission inventory (client to assist in the provision of this information);
- Define the potential sensitive receptors areas, such as local communities, as well as environmental constraints relative to air quality;
- Dispersion simulations of ground level concentrations (GLC) of particulate matter (PM_{10}, and $PM_{2.5}$), emissions and dust deposition will be carried out. The baseline and anticipated cumulative impacts of the activities on the ambient air quality of the operations will also be identified and discussed.

Analysis of the dispersion modelling will highlight:

- Predicted zones of maximum ground level impacts (PM_{10}, $PM_{2.5}$ and nuisance dust);
- Frequency with which guidelines (standards) for criteria pollutants will be exceeded; and
- Recommendations of buffer zones and impact management zones.

Recommendations will be provided regarding the mitigation and management of the identified potential impacts on air quality. These will include preparation of a mitigation and management plan that mitigates or manages all potential environmental, health and social risks, and includes a management plan for the on-going monitoring of relevant air quality aspects.

10.4.2 Noise Study

The comprehensive noise assessments will look at what the significance of the noise impacts are for each application and will quantify the main noise sources from the construction and operation of the CPP as well as the construction of the RTSF, including the construction and operation of the associated pump station and pipelines between the CPP and RTSF.

10.4.2.1 Methodology – Detailed Assessment

The noise assessment will be carried out in accordance with the Gauteng Noise Control Regulations GN 5479 of 1999 (PG 75 of 20 August 1999) in terms of section 25 of the Environmental Conservation Act of 1989 (Act 73 of 1989).

Baseline measurements will take for a 24 hour period per location. A Cirrus, Optimus Green, precision integrating sound level meter will be used for the measurements. The instrument will be field calibrated with a Cirrus, sound level calibrator.

The noise level propagation from the proposed reclamation activities will be calculated by means of the dispersion modelling software ‘Soundplan’. This model will depict in detail, what the expected noise levels are to be at sensitive receptors, and can predict, per receptor, the intensity of the noise impact.

The noise assessment report will include the analyses of the baseline information as well as the quantification of the proposed noise sources depicted as isopleth plots, indicating the expected propagation of sound pressure from the proposed reclamation activities.

The noise assessment report will also include recommended practical mitigation measures as well as recommended a noise management programme to minimise the impact of noise on the surrounding environment.

Both the desktop assessments and comprehensive noise assessment will be presented in one noise assessment report and will comprise of baseline noise measurements as well as assess, via predictive noise dispersion modelling, the potential impact of the noise emissions from the new CPP plant and RTSF.

The primary deliverable will be a Noise Assessment Report which will describe the following:

- Baseline noise measurements;
- Noise dispersion modelling in support of the application for the CPP and RTSF;
- Significance of impacts; and
- Noise management programme.

10.4.3 Groundwater Study

This geohydrological study will focus on the assessment of the potential impact of the proposed RTSF on the groundwater environment. The influence of the RTSF will be investigated fully to comply with the Department of Water and Sanitation (DWS) regulatory requirements under the NWA as well as the NEMA. During the geohydrological study, the following tasks will be completed:

- Determination and description of the baseline (existing) groundwater quality, level, gradient and flow direction for the RTSF site;
- Environmental significance rating of the baseline water quality by comparing the water chemistry with the South African water quality guidelines;
- All borehole construction details, hydrogeological logging and aquifer test results;
- Quantification of contamination plumes originating from the RTSF during operation and after mine closure;
- Determination of the migration patterns and flow pathways of the contamination plume and the connectivity between the contamination sources and the groundwater receptors;
- A list of boreholes and farms that will be affected by the contamination plume will be compiled;
- Environmental significance rating of each of the activities that could potentially impact the groundwater environment will be determined;
- Coordinates of preferred monitoring boreholes (existing and new) that are located up-gradient, as well as down-gradient of the RTSF and associated infrastructures. This will assist with accurately quantifying any contaminants released from the CTSF by comparing the inflowing quality with that of the outflowing;
- The completion of a numerical model of the RTSF site;
- Comments on the design of the mine activities, such as the blast-curtain, so as to prevent and abate groundwater contamination; and

- Ultimately the above tasks will be integrated into a final report conforming to EIA and EMP standards and made available to the client for review. The report will include all data, information and findings, recommendations and a full risk assessment derived from the transient simulations for life of project and post closure, as well as a groundwater monitoring protocol.

10.4.4 Soils Study

Baseline soil information was obtained using published South African Land Type Data. Land Type Data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff 1972 - 2006). The land type data is presented at a scale of 1:250 000 and comprises of the division of land into land types.

A more detailed study of the soils present within the project area will be conducted. The site will be traversed by vehicle and on foot. A soil auger will be used to characterise and classify the soil form and depth. The soil will be hand augured to the first restricting layer or a depth of 1.2 m. Soil survey positions will be recorded as waypoints using a handheld GPS. Soil forms (types of soil) found in the landscape will be identified using the Taxonomic Soil Classification, a System developed for South African. Landscape features such as existing open trenches will also be used in mapping the soil profile and classifying the soil form and depth.

Land capability will be determined by a combination of soil, terrain and climate information/features (geomorphology). Capability is defined by the most intensive long term sustainable use of land under rain-fed conditions.

10.4.5 Surface Water Study

In order to complete the surface water assessment, there are a number of tasks which need to be completed. These tasks are set out below.

10.4.5.1 Desktop Assessments

The desktop assessment will constitute:

- Assessment and update of Baseline hydrological characteristics of the area ; and
- Assessments of the adequacy of existing surface water sampling points up and downstream of infrastructure upgrades and extensions. If existing sites are inadequate new sites should be located up and downstream.

10.4.5.2 Site visit and Sampling

A site visit will be undertaken to confirm the site characteristics, confirm catchment characteristics and the existing water resources (pans, dams and streams) and also to collect independent water quality samples for submission to a South African National Accreditation Systems (SANAS) accredited laboratory for analysis of the variables of concerns.

10.4.5.3 Water Balance Update

The current water balance will need to be updated to reflect the new activities and water uses. This update will take place in conjunction with the Sibanye Water Department, however, Digby Wells will take the lead on this aspect.

To update the water and salt balance, Digby Wells will undertake the following:

- review the available information to gain an understanding of the entire project water system, and explaining the drivers of water within the system and management thereof, for example:
  - The mass balance processes;
  - Waste storage facilities;
  - Water inflows required to be pumped to storage dams for use within the system;
  - Pollution control dams and runoff from the polluted areas.
- Undertake a site verification:
  - Perform interviews with the appropriate site personal to confirm process flows and estimates.
- Update water and salt balance;
- A technical report will be compiled for the overall integrated water management providing the following:
  - All modelling methodologies and assumptions for the water balance; and
  - Data analysis in the spread sheets and a presentation illustrating the results.

10.4.5.4 Floodline Determination

The determination of the flood lines associated with the Leeuspruit will be required for the RTSF. This will entail the following:

- Conducting a hydrological assessment to determine flood peak analysis for the different recurrence interval flood peaks for the watercourse within the proposed development area for the 1:50 and 1:100 year recurrence interval flood-line;
- Performing a hydraulic analysis in Hec-Ras Programme to determine the surface water elevations for the 1:50 and 1:100 year flood peaks; and

- Plot the flood-lines using the Arc GIS programme software.

10.4.5.5 Impact Assessment

The specialist surface water assessment reports will include the following:

- The use of the Digby Wells developed impact assessment methodology to rate the significance of the impacts;
- Update of mitigation measures to reduce the significance respectively;
- Update of a surface water management plan to ensure that the impacts are minimised; and
- An updated monitoring programme to ensure that new potential impacts are monitored.

10.4.6 Aquatics Study

A number of studies already exist for the proposed area and the data, although outdated, will be updated and used during the aquatic assessment. No information pertaining to the aquatic conditions of the Mooirivierloop River and its associated tributaries is, however, available. This river system is the primary draining feature of the stage 2a project area and therefore an aquatic specialist study for the Mooirivierloop River and its associated tributaries is recommended. This should comprise an aquatic state assessment report for a low and high flow survey, as well as describing temporal and spatial trends of the Mooirivierloop River and its associated tributaries. The focus of this study will be the Integrated Habitat Assessment, South African Scoring System (version 5) and fish biotic indices at sites located in this watercourse.

In order to complete the above deliverable the following methodology should be applied. Methods outlined by the River Health programme should be utilized to determine the state of the biophysical attributes of the associated river course. These biophysical attributes refer to the drivers and biological responses of an aquatic ecosystem. The selected drivers and biological responses for this study include:

10.4.6.1 The Abiotic Driver Assessment:

- The assessment of physio-chemical variables of the water; and
- Habitat indices:
  - Invertebrate Habitat Assessment System (IHAS).
  - Intermediate Habitat Integrity Assessment (IHIA)

10.4.6.2 The Biotic Response Indicator Assessment:

- South African Scoring System version 5 (SASS5);
- Macro – Invertebrate Response Assessment Index (MIRAI); and
- Fish Response Assessment Index (FRAI).

10.4.7 Fauna & Flora Study

10.4.7.1 Vegetation Survey

A floristic (plant) survey will be conducted during the growing season of all species that may potentially occur in the project area. Two wet seasons will be undertaken. Visits during other seasons will be determined by the flowering and fruiting times of species that do not occur during the summer, specifically the grasslands and rocky areas. This will give an indication of the actual species present on site and these will be discussed in context of plant communities within the ecosystem of the area. The protected, endemic, exotic, alien invasive and culturally significant species will also be discussed as separate issues and related back to relevant legal requirements. Furthermore the identification of red data and protected species as listed according to the IUCN List as well as Provincial and National legislation will be completed. Depending on the vegetation and terrain, the Braun-Blanquet sampling, belt or line transect methods could be used during vegetation assessments, however should dominant vegetation types require other methods be used, then these shall be motivated. The Braun-Blanquet method allows for the following to be compiled:

- Vegetation classification regarding plant communities within the area and sub communities and variations of these;
- Species list for each plant community, including diagnostic and dominant species.
- Invasive species (if present) for each plant community;
- Exotic species (if present) for each plant community;
- Protected and/or endemic species for each plant community; and
- Culturally significant plant species within each community.

Additional vegetation assessment such as quantitive assessments will be conducted to determine the tree/shrub structure, height and average tree cover of the natural area as objective for rehabilitation.

10.4.7.2 Faunal Survey

Field surveys will be conducted concurrently with vegetation surveys and all animals observed in the area will be noted. Any ecological indicators, such as calls, tracks and dung will also be noted and regarded as the presence of that particular animal. An invertebrate assessment will include sweep-netting for insects, which will be preserved in alcohol for identification purposes. Detailed fauna lists will be generated and discussed and related back to the floristic component of the area. The probability of occurrence for species not observed during field surveys will be updated if applicable regarding available habitats. Protected and endemic species will be the focus of discussion. Diurnal and nocturnal surveys will be performed. Faunal composition of disturbed sites will be compared to the composition of undisturbed areas. The number of sample plots will vary for each component of the faunal survey. The current status of the faunal environment will be determined and an evaluation of the extent of site-related effects in terms of certain ecological indicators, as well as identification of specific important ecological attributes such as rare and endangered species, protected species, sensitive species and endemic species will be made. The faunal environment and habitat will be characterised in relation to biota and the extent of site related effects. Presence of read data and protected species will be indicated on a map. The deliverables include:

10.4.7.2.1 Mammals

A list of all potential mammals will be compiled by means of desktop study and all potential red data species will be highlighted with short habitat descriptions.

The presence of mammals will be recorded using tracks, dung, ecological indicators, camera traps, non-fatal traps (Sherman traps) and visual sightings of the animals themselves, sample sites will cover all habitat available for mammals species within the study area, is expected that at least 10 sample sites will be completed. A full survey to determine species richness will be carried out. The following will be recorded during the mammal survey:

- All mammals encountered or noted during the surveys will be recorded;
- Tracks and dung of mammals encountered during the survey will be, where possible, identified and recorded (if possible);
- A list of the most prominent mammal species will be compiled;
- A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey, will be compiled;
- A list of protected species that occur on the potential list but not recorded during the site visits or surveys; and
- A list of exotic or introduced vertebrate species occurring on the property.

10.4.7.2.2 Birds

Visual sightings will be conducted with binoculars and identification will be obtained from recognised field guide text books. A complete list of bird species encountered within the boundaries of the study area will be compiled. Transects, spot counts and fixed point counts will be completed for the bird assessment. Sample sites will be randomly spread across the study area with at least 10 sample sites located across all of the vegetation units identified. Supporting material such as bird sounds, text books etc. must also be used to identify birds on site. The following will be recorded during the bird survey:

- All birds encountered or noted during the surveys will be recorded;
- A list of the most prominent birds encountered and possible species that can be expected to be present;
- A list of rare and endangered species encountered during the survey;
- Possible migration species that are not on site during the survey will be assessed from literature surveys; and
- A species list of all the birds that can possibly be present within the relevant grid in which the farms are situated will be compiled using the Roberts' Multimedia Birds of Southern Africa.

10.4.7.2.3 Amphibians and Reptiles

Reptiles and Amphibians will be sampled using both active and passive sampling techniques. Active searching will be done and as many as possible caught, identified and photographed using the rubber band technique. Sample sites will be concentrated in areas where habitat that could support reptile and amphibian species are found, at least five sample plots will be completed. Passive sampling will include drift fence arrays and pitfall traps where possible. Amphibians will be sampled using active methods such as netting during their hours of activity (night).

Passive sampling methods will include pitfall traps and sound recordings where possible:

- All frogs, snakes, lizards and tortoises encountered or noted during the surveys will be recorded;
- A list of the most prominent amphibian and reptile species will be compiled;
- A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey, will be compiled; and
- A list of protected species that occur on the potential list but not recorded during the site visits or surveys.

10.4.7.2.4 Invertebrates

Indicator invertebrates groups will be sampled using appropriate methodology, such as sweep netting. Approximately ten sample plots are envisaged however this number could change during the site assessment. For each sample plot the insects are identified to at least family level and where possible to genus and species level. Groups including ants, ground living beetles (Tenebrionidae and Carabidae), termites, leafhoppers, spiders and scorpions will be included if present. The methodology of how the field surveys will be conducted (pitfall traps, active search, netting, etc.) will be included.

10.4.7.2.5 Sensitive Areas

All sensitive areas, as described by the provincial and national legislation, will be identified. The locality and extent, as well as species composition of sensitive areas such as the wetlands or pans, streams, rivers and rocky outcrops will be conducted in order to identify and map all such sensitive areas present.

10.4.8 Wetlands Study

10.4.8.1 Wetland Delineation

The wetland delineation will be completed according to the following features outlined in the DWAF (2005) guidelines:

- Terrain Unit Indicator – helps to identify those parts of the landscape where wetlands are more likely to occur;
- Soil Form Indicator – identifies the soil forms, which are associated with prolonged and frequent saturation;
- Soil Wetness Indicator – identifies the morphological “signatures” developed in the soil profile as a result of prolonged and frequent saturation, and
- Vegetation Indicator – identifies hydrophilic vegetation associated with frequently saturated soils.

10.4.8.2 Wetland Integrity and Functionality Assessment

The most suitable South African tools for wetland ecological status are used to determine the state of the wetlands identified on site. The following tools are used for the integrity and functionality assessment:

- Wet-Health – a rapid assessment of the Present Ecological State (PES) of the vegetation, hydrology and geomorphology of wetlands on site (Macfarlane *et al.* 2007);
- Wet-Eco-services – an assessment of the services provided by wetlands to society and biodiversity (Macfarlane *et al.,* 2007); and

- EIS – an assessment of the ecological importance of the system for the maintenance of biodiversity (Duthie 1999).

10.4.9 Heritage Study

The following methodology will be carried out as part of the heritage study:

- Collection of qualitative data to described the cultural landscape, including review of credible information sources. This includes a review of historical imagery and cartographic sources.
- Collection of quantitative data through a non-intrusive survey of the proposed development footprint, recording of identified heritage resources through GPS waypoints, photographs and detailed notes.
- An assessment of the cultural significance of identified heritage resources against criteria outlined under Section 3 of the NHRA.
- An assessment of potential direct, indirect and cumulative impacts of the proposed project activities on identified heritage resources.

10.4.10 Socio – Economic Study

Should the scoping phase of the project be successful, the project will proceed to the impact assessment phase, during which a full EIA would be submitted. The EIA will include a SIA that will perform detailed investigations to confirm the anticipated severity and extent of the identified socio-economic impacts. The SIA will quantify impacts according to a recognised rating scale, and formulate appropriate mitigation measures to ameliorate negative socio-economic impacts and enhance positive ones.

The following activities will be undertaken as part of the SIA:

- Qualitative data collection by means of interviews;
- Description of socio-economic baseline conditions;
- Identification, assessment and rating of impacts;
- Designing of measures to mitigate or enhance of identified social impacts; and
- Reporting of study results in the form of a specialist SIA report.

10.5 Item 2(i)(v): The Proposed Method of Assessing Duration Significance

Duration will be assessed using the following qualifications:

- Permanent: No Mitigation. No mitigation measures or natural process will reduce the impact after implementation.
- Permanent: Mitigation. Mitigation measures of natural process will reduce the impact.

- Project Life. The impact will cease after the operational life span of the project.
- Long term. The impact will last for 6-15 years
- Medium term. The impact will last for 1-5 years
- Short term. The impact will last for less than 1 year
- Immediate. The impact will last for less than 1 month

10.6 Item 2(i)(vi): The Stages at which the Competent authority will be Consulted

In addition to the DMR having been consulted during the pre-application phase, the DMR will be consulted at the following stages:

- On submission of application (in the form of a submission meeting);
- During the legislated timeframes associated with the Scoping Report for comment; and
- During the legislated timeframes associated with the EIA Report for comment.

10.7 Item 2(i)(vii): Particulars of the Public Participation Process with regard to the Impact Assessment Process that will be Conducted

This section provides details on the PPP to be conducted as part of the EIA process.

10.7.1 Steps to be taken to Notify Interested and Affected Parties

The PP process for the Impact Assessment phase will be similar to that of the Scoping phase. The premise is to meet various legislative requirements for PP and for a single, integrated process to be followed. This will limit stakeholder fatigue and enable stakeholders with a single view of the full project and EIA information. However, stakeholder comments gathered during the Scoping phase will be used when designing the PP process for the Impact Assessment phase.

The main objective of stakeholder engagement in this phase is to:

- Share results of the specialist impact studies;
- The proposed mitigation measures and recommendations; and
- Demonstrate how I&AP comments and concerns were addressed.

In Table 10-1 a summary of the anticipated PP activities for the Impact Assessment phase is provided.

Table 10-1: Summary of PPP activities during the Impact Assessment Phase

Activity	Details	Reference in PP Report
Impact Assessment Phase		
Update of stakeholder information	The stakeholder database will be updated with new I&APs who formally register, attend stakeholder meetings or submit comments.	**PP Report Appendix 5** Stakeholder database.
Announce availability of the EIA/EMP Reports	Announcement of availability of the EIA/EMP Reports will be distributed in early December 2015 via email, post and SMS. Advertisements were also placed in the following newspapers: ▪ Randfontein Herald (Local Newspaper) ▪ Carletonville Herald (Local Newspaper) ▪ The Star (Regional Newspaper – optional cost implication)	**PP Report Appendix 5** EIA/EMP announcement letter.
Placement of EIA/EMP Reports	The EIA/EMP Report will be made available to stakeholders at the following public places: ▪ City of Johannesburg Metropolitan Library ▪ Randfontein Public Library ▪ Westonaria Public Library ▪ Toekomsrus Public Library ▪ Fochville Public Library ▪ Carletonville Public Library ▪ Bekkersdal Public Library The EIA/EMP Reports will also available on the Digby Wells website www.digbywells.com (under Public Documents) and will also be available at the various stakeholder meetings.	**PP Report Appendix 5** Placement map.

Activity	Details	Reference in PP Report
Stakeholder Meetings	A series of stakeholder meetings will be held in January/February 2016. It is scheduled that focus group meetings be held with authorities, landowners and occupiers, NGOs and communities. An open house meeting is also scheduled and all stakeholders on the database will be invited to attend. All comments received at these meetings will be captured and responded to in the CRR.	**PP Report Appendix 5** Comment and Response Report.
Announcement of the updated EIA/EMP Reports	A letter will be emailed and posted to the full database to announce availability of the updated EIA/EMP Reports so that stakeholders can confirm that their comments have been addressed. *An SMS to notify stakeholders that the updated Scoping Reports are available for comment will be sent to the full database.*	**PP Report Appendix 5** Updated EIA/EMP Reports announcement letter.
Placement of updated EIA/EMP Reports	The updated EIA/EMP Reports will be made available in February 2016 on the Digby Wells website www.digbywells.com (under Public Documents). The updated EIA/EMP Reports will include the amended CRR, which contains new stakeholder comments and responses, and the inclusion of new PP activities undertaken as part of the Impact Assessment phase.	**PP Report Appendix 5** Placement map.

10.8 Item 2(i)(viii): Description of the Tasks that will be Undertaken During the Environmental Impact Assessment Process

The following tasks will be undertaken during the EIA phase:

- Further define the project activities;
- Further assess the project alternatives based on technical, economic, social and environmental criteria;
- Supplement the legal review of the project;
- Undertake detailed specialist investigations;
- Assess potential impacts using the methodology provided herein;
- Provide detailed and feasible mitigation and management measures in an EMP; and
- Public participation activities, including public and key stakeholder meetings.

10.9 Item 2(i)(ix): Measures to Avoid, Reverse, Mitigate, or Manage Identified Impacts and to Determine the Extent of the Residual Risks that need to be Managed and Monitored

Refer to Table 10-2 for a summary of the potential impacts, mitigation measures and residual impacts for the Cooke component of the WRTRP.

Table 10-2: Preliminary Proposed Measures

Activities	Potential impacts	Mitigation type	Potential for residual risk
Construction of the Pipeline which includes clearance of vegetation and soil on the pipeline servitude	The impact of noise generated by the construction vehicles and associated machinery could potentially impact the surrounding farms and communities.	▪ Restricting construction activities to daylight hours; ▪ machines and vehicles to be serviced to the designed requirements of the machinery/vehicles to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ▪ Switching off equipment when not in use	▪ Although dust suppression techniques will reduce a high percentage of particulate matter from dispersing in the air, some particulate matter may still disperse. ▪ Sound abatement measures will minimise noise levels but not necessary to within existing ambient noise levels. ▪ Surface water runoff from hard areas (paved or solid areas) may spill over containment infrastructure (trenches/containment dams) during extreme rain events.
	Dust emissions as a result of soil stripping in the pipeline servitude.	▪ Application of wetting agents or dust suppressant on the dirt road and exposed areas; ▪ Limit activity to non-windy days; ▪ The area of disturbance must be kept to a minimum and no unnecessary clearing of vegetation must occur; ▪ Drop heights when loaders and offloading should be minimised; ▪ Vehicle travel speed and distances should be minimised	
	Potential gaseous emissions from construction vehicles are expected.	▪ Manage through regular monitoring of ambient air quality and mitigate through identifying the potential sources and modifying control measures where necessary.	
	The construction of the pipeline will have a small impact on the soil environment since the pipelines will be constructed above ground.	▪ Ensure proper storm water management designs are in place; ▪ If any erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place; ▪ If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion; ▪ Only the designated access routes are to reduce any unnecessary compaction; ▪ Compacted areas are to be ripped to loosen the soil structure; and ▪ Implement land rehabilitation measures as defined in rehabilitation report.	
	Loss of Species of Special Concern and habitats in pipeline servitude.	▪ Limit degradation and destruction of natural environment to designated project areas by keeping the footprint of the disturbed areas to the minimum and within designated areas only. Re-vegetate open areas to limit erosion. ▪ Avoid known areas of faunal and floral SSC. ▪ Avoid sensitive landscapes such as riparian and ridge areas that were encountered on site. ▪ Manage nationally restricted alien invasive plant species by ensuring the removal of vegetation during construction and operation are controlled so that no open areas occur. ▪ Applications for permits for removal of certain plants, where required; and ▪ If alien vegetation is encountered, remove these plants in the correct way and timeously.	

Activities	Potential impacts	Mitigation type	Potential for residual risk
Transportation of concentrated tailings from the CPP to the Ezulwini Plant	The impact associated with the pipeline crossings over wetlands could disturb the functionality of the wetland systems.	▪ Responsible construction to protect the surrounding environment will mitigate this impact. Vehicles must be in good working order. Construction should occur in the dry-season. Particular care must be taken when constructing the wetland crossings and no vehicles are to enter wetlands. ▪ In addition, the sections of pipe crossing wetlands should have no joins and must be fitted with steel sleeves.	
	The impact of disturbance of drainage lines as a result of pipeline river crossings could potentially cause flow changes in the downstream rive regime.	▪ Responsible construction to protect the surrounding environment will mitigate this impact. Vehicles must be in good working order. Construction should occur in the dry-season. Particular care must be taken when constructing the wetland crossings and no vehicles are to enter wetlands. ▪ In addition, the sections of pipe crossing wetlands should have no joins and must be fitted with steel sleeves.	
Decommissioning of the tailings pipeline	Potential spillages from vehicles and machinery used during the decommissioning process	▪ Ensure that vehicles and machinery are serviced at a regular basis. Develop and follow Environmental Risk Procedures; ▪ Empty infrastructure before removal; and ▪ The durability and longevity of water management designs, e.g. provision of erosion protection for long-term control of erosion and potential pollution to water resources during decommissioning.	
	The vehicles and machinery involved in the decommissioning process are proposed to be the main noise sources in the project area during this phase	▪ Restricting construction activities to daylight hours; ▪ machines and vehicles to be serviced to the designed requirements of the machinery/vehicles to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ▪ Switching off equipment when not in use	

11 Item 2(l): Other Information Required by the Competent Authority

The competent authority has not requested additional information to date.

11.1 Impact on the Socio-Economic Conditions of any Directly Affected Person

A social impact assessment will be undertaken as part of the EIA, anticipated impacts include:

- Temporary job creation during the construction phase;
- Permanent employment opportunities during the operational phase;
- Possible dust fallout within surrounding communities; and
- Potential groundwater contamination which may impact the quality of potable water.

11.2 Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act

A heritage impact assessment will be undertaken as part of the EIA process. Based on the current understanding of the cultural landscape and the identified heritage resources within the project area, Digby Wells will be undertaking the following:

- Exemption from further palaeontological assessments for the proposed infrastructure footprint as the palaeo-sensitivity is insignificant;
- An HIA will be undertaken that includes the following heritage components:
  - An Archaeological Impact Assessment including reconnaissance to identify and record archaeological resources within the impact footprint;
  - An assessment of burial grounds and graves including reconnaissance to identify, record and document all burials that may exist in the impact footprint;

Integration of additional specialist studies to determine any possible living heritage in the project area. Studies that may be considered for integration include Social Impact Assessment, Biophysical Assessment and Visual Assessment.

12 Other Matters Required in terms of Sections 24(4)(a) and (b) of the Act

Section 24(4)(b)(i) of the NEMA (as amended), provides that an investigation must be undertaken of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity. Refer to Sections 9 and 10 for feasible alternatives assessed.

13 Undertaking Regarding Correctness of Information

I Marcelle Radyn herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and I&APs has been correctly recorded in the report.

Signature of the EAP: _____

Date: _____

14 Undertaking Regarding Level of Agreement

I Marcelle Radyn herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP: _____

Date: _____

Appendix 1: Proof of Qualifications for EAP

Appendix 2: EAP's CV

Appendix 3: Regional and Local Setting

Appendix 4: Plans

Appendix 5: Public Participation Process