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Gold One Tailing Backfill Plant and Pipeline Environmental Impact Assessment and Environmental Management Programme

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

Report

Version – Draft for Public Review

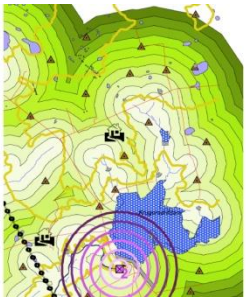
July 2013

Gold One International Limited

GCS Project Number: 12-561

GDARD Reference: GAUT: 002/12-13/E0230

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	Name	**Signature**	**Date**
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Document Reviewer	Estie Retief Tanja Bekker	 	July 2013
Director	Ferdi Pieterse		July 2013

DISCLAIMER

Information contained in this report is based on data/information supplied to GCS Water and Environment (Pty) Ltd (GCS) by the client and other external sources (including previous site investigation data and external specialist studies). It has been assumed that the information provided to GCS is correct and as such the accuracy of the conclusions made are reliant on the accuracy and completeness of the data supplied. No responsibility is accepted by GCS for incomplete or inaccurate data supplied by the client and/or other external sources. Opinions expressed in this report apply to the site conditions and features that existed at the time of the start of the relevant investigations and the production of this report.

EXECUTIVE SUMMARY

Introduction and background

Gold One International Limited (Gold One) is a dual listed (ASX/JSE: GDO) mid-tier mining group with gold operations and gold and uranium prospects across Southern Africa. At the beginning of 2012, the group expanded further with the acquisition of Rand Uranium (Pty) Limited consisting of the Cooke Underground Operations and the Randfontein Surface Operations located in the West Rand.

The Cooke 1, 2 and 3 mines are serviced by a developed network of mining and civil infrastructure, with adequate electrical power and water readily available. Dump 20 was created as a result of stamp milling technology that was employed at the Millsite Gold Plant, which was commissioned in 1911. The battery of stamp mills could not fine grind the ore to effectively extract all the contained gold, and this resulted in the creation of Tailings Dam (Dump) 20. Today the Randfontein Surface Operations process Dump 20 at a typical rate of 300,000 tonnes per month and produces some 32,000 ounces per annum.

Reclamation of this sand dam will reduce by the end of 2012, whereupon the Dump 20 sand and slime resource will be processed through the Cooke Plant. The Cooke Plant was upgraded during 2012 to increase feed throughput to 400,000 tonnes per month.

Project Description

For the proposed Project, tailings from the Cooke (gold) plant would require modification in order to be suitable for use as a backfill medium. The Backfill plant will require a 14hr supply per day at a rate of 217m^3/h with a relative density of 1. 4t/m^3 to manufacture 38 850m^3 FPT backfill every month.

Depending on the tailings particle grading approximately two thirds of the solids (the coarse portion) never leaves the gold plant through the cyclone system. Approximately one third (fines) is pumped overland to the thickeners, where flocculent is added to aid in increasing the density. The thickener overflow consists mainly of water but also contains a small quantity of ultra-fines that is pumped back to the gold plant for disposal on a tailings dam. The thickener underflow is mixed with binder and pumped underground.

Spillage is also disposed of at the gold plant, diluted greatly by the thickener overflow. The total solids used will be approximately 118 tons per hour.

The Backfill plant will be designed to be modular with all equipment (including the thickeners) being transportable to another site, thereby ensuring the Backfill plant can be relocated. Due to the shallow operations, boreholes located close to the operations can be used to transfer the backfill down the mine. The tailings are then pumped or gravitated underground to fill voids providing local support.

Environmental Authorization Processes

The proposed project requires authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) (NNRA), the National Water Act, 1998 (Act No. 36 of 1998) (NWA) and the Mineral and Petroleum Resource Development Act, 2002 (Act No. 28 of 2002) (MPRDA) before construction may begin.

Public Participation

The Public Participation Process (PPP) is a vital component of the environmental authorisation application process. The PPP allows for transparency with the Interested and Affected Parties (I&APs) and input from the relevant provincial and local authorities. In order to streamline the PPP and ensure that the PPP for all processes is as comprehensive as possible, the PPP prescribed in terms of Chapter 6 of the NEMA Regulations R543, dated 18 June 2010 was complied with.

The Scoping Phase PPP has comprised the following:

- Pre-application notification of adjacent landowners;
- Placement of site notices;
- Advertisement in the Randfontein / Westonaria Herald;
- Distribution of Background Information Documents (BIDs);
- Written notifications to landowners;
- Public meeting in Westonaria; and
- Consultation meetings with the GDARD and the Department of Water Affairs (DWA).

Issues were raised during the PPP, which thus far include the concerns the landowners have regarding the impacts of mining in the area, concerns from residents regarding Social spinoffs and employment opportunities, the occurrence of Acid Mine Drainage (AMD), the occurrence of spills, and concerns regarding communications with communities.

Environmental Impacts and Mitigation:

Geology

- Impact
    - The Geology of the area will be permanently transformed, causing a change in the chemical and flow interactions of the natural area.
- Mitigation
    - No mitigation is possible.

Topography

- Impacts
    - The removal of vegetation will allow for increased surface water runoff; and
    - Change in topographical characteristics of the area.
- Mitigation
    - Clearly demarcate construction areas;
    - Removal of vegetation must be undertaken in a phased approach;
    - Erosion control measures must be implemented before construction commences; and
    - Rehabilitate the area concurrent with mining activities and ensure that the area is free draining at completion of the rehabilitation.

Soils, Land Use, Land Capability

- Impacts
    - Disturbance of the natural sequence of soil layers;
    - A change in soil capability;

- Compaction of soil;
- Soil erosion;
- Contamination and pollution of soil; and
- Additional mining operation that may open in the region will result in areas with potential agricultural soil being degraded to low production potential. This will result in lower yields possible for farmers in the area

- Mitigation
  - Surface runoff water from compacted areas must be controlled;
  - Roads must be inspected and eroded shoulders repaired;
  - Storage areas must be contained using brick walls; and
  - Any hydro-carbon spills on soil must be reported to the environmental officer and cleaned up by trained personnel.

Flora and Fauna

- Impacts
  - Vegetation will be removed;
  - Decreased habitat availability;
  - Increase in exotic / invasive species;
  - Disturbance of fauna cycles/species; and
  - Toxic pollution of the project area which will result in ecological degradation.

- Mitigation
  - Keep the footprint of the disturbed area of the pipe route to the minimum;
  - Make use of existing roads and/or areas;
  - Remove lose earth from the road sides;
  - Periodically spray roads with water or dust inhibitor;
  - Before digging commences a sweep must take place to determine small mammal colonies; and
  - The pipeline should be monitored weekly.

Wetlands

- Impacts
    - Wetland site disturbance and alteration;
    - Change in flow rates;
    - Compacting of wetland soils;
    - Water quality deterioration;
    - Toxic contamination of the wetland;
    - Increasing deterioration of the Wonderfonteinspruit due to surrounding industries can cause fish fatalities at downstream local fishing attraction, Donaldson dam; and
    - Diseases affecting people due to contamination.
- Mitigation
    - Minimize the area where construction takes place;
    - Stay out of the wetland and its buffer zone;
    - Sufficient spill clean-up materials should be kept on site at all times;
    - All waste should be stored in clearly demarcated areas;
    - The pipeline should be constructed with containment paddocks either sides of the stream/wetland;
    - Maintenance of the pipelines should be done weekly to detect whether leaks are present;
    - Complete removal of all infrastructure and waste must be ensured following mine closure; and
    - Revegetate the area with indigenous species.

Aquatic Ecosystems

- Impacts
    - Removal of riparian areas;
    - Reduction in the vegetation cover of the banks;
    - Reduction in the ability of the banks to resist erosion, provide structural stability and cover for instream and riparian biota;

- Changes to water temperatures;
- Increased potential for the inputs of litter and wood;
- Limited ability for the retention of nutrients and pollutants;
- Reduction in the sediment trapping function;
- Spillages/leaks into the systems, impacting on water quality

- Mitigation
  - Make use of existing river crossings;
  - The pipelines spanning the river systems should be raised and supported above ground;
  - Inspection on a regular basis as well as fracture and weakness inspection of the pipeline; and
  - Complete removal of all infrastructure and waste must be ensured following mine closure.

Surface Water

- Impact
  - Increased erosion of the stream banks;
  - Increased amount of suspended solids in downstream watercourses; and
  - Surface water contamination.
- Mitigation
  - Areas that may be prone to erosion or where signs of erosion are evident will be stabilized;
  - Footprint area to be disturbed / developed will be kept to a minimum;
  - Contaminated water from equipment will be drained to the plant storm-water containment dams;
  - If a spill occurs, it should be contained and cleaned up as quickly as possible; and
  - Complete removal of all infrastructure and waste must be ensured following mine closure.

Groundwater

- Impact
    - Contamination of the groundwater system; and
    - Inlfow of groundwater into the underground workings.
- Mitigation
    - Identify potential risk areas in the vicinity of the proposed boreholes and ensure that the possibility to intersect large groundwater volumes is reduced;
    - Groundwater quality sampling should be undertaken on a monthly basis;
    - Maintenance of the pipelines should be done weekly; and
    - Spillage should be contained and cleaned as quickly as possible.

Air Quality

- Impacts
    - Generation of nuisance dust.
- Mitigation
    - Dust suppression; and
    - Barren areas should be re-vegetated.

Sites of Historical and Cultural Importance

- Impacts
    - Damage to historical sites.
- Mitigation
    - Built structures should be fenced in order to avoid unwanted damage caused by nearby moving construction vehicles.

Noise

- Impacts
    - Noise disturbance to surrounding communities.

- Mitigation
    - Equipment should be switched off when not in use;
    - Construction activities should also be limited to daylight hours; and
    - Machinery and vehicles be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.

Social Conditions

- Impacts
    - Employment opportunities will be created;
    - Increase in the quality of life;
    - Over-crowding due to people looking for jobs;
    - Increase in stock theft and compromise landowner safety and livelihoods;
    - Spillages that may occur if the pipes burst;
    - Radiation Exposure;
    - Increase in informal settlements;
    - Job loss after closure; and
    - Mining and related activities are increasingly changing agricultural areas into industrial areas.
- Mitigation
    - Rehabilitate those tailings dams and make them available for alternative land uses;
    - Clean up spills immediately;
    - Maximise and monitor local recruitment;
    - Ensure that the low-skilled workforce is employed from the project area; and
    - Keep open communication channels with the public.

Monitoring of Impacts

The following monitoring will be undertaken to determine the impact of the proposed mine on the environment:

- Surface water monitoring: Water quality will be monitored in the Wonderfonteinspruit. Monitoring will be conducted weekly during construction and decommissioning and monthly during operation.
- Groundwater monitoring: Groundwater levels (quantity) and quality will be monitored bi-annually. This monitoring will begin prior to construction to establish the baseline conditions and to identify the changes caused by the mine over time;
- Fauna and Flora monitoring: Monitoring will be conducted annually during the wet and dry season to record the change in biodiversity occurrence and abundance.
- Aquatic biomonitoring: monitoring wil take place up- and downstream of the pipeline crossing to determine change is aquatic species composition. Fish health and bio-accumulation should also be determined.

Motivation for the Project

The purpose of backfill is to provide support for mined out areas up to 4m in height in order to maximise ore extraction as well as reduce the ventilation requirements underground. The risk of fires is also reduced, and surface environmental pollution is mitigated by the transfer of tailing underground. Furthermore it will:

- Reduce tailing material to be placed on the tailings storage facility.
- Improve geotechnical safety in the workplace.

The EAPs and environmental consultants responsible for the compilation of this document, and PPP thus feel that the Gold One Tailings Backfill Plant project should be approved for, on condition that the mine implements all identified management measures, implements the monitoring plan, as well as address all identified information gaps. The applicant must implement the social and labour plan as well as continue with public consultation in order to ensure that the communities surrounding the operation are informed of developments on site throughout the life of mine.

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1 BACKGROUND AND INTRODUCTION

1.1 Background

Gold One International Limited (Gold One) is a dual listed (ASX/JSE: GDO) mid-tier mining group with gold operations and gold and uranium prospects across Southern Africa. At the beginning of 2012, the group expanded further with the acquisition of Rand Uranium (Pty) Limited consisting of the Cooke Underground Operations and the Randfontein Surface Operations located in the West Rand, situated 30 kilometers (km) southwest from Johannesburg. Through Gold One's purchase of Rand Uranium (Pty) Limited, the group has also acquired one of the world's most advanced uranium projects, which envisages recovering uranium, gold and sulphur from the Cooke Tailings Dam and underground ores.

The Gold One group is majority-owned by a consortium comprising Baiyin Non-Ferrous Group Co. Limited, the China-Africa Development Fund, and Long March Capital Limited (Figure 1.1).

The Cooke mines are shallow (~1,000 meters), safe and efficient, with limited seismicity or heat challenges. Ongoing exploration and resource development work has indicated that much of the Cooke Underground resource potential is not yet fully understood. It presents numerous life extension opportunities that justify significant exploration attention.

The Cooke 1, 2 and 3 mines are serviced by a developed network of mining and civil infrastructure, with adequate electrical power and water readily available. The underground orebodies are exploited by means of conventional hard rock mining methods involving drilling, blasting, scraping, tramming and hoisting.

Dump 20 was created as a result of stamp milling technology that was employed at the Millsite Gold Plant, which was commissioned in 1911. The battery of stamp mills could not fine grind the ore to effectively extract all the contained gold, and this resulted in the creation of Tailings Dam 20. Today the Randfontein Surface Operations process Dump 20 at a typical rate of 300,000 tonnes per month and produces some 32,000 ounces Gold per annum.

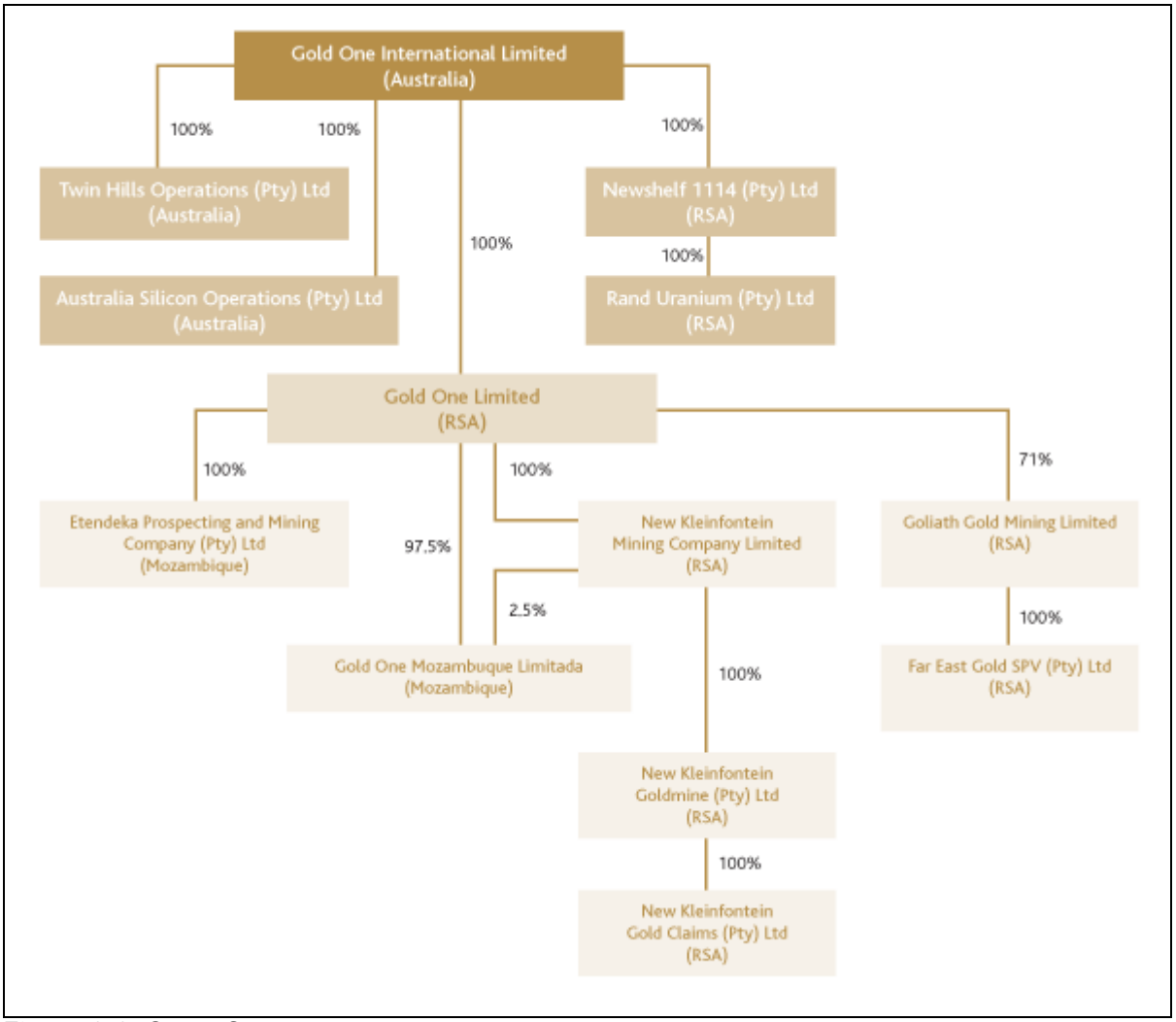


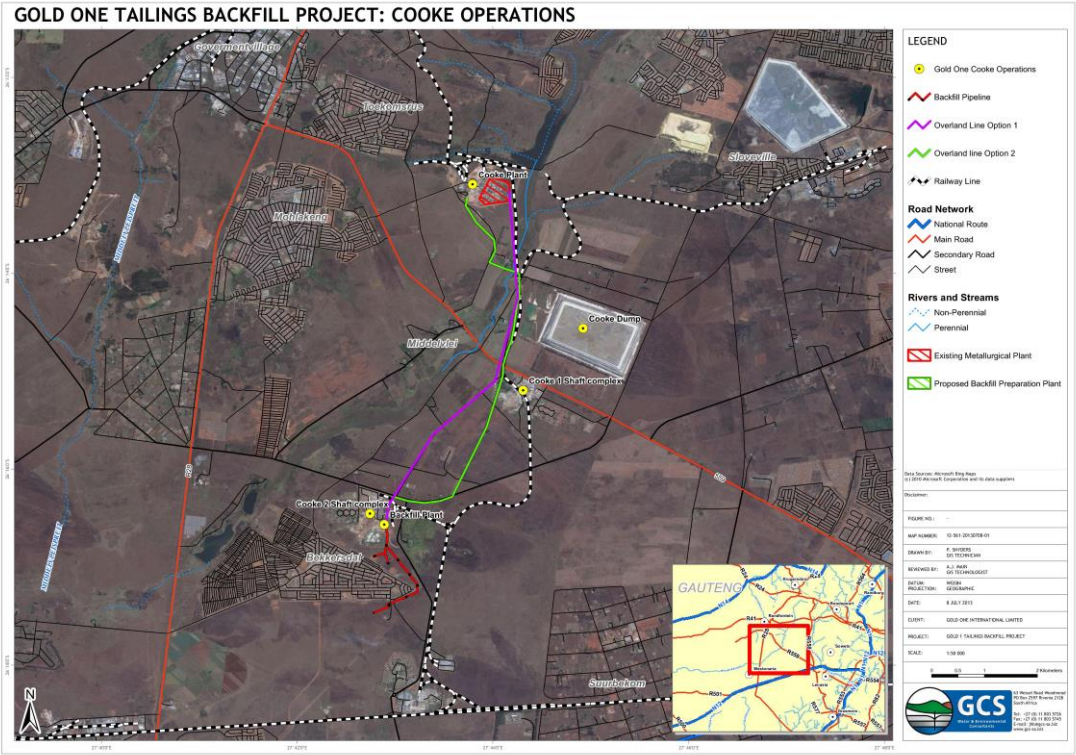
Figure 1.1: Group Structure

Reclamation of this sand dam will reduce by the end of 2012, whereupon the Dump 20 sand and slime resource will be processed through the Cooke Plant. The Cooke Plant will be upgraded during 2012 to increase feed throughput to 400,000 tonnes per month.

The Cooke Plant was constructed in 1978 and initially treated the high grade ores from the adjacent Cooke shafts. The mills at the Cooke Plant were subsequently converted to treat the sand from Tailings Dam 20, however, two mills remain available to treat the underground ore should such be required.

1.2 Brief Project Description

The project area is situated next to Bekkersdal, near Westonaria in the Gauteng Province of South Africa (Figure 1.2). The proposed development will fall within a brownfields area, and numerous environmental studies have been conducted for the Cooke Operations (Cooke 1, 2 and 3 underground mining operations, Cooke plant and Dump 20) previously.



[FIGURE NOT TO SCALE- REFER TO A3 MAP APPENDIX C]

Figure 1.2: Project Location

The intention of introducing backfill in the underground workings has been proposed in order to make more mineable reserves available. The flexibility this mining method presents in terms of underground support and the improvement of geotechnical stability will result in areas previously not considered feasible as part of the mining plan suitable for future underground mining. The Project is proposed for the Cooke Operations, initially to provide backfill to Cooke 2 Shaft with the intention to expand to Cooke 3 Shaft if necessary.

By mining these areas Gold One could increase tonnage throughput or utilize the opportunity to replace lower grade tonnage with higher grade pillar material. In addition to the safety benefits and possible increase and/or improvement of tonnages, this method will also reduce the volume of tailing material to be placed on the Tailings Storage Facility (TSF).

The latest production profile has been used to determine the required backfill. The stope height of 3.5 m has precluded the use of Cyclone Classified Tailings (CCT), also referred to as hydraulic fill. A 100% fill has been designed for the stopes. The backfill has been designed to have a free standing height of 3.5 m. The backfill will be placed at a density of 1.75 t/m^3. All backfill will have a binder added, with the current design based on a 7% binder addition.

The Full Plant Tailings (FPT) Backfill Plant will be designed to be modular with all equipment (including the thickeners) being transportable to another site, thereby ensuring the backfill plant can be relocated in future. Due to the shallow operations, boreholes located close to the operations can be used to transfer the backfill down the mine. All excess water will be transferred back to Cooke Plant via a return pipeline for disposal.

1.3 Contact Details

The applicant is Gold One International Limited (Gold One). The relevant contact details of the applicant are presented in Table 1.1.

Table 1.1: Applicant Contact Details

Name of Applicant	Gold One International limited
Company Registration number	2009/000032/10
Contact Person	Jonathan Steinmann
Physical Address	Bridgeview House, Constantia Office Park, Cnr 14th Ave and Hendrik Potgieter Str, Weltevreden Park, 1709
Postal Address	Postnet Suite 115, Private Bag X17, Weltevreden Park, 1715.
Telephone	011 411 6419
Fax	011 278 0000

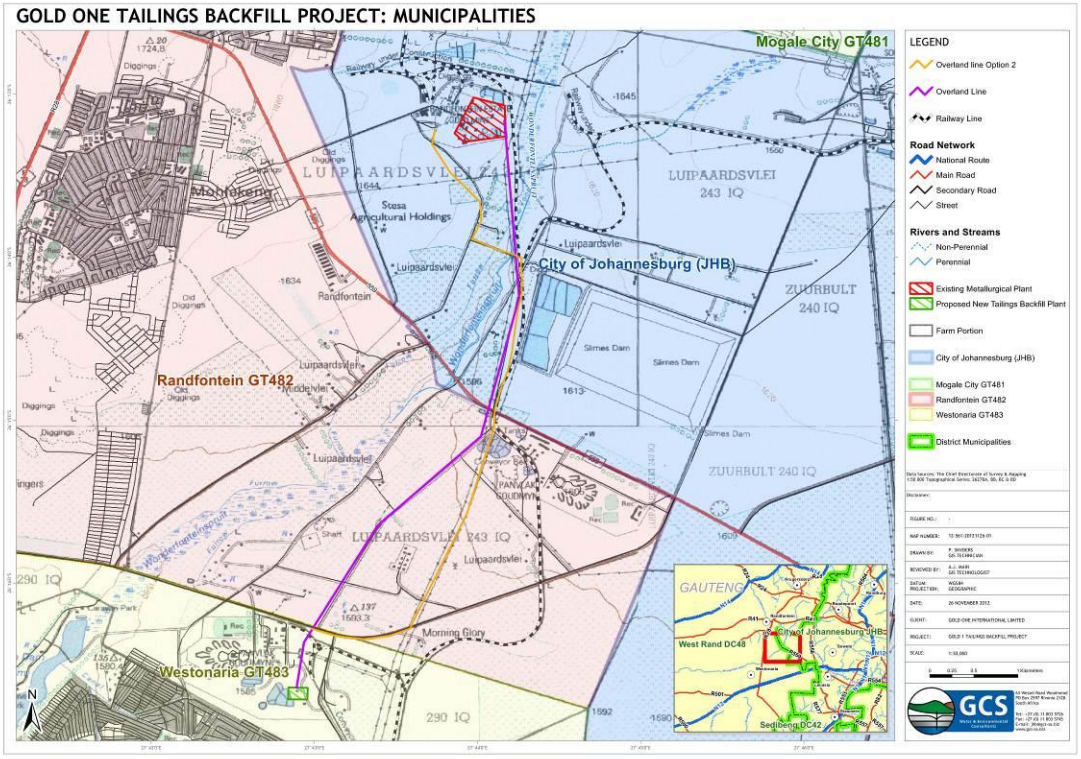
Email	jonathan.steinmann@gold1.co.za

1.4 Description of Land

This section of the report relates to Section 31(2) and 33 of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

REGULATION 31(2)
2 c) A description of the property on which the activity is to be undertaken and the location of the activity on the property and if it is: i. A linear activity, a description of the route of activity; ii. An ocean based activity ,the co-ordinates where the activity is to be undertaken

The proposed Backfill project by Gold One in the Randfontein/Westonaria/Johannesburg region, is situated in the West Rand District and Johannesburg Municipalities approximately 40 km west of Johannesburg city centre and 40 km south west of Mogale City (Krugersdorp), Gauteng Province. The closest towns and residential suburbs to the mining operations are Randfontein (10 km North), Westonaria (8 km Southwest), Bekkersdal (1 km Southwest) Toekomsrus (7 km North) and Mohlakeng (5 km North).



[FIGURE NOT TO SCALE- REFER TO A3 MAP APPENDIX C]

Figure 1.3: Municipalities of the project area

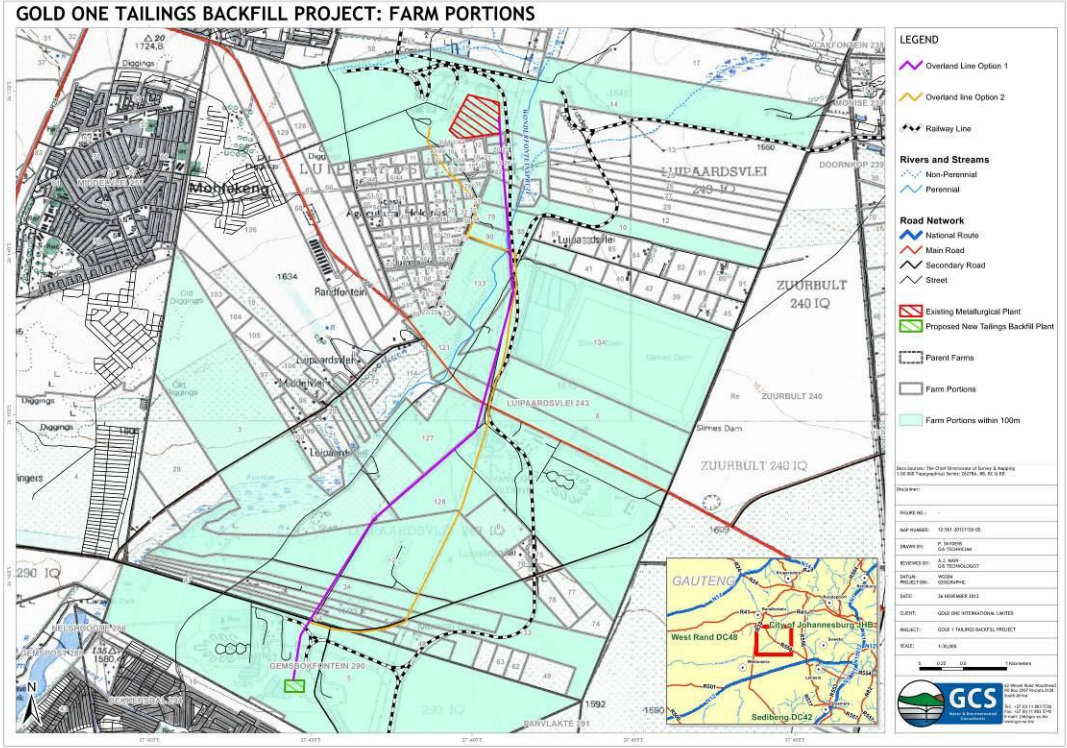
The Project area comprises two (2) farms, namely, Luipaardsvlei 243 and Gemsbokfontein 290 in the Johannesburg Registration Division. The proposed pipeline will cross over the Luipaardsvlei farms, and the FPT Backfill Plant will be situated on the farm Gemsbokfontein 290 (Figure 1.4).

The property details for the project were obtained from the government deeds website (www.deeds.gov.za) and are described in Table 1.2.

Table 1.2: Gold One Tailings Backfill Plant and Pipeline Property Details

Property ID	Division	Farm	Portion	Farm_name	Owner
T0IQ00000000024300000	IQ	243	0	Luipaardsvlei	Du Toit Ebenhaezer-Administrators
T0IQ00000000024300002	IQ	243	2	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300003	IQ	243	3	Luipaardsvlei	Rand Uranium (Pty) Ltd

Property ID	Division	Farm	Portion	Farm_name	Owner
T0IQ00000000024300005	IQ	243	5	Luipaardsvlei	National Government of The Republic of South Africa
T0IQ00000000024300007	IQ	243	7	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300008	IQ	243	8	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300010	IQ	243	10	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300014	IQ	243	14	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300031	IQ	243	31	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300033	IQ	243	33	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300034	IQ	243	34	Luipaardsvlei	Justice Lunuberg
T0IQ00000000024300046	IQ	243	46	Luipaardsvlei	First Westgold Prop (Pty) Ltd
T0IQ00000000024300058	IQ	243	58	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300059	IQ	243	59	Luipaardsvlei	Arch Import & Export cc
T0IQ00000000024300064	IQ	243	64	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300079	IQ	243	79	Luipaardsvlei	Charles Villet
T0IQ00000000024300088	IQ	243	88	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300090	IQ	243	90	Luipaardsvlei	Nicolaas Johannes Erasmus Coetzee
T0IQ00000000024300121	IQ	243	121	Luipaardsvlei	Jan Harm Du Plessis
T0IQ00000000024300126	IQ	243	126	Luipaardsvlei	Rand Uranium (Pty) Ltd
T0IQ00000000024300127	IQ	243	127	Luipaardsvlei	Zacharias Johannes Van Greuning / Sakkie Van Greuning
T0IQ00000000024300133	IQ	243	133	Luipaardsvlei	Jan Harm Du Plessis
T0IQ00000000024300134	IQ	243	134	Luipaardsvlei	Randfontein Estates Gold Mining Co Witwatersrand Ltd
T0IQ00000000029000005	IQ	290	5	Gemsbokfontein	Rand Uranium (Pty) Ltd
T0IQ00000000029000005	IQ	290	5	Gemsbokfontein	Rand Uranium (Pty) Ltd



[FIGURE NOT TO SCALE- REFER TO A3 MAP APPENDIX C]

Figure 1.4: Proposed Project Area and Farm Portions

1.5 Environmental Assessment Practitioner

This section of the report relates to Section 31(2) and 33 of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31(2)
2 a) Details of : (i) The EAP who compiled the report; (ii) Expertise of the EAP to carry out the environmental impact assessment.
REGULATION 33
a) Details of: (i) The person who prepared the environmental management programme; and (ii) The expertise of that person to prepare an environmental management programme

In terms of Section 17 of the NEMA, the applicant has to appoint Environmental Assessment Practitioners (EAPs) before applying for an environmental authorisation of any activity listed in terms of GN 544 and 545. For this purpose Gold One has appointed GCS Water and Environment (Pty) Ltd (GCS) to undertake the necessary environmental assessments and to ensure that all legislative requirements are adhered to as part of the environmental authorisation processes.

GCS provides a professional, independent consulting service in the fields of water, environmental, engineering and earth sciences. The GCS team consists of highly trained staff that has extensive experience in the fields of geohydrology, hydrology, pedology, engineering geology, engineering and environmental science.

GCS have considerable experience in Southern Africa and undertake investigations for environmental assessments. The environmental scientists carry out all aspects of environmental assessments and management programmes.

GCS was founded in 1987 and the broad GCS client base ranges from individuals, engineers, municipalities and mines, to Independent States and Governments. GCS is an independent practice, which is wholly owned by the partners of the company.

GCS is an independent environmental consulting firm and has undertaken the Environmental Impact Assessment (EIA)/Environmental Management Programme (EMP) Report development. GCS is also responsible for the updated Public Participation Process (PPP) pertaining to the proposed operation.

The EAP is independent and has no vested interest in the outcome of the environmental authorization applications.

Table 1.3: EAP Details

Name of EAP	Position	Qualification	Experience
Tanja Bekker	Technical and Quality Control	MSc. (Environmental Management). PrSci Registered	10 years

Name of EAP	Position	Qualification	Experience
Estie Retief	Environmental Project Manager	M.A (Environmental Management): University of Johannesburg	7 years
Megan Wuite	Senior Environmental Consultant	MEnvDev (Water Resource Management)	6 years
Riana Panaino	Environmental Consultant	B. Sc (Hons) Biodiversity and Conservation	5 years
Jane Mahaba	Environmental Consultant	B.Sc Animal, Plant and Environmental Sciences	5 years

1.6 Reporting

Based on the outcome of the Environmental Scoping Phase, an EIA and an EMP Report must be submitted to the Ministers of the Gauteng Department of Agriculture and Rural Development (GDARD) and the Department of Mineral Resouces (DMR) for consideration and approval.

1.6.1 Environmental Impact Assessment

The EIA Report must determine the nature, extent, duration, probability and significance of the environmental, social and cultural impacts of the project, the reasonable alternatives and the required mitigation measures for each impact during the life of the mine. It is the role of the relevant environmental authorities to make a decision on whether the project should proceed or not, based on the information provided in the EIA and this report therefore does not make a recommendation on whether the project should proceed or not.

Regulation 31(2) of Government Notice R543 of the NEMA Regulations stipulates that an EIA Report must contain all necessary information to enable the competent authority to consider the application and to reach a decision. The EIA Report must contain, inter alia, the following:

- A description and comparative assessment of all alternatives identified;
- A description of all environmental issues identified as well as the significance of each issue and an indication if the extent to which the issue could be addressed by the adoption of mitigating measures;

- An Environmental Impact Statement; and
- An Environmental Management Programme.

Furthermore, the criteria which the competent authority will apply, when considering applications in terms of the provisions of NEMA, is enunciated in Regulation 8 of Government Notice R543 of the Regulations. The latter regulation states that consideration must be had for Section 24O, Section 24(4) as well as the need and desirability of the activity. The activities identified in the provisions of NEMA and the Regulations thereto pertain to activities which may have a detrimental impact on the environment.

The criteria to be taken into account by the competent authority when considering applications as set out in Section 24O and 24(4) of NEMA includes, inter alia, the following relevant factors:

- Any pollution, environmental impacts or environmental degradation likely to be caused if the application is approved or refused;
- Measures taken to protect the environment from harm as a result of the activity which is the subject of the application;
- Measures taken to prevent, control, abate or mitigate any pollution, substantially detrimental environmental impacts or environmental degradation;
- The ability of the applicant to implement mitigation measures and to comply with any conditions subject to which the application may be granted;
- Where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment;
- Any comments received from organs of state that have jurisdiction over any aspect of the activity which is the subject of the application.

1.6.2 Environmental Management Programme

Each specialist was required to identify means of avoiding, mitigating and/or managing the negative impacts in his/her particular aspect of the investigation. The recommended management strategies are synthesised in this report by GCS to formulate the EMP for the proposed listed activities and the operation as a whole. Management strategies are based on the recommendations by specialists in their specific field of study. The management measures will be incorporated into the mine systems to avoid, or appropriately manage impacts from the outset.

A draft EMP must include details of the person who prepared the EMP and the expertise of that person to prepare an EMP. The draft EMP must, furthermore, include:

- Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified, including environmental impacts or objectives in respect of –
    - Planning and design;
    - Pre-construction and construction activities;
    - Operation or undertaking of the activity;
    - Rehabilitation of the environment; and
    - Closure, where relevant.
- A detailed description of the aspects of the activity that are covered by the draft EMP;
- An identification of the persons who will be responsible for the implementation of the mitigating measures;
- Where appropriate, time periods within which the measures contemplated in the draft EMP must be implemented; and
- Proposed mechanisms for monitoring compliance with the environmental management plan and reporting thereon.

The EIA ensures that the needs of the environment (biophysical and socio-economic) are identified. The EMP in turn provides a tool for meeting the objective to reduce or avoid negative environmental impacts associated with a project within a certain environment by providing detailed mitigation measures and management commitments. All of these sections will become legally binding on the approval of this report.

1.6.3 Report Layout

This report has been structured to comply with the information requirements as set out under Regulation 31(2) and 33 of the GNR543.

NEMA REGULATION	CHAPTER
REGULATION 31(2)	
2 a) Details of : i. The EAP who compiled the report; ii. Expertise of the EAP to carry out the environmental impact assessment.	Chapter 1 Chapter 1
2 b) Detailed description of the proposed activity	Chapter 3
2 c) A description of the property on which the activity is to be undertaken and the location of the activity on the property and if it is: iii. A linear activity, a description of the route of activity; iv. An ocean based activity ,the co-ordinates where the activity is to be undertaken	Chapter 1, Chapter 3
2 d) A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity	Chapter 2, Chapter 6
2 e) Details of the public participation process conducted in terms of the subregulation (1),including: i. Steps undertaken in accordance with the plan of the study; ii. A list of persons, organizations and organs of state that were registered as interested and affected parties; iii. A summary of comments received from and a summary of issues raised by interested and affected parties, the date of receipt of these comments and the response of the EAP to these comments; and iv. Copies of any representations and comments received from registered interested and affected parties	Chapter 5, Appendix B Appendix B Chapter 5, Appendix B Appendix B
2 f) A description of the need and the desirability of the proposed activity	Chapter 3 and 4

NEMA REGULATION	CHAPTER
2 g) 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 4 and 6
2 h) An indication of the methodology used in determining the significance of potential environmental impacts	Chapter 6
2 i) Description and comparative assessment of all alternatives identified during the environmental impact assessment process	Chapter 4
2 j) A summary of the findings and any recommendations of any specialist report or a report on a specialized process	Chapter 2, Chapter 6
2 k) A description of all environmental issues that were identified during the environmental impact process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures	Chapter 6
2 l) An assessment of each identified potentially significant impact including: i. Cumulative impacts; ii. The nature of the impact; iii. The extent and duration of the impact; iv. The probability of the impact occurring; v. The degree to which the impact can be reversed; vi. The degree to which the impact can cause irreplaceable loss of resources and ; vii. The degree to which the impact can be mitigated.	Chapter 6
2 m) A description of the assumptions, uncertainties and gaps in knowledge	Chapter 9
2 n) A reasoned opinion as to whether the activity should or should not be authorised, and if it should be authorized any conditions that should be authorized, any conditions that should be made in respect of that authorization.	Chapter 10
2 o) An environmental impact statement which contains : viii. A summary of the key finding of the Environmental Impact Assessment ; and ix. A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.	Chapter 10
2 p) A draft Environmental Management Programme containing the aspects contemplated in regulation 33	Chapter 6
2 q) Copies of any specialist reports and reports on specialized processes complying with Regulation 32	Appendix C

NEMA REGULATION	CHAPTER
2 r) Any specific information that may be required by the competent authority	Appendix A, B, C, D, E
2 s) Any matters required in terms of sections 24(4) (a) and (b) of the act.	N/A
REGULATION 33	
a) Details of: i) The person who prepared the environmental management programme; and ii) The expertise of that person to prepare an environmental management programme	Chapter 1
b) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these regulations, including environmental impacts or objects in respect of : i) Planning and designing; ii) Pre Construction and construction activities; iii) Operation or undertaking of the activity; iv) Rehabilitation of the Environment; and v) Closure, where relevant	Chapter 6
c) A detailed description of the aspects of the activity that are covered by the draft environmental management programme	Chapter 6
d) An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b)	Chapter 6
e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon	Chapter 7
f) As far as is reasonably practical, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principal of sustainable development ,including ,where appropriate, concurrent or progressive rehabilitation measures	Chapter 6
g) A description of the manner in which it intends to : i) Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; ii) Remedy the cause of pollution or degradation and migration of pollutants;	Chapter 6 Chapter 6
iii) Comply with any prescribed environmental management standards or practices;	Chapter 6

NEMA REGULATION	CHAPTER
iv) Comply with any applicable provisions of the act regarding closure, where applicable; v) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Chapter 6 N/A
h) Time periods within which the measures contemplated in the environmental management programme must be implemented	Chapter 6
i) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity	Chapter 6; Appendix E
j) An environmental awareness plan describing the manner in which- i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment	Chapter 8; Appendix E
k) Where appropriate, closure plans, including closure objectives.	Chapter 6

2 LEGISLATIVE BACKGROUND

For most of its history, the mining industry in South Africa has not been subjected to comprehensive environmental regulation. However, in recent years, this has changed significantly and the industry is now required to comply with a multifaceted network of mining and environmental legislation. There are no shortages of policy and legal frameworks to ensure "responsible" mining in South Africa. The *Minerals and Mining Policy for South Africa*, 1998 affirmed that the State, as custodian of the nation's natural resources will support mining development while maintaining and enhancing environmental awareness of the mining industry in accordance with national environmental policy, norms and standards.

To this end, 10 principles on sustainable mining were adopted. These include the adoption of the precautionary approach as well as the polluter pays principle; assertion that a consistent standard of environmental impact management would be adopted, irrespective of the scale of mining concerned; encouraging the mining industry to reduce problems of pollution by promoting a culture of waste minimisation through re-cycling, and re-use of waste products; and ensuring the effective implementation of environmental management measures and monitoring of occurrences of pollution, amongst others.

For the purposes of this application, authorization in terms of the *National Environmental Management Act*, Act 107 of 1998 (hereinafter referred to as "*NEMA*"), the *Minerals and Petroleum Resources Development Act*, Act 28 of 2002 (hereinafter referred to as the "*MPRDA*"), the *National Water Act*, Act 36 of 1998 (hereinafter referred to as the "*NWA*") and *National Nuclear Regulator Act*, 1999 (Act No. 47 of 1999) (hereinafter referred to as "*NNRA*") will be undertaken.

2.1 The Constitution

The Constitution reigns supreme and the advancement of human rights is one of the foundations of South Africa's democracy. Furthermore, the Bill of Rights plays a central role in the democratic regime because it embodies a set of fundamental values which should be promoted at all times.

One of the fundamental values is contained in Section 24 and is, arguably, the cornerstone for environmental governance in South Africa which includes the mining industry. Section 24(a) proclaims the right of everyone ***"to an environment that is not harmful to their health or well-being"***. Mining companies are thus duty-bound to constitutional, legislative, and other measures to prevent pollution and ecological degradation, promote conservation and to develop in a sustainable manner.

Two particular judgments deserve consideration in that they contain a comprehensive analysis of the nature and content of the environmental right within the sustainability context. Firstly, the court in *BP Southern Africa (Pty) Ltd v MEC for Agriculture, Conservation and Land Affairs* 2004 5 SA 124 (WLD) confirmed that environmental interests should be balanced with justifiable economic and social development well beyond the interests of the present living generation. The court justified the latter with Section 24(b), since this Section requires the environment to be protected for the benefit of present and future generations. The court confirmed the importance of sustainable development and predicted that it will ***"…play a major role in determining important environmental disputes in the future"***.

Within this context, the mining industry (and the accompanied social and economic development it should bring with it) is constitutionally bound to uphold the environmental right. The court in *Fuel Retailers Association of Southern Africa v Director General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province* 2007 6 SA 4 (CC) attempted to balance these social, environmental and economic concerns by recognising the importance of economic and social development for the well-being of human beings. However, the court emphasised that development and the environment are inexorably linked and development cannot exist upon a weakening environmental base. Consequently, the promotion of development requires the protection of the environment.

The constitutional environmental right elevates the importance of environmental protection and conservation, and emphasises the significance that South Africans attach to a sound and healthy environment. In addition, the environmental right applies horizontally and this implies that the mining industry has to exercise a duty of care if liability, on the basis of the constitutional environmental right, is to be avoided. The constitutional environmental right is given effect to by means of detailed statutory provisions ranging from framework to sectoral legislation which relate to mining.

2.2 Environmental principles

Section 2(1)(c) of the NEMA provides that:

"***The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and… serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment…***"

Any decision taken in respect of the proposed application for environmental authorization should take into account the principles as set out in Section 2 of NEMA. GCS acknowledge that these principles serve as guiding principles because they are binding, enforceable and justiciable. By adhering to these principles, GCS promotes a cautious approach when advising on the activities, processes and daily operations of Gold One's mining operation and advocates compliance with environmental regulatory measures.

The principles contained in Section 2 of NEMA are the corner stone of environmental governance and liability in South Africa and is based on the foundation of sustainable development. These principles all apply directly to mines by virtue of Section 37(1) of the MPRDA which provides that regard must be had to the NEMA principles by stipulating that the principles set out in Section 2 of NEMA:

"***a) apply to all prospecting and mining operations, as the case may be, and any matter or activity relating to such operation; and***
b) serve as a guideline for the interpretation, administration and implementation of the environmental requirements of this Act."

Section 37(2) of the MPRDA further provides that:

"***Any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations.***"

(own emphasis)

By virtue of Section 37(1) of the MPRDA, these principles apply to the mining sector and therefore the mining industry must adopt a risk-averse and cautious approach; prevent negative impacts or effects of their activities on the health and well-being of people and the environment; and pay for all their pollution since they remain liable for the effects of their policies, projects, programmes, products, processes, services or activities throughout their life cycles. When a competent authority takes a decision in terms of NEMA or any other law concerned with environmental protection, the principles must serve as guidelines. More specifically, the principles should guide the interpretation and implementation of the liability regime of NEMA and any other law concerned with environmental protection including mining related legislation. The following principles are particularly important and are discussed below.

2.2.1 Polluter Pays Principle

The Polluter Pays Principle is reflected in the provision that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

In essence, the Polluter Pays Principle means that "***polluters and users of natural resources (should) bear the full environmental and social costs of their activities***". The Polluter Pays Principle can also be described as an economic principle that requires the polluter (the mining industry in this instance) to be held liable to compensate or pay for pollution prevention, minimisation and remediation. Therefore, the crux of the principle is to impose economic obligations when environmental damage is caused by a polluter and this is achieved by setting minimum rules on liability for environmental damage.

2.2.2 Precautionary Principle

The precautionary principle provides guidance during development or when anything occurs which might harm the environment and where there is scientific uncertainty. NEMA stipulates and requires "a risk averse and cautious approach" to be applied and that decision-makers should take "***into account the limits of current knowledge about the consequences of decisions and actions***". This approach is also acknowledged in the *White Paper on a Minerals and Mining Policy for South Africa* in that:

"…during decision-making a risk averse and cautious approach that recognises the limits of current environmental management expertise will be adopted and where there is uncertainty, action is required to limit the risk."

The precautionary principle requires the mining industry to take adequate precautionary measures to safeguard against contamination, pollution or degradation of the environment and where there is uncertainty, the action taken should be to limit the risk to the environment.

2.2.3 Preventive Principle

The preventive principle is reflected in the concept that the disturbance of ecosystems and loss of biological diversity are to be ***"…avoided, or…minimised and remedied."*** Furthermore, the principle prescribes that the disturbance of the landscape and the nation's cultural heritage is to be avoided, and where it cannot be altogether avoided, must be minimised and remedied. Any negative impacts on the environment and on people's environmental rights should also be anticipated and prevented, and where they cannot be altogether prevented they should minimised and remedied.

The principle aims to minimise environmental damage by requiring that action be taken at an early stage of the process, and if possible, before such damage actually occurs. Broadly stated, it prohibits any activity which causes or may cause damage to the environment in violation of the duty of care established under environmental law. The preventive principle bestows on the mining industry an obligation to take steps to avoid causing certain types of damage to the environment, including the environment beyond their own territory or property.

2.2.4 Cradle-to-grave

A cradle-to-grave stewardship perspective indicates the adoption of a comprehensive ecological view of the impacts of a process on the environment, commencing with research, development and design through the extraction and use of raw materials, production and processing, storage, distribution and use, to the final disposal of the product and the waste generated as a by-product. The integrated consideration of all the environmental impacts forms part of this cycle. The “cradle-to-grave” principle advocates liability as a result of, or caused by, policies, programmes, projects, products, processes, services and activities. Given the general purpose of NEMA, together with the other sustainability principles, this legal liability may include to rectify, remedy or compensate for environmental damage or degradation. The principle also recognises that environmental impacts, pollution or degradation may be associated with the entire life cycle of a mine, that is, from the identification, exploration phase through project planning, implementation, operations and post-operational closure, decommissioning and rehabilitation. Thus, the mining industry will remain liable for the damage or degradation caused by its activities throughout the life cycle of the mining operations until decommissioning and rehabilitation.

2.3 The National Environmental Management Act

As stated above, NEMA provides for a comprehensive array of principles which cumulatively aim to create among others, corporate socially responsible behaviour by establishing legal liability for environmental damage as well as damage to human health and well-being. Apart from these principles, NEMA also contains mechanisms, procedures and structures to facilitate pollution prevention, minimisation and remediation.

Chapter 7 of NEMA contains essential provisions dealing with liability for environmental damage in South Africa and two key elements form part thereof; namely: pollution prevention and remediation. A duty of care is contained in Section 28, which encompasses the main liability provision which applies retrospectively and therefore also to historical pollution. Section 28(1) applies to all forms of pollution, including mining pollution, and is formulated generally by providing a duty of care to avoid, minimise and/or remedy pollution or environmental degradation. In terms of this subsection, the duty imposes liability on an almost non-exhaustive category of persons, because it refers to "every person".

Section 28(2) goes even further and imposes the duty on a range of people including owners or people in control of land or premises and people who have the right to use the land or premises on which, or in which, an activity or process is, or was, performed or undertaken, or any other situation exists which causes, or is likely to cause, significant pollution or degradation to the environment.

The duty of care imposes strict liability since Section 28(1) requires reasonable persons to take reasonable measures. Subsection (3) provides an indicative range of measures that can be considered as "reasonable measures" and these may include measures to investigate, assess and evaluate the impact on the environment; inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation, contain or prevent the movement of pollutants or the causing of degradation, eliminate any source of the pollution or degradation and remedy the effects of the pollution or degradation. One can identify from the wording an obligation to prevent and minimise pollution or degradation and the list indicates that remediation is clearly part of South African law. Where a mine fails to take reasonable measures to prevent or minimise pollution, it can be directed to do so by the relevant authority and if it does not comply with the directive, measures will be taken by government on its behalf, but at the mine's expense.

Under Section 34(7), liability is specifically extended to the director of the mining company concerned in his or her personal capacity, in other words, the director is personally liable. Furthermore, Section 43 provides that if directors failed to take all reasonable steps to prevent the offence being committed, and monetary advantage was gained, they may be personally liable for damages or compensation, have to pay a fine, or have to comply with remedial measures determined by the Court, and may even have to pay the State's investigative costs. The latter was confirmed in *Minister of Water Affairs and Forestry v Stilfontein Gold Mining Co Ltd and Others* 2006 5 SA 333 (W) where the court held, in a telling statement that:

"To permit mining companies and their directors to flout environmental obligations is contrary to the Constitution, the Mineral Petroleum Development Act and to the National Environmental Management Act. Unless courts are prepared to assist the State by providing suitable mechanisms for the enforcement of statutory obligations an impression will be created that mining companies [and their directors] are free to exploit the mineral resources of the country for profit over the lifetime of the mine, thereafter they may simply walk away from their environmental obligations. This simply cannot be permitted in a constitutional democracy which recognises the right of all of its citizens to be protected from the effects of pollution and degradation."

2.4 The Mineral and Petroleum Resources Development Act

Section 38 provides a key insight into the MPRDAs environmental liability approach. In terms of this Section, mining companies are required to familiarize themselves of potential environmental impacts; manage any environmental impacts; and rehabilitate the environment in so far as is reasonably possible. Furthermore, Section 38(1)(e) states that such holders, whose mining causes or results in ecological degradation, pollution, or environmental damage that may be harmful to the health or well-being of anyone:

"***…is responsible for any environmental damage, pollution or ecological degradation as a result of his or her operations and which may occur inside and outside the boundaries of the area to which such right, permit or permission relates.***"

These holders will "***…remain responsible for any environmental liability, pollution or ecological degradation and the management thereof until a closure certificate has been issued***". Similar to NEMA, the MPRDA specifically extends the widely-framed liability of mines to the director of the mining company concerned in his or her personal capacity, by stating in Section 38(2) the following:

"***...the directors of a company or members of a close corporation are jointly and severally liable; for any unacceptable negative impact on the environment, including damage, degradation or pollution; advertently or inadvertently caused by the company or close corporation which they represent or represented.***"

In general, this provides for a comprehensive liability net which must also be considered in light of NEMAs provisions. According to Section 39, a mine must indicate how it will contain or remedy the cause of pollution or degradation and migration of pollutants and comply with any prescribed waste standards or management practice. Granting of permission to mine or prospect, among others, is conditional on an environmental management programme and plan being submitted and accepted by the relevant government authority. Section 43 is one of the most important provisions as it deals with the responsibility for any environmental liability, pollution or ecological degradation until the issue of the closure certificate. It is important to note that environmental liability will not necessarily cease or fall away by the issuing of a closure certificate. In addition to the broader liability provisions above, Section 45 provides that the relevant authority may direct a mine to undertake remedial measures where:

"*...any prospecting, mining, reconnaissance or production operations cause or results in ecological degradation, pollution or environmental damage which may be harmful to the health or well-being of anyone and requires urgent remedial measures*."

Where the mine fails to take these measures, the relevant authority will act on its behalf and then recover costs incurred from the mine. If the mine fails to compensate the authority, the latter is empowered to seize and sell the mine's property to recover the costs. The mine will thus remain financially liable for the rehabilitation, even if it chooses to ignore the government directive.

2.5 The National Water Act

One of the main and ever-continuing concerns in South Africa is the sustainability of water management, and the costs associated with the prevention and remediation of pollution in a country with an average rainfall far below international standards. The NWA is one of the government's answers to some of these challenges and functions as sectoral legislation within the framework of NEMA.

Section 19 of the NWA mirrors the provision of Section 28 of NEMA and addresses the prevention and remediation of the effects of pollution. The NWA provides a wide duty of care in that:

"(1) an owner of land, a person in control of land or a person who occupies or uses the land on which-

(a) any activity or process is or was performed or undertaken; or

(b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring."

The words "likely to cause pollution" broadens the scope of the duty, which enables an activity, or situation that is land-based, to trigger the application of the duty. The "reasonable measures" are not prescribed, but may include measures intended to:

"***cease, modify or control any act or process causing the pollution; comply with any prescribed waste standard or management practice; contain or prevent the movement of pollutants; eliminate any source of pollution; remedy the effects of pollution; and remedy the effects of any disturbance to the bed and banks of a watercourse."***

The NWA, furthermore, provides for water use authorisations which a mine will have to apply for, before commencing with its primary activity of mining. Various conditions may be attached to these licenses and a breach thereof will result in criminal and civil liability. The conditions attached to water use authorisations will function alongside the additional protective measures, duty of care and statutory liability provisions provided by the NWA and other legislation to regulate a whole array of water issues.

The detrimental impact of mining on water resources is further regulated by the NWA in a comprehensive set of regulations titled: "Regulations on the Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources". In terms of these regulations:

"No person in control of a mine or [mining] activity may place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation."

Regulation 7 provides for a whole array of provisions which specifically aim to protect water resources from mining. These provisions state that every person in control of a mine or mining activity must take all reasonable measures to, inter alia: prevent water containing waste or any substance which causes or is likely to cause pollution from entering any water resource; design, modify, locate, construct and maintain all water systems including residue deposits, to prevent the pollution of any water resource through the operation or use thereof; cause effective measures to be taken to minimise the flow of any surface water or floodwater into mine workings, opencast workings, other workings or subterranean caverns; prevent the erosion or leaching of materials from any residue deposit or stockpile from any area; and ensure that water used in any process at a mine or activity is recycled as far as practicable. These provisions specifically relate to the protection of water resources and they clearly set out further additional liabilities for mines as far as their water resource protection activities are concerned.

2.6 Environmental Process

The EAP will undertake parallel environmental authorisation application processes under NEMA, MPRDA, NNRA and NWA. The following documents will be submitted to the indicated competent authorities:

- EIA/EMP under NEMA: Gauteng Department of Agriculture and Rural Development (hereinafter referred to as "*GDARD*");
- EMP Amendment under MPRDA: Department of Mineral Resources (hereinafter referred to as "*DMR*"), in Gauteng;
- Assessment under NNRA: National Nuclear Regulator, in Gauteng; and
- Integrated Water Use License Application (IWULA) and Integrated Waste and Water Management Plan (IWWMP) under NWA: Department of Water Affairs (hereinafter referred to as "*DWA*").

The various environmental authorisation processes being followed for this project are described in the sections which follow.

2.6.1 The process in terms of the National Environmental Management Act

Section 24(1) of NEMA requires that the potential consequences of or impacts on the environment of listed activities must be considered, investigated, assessed and reported on

to the competent authority. Where environmental impact assessment has been identified as the instrument to be utilised in achieving the aforementioned, an application for environmental authorisation needs to be obtained. The identified activities are listed under GN R544, R545, R546 and R547 of the NEMA Regulations respectively.

The listed activities (Table 2.2) which are triggered by the proposed mining operation are contained in Listing Notice 1 (GN R544) and Listing Notice 2 (GN R545). Activities contained in Listing Notice 1 require a Basic Assessment (BA) process to be followed whilst activities in Listing Notice 2 require a Scoping and EIR (S&EIR) process to be followed. For the purposes of this application, all items listed under Listing Notice 1 will be addressed in the required EIA process applicable to Listing Notice 2 activities. GDARD is regarded as the competent authority and as such a consolidated EIA report will be developed for Gold One and submitted to GDARD for assessment and authorisation.

S&EIR entail a comprehensive environmental impact assessment which includes a scoping phase and an EIA phase. In the scoping phase, issues are identified and it includes a plan of study for the EIA. The EIA phase assesses issues identified during the scoping phase and includes an environmental management programme. The EMP report provides information on the proposed activity and the manner in which potential impacts will be minimised or mitigated. This process is required for all listed activities.

Table 2.1 provides a description of the S&EIR process followed in respect of the proposed Gold One mining operations and Table 2.2 indicates the potential listed activities which will be undertaken by Gold One.

Table 2.1: Description of the S&EIR process in terms of GN R543 in GG 33306 of 18 June 2010

Regulation	Provision	Progress	Date
Regulation 26	The Applicant or the EAP must complete the application form for environmental authorisation and submit to the competent authority.	The EIA application form was submitted to the GDARD.	16 January 2013
Regulation 13(2)	The competent authority must acknowledge receipt of the application within 14 days of receipt of the application.	The GDARD acknowledged receipt of the application and granted permission to proceed with the S&EIR.	18 January 2013
Regulation 27	After having submitted an application, the EAP managing the application must: • conduct a public participation process; • give notice of the proposed application to any organ of state which has jurisdiction in respect of any aspect of the activity; • open and maintain a register of all interested and affected parties; • consider all comments and representations received from interested and affected parties following the public participation process; • subject the application to scoping • prepare a scoping report; • give all registered interested and affected parties an opportunity to comment on the scoping report; • submit at least five copies of the scoping report to the competent authority.	<u>List of authorities consulted</u> The authorities as listed below have been invited to become involved in the process by written and telephonic invitation. The following authorities were informed, in writing, of the project application processes being undertaken: • Randfontein Local Municipality; • Westonaria Local Municipality; • West Rand District Municipality; • Gauteng Department of Agriculture and Rural Development (GDARD); • Department of Mineral Resources; • Provincial South African Heritage Resources Agency (SAHRA); • Department of Water Affairs (DWA); and • National Nuclear Regulator (NNR). These authorities were automatically registered as I&APs on the stakeholder database developed for the project. All I&APs on the existing Gold One database were contacted at the start of the project. During the consultation with I&APs, as well as	N/A

Regulation	Provision	Progress	Date
		with the mine, additional parties will be identified and included within the existing database to provide an updated database. Numerous I&APs will be notified by word of mouth. Parties who respond to the advertisements and notifications will be included in the database. GCS has developed and will maintain an electronic database for the duration of the project where stakeholder details are captured and automatically updated as and when information is received from I&APs.	
		A site notice was placed at 9 localities in and around the project area (See Appendix B)	5 February 2013
		One advertisement was placed as per the NEMA requirements. An advertisement regarding the project background, the process being followed, and the details and purpose of the PPP were placed in the local newspaper, Randfontein/Westonaria Herald.	15 February 2013
		Background Information Documents (BID) were sent to all I&APs/Stakeholders. All I&APs were notified by way of fax, email or letter, depending on their preferred method of contact. The BID included details of the proposed project, the EIA process and the requirements of the NEMA. The BID also includes relevant contact details and a comment/registration sheet for I&APs to complete. I&APs are invited to register and send responses by fax, telephone or email to GCS.	7 February 2013
		Public meeting	27 February 2013

Regulation	Provision	Progress	Date
		The Scoping Report was made available for review by I&APs for a minimum 30 day period and all registered I&APs were informed of the report's availability, CD's were provided to I&APs who required copies, the Scoping Report was also submitted to authorities for comment.	7 February 2013
Draft Scoping Report	The Draft Scoping report (Hard Copy) was placed in the Westonaria and Randfontein Public Libraries, as well as the Cooke 1 Offices for public review. The report was also available on the GCS website.		7 February 2013 until 19 March 2013 Review of Draft Scoping Report. 5 April 2013 Review of Final Scoping Report
Regulation 29	The EAP managing an application must submit 5 copies of the scoping report to the competent authority.	As confirmed telephonically, 3 Hard Copies and 2 CD's of the Report was submitted to the competent authority.	19 February 2013 Draft Scoping Report was submitted 19 April 2013 Final Scoping Report was submitted
Regulation 30	The competent authority must, within 30 days of receipt of a scoping report, or receipt of the required information, reports, or comments or the amended scoping report, consider it, and in writing: • accept the report and advise the EAP to proceed with the tasks contemplated in the plan of study for EIA; • request the EAP to make such amendments to the report as the competent authority may require; or • reject the scoping report.	GDARD has in writing accepted the report and advised GCS to proceed with the tasks contemplated in the plan of study for EIA	9 July 2013

Regulation	Provision	Progress	Date
Regulation 31	If a competent authority accepts a scoping report and advises the EAP to proceed with the tasks contemplated In the plan of study for environmental impact assessment, the EAP must proceed with those tasks, including the public participation process for EIA and prepare an EIA report in respect of the proposed activities.	The draft EIA/EMP will be placed in the public domain at the Westonaria and Randfontein Public Library, Cooke Offices and on the GCS Website for a forty (30) day period. All registered I&APs will be informed in writing via email and sms. The final EIA/EMP will be placed in the public domain at the same locations listed above for a twenty-one (21) day period. All registered I&APs will be informed in writing via email and sms. A Public meeting will be held for public feedback on the EIA / EMP	The draft EIA will be available from the 15th of July until the 26th of August.
Regulation 34(1)	The EAP managing an application must submit the draft EIA report to the competent authority.	As confirmed telephonically, 3 Hard Copies and 2 CD's of the Report will be submitted to the competent authority.	15 July 2013
Regulation 34(2)	The competent authority must, within 60 days of receipt of an EIA report: • accept the report; or • reject the report.	(submission of final EIA report)	To be scheduled
Regulation 34(4)	An EIA report that is rejected in terms of Regulation 34(2) may be amended and resubmitted by the EAP.		

Table 2.2: Listed Activities in terms of NEMA

Number and date of the relevant notice	Activity number	Listed activity	Activity description
GN R 544 in GG 33306 of 18 June 2010	9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water – i. With an internal diameter of 0,36 metres or more; or ii. With a peak throughout of 120 litres per second or more.	Pipeline to transport tailings and return water
GN R 544 in GG 33306 of 18 June 2010	23	The transformation of undeveloped, vacant or derelict land to – (i) Residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares.	Establishment of a Tailings Backfill Plant
GN R 544 in GG 33306 of 18 June 2010	28	The expansion of existing facilities for any process or activity where such expansion will result in the need for a new, or amendment tor, an existing permit or license in terms of national or provincial legislation governing the release of emission or pollution, excluding where the facility process or activity s included in the list of waste management activities published in terms of section 19 of the NEMWA.	Establishment of a Tailings Backfill Plant and the additional pipeline to transport tailings and return water, which will require a WULA in terms of the NWA.
GN R 544 in GG 33306 of 18 June 2010	37	The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where: (a) The facility or infrastructure is expanded by more than 1000 m in length; or (b) Where the throughput capacity of the facility or infrastructure will be increased by 10% or more.	The expansion of pipeline to transport return water.

Number and date of the relevant notice	Activity number	Listed activity	Activity description
GN R 544 in GG 33306 of 18 June 2010	39	The expansion of (i)Canals (ii)Channels (iii)Bridges (iv)Weirs (v)Bulk storm water outlet structures (vi)Marinas; Within a watercourse or within 32 meters of watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.	The expansion of the pipeline bridge across the Wonderfonteinspruit.
GN R 544 in GG 33306 of 18 June 2010	49	The expansion of facilities or infrastructure for the bulk transportation of dangerous goods: (i) In gas form, outside an industrial complex, by an increased throughput capacity of 700 tons or more per day (ii) In liquid form, outside an industrial complex or zone by an increased throughput capacity of 50 cubic metres or more per day (iii) In solid form, outside an industrial complex or zone, by an increased throughput capacity of 50 tons or more per day.	The expansion of pipeline to transport tailings.
GN R 545 in GG 33306 of 18 June 2010	2	The construction of facilities or infrastructure for nuclear reaction including energy generation, the production, enrichment, processing, reprocessing, storage or disposal of nuclear fuels, radioactive products and nuclear and radioactive waste.	Construction of the Tailings Backfill Plant and associated pipeline.

Number and date of the relevant notice	Activity number	Listed activity	Activity description
GN R 545 in GG 33306 of 18 June 2010	5	The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of Section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.	Construction of the Tailings Backfill Plant and associated pipeline.
GN R 545 in GG 33306 of 18 June 2010	25	The expansion of facilities for nuclear reaction including energy generation, the production, enrichment, processing, reprocessing, storage or disposal of nuclear fuels, radioactive products and nuclear and radioactive waste.	Expansion of the tailings pipeline.

2.6.2 The process in terms of the Mineral and Petroleum Resources Development Act

Mines and mining related activities are regulated by the MPRDA, therefore in terms of Section 102 of the MPRDA, Gold One requires authorisation for the proposed activities in the form of an amendment to the existing EMP, which must be approved by the DMR in Gauteng, before construction may begin.

The application to amend the EMP requires the compilation and submission of an Environmental Scoping Report (ESR), and thereafter an Environmental Impact Report (EIR) and EMP. This ESRhas been compiled in compliance with Regulation 49 of GN R527, dated 23 April 2004 (published in terms of Section 107(1) of the MPRDA) (hereinafter referred to as the "*MPRDA Regulations*") as well as the Guidelines, and takes into consideration all aspects included in these documents.

The EMP to be submitted to DMR will comply with the requirements stipulated in Regulation 51 of the MPRDA Regulations. As such, the EIR will contain the following:

- An assessment of the environment likely to be affected by the proposed operations;
- An assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed operation, including cumulative impacts;
- A comparative assessment of the potential operation, as well as a comparison of other potential land uses for those sites;
- Identification of appropriate mitigatory measures for each significant potential impact of the proposed operation;
- Description of the stakeholder engagement process undertaken during the course of the assessment, issues that were raised and questions asked by Interested and Affected Parties (I&APs) and authorities, and how these issues and questions were addressed;
- Identification of gaps in knowledge, report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information;
- Description of the arrangements for monitoring and management of environmental impacts;

- A description of the environmental objectives and specific goals for the management of the identified environmental and socio-economic impacts during all phases of the development(construction, operation, decommissioning and post-closure);
- A description of the appropriate technical and management options chosen for each environmental, socio-economic, cultural and historical impact for all project phases;
- Action plans to achieve the specific goals set out, as well as timeframes for the implementation of mitigatory measures;
- Procedures for environmental related emergencies and remediation;
- Planned monitoring and environmental management programme performance assessment;
- An environmental awareness plan; and
- An undertaking by the applicant to comply with the provisions of the MPRDA and regulations thereto.

2.6.3 The process in terms of the National Water Act

In addition to the NEMA and MPRDA authorisations, activities which have the potential to impact on a water resource require a Water Use Licence (WUL) issued by the DWA, under the NWA. Section 21 of the NWA identifies certain water uses which have to be authorised. A Water Use Licence Application (WULA) and an accompanying Integrated Waste Water Management Plan (IWWMP) must be submitted to the DWA for the following:

- 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource; and
- 21 (i): Altering the beds, banks, course or characteristics of a watercourse.

The IWWMP is used as a management tool by Gold One to manage water emanating from their operations, using best practices in the interest of protecting the water resources which may be affected.

A WUL may be issued for a maximum period of 40 years with a specified review period. The WUL also prescribes a set of conditions to protect water resources, and gauge the impact of the water use. These have to be strictly adhered to for as long as the water use continues. This may extend beyond the life of the mining operation, as Gold One will be responsible for impacts caused by the mining operations after decommissioning and closure.

Furthermore, Section 27 of the NWA specifies that the following factors, regarding water use authorization, must be taken into consideration:

- The efficient and beneficial use of water in the public interest;
- The socio-economic impact of the decision whether or not to issue a license;
- Alignment with the catchment management strategy;
- The impact of the water use and possible resource directed measures; and
- Investments made by the applicant in respect of the water use in question.

Section 27 considerations will be included in the WULA and IWWMP. This will assist Gold One in ensuring that the water uses applied for, are undertaken in a manner that does not negatively impact on the public, water resources, or downstream water users or compromise any of the country's international obligations with regards to shared water resources.

3 ENVIRONMENTAL DESCRIPTION

This section of the report relates to Section 31(2) of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)
2 d) A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity
2 j) A summary of the findings and any recommendations of any specialist report or a report on a specialized process

The environmental baseline description of the proposed Gold One FPT Backfill Plant area and the path of the associated pipeline which was compiled by means of a literature review is provided in the sections that follow. The information provided is based on specialist studies previously undertaken for the purposes of the Cooke Uranium Project: Long Term TSF conducted by Digby Wells Environmental (2012) and the Uranium Plant Project undertaken by Golder Associates (2010).

3.1 Geology

The Randfontein area and Johannesburg in general, lie in the area of outcrop of several groups of rocks. The source of the Cooke Dump tailings are the gold-bearing rocks of the Witwatersrand Supergroup which consists of sediments deposited in an ancient basin.

The Witwatersrand Basin is underlain by an Archaean age (>3.1 Ga) granite-greenstone basement and the 3.086 Ma to 3.074 Ma Dominion Group. The basin is unconformably overlain by rocks of the Ventersdorp 2.7 Ga), Transvaal (2.6 Ga) and Karoo (302 Ma to 180 Ma) Supergroups. The Witwatersrand Supergroup is divided into two groups, the West and Central Rand Groups and is composed predominantly of a succession of shales, meta-quartzites and conglomerates (CCIC, 2006). The proposed project lies on rocks of the Transvaal Supergroup. The Transvaal Supergroup in this area can be considered as two main units, namely, the Black Reef Formation and the overlying Malmani dolomites.

3.1.1 Black Reef Formation

In the project area, the Black Reef Formation unconformably overlies steeply dipping strata of the West and Central Rand groups of the Witwatersrand Supergroup, and the Klipriviersberg lavas of the Ventersdorp Supergroup. The reef dips at approximately 15^{o} to the northeast and is highly undulating in places (CCIC, 2006). This formation is about 25 m thick in places. The formation consists of quartzite with lenses of grit stone and conglomerate especially along the base. The top of the formation often consists of shale where it gradually merges into the overlying Malmani dolomite (Visser et. al., 1989).

3.1.2 Malmani Subgroup

From the 1:250 000 geological map (2626 West Rand) it can be seen that the site is underlain by rocks of the Malmani Subgroup of the Chuniespoort Group of the Transvaal Supergroup. These rocks predominantly consist of poorly-bedded dolomite and limestone with chert layers.

3.1.3 Geological structure

The 1:250 000 scale geological map (2626 West Rand) shows major fault zones in the region, with the Roodepoort Fault being particularly significant in this study. Faults and dykes are significant since they may act as preferential pathways for groundwater flow.

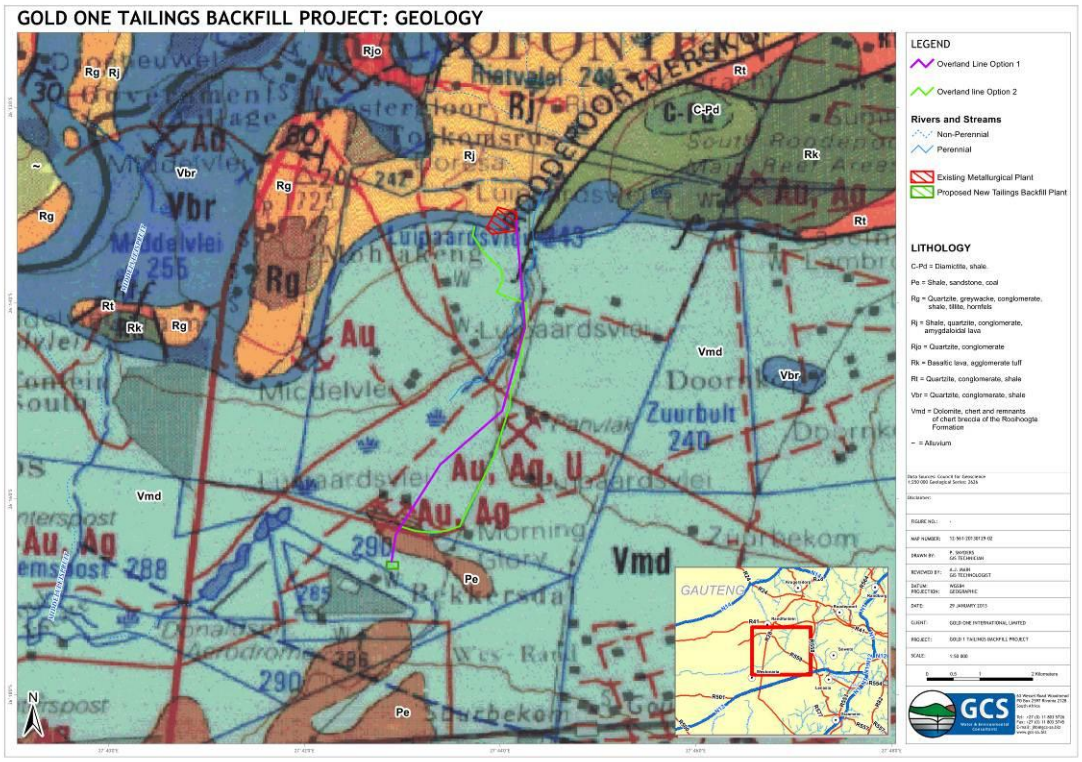


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Figure 3.1: Regional Geology

3.2 Topography

The topography of the overall area is relatively flat to rolling with a gradual slope towards the wetland system. The only significant topographical features are the low ridgelines that traverse the landscape from east to west in a number of places. The elevation of the general area rises from 1550 metres above mean sea level (mamsl) to 1730 ma.sl.

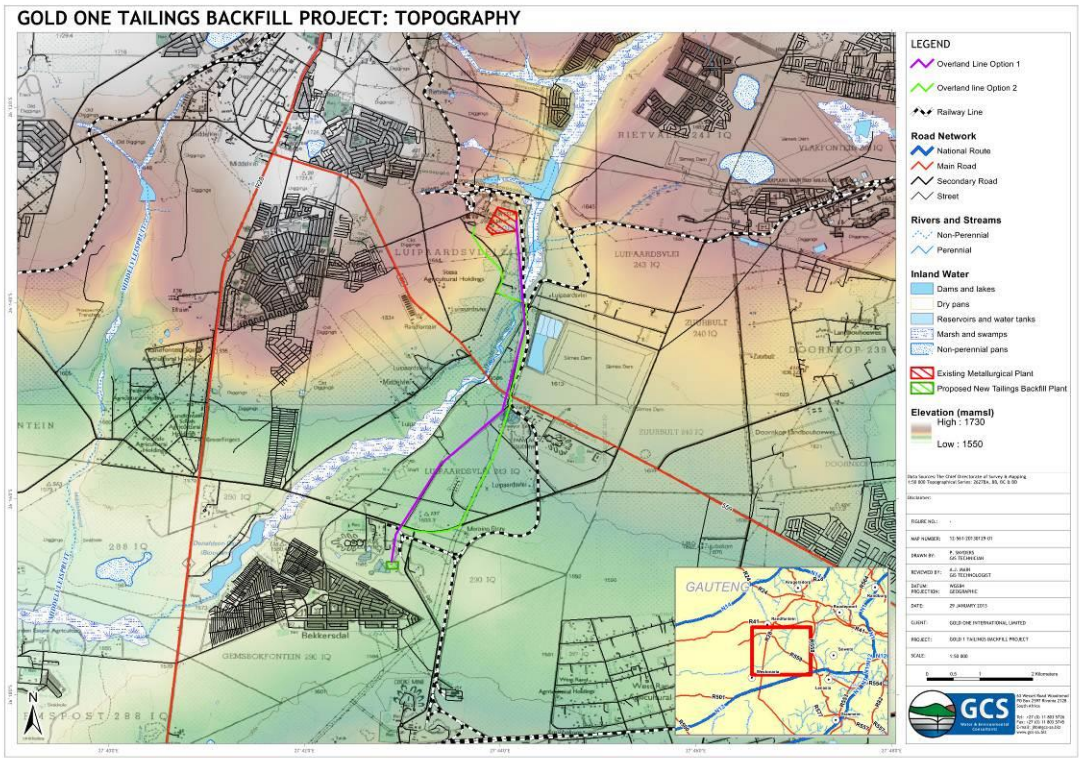

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Figure 3.2: Topography

3.3 Climate

The climate is typical for the Gauteng Highveld and is characterised by warm summers with rainfall. Winters tend to be dry and mild during the day and cold at night with regular frosts. Modelled meteorological data for the period January 2009 to December 2011 was obtained for a point South of the project site (26.533722 S, 27.629725 E).

The average daily maximum temperatures range from 22.9°C in December to 8.1°C in July, with daily minima ranging from 21.5°C in December to 7.1°C in July. Annual mean temperature is given as 16.8°C.

The area falls within the summer rainfall region with low rainfall between May and September (less than 25 mm a month). The highest monthly maximum precipitation (266.4 mm) occurs for January. The rate decreases down to 8.1 mm in July. The monthly minimum precipitation ranges between 191.3 mm in January and 0 mm in July and August.

The predominant wind direction is from the North, North-North West and North North-East, with frequent winds also occurring from the North East and Eastern quadrant.

The annual maximum, minimum and mean monthly evaporation rates for the area for the period 1957-1987 are 244 mm, 130 mm and 178 mm, respectively. The highest monthly maximum evaporation (332.2 mm) occurs for November. The rate decreases significantly down to 121.6 mm in June. The monthly minimum evaporation ranges between 200.7 mm in December and 69.9 mm in June.

3.4 Soils, Land Type, Land Use and Land Capability

Information with regards to the Soils, Land Type, Land Use and Land Capability study were sourced from the Environmental Impact Assessment (EIA) for the proposed Uranium Plant and Cooke Dump Reprocessing Infrastructure (Permit 1): Soils and Land Capability Specialist Study by Golder, February 2010.

The pipeline stretching from the Cooke plant to the proposed Backfill Plant is located on Land Types Ab7 and Fb 5. Land Type Ab7 is dominated by deep red soils while Land Type Fb 5 is dominated by shallow stony soils. The land use is dominated by grazing across Land Type Ab7, Fb5 found within the project area.

The land capability of the Land Types on the pipeline routes are arable Class II and grazing Class VI.

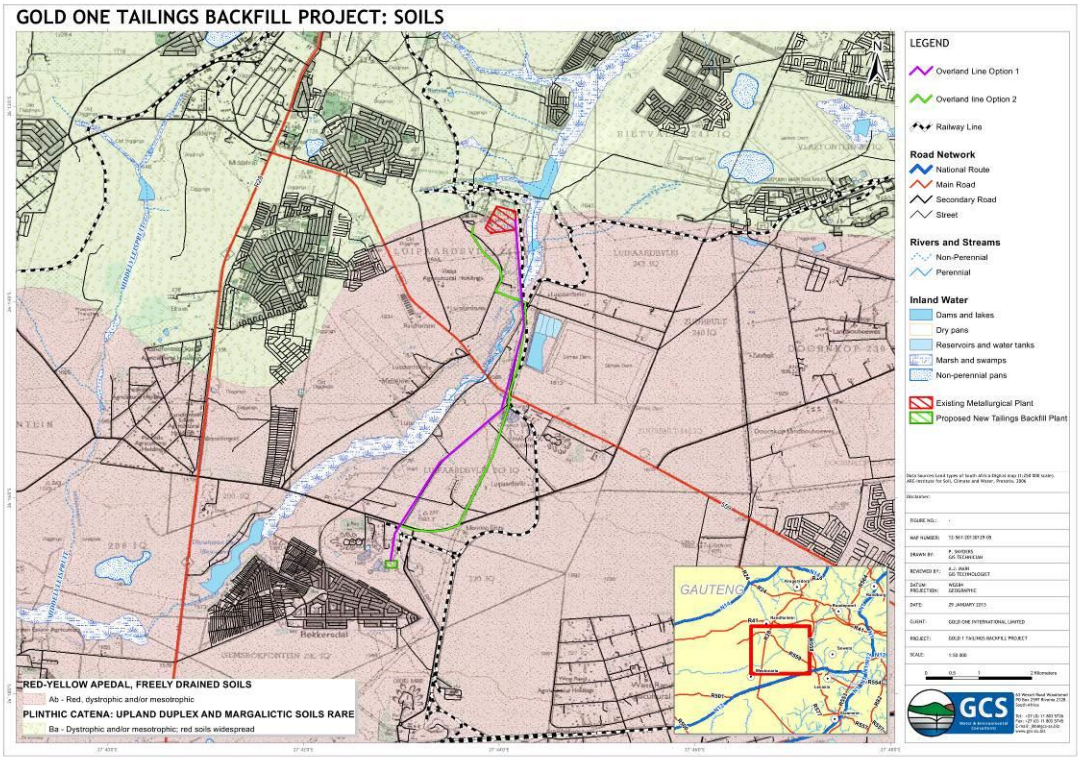

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Figure 3.3: Soils found in the project area

3.5 Flora and Fauna

The fauna and flora studies were conducted by Golder Associates for the Cooke Uranium plant in 2009 and by Digby Wells Environmental in 2012 for the Geluksdal Mega TSF Project. The study area is comprised of Grassland and Transformed areas and is described herewith.

The *Eragrostis gummiflua – Hyparrhenia hirta* grassland community was found in the project area. This grassland community falls within the Carletonville Dolomite Grassland (Mucina and Rutherford, 2006) (**Figure 3.4**).

Large portions of natural vegetation have been replaced by both alien vegetation which is comprised of exotic tree stands, disturbed areas which have been colonised by alien invasive vegetation and agricultural lands. Transformed vegetation is not regarded to have high ecological importance due to poor integrity, limited ecosystem functioning and abundance of introduced alien vegetation species.

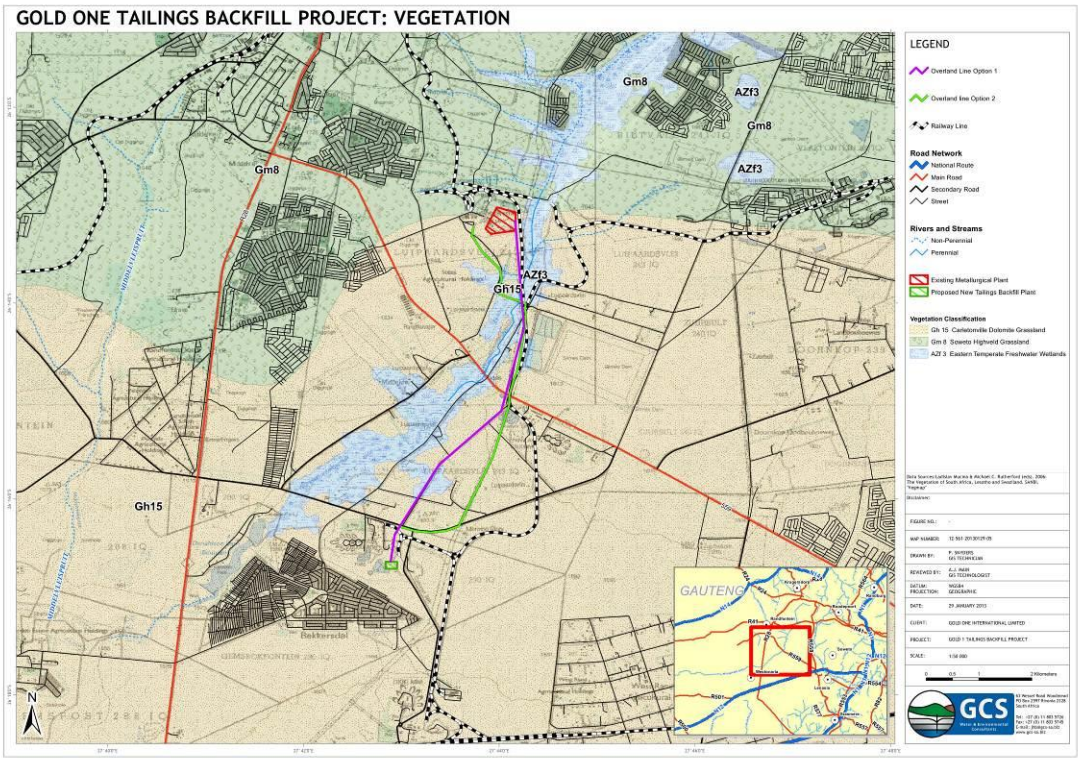

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Figure 3.4: Vegetation types (Mucina and Rutherford, 2006)

No Red Data Flora species have been identified during previous environmental authorization process field surveys. A number of endemic and biogeographically Important Species are however expected to occur within the project area (Digby Wells Environmental, 2012c).

No Listed or Red Data Mammals have been identified during previous environmental authorization process field surveys. Also no Listed Red Data bird species were identified during the 2012 field surveys, however the Grass Owl (*Tyto capensis*), has previously been identified within the project area (Golder, 2008). No amphibians were encountered during previous environmental authorization process field surveys. A number of threatened butterflies have been identified during previous environmental authorization process field surveys within the surrounding area.

3.6 Wetlands

The wetland studies were conducted by Golder Associates for the Cooke Uranium plant in 2009 and by Digby Wells Environmental in 2012 for the Geluksdal Mega TSF Project.

Wetlands were defined in terms of the NWA, as follows:

"*Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.*"

The soil composition of the wetland at the pipeline bridge has been impacted by anthropogenic activities. Poplar (*Populus canescens*) trees were growing within the wetland seasonal zone adjacent to the pipeline bridge. A pipeline support wall was constructed from building sand alongside a road. The road and stream crossing impeded the floodplain water flow. The stream bank was very steep and eroded on the eastern side. Grazing occurred within the temporal zone. This wetland has been classified as irreplaceable according to C-plan (Compaan, Pfab, Coetzer, Forsyth, Wittington-Jones, & Peinke, 2005) (**Figure 3.5**).

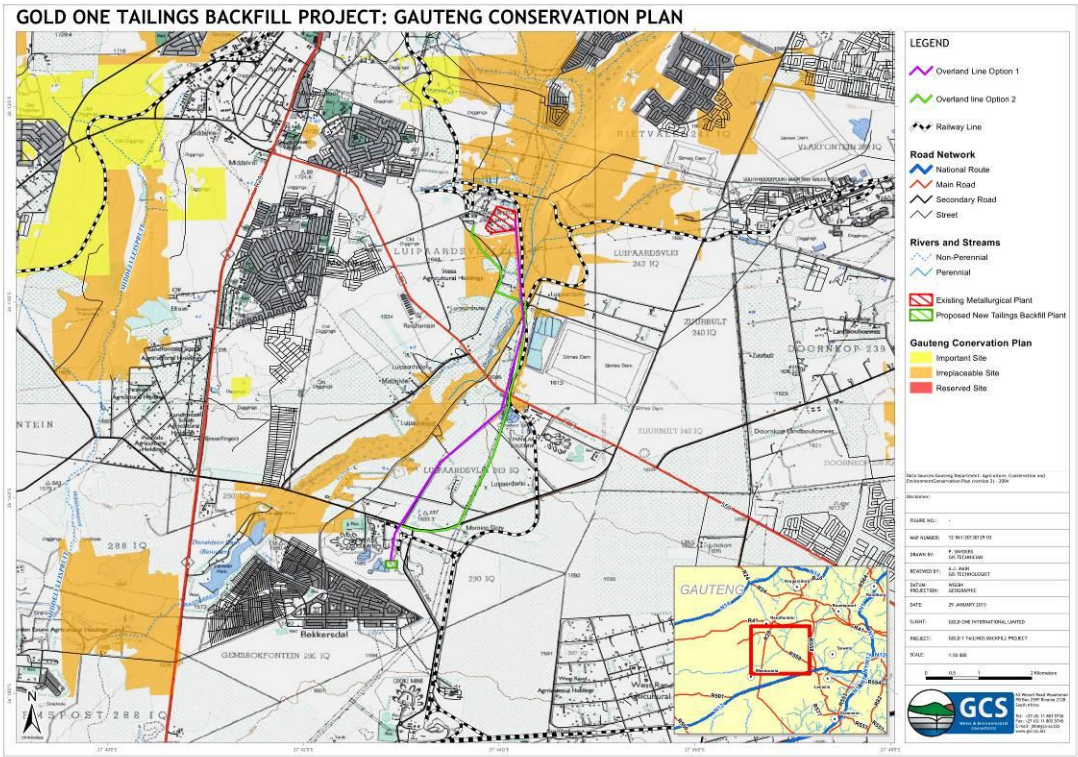

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Figure 3.5: Gauteng Conservation Plan (C-Plan)

The wetland found on site was classified as a floodplain wetland (Kotze, et al., 2005). Floodplains usually receive their water during high flow periods as water overtops the riverbanks. These types of wetlands are important for flood attenuation and do not significantly contribute to streamflow regulation.

During the assessment of the wetland it was found that the wetland's integrity was very low. Wetlands with very low integrity have an extensive loss of natural habitats and ecosystem functions

The wetland habitat was found to be largely modified with a large loss of natural habitat, biota and basic ecosystem functions, scoring only 61.7%. This puts the wetland in a C/D category. During the survey it was found that the wetland was highly degraded.

The Riparian Vegetation of the Wonderfonteinspruit determined (VEGRAI) to be moderately modified due to the loss and change of natural habitat and biota which has occurred, but the basic ecosystem functions are still predominantly unchanged.

According to the assessed score this wetland is considered ecologically important and sensitive on a provincial or local scale, with the biodiversity of the floodplains not being sensitive to flow and habitat modifications. This wetland can play a role in moderating the quantity and quality of water of its receiving river due to its location. Although due to the impacted nature of the wetland the role it plays is probably very small. The absence of high biodiversity can also be contributed to the impacted nature and large amount of invasive plant species present.

3.7 Aquatic Ecosystems

The aquatic study was conducted by Digby Wells Environmental in 2012 for the pipeline of the Geluksdal Mega TSF.

The project area is situated within the Upper Vaal Water Management Area (WMA 8), within Quaternary Catchment C23D. The ecological importance and sensitivity classification for the quaternary catchment C23D is considered to be high which in the default ecological management class category is considered to be a sensitive system. The present ecological status category for the system is described as largely modified (Class D). The attainable ecological management class for the system is a Class C (moderately modified)

The Cooke Plant and proposed pipeline for the plant are associated with the Wonderfonteinspruit, which is a perennial system and considered to be largely modified by local land uses and anthropogenic activities.

The overall in situ water quality was determined to be in a modified state with the conductivity and dissolved oxygen saturation being a limiting factor for aquatic diversity. The pH values for the low and high flow surveys are considered to be acceptable. Electrical conductivity was also acceptable. The in situ Dissolved Oxygen (DO) saturation was within the sub-lethal recommended for aquatic ecosystems and may be a limiting factor for aquatic biota.

Overall the constituents included in the *in-situ* water quality analysis were within the Target Water Quality Range (TWQR) with the exception of conductivity. Due to the high levels of conductivity recorded during both high and low flow surveys the conductivity is seen to be a limiting factor for aquatic biota. During the high flow survey (conducted in the summer months of 2012) it was noted that the conductivity of the aquatic systems showed an increasing trend. This is expected to be as a result of the surrounding land uses which includes the activities such as agriculture and mining.

Direct and indirect inputs from the local agricultural activities and mining operations have contributed to the physic-chemical modifications of the systems due to the release of chemicals, nutrients and toxics. These local land uses, as well as considering local infrastructure development have also contributed to the modifications of the streambeds due to sedimentation which will also impact on the water quality of these systems. The river banks of the catchment have also been modified by the local agricultural and mining activities which have encroached into these areas, resulting in the banks being eroded as a result.

Owing to the land uses and local development of the catchment, the state of the habitat of the catchment areas was determined to be moderately modified (Class C). This is an indication that a loss and change of natural habitat and biota has occurred, but the basic ecosystem functions are still predominantly unchanged.

The habitat associated with the Wonderfonteinspruit was determined to be “Adequate” to support macroinvertebrate diversity. The site consisted of a variety of habitat types which included the stones biotope, gravel, sand and mud as well as vegetation. In addition to this, a variety of flow-depth scenarios were also presented, and these include slow-shallow and fast-shallow areas in particular.

The only fish species sampled from the Wonderfonteinspruit system was the exotic species *Micropterus salmoides*. The state of the fish communities was determined to be in a critical state (Class F).

The low Average Score per Taxon (ASPT) scores (< 5) recorded at the Wonderfonteinspruit may be an indication that impaired water quality may be the dominant driving component of the system, with habitat modifications providing secondary impacts.

The Riparian Vegetation of the Wonderfonteinspruit determined (VEGRAI) to be moderately modified due to the loss and change of natural habitat and biota which has occurred, but the basic ecosystem functions are still predominantly unchanged.

The Overall EcoStatus for the survey location on the Wonderfonteinspruit was determined to be largely modified (Class D). This is an indication that a large loss of natural habitat, biota and basic ecosystem functions has occurred.

3.8 Surface Water

The Surface Water study was conducted by Golder Associates in 2009 for the pipeline of the proposed Uranium Plant, Uranium Plant, possible Acid Plant and Cooke Dump reprocessing.

The Uranium Plant, Cooke Dump and the pipelines fall in the Wonderfonteinspruit catchment which falls in the C drainage region of the Vaal River Catchment. The Wonderfonteinspruit catchment comprises quaternary catchments C23D, C23E and part of C23G. The project area is situated within Quaternary Catchment C23D (**Figure 3.6**). The Wonderfonteinspruit is a tributary of the Mooi River which joins the Vaal River below the Vaal Barrage (**Figure 3.7**).

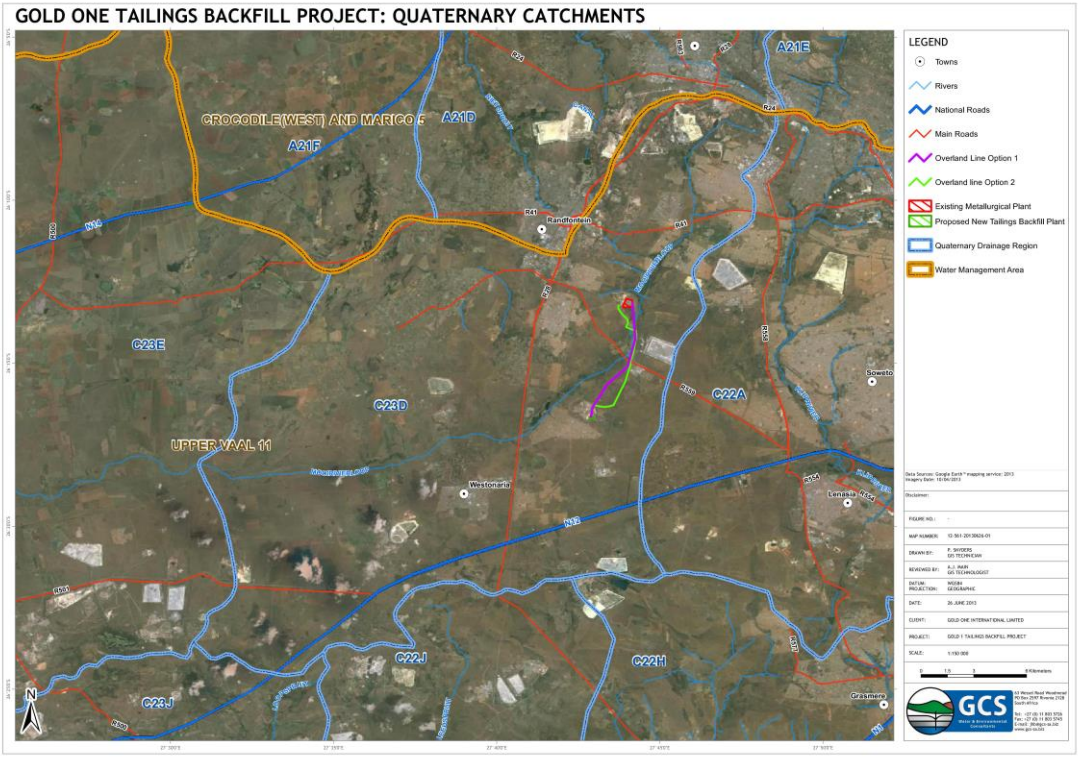

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Figure 3.6: Quaternary catchment of the project area

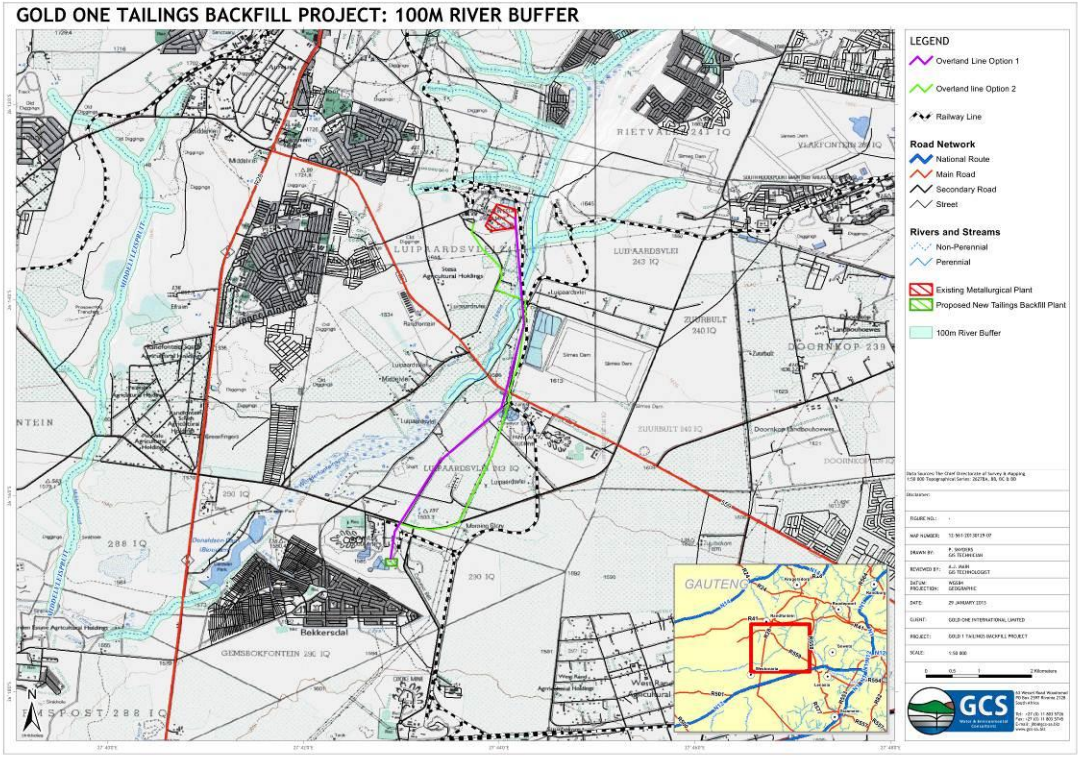

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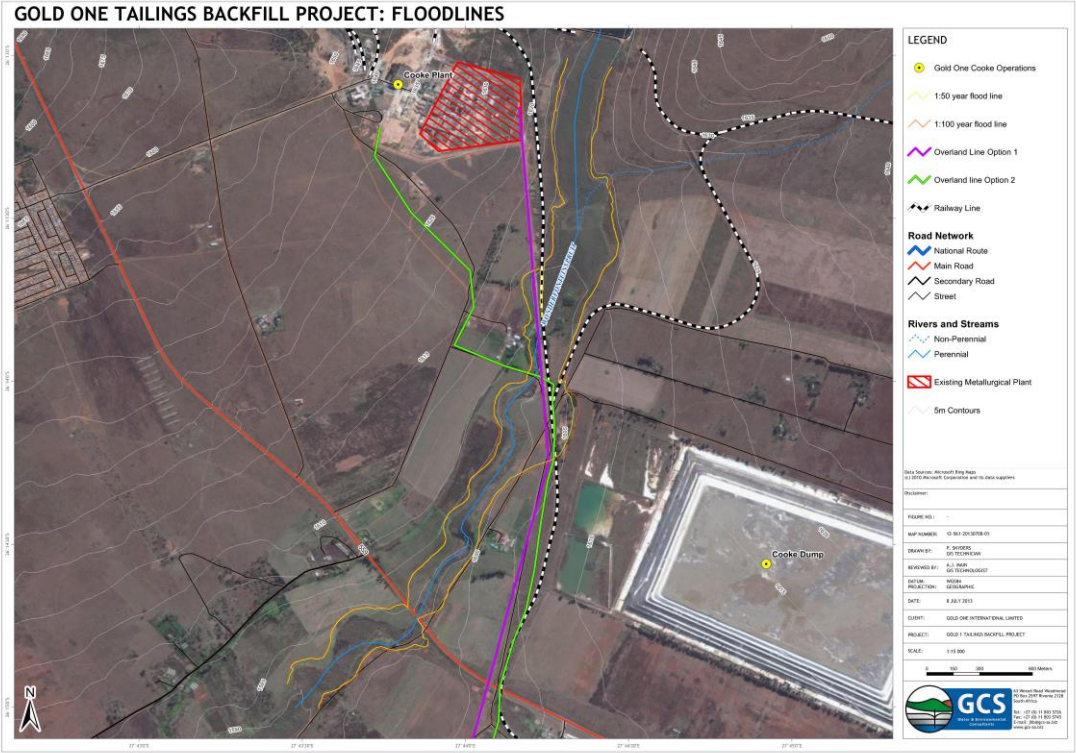
Figure 3.7: Wonderfonteinspruit drainage lines with 100m buffer

The source of the Upper Wonderfonteinspruit comprises a diffuse seepage 1 – 2 km upstream of Lancaster Dam. This dam is now largely filled with gold tailings eroded from the surrounding tailings dams.

The 1:50-year and the 1:100-year floodlines were determined using the available information (Golder Associates Africa, 2009c) (**Figure 3.8**). The sensitivity analysis showed that the water surface elevations were not sensitive to the conditions at the R559 road bridge.

The pipelines from the FPT Backfill plant will cross over the Wonderfonteinspruit via an existing pipeline bridge (**Figure 3.7**).



[FIGURE NOT TO SCALE – REFER TO A3 MAP IN APPENDIX C]

Figure 3.8: Wonderfonteinspruit floodline

3.9 Groundwater

The Groundwater study was conducted by Jones and Wagener in 2012 for the Gold One proposed Backfill Plant and Boreholes.

Gold One proposes to establish a backfill plant and four backfill boreholes at its Cooke Operations, Randfontein. The purpose of the boreholes is to deliver grout to the underground workings, to depths of approximately 900 m below surface. These boreholes will have to be drilled through a dolomitic aquifer, which is known for its large water storage capacity. Not only is drilling through this formation difficult, but the risk of intersecting and introducing groundwater to the mine workings is a significant risk. The non-weathered dolomite is largely impermeable, with the exception of a few groundwater conduits such as faults.

The Wonderfontein Spruit, a tributary of the Mooi River that flows into the Vaal River, drains the mining area. The regional geology includes, in chronological order;

- Witwatersrand Supergroup. These formations contain the economical gold placers (reef).
- Ventersdorp Supergroup. This formation often forms an effective barrier between the groundwater in the dolomite and the mine workings.
- Transvaal Supergroup. This formation contains the dolomite aquifer, which is the primary source for groundwater ingress into the mines.
- Karoo Supergroup. Only scattered remains of this unit, but sometimes a perched aquifer is present in these rocks.

The structural geology of the region is important in the sense that it controls the inflow or potential for groundwater inflow into the mine workings. The majority of the faults in the mine workings are of Witwatersrand age, but occasionally faults of Transvaal age are encountered. It is these faults, as well as the numerous intrusions of Karoo age that connect the dolomite aquifer to the underlying mine workings.

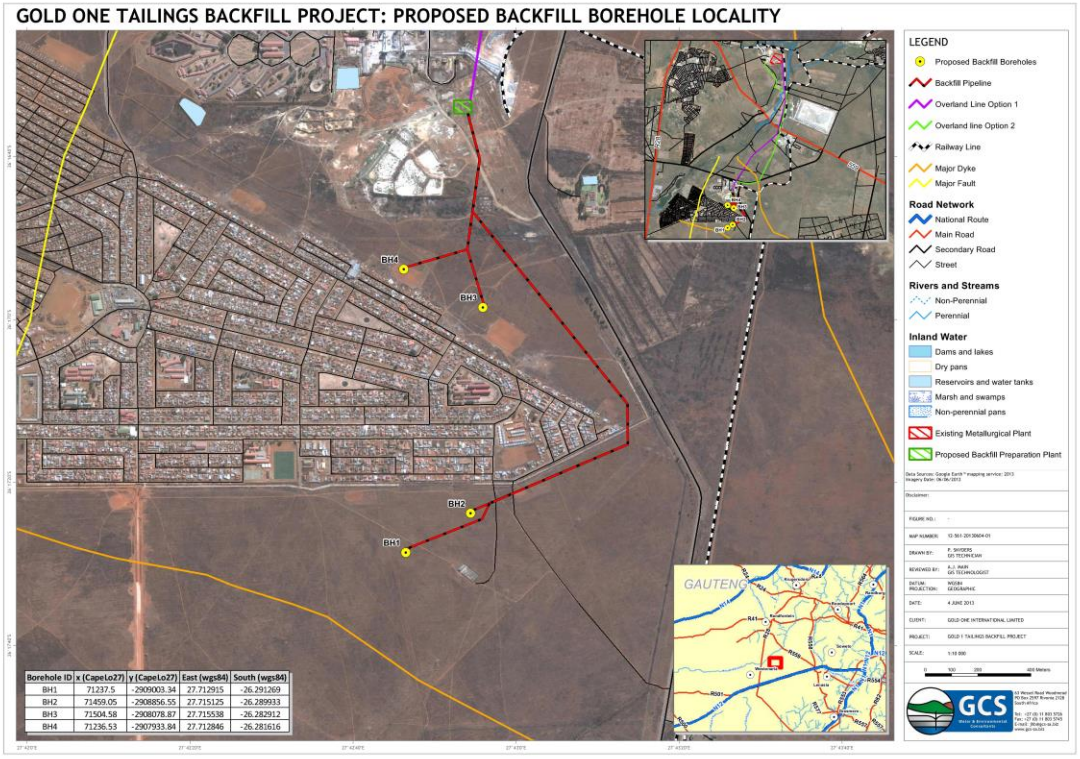
The weathered dolomite, together with its dissolution products (WAD), forms the main aquifer in the area. The near surface dolomite, which is extensively karstified, contains huge water storage potential and is the most probable source of groundwater inflow into the underlying mine workings. JCI (1986) mapped the Zuurbekom and Gemsbokfontein dolomite surface through a regional gravity survey to identify zones of deep weathering. The regional survey was conducted on a 100 x 100m grid and it was decided to refine this grid in the vicinity of the proposed plant and boreholes. A total of 121 gravity stations were acquired on each borehole location using a grid spacing of 10 metres.

Strong and prominent low gravity anomalies could be observed on all the borehole sites. These anomalies do infer the presence of relatively lower subsurface densities which may be caused by deeper and more weathered dolomite bedrock and also the presence of subsurface voids.

The most prominent geological feature within the immediate vicinity of the proposed backfill area is the Panvlakte fault. This fault marks the western boundary of the Cooke mining area. Although it is expected that this fault is associated with several smaller faults, the study area is far enough away from this feature not to have a significant influence. A review of the available borehole data in this area also indicates that there is no displacement of the dolomite by this fault. This would suggest that the fault is pre-Transvaal and is therefore not considered a groundwater conduit. This appears to be the case for all the faults in the vicinity of the study area. No evidence of post-Transvaal faults was found.

In terms of the proposed borehole and backfill plant positions (**Figure 3.9**) the following recommendations were thus made:

- Borehole BH1: This borehole is not located on any fault or within deeply weathered dolomite. The expected depth of weathered dolomite is 40 m. This borehole position appears to be suitable.
- Borehole BH2: This borehole is not located on deeply weathered dolomite, but it is situated in a faulted area. It is recommended that the borehole be moved approximately 30 m south. The dolomite bedrock appears to become shallower towards the south. The expected depth of weathering in the revised position is 35 m.
- Borehole BH3: This borehole is located in a gravity low area and it is recommended that it be moved approximately 60 m east.
- Borehole BH4: This borehole is not located on deeply weathered dolomite, but it is situated in a faulted area. The borehole position is also located in close proximity to a fault. It is recommended that this borehole position be moved approximately 50 m south. The expected dolomite weathering in the revised position is 25 m.
- Backfill Plant: The structural geology does not influence the proposed backfill plant and it is also located on a gravity high. The plant position appears to be suitable.



Borehole ID	x (CapeLo27)	y (CapeLo27)	East (wgs84)	South (wgs84)
BH1	71237.5	-2909003.34	27.712915	-26.291269
BH2	71459.05	-2908856.55	27.715125	-26.289933
BH3	71504.58	-2908078.87	27.715538	-26.282912
BH4	71236.53	-2907933.84	27.712846	-26.281616

[FIGURE NOT TO SCALE – REFER TO A3 MAP IN APPENDIX C]

Figure 3.9: Proposed Backfill Borehole Localities

3.10 Air quality

The Air Quality study was conducted by Airshed Planning Professionals in 2009 for the proposed Uranium Plant and Cooke Dump reprocessing infrastructure.

Monitoring conducted by DD Science over the period December 2008 to March 2009 indicated relatively high Particulate Matter (PM10) background concentrations and dust fallout levels. The average PM10 background concentration and dust fallout levels were found to be 66 ìg/m^3 (microgram per cubic meter) (SA proposed PM10 Standard: Annual average: 40ìg/m^3, Daily Average: 75ìg/m^3) and 556 mg/m^2/day (milligrams per square meter per day) (SANS residential target value: 600 mg/m^2/day (based on 30 day average), SANS industrial target value: 1200 mg/m^2/day (based on 30 day average)). Strategic Environmental Focus (SEF) reported background gaseous data received in 2007 from the Randfontein and Mogale City Local Council. The background Sulfur dioxide (SO_2) concentration throughout 2007 varied between 5 ìg/m^3 and 25 ìg/m^3 (SA proposed SO_2 Standard: Annual average: 50 µg/m^3(microgram per cubic meter)), with the highest concentrations recorded during the winter months.

The passive diffusive ambient monitoring conducted over the period August to September 2009 indicated average background levels of 10.2 and 14.2 ìg/m³ for SO_2 and nitrogen dioxide (NO_2) respectively.

The air quality in the area is influenced by the tailings dumps, dirt roads, farming and industrial operations.

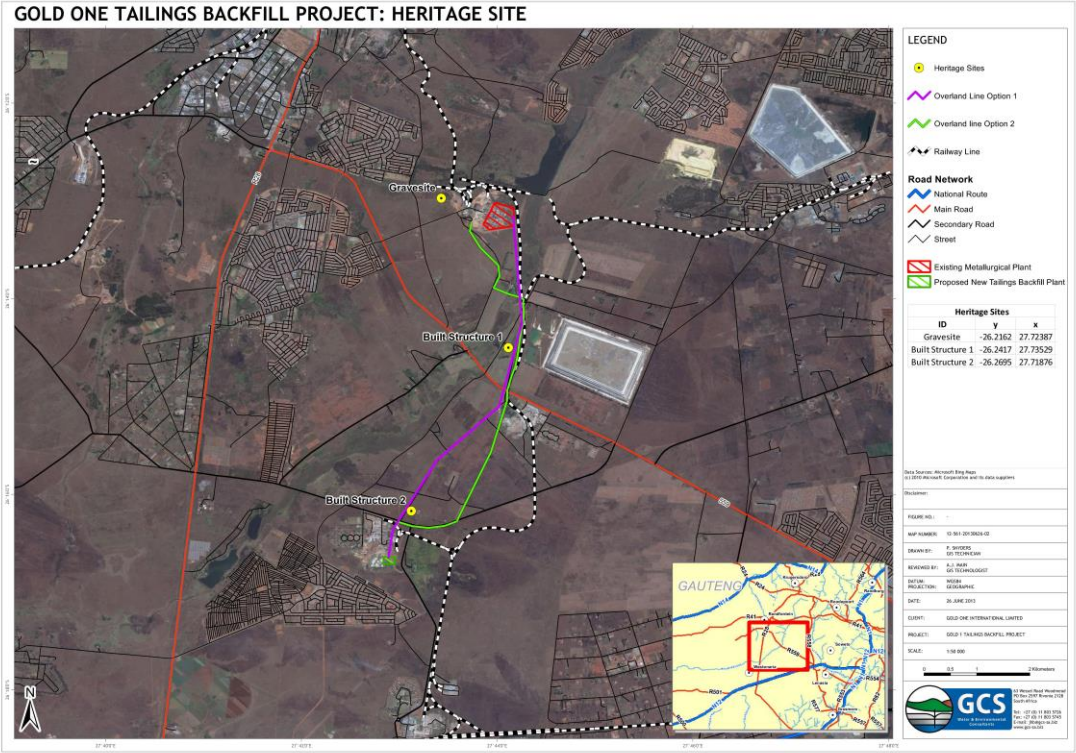
Based on the conceptual Project description there will not be an impact on Air Quality.

3.11 Sites of Historical and Cultural Importance

The Heritage study was conducted and updated by Digby Wells Environmental in 2012 for the proposed Geluksdal Tailings Storage Facility (TSF) and Pipeline Infrastructure. The Geluksdal Pipeline follows the same route as the proposed Backfill Plant.

Pistorius (2009c) conducted a survey for the proposed pyrite project near the Cooke Gold Plant. Only a single graveyard was identified. This graveyard will however not be impacted by the proposed pipeline or Backfill Plant.

The proposed pipeline routes lay within existing servitudes and potential impacts on heritage resources are not expected. Only the one cemetery (Pistorius 2009) and two built complexes (RAN1386/DW002 and RAN1386/DW003) occur in close proximity to the proposed pipeline routes, but potential impacts to these structures are negligible.



[FIGURE NOT TO SCALE – REFER TO A3 MAP IN APPENDIX C]

Figure 3.10: Sites of Historical Significance

3.12 Noise

Baseline measurements were used from previous studies done in the area, such as baseline information from J H Consulting for the proposed Uranium Plant and Cooke Dump reprocessing infrastructure as well as from two schools in the townships of Bekkersdal and Simunye in Westonaria. The overall baseline values indicate that ambient noise levels are typical of that which is expected of rural and suburban districts.

Noise propagation calculations performed for the construction of the pipeline, indicated that the construction noise (to the east and west) will not measure above the SANS rural limit guidelines of 45 dBA (A-weighted decibels), further than 950 m or not measure above the South African National Standards (SANS) suburban limit guidelines of 50 dBA, further than 590 m. There are a number of farmsteads and agribusinesses within the 950 m buffer along the pipeline.

Noise impacts during operational phase are mostly negligible because of limited noise sources as well as limited dispersion potential of the noise sources.

3.13 Traffic

The R559 (Main Road) crosses the project area in a south-easterly – north-westerly direction and the R93 crosses the project in a easterly – westerly direction. The R559 is the main road between the R28 (Toekomsrus and Mohlakeng) and the N12 at Protea Glen. The R93 links the R559 to the R28 at Bekkerdal.

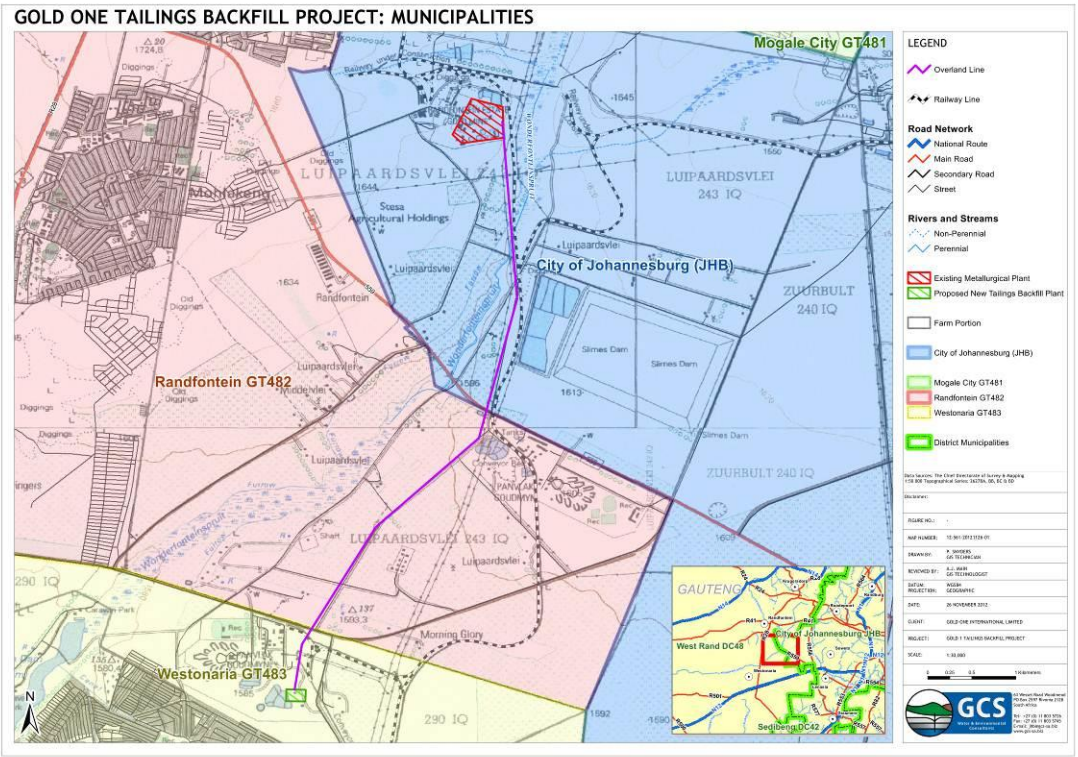
Two main roads are in close proximity to the project area; the R28, and the N12 highway. The location of the backfill plant is surrounded by entrance roads to the different Cooke offices, as well as several dirt roads to farmsteads and settlements.

From previous assessments conducted by BKS (2012) the traffic volumes are not expected to increase with regards to the project description and therefore no impact is expected and a detailed traffic assessment is not proposed.

3.14 Social Conditions

The Social Impact study was conducted by Digby Wells Environmental in 2012 for the proposed Geluksdal Tailings Storage Facility (TSF) and Pipeline Infrastructure. The Geluksdal Pipeline follows the same route as the proposed Backfill Plant pipeline and thus covers the same municipal areas.

Most of the project site falls within the West Rand District Municipality – more specifically, within two local municipalities that form part of this district municipality: Westonaria and Randfontein. Part of the pipeline route and the Cooke dam (to be reclaimed) also traverses the City of Johannesburg Metropolitan Municipality.



[FIGURE IS NOT TO SCALE- REFER TO A3 FIGURE ATTACHED]

Figure 3.11: Municipal Boundaries

The Backfill plant and pipeline project site overlaps with several municipal wards; these are listed below:

- Westonaria Local Municipality
    - Ward 12 - section of pipeline. Contains part of the town of Bekkersdal.
- Randfontein Local Municipality
    - Ward 14 - section of pipeline from the R559 to R93. Consists mainly of agricultural holdings. Contains a portion of Mohlakeng Township.
- City of Johannesburg Metropolitan Municipality
    - Ward 53 - section of pipeline from Cooke Plant southwards. Contains a portion of the suburb of Protea Glen, Doornkop Township and Slovoville.

Westonaria Ward 12 has the smallest population of all the affected wards with 3 987. The proportion of men and women is fairly even in this ward, averaging at 50% male and female.

The population densities of Westonaria Ward 12 are high having the highest (780 people per square kilometre) as well as the highest average number of persons per household (3.8 people). The average ages of residents is 28.6 years, making these fairly young populations that are likely to be more transient and altering than the older, more established wards. Westonaria Ward 12 is a largely Setswana speaking area due to 53% of residents speaking the language.

The level of informal settlement in Westonaria Ward 12 is 34%. Westonaria Ward 12's access to water, sanitation and electricity is above 70%.

The levels of education, as with most of the wards, are fairly low. In Westonaria Ward 12 31% of the population over 20 years old that has grade 12 or higher. People employed in craft/trade or elementary occupations account for just over 41% of Westonaria wards 12. Correspondingly, unemployment is higher in Westonaria Ward 12. Westonaria Ward 12 has 29% of households with no income. A portion of the town of Bekkersdal is situated in Westonaria Ward 12.

Randfontein Ward 14 is a small ward with a population of 14 052, whereas the City of Johannesburg (CoJ) Ward 53 has a population of 46 633. The two wards are situated alongside each other on the northern section of the pipeline.

The most commonly spoken language in Randfontein Ward 14 is Setswana (38%) and in CoJ Ward 53 it is isiZulu (45%). The population densities are similarly high - 660 people per square kilometre in Randfontein Ward 14 and 650 people in CoJ Ward 53. The average age of the CoJ Ward 53 population is 27.9 years old, the youngest of all the wards. This is largely due to Johannesburg being a thriving city that attracts many youth who seek work opportunities. The Randfontein Ward 14 population is also young, the average age being 29.1. It is likely host to many overflow immigrants from Johannesburg City.

Informal settlement in Randfontein Ward 14 is far higher (60%) than in CoJ Ward 53 where it is close to zero. There may be greater controls by the CoJ Metropolitan Municipality to keep informal settlement out, given the administrative significance of the city, provincially and nationally. The provision of municipal services is far greater in CoJ Ward 53 than in Randfontein Ward 14. Thirty-one percent and 39% of households in Randfontein Ward 14 have access to flush toilets and piped water inside the dwelling or yard respectively. Only 17% have access to electricity for lighting. In CoJ Ward 53, access to these services is 96%, 99% and 98%.

While these two wards are situated alongside each other, their economic status varies quite substantially. Randfontein Ward 14 has the largest portion of households with no income (38%) out of all the wards, while in CoJ Ward 53 it is 14%. Fifty-nine percent of households in Randfontein Ward 14 are in craft/trade or elementary occupations while in CoJ Ward 53 it is 31%. One could assume that because the CoJ population has the largest portion of the population aged 20 and older with grade 12 or higher (41%) out of all the wards that few people will be in elementary occupations. In Randfontein Ward 14 only 14% of the population over 20 years old has grade 12 or higher. Similarly, CoJ Ward 53 has the highest annual household income (R 40 700), while Randfontein Ward 14 has the lowest (R 14 800). Randfontein Ward 14 consists mainly of agricultural holdings and contains a portion of Mohlakeng Township. CoJ Ward 53 hosts a portion of the suburb of Protea Glen, Doornkop Township and Slovoville.

4 PROJECT DESCRIPTION

This section of the report relates to Section 31 (2) of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)
2 b) Detailed description of the proposed activity
2 f) A description of the need and the desirability of the proposed activity

This chapter describes the proposed surface infrastructure, mining infrastructure, mining method, etc. The information contained in this chapter has been obtained from the FPT Backfill Plant Conceptual Design report compiled by Murray and Roberts Cementation. The final design of the Tailings Backfill Plant is being completed by DRA, and will be incorporated into the Final EIA/EMP document.

4.1 Existing Infrastructure

The properties within the study area consist of informal settlements, the towns of Bekkersdal, Mohlakeng and Toekomsrus.

Mining located in the study area comprise of the Gold One Cooke Operations. The Cooke 1, 2 and 3 mines are serviced by a developed network of mining and civil infrastructure, with adequate electrical power and water readily available. The underground orebodies are exploited by means of conventional hard rock mining methods involving drilling, blasting, scraping, tramming and hoisting.

Dump 20, also located in the study area, was created as a result of stamp milling technology that was employed at the Millsite Gold Plant, which was commissioned in 1911. The Cooke Plant was constructed in 1978 and initially treated the high grade ores from the adjacent Cooke shafts (Cooke 1, 2 and 3). The plant has a nameplate capacity of 280,000 tonnes per month for underground ores.

Additional existing infrastructure includes gravel roads on the farms, farm buildings, railroads and pipeline infrastructure.

4.2 Overview of Proposed Operations

At present, the Gold One Cooke Operations consists of Cooke Underground operations, Cooke Plant and Dump 20.

The primary mining horizons at Cooke Underground are the upper Elsburgs and VCR reefs. While these ore bodies have been mined for 20 - 30 years, the current owners have deployed a range of modern exploration and resource development tools designed to significantly expand the life of these operations. The Cooke 1, 2 and 3 mines are serviced by a developed network of mining and civil infrastructure, with adequate electrical power and water readily available. The underground ore bodies are exploited by means of conventional hard rock mining methods involving drilling, blasting, scraping, tramming and hoisting.

Dump 20 was created as a result of stamp milling technology that was employed at the Millsite Gold Plant, which was commissioned in 1911. The battery of stamp mills could not fine grind the ore to effectively extract all the contained gold, and this resulted in the creation of Tailings Dam (Dump) 20. Today the Randfontein Surface Operations process Dump 20 at a typical rate of 300,000 tonnes per month and produces some 32,000 ounces of gold per annum.

Reclamation of this sand dump will reduce by the end of 2012, whereupon the Dump 20 sand and slime resource will be processed through the Cooke Plant. The Cooke Plant was upgraded during 2012 to increase feed throughput to 400,000 tonnes per month.

4.2.1 Additional Infrastructure Required

For the proposed FPT Backfill Project, tailings would require modification in order to be suitable for use as a backfill medium. The Backfill plant will require a 14 hour (hr) supply per day at a rate of 217 cubic meters per hour (m^3/h) with a relative density of 1.4 ton per cubic meter (t/m^3) to manufacture 38 850 m^3 FPT backfill every month.

The process diagram is presented in Table 4.1 and described briefly in Figure 4.1.

According to the Murray and Roberts conceptual design, the tailings particle grading approximately two thirds of the solids (the coarse portion) never leaves the gold plant through the cyclone system (3). Approximately one third (fines) is pumped overland to the thickeners (2), where flocculent (5) is added to aid in increasing the density.

The thickener overflow (6) consists mainly of water but also contains a small quantity of ultra-fines that is pumped back to the gold plant (7) for disposal on a tailings dam. The thickener underflow (4) is mixed with binder (9) and pumped underground (10). Spillage is also disposed of at the gold plant, diluted greatly by the thickener overflow (6). The total solids used will be approximately 118 tons per hour.

Table 4.1: Process Description

Line	Description	Solids (t/h)
1	Gold Plant Feed	360
2	Cyclone overflow (Fines)	120
3	Cyclone underflow (Coarse)	240
4	Thickener Underflow	117
5	Flocculent addition	0.005
6	Thickener Overflow (Ultra fines)	3
7	Solids waste	9
8	Plant Spillage	6
9	Binder addition	7
10	Finished Backfill	118

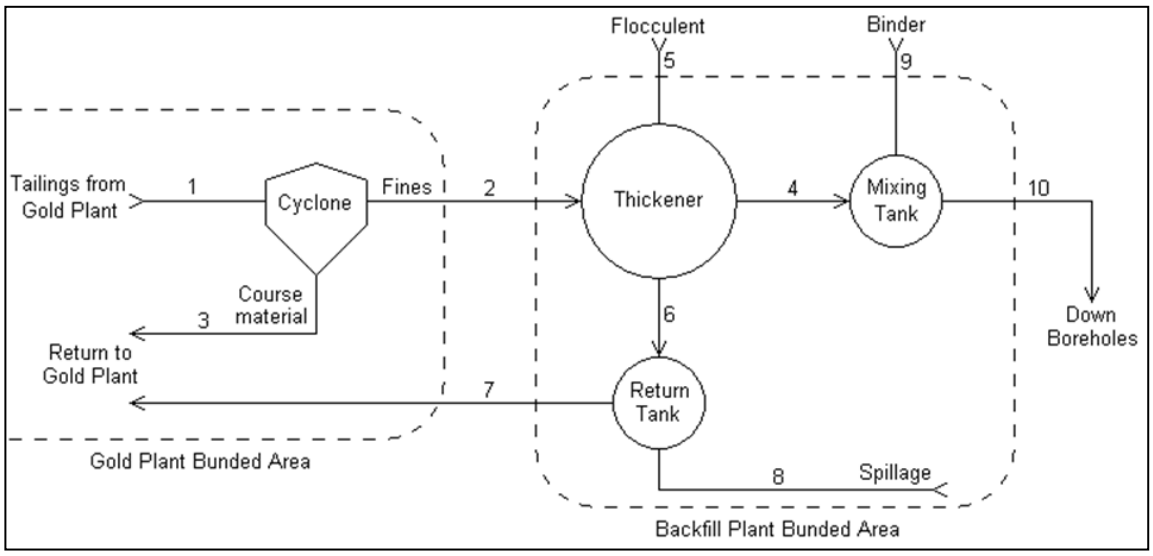
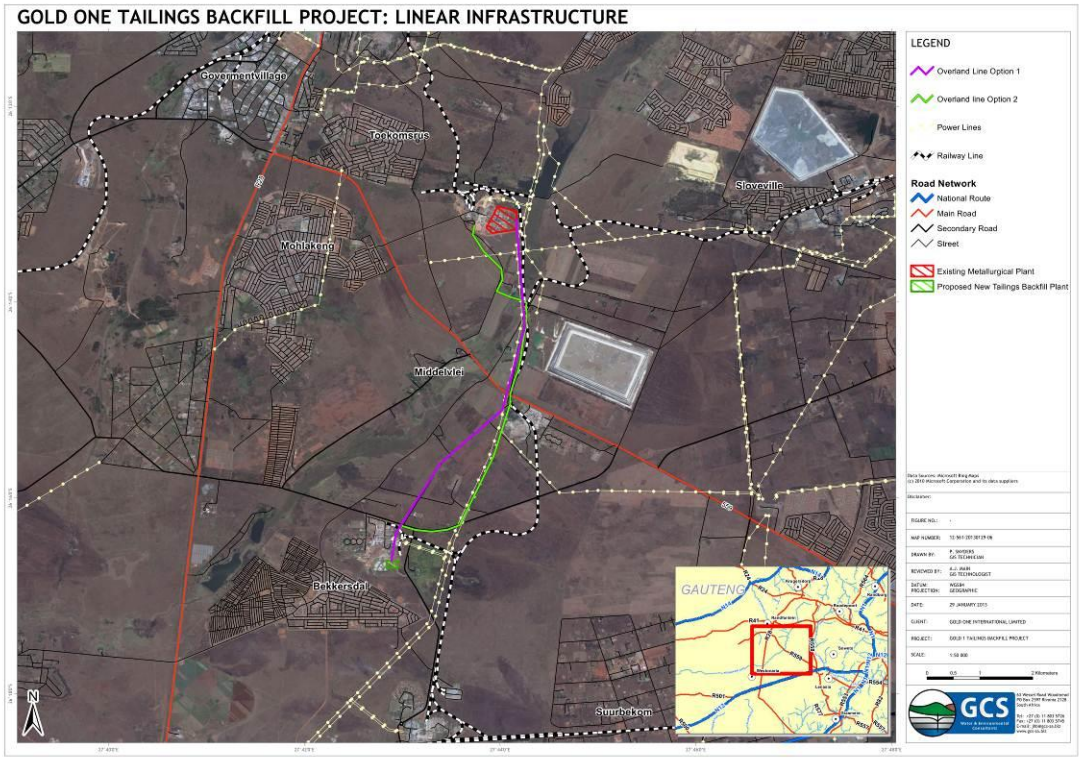


Figure 4.1: Tailings Backfill Plant Process

4.3 Linear Infrastructure

Linear infrastructure refers to roads, railways, powerlines and pipelines. The following linear infrastructure is located on and adjacent to the project area (**Figure 4.2**).



[FIGURE NOT TO SCALE- – REFER TO A3 MAP IN APPENDIX C]

Figure 4.2: Existing linear infrastructure

4.3.1 Roads and Railways

4.3.1.1 Existing

The proposed project area is located within an area with extensive existing road and railway infrastructure (**Figure 4.2**). The R559 (Main Road) crosses the project area in a south-easterly – north-westerly direction and the R93 crosses the project in a easterly – westerly direction. Two main roads are in close proximity to the project area; the R28, and the N12 highway. The location of the backfill plant is surrounded by entrance roads to the different Cooke offices, as well as several dirt roads to farmsteads and settlements.

4.3.1.2 Proposed Additional Roads and Railways

For the purposes of the FPT Backfill Plant project, it is not anticipated that any additional roads or railway lines will be constructed.

4.3.2 Powerlines

4.3.2.1 Existing

The proposed project area is located within an area with extensive existing infrastructure. Existing Powerlines are located in a northerly – southerly direction passing the proposed Backfill Plant site and following the proposed pipeline route. Some power lines branch off from this line towards the Cooke 2 Shaft area where the FPT Backfill Plant will be located (**Figure 4.2**).

4.3.2.2 Proposed Additional Powerlines

Electricity for the operation of the proposed FPT Backfill Plant and associated infrastructure will be obtained by connecting to the nearest overhead Eskom power line and routing a supply cable along the shortest feasible route to the facilities. The electricity requirements for the plant are 500 kilowatt (kW) on average with 4400 tons carbon dioxide (CO_2) generation per year.

Gold One will establish that Eskom has sufficient capacity to accommodate the proposed scheme beforehand, and will implement any required upgrades if indicated to be necessary by Eskom.

4.3.3 Pipelines

4.3.3.1 Existing

The proposed project area is located within an area with extensive existing infrastructure. Currently there are several pipelines located between the different Cooke underground operations and the Cooke Plant. These pipelines transport sludge and return water between the facilities.

4.3.3.2 Proposed Geluksdal TSF pipeline

For the proposed TSF project (Digby Wells Environmental, 2012, GDARD ref no: 002/09-10/N073), residue tailings, partially thickened or dewatered, will be pumped via a 42 km overland pipeline to the consolidated TSF for deposition (not part of scope of work for Tailings Backfill Plant – but this application was made to GDARD in 2012 and is given as background).

One tailings pipeline will be constructed and provision made for future expansions envisaged at this time. The return water pipeline will transport the return water from the TSF return water dam back to the Cooke plant water storage facility, for re-use in the process. The proposed tailings pipeline is proposed to be a DN450 mm/350 mm carbon steel pipeline with a wear resistant liner; and the return water pipeline will be a DN300 mm carbon steel pipeline with epoxy lining. The northern section of this pipeline will be located within existing servitudes, and next to or on, property boundaries.

The location of the pipes will be above ground on precast concrete plinths, which will allow for greater integrity of the installation and access for maintenance purposes. The plinths will simplify leakage and damage detection to the pipeline and will aid in carrying out maintenance and repair operations. Where the pipelines cross roads and other linear infrastructure, a method referred to as “cut and cover” crossings or pipe jacking will be used where appropriate. This will enable the pipeline to pass underneath the obstruction in a precast culvert-like concrete conduit or similar. Where the pipeline has to cross surface water resources, the pipelines will cross above ground over the watercourse and specialized engineered crossings will be used.

4.3.3.3 Proposed Additional Pipelines for the FPT Backfill Plant

Pumps will be installed to transport the overflow product from the cyclone at Cooke plant (based on the conceptual design), via the proposed pipeline to the new backfill plant adjacent to Cooke 2 shaft. The return water pipeline will transport the return water back to the return water dam at the Cooke plant, for re-use in the process.

Based on the conceptual design, the tailings pipelines will be 450 mm in diameter and rubber lined for erosion and corrosion protection. The return water pipeline, 300 mm in diameter, will be coated internally and externally. All three pipelines will be placed in a common servitude and bunded where appropriate. The individual pipes will be placed above ground on precast concrete plinths, which will prevent soil contact; and to simplify damage detection and facilitate maintenance and repair operations.

Where the pipelines cross roads and other linear infrastructure, specific designs appropriate for the particular crossing will be employed. At railway and provincial road crossings, the pipes will pass underneath the obstruction in a precast concrete culverts or jacked structures, whereas at smaller roads, appropriately designed structures will be used. Where watercourse crossings are required, it is envisaged that the pipelines will cross above ground over the watercourse utilising the minimum number of plinths possible, and manual construction methods to minimise construction impact.

The pipeline route will be specifically selected to ensure that the pipes run along existing servitudes and linear infrastructure to minimise impact on the receiving environment.

4.4 FPT Backfill Plant

The proposed FPT Backfill Plant is situated in a Brownfield's area North of Bekkersdal, near Westonaria in the Gauteng Province. It will further be located adjacent to Cooke 2 shaft complex south of the R93.

According to the conceptual design, the FPT Backfill Plant will receive tailings from the cyclone overflow feed tanks, and tailings are then thickened. Binder is added to thickened tailings to produce cemented FPT before being delivered underground. The plant essentially comprises of three 8 m diameter High Compression Thickeners. Associated tanks and flocculent plants are included in this area.

The entire area will be bunded with brick bund walls to ensure that no spillage occurs outside of the bunded areas.

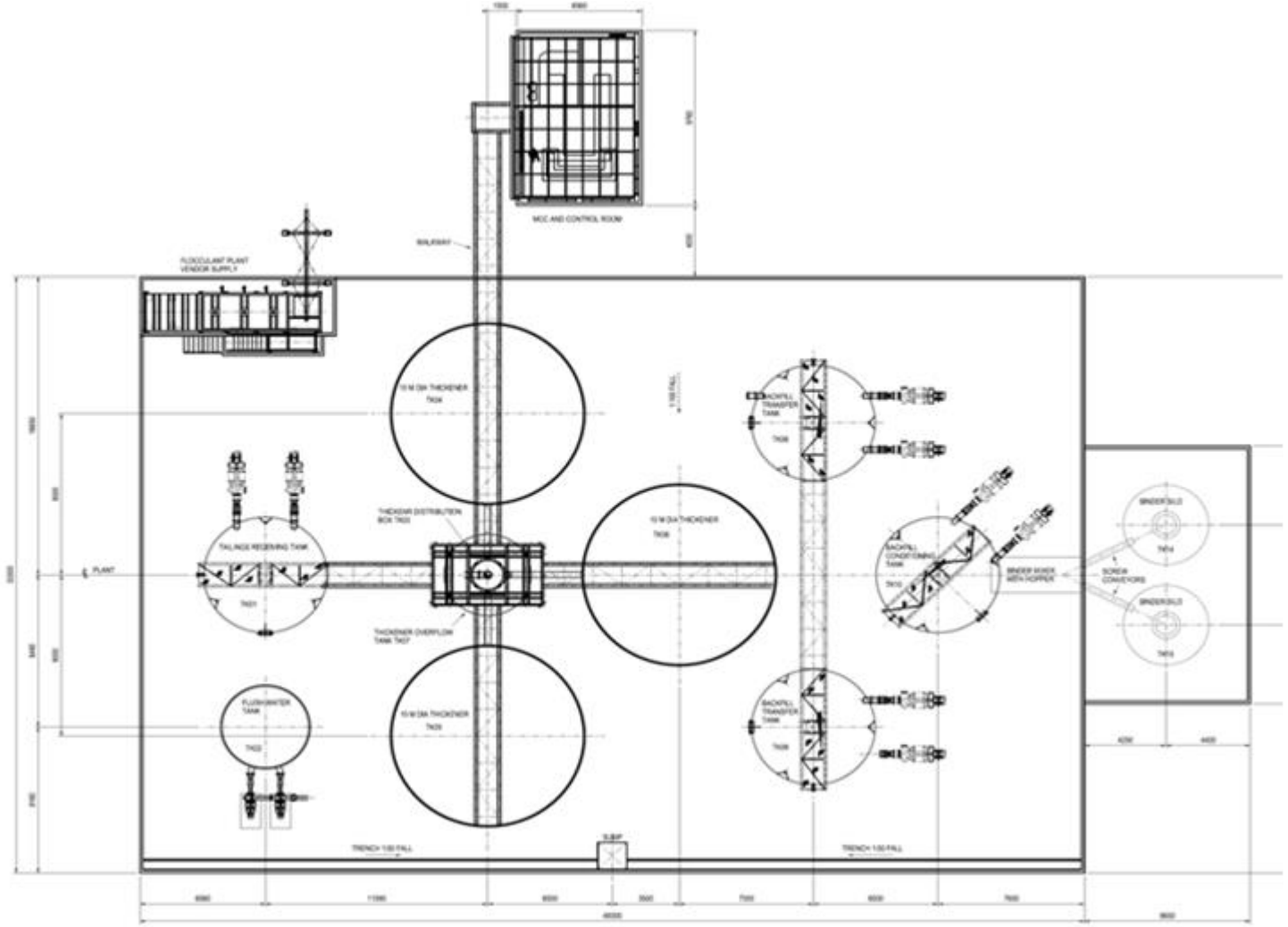


Figure 4.3: Conceptual general arrangement of the backfill Plant

The infrastructure description that follows herewith is based on the conceptual design from Murray and Roberts. The final EIA/EMP document will indicate both the conceptual and final infrastructure descriptions.

4.4.1 Tailings Receiving Tank

Tailings, from the Cyclone overflow tank at Cooke Plant located 7.4 km to the North will be pumped into the Tailings Receiving Tank, where tailings are then transferred to the thickener distribution tank. Tailings supply is planned to be sourced from Cooke Plant due to the Particle Size Distribution (PSD) of the tailings.

Dilution water will be delivered by variable speed driven mine water pumps from Cooke 2 Shaft. This will be used to dilute the thickener feed to a Specific Gravity (SG) of 1.2 t/m^3 if it is too high. The ideal SG for the thickener is 1.2 t/m^3. The Tailings Receiving Tank is equipped with mechanical and air agitation devices to ensure continuous agitation of the product. Mechanical agitation will normally be used, with air agitation used for start-up and during mechanical failure of the agitator.

The receiving tank has a capacity of 350 m^3 and has been sized to provide buffer capacity to ensure availability of tailings when needed, and will also be sized to accept the full overland line contents in an emergency (290 m^3). The tank can also be pre-fabricated and transported to site, thus making it easier to erect and also allowing removal to another location at a later stage.

Pumps will deliver the tailings to a thickener distribution box. Density control will ensure that the correct product density is achieved by measuring the thickener underflow and circulating the product until the correct density is achieved.

4.4.2 Thickener Distribution Box

The thickener distribution box will deliver tailings into any of the three thickeners. The thickener distribution box will have a capacity of 10 m^3 and will be installed on a 10 m high tower. Three high-density polyethylene (HDPE) gravity pipes connected to the thickener distribution box will be used to feed any of the three thickeners with tailings.

Each of the gravity pipes will be a 350NB. The thickener distribution box will be equipped with a fourth, larger diameter gravity pipe feeding back to the tailings receiving tank to take up any excess flow which does not report to the thickener. Flow control valves will be installed to control the flow into each thickener. This will be controlled by the underflow density of the thickeners.

4.4.3 Thickeners

Three 8 m diameter High Compression Thickeners (HCT), also known as Deep Cone Thickeners (DCT) have been included in the design. A bolted design is envisaged which would enable the plant to be relocated if required. Each thickener is capable of handling 500 m^3/day product (underflow). The thickeners would be configured concentrically to ensure minimal feed and overflow tanks are required.

Tailings are delivered to any of the thickeners at a feed rate of 63 m^3/hr. Flocculent is then supplied to the thickener at a rate of 40 Grams per ton (g/t) to facilitate the thickening process. Overflow from all the thickeners report to the thickener overflow tank and the thickener underflow from the thickeners is delivered to the backfill transfer tanks before being delivered underground.

Each thickener is provided with a re-circulation facility to ensure the desired underflow density is attained before the tailings report to the backfill transfer tanks, also to ensure that tailings are returned to the thickener should breakdowns occur in the upper section of the plant. High density variable speed driven centrifugal pumps will be utilized to transport thickener underflow from thickeners to either of the backfill transfer tanks.

4.4.4 Thickener Overflow Tank

The overflow from the thickeners will report to the overflow tank, centrally located between the thickeners. The overflow tank has 100 m^3 capacity and is a cone bottomed tank. This tank will also receive all spillage from the backfill plant and will then transfer the water back to Cooke Plant.

4.4.5 Backfill Transfer Tanks

The thickener underflow reports to the backfill transfer tanks, by means of variable speed driven backfill transfer feed pumps. The backfill transfer tanks are mechanically agitated flat bottomed tanks and each has been sized to have a capacity of 350 m^3.

They serve a function of holding backfill before being transferred to the binder mixing tank. Pumps will be used to pump the thickener underflow/backfill to the binder mixing tank. The pumps are equipped with mechanical seals to prevent additional gland seal water to dilute the product.

4.4.6 Binder Plant

The binder preparation plant has been designed to have the capability of manufacturing sufficient quantity of binder needed by the new FPT backfill preparation plant. The binder plant will also have enough binder buffer capacity to minimise binder shortage. The binder plant has binder storage capacity of 300 tons which is equivalent to three days storage when the plant consumes binder at 7% by mass. According to the process flow diagram 50 tons per hour (t/hr) of binder will be produced by the binder plant. This plant will consist of the following equipment:

- 2 x 150 ton Binder Storage silos;
- Related screw conveyors;
- Binder mixer; and
- Related plant instrumentation.

Binder will be transferred to a weigh hopper located above the mixer. Once the mixer has a load of slurry, the weigh hopper will discharge and the mixer will mix the product. The mixing process will take approximately 6 seconds. The product will discharge into a transfer tank which will then be pumped to four boreholes where the product is transferred via pipelines to the underground workings.

4.4.7 Borehole Tanks – Flushing circuit

The mine water tank will provide flushing water to the 65NB backfill ranges at any given time. Each range is able to deliver 60 m^3/hr of water. Water can be used to flush the backfill ranges all the way to the stopes.

4.5 Control System

The FPT Backfill Plant will be controlled using a Supervisory Control And Data Acquisition (SCADA) control. All density meters, flow rate, transmitters and mass measurements will report to the control room, located above the MCC to the North of the binder preparation plant. The operator will have access to the plant via an overhead walkway which will traverse the thickeners, and provide access to all tanks and control valves.

4.6 Waste Management

4.6.1 Process waste

Process waste will consists mainly of water, but also containing a small quantity of ultra-fines, and binder that might spill during the processing of the backfill.

The entire area will be bunded to ensure that no spillage occurs outside of the bunded area. All spillage inside the bunded area will be transferred back to Cooke Plant for disposal on a tailings dam. This will either be done through a dedicated return line, or a line which links to the Cooke 2 disposal pipeline.

4.6.2 Sewage Facilities

Ablution facilities will be located on site and sewage from the ablutions will be handled via septic tank arrangement.

4.7 Water Storage and Management

The infrastructure description that follows herewith is based on the conceptual design from Murray and Roberts. The final EIA/EMP document will indicate both the conceptual and final infrastructure descriptions.

4.7.1 Water Balance

The water balance is very similar to the FPT Backfill Plant process with the exception of mine water (11) and rainfall (14). Mine water consists of both flushing water used to clean pumps and pipes (12) and wash water (13), used to clean the bund of spillages. Ultimately, all excess water is sent to the gold plant (7) for disposal. The total water used will be approximately 38 m^3/hr with 108 m^3/hr returned to the gold plant.

Table 4.2: Water balance within process

Line	Description	Water (m^3/h)
1	Gold Plant Feed	433.2
2	Cyclone overflow (Fines)	144.4
3	Cyclone underflow (Coarse)	288.8
4	Thickener Underflow	48.9
5	Flocculent addition	9.6
6	Thickener Overflow (Ultra fines)	93.3
7	Waste water	107.8
8	Plant Spillage	7.2
9	Binder addition	3.15
10	Finished Backfill	37.6
11	Mine water supply	7.2
12	Dilution Water	0
13	Wash Water and Flushing water	7.2
14	Rainfall Water	0.10

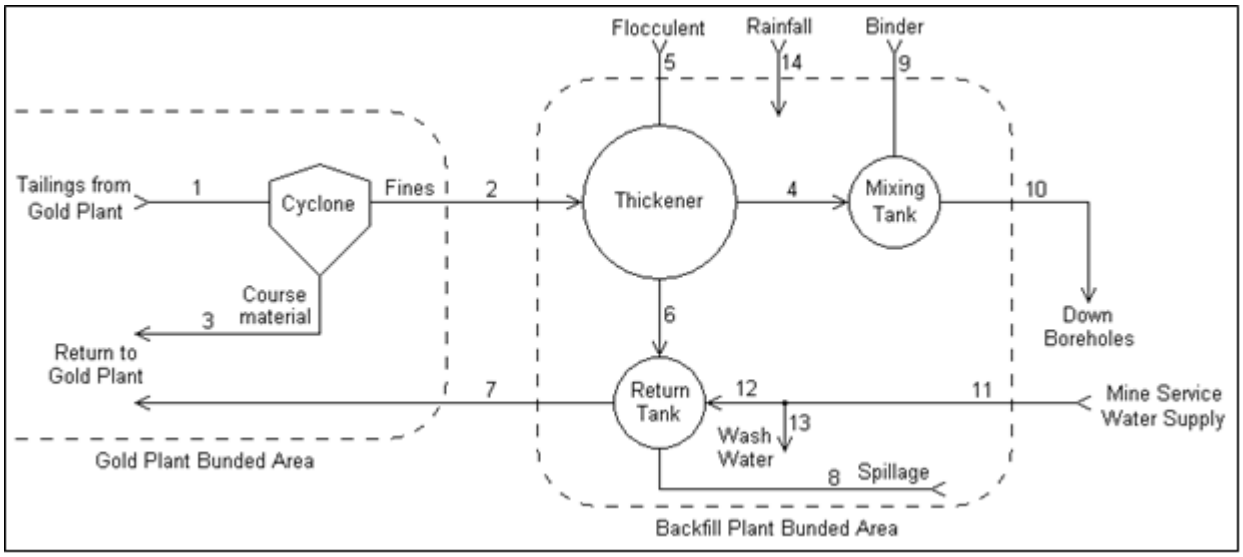


Figure 4.4: Water Balance within Process

4.7.2 Clean Water and Dirty Water Storage Facilities

Potable water and dirty water will stay unmixed and will be stored in separate tankage. Braithwaite tanks are typically used for potable or mine water. Most of the dirty water is handled at the cyclone plant (288.8 m^3/hr). Of the 144.4 m^3/hr of dirty water sent to the backfill plant only 37.6 m^3/hr (25%) is used to transport backfill underground and the balance returned back to the cyclone plant 107.8 m^3/hr(75%).

The plant layout will be designed such that no accumulation of water on the floor will occur. Floors will be graded with a slope of 1:100, to allow water to collect into a sump where water will be disposed-off in a controlled manner. The plants will have bund walls for spillage containment with volume of 120% of single biggest tank. At the cyclone plant existing storm water drainage will be used and a dedicated sump will be provided for storm water/spillage catchment purposes.

4.7.3 Conceptual Storm Water Management Plan (SWMP)

The Storm Water Management will be assessed in terms of DWA best practice guidelines and Government Notice No. 704, published in terms of the National Water Act (Act No. 36 of 1998) which requires the following to be adhered to:

- All clean water systems must be designed and operated in such a manner that they are at all times capable of handling the 1:50 year flood event on top of their mean operation level without spilling;
- Any water arising from an area, which causes, has caused or is likely to cause pollution of a water resource, including polluted storm water, must be contained within a dirty water system. In order to reduce the volume of polluted water, contaminated areas should be minimised. While clean water should be diverted to natural water courses, polluted water should be re-used wherever possible, thereby reducing the use of clean water; and
- Design, construct, maintain and operate any dam or tailings facility that forms part of a dirty water system to have a minimum freeboard of 0.8 m above full supply level.

The SWMP is being compiled and will be finalised and included in the Final EIA report.

4.8 Water Supply

4.8.1 Potable Water

Potable water provision will be required. It is anticipated that potable water will be obtained from existing sources, should this not be a feasible option, Gold One will explore the possibility of obtaining water from alternate sources.

Average potable water consumption is 15 m^3 per hour (consumers for this would be flocculent plant, gland service water and humans)

4.8.2 Process Water

Dilution water will be delivered by variable speed driven mine water pumps from Cooke 2 Shaft. This will be used to dilute the thickener feed if it is too high. The mine water tank will provide flushing water (at 7.2 m^3/h) to the 65NB backfill ranges at any given time.

4.9 Operating Hours

Operating hours of the plant - 10 hr period, with potential to go into 24 hrs.

4.10 Final plant layout

The information used for the project description is based on the conceptual design report of Murray and Roberts. The final plant design as undertaken by DRA will be incorporated into the Final EIA/EMP.

4.11 Life of Operation

The planned life of operation is based on a conceptual understanding of the project and is estimated at approximately 9 years. The overall Gold 1 operation's life of mine is considered to be in excess of 20 years. Gold 1 may potentially continue to use the infrastructure of the Tailings Backfill Plant for the duration of the life of mine (in excess of the original 9 years).

5 PROJECT ALTERNATIVES

This section of the report relates to Section 31 (2) of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)
2 f) A description of the need and the desirability of the proposed activity
2 g) 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.
2 i) Description and comparative assessment of all alternatives identified during the environmental impact assessment process

5.1 Pipeline Alternatives

One pipeline alternative for the tailings to be transported to the FPT Backfill Plant was to follow power lines for majority of the way and linking up with the western side of the Cooke Gold Plant. This alternative would have been in close proximity to a wetland area East of the FPT Backfill Plant and would have required additional infrastructure for the pipeline and was thus the less preferred option. The preferred option was to follow the current pipeline servitude and possibly use an existing pipeline and link up on the eastern side of the Cooke Gold Plant.

Several alternatives exist for the Wonderfonteinspruit crossing. The current option is to support the pipes on plinths next to the road crossing over the Wonderfonteinspruit. This option is currently the preferred option as it is within existing servitudes and property owned by Gold One.

Alternatives to this will be to cross perpendicular to the stream either upstream or downstream of the preferred option. This will minimise the length of the crossing, however might have a bigger impact during construction and on landowners.

5.2 Pipeline Design Alternatives

It is common practice for large civil and utility infrastructure pipelines to be buried underground. This is done so that the pipelines do not form physical obstructions in the landscape; are protected by the surrounding earth; and do not pose a safety risk to people.

Pipelines that are used to transport slurried tailings (tailings material that is mixed with water and moved through the pipeline, either under the influence of gravity or under pressure provided by a booster pump) are usually positioned above-ground, for a number of reasons:

- The construction operations and trenching required to bury a pipeline require a significant amount of earthworks potentially resulting in a larger temporary construction servitude, and causes greater environmental impact than is the case with pipelines constructed above ground.
- Pipelines that cross watercourses and wetlands above ground on plinths or suspended by other means have the potential of causing far less environmental impact on the water body and associated habitat that it crosses, especially if low-impact manual construction methods are used in these areas.
- Detecting potential leaks in any of the pipes is much easier than with buried pipes, as the leaks are visible and can therefore be identified more quickly and accurately.
- Maintenance and repair actions which require rotating of the pipes from time to time are simpler and less intrusive on the environment to carry out, as the pipe does not have to be re-exposed as would be the case with a buried pipeline.
- It is cheaper than buried lines, which is a significant consideration where large distances are involved.

For the reasons above, Gold One will construct the pipeline(s) aboveground. For the purposes of this project, the pipelines will not have embankments or buttresses along the entire length of the pipeline, and these will only be built in significantly steeper areas, where surface runoff may potentially cause erosion within the servitude. Should a backfill spillage occur on private property, Gold One will be responsible for the cleanup and rehabilitation back to original condition of the affected area.

5.3 Supply Alternatives

Initially the tailings supply was planned to be sourced at the South West corner of the tailings dam, near Cooke 1 Shaft. This was changed to source tailings from Cooke Plant due to the required Particle Size Distribution (PSD) of the tailings.

A PSD of two samples taken from the tailings at Cooke Plant indicated a high concentration of coarse material. This is due to the current sand treatment process, and has created tailings which will not be suitable for the production of backfill. The tailings would require modification in order to be suitable for use as a backfill medium.

This course material from the tailings dam will be difficult to pump directly due to its high settlement tendencies. This however will be blended with the original tailings at the Cooke Plant which will not be passing through the cyclone (pumps will be installed to transport the overflow product) and transported to the new backfill plant.

5.4 Location of Backfill Plant

The proposed location for the Tailings Backfill Plant was chosen as it was already heavily impacted on and located in a disturbed (Brownfield's) area. The location is also in close proximity to the Cooke 2 Shaft complex which will aid in the supply of process water and is also the location for the area to be backfilled.

The Brownfield's area was the preferred option for the reasons stated above, and due to the fact that no Greenfields areas will be impacted. No further alternatives were therefore investigated.

5.5 Benefit/Motivation of the Project

The purpose of backfill is to provide support for mined out areas up to 4 m in height in order to maximise ore extraction as well as reduce the ventilation requirements underground. The risk of fires is also reduced, and surface environmental pollution is mitigated by the transfer of tailing underground. Furthermore it will:

- Reduce tailing material to be placed on the tailings storage facility;
- Improve geotechnical safety in the workplace;
- Continued job creation within the local community.

5.6 No-Go Option

The implications of the no-go option are:

- The potential local and national economic benefits that could be derived from the beneficiation of precious metals and uranium from the Cooke Dump and others will be lost;
- The environmental benefit/opportunity of removing pyrite in the current tailings will be lost;
- Rand Uranium's current underground operations (life of mine) in the Randfontein area will not be extended;
- Job opportunities will not be realised; and
- The opportunity to improve geotechnical safety in the workplace will be lost.

6 PUBLIC PARTICIPATION PROCESS

This section of the report relates to Section 31 (2) of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)	
2 e) Details of the public participation process conducted in terms of the subregulation (1),including:	
v.	Steps undertaken in accordance with the plan of the study;
vi.	A list of persons, organizations and organs of state that were registered as interested and affected parties;
vii.	A summary of comments received from and a summary of issues raised by interested and affected parties, the date of receipt of these comments and the response of the EAP to these comments; and

This chapter describes the stakeholder engagement process undertaken thus far. The proof of public consultation undertaken to date is included in Appendix B of this report.

6.1 Purpose of public participation

6.1.1 Legal Requirements

The Public Participation Process (PPP) forms an integral part of the environmental authorization application in terms of the following legislative processes:

- MPRDA: Section 48 (f) and 49(f) respectively of the MPRDA regulation R527, published in terms of Section 107(1) of the MPRDA Government Gazette No. 26275, dated 23 April 2004;
- NEMA: Chapter 6, R543, Government Gazette No. 33306 dated 18 June 2010; and
- NWA: Section 41 (4) of the NWA provides that the competent authority (DWA) may, at any stage of the application process, require the applicant to place a suitable notice in newspapers and other media, and to take other reasonable steps as directed by the competent authority to bring the application to the attention of relevant organs of state, interested persons and the general public.

Due to the legislative requirements listed above, the public consultation process has been integrated as far as possible to present all environmental authorization application processes to I&APs.

6.2 Identification of Interested and Affected Parties (I&APs)

The following stakeholder groups were identified and informed of the project:

- Landowners;
- Lawful occupiers of land;
- Relevant authorities;
- Utilities; and
- Members of the public within the Randfontein, Westonaria and Johannesburg areas.

The stakeholder database for the FPT Backfill Plant Project is provided in Appendix B of this report.

6.2.1 Landowner Consultation

Landowners were consulted in the following manner:

- Letters were delivered to landowners surrounding the site notifying them of the proposed project;
- Written communication (Background Information Document) sent via email; and
- A public meeting was held on 27 February 2013 in Westonaria (Refer to the description under Section 7.2.4.1 of this report). The meeting has been scheduled post submission of the ESR to the stakeholders to award all the opportunity to comment on the report.

6.2.2 List of Authorities consulted

The following authorities were informed, in writing, of the project application processes being undertaken:

- Randfontein Local Municipality;

- Westonaria Local Municipality;
- West Rand District Municipality;
- Gauteng Department of Agriculture and Rural Development (GDARD);
- Department of Mineral Resources;
- Provincial South African Heritage Resources Agency (SAHRA);
- Department of Water Affairs (DWA); and
- National Nuclear Regulator (NNR).

These authorities were automatically registered as I&APs on the stakeholder database developed for the project.

6.3 Notification of Stakeholders

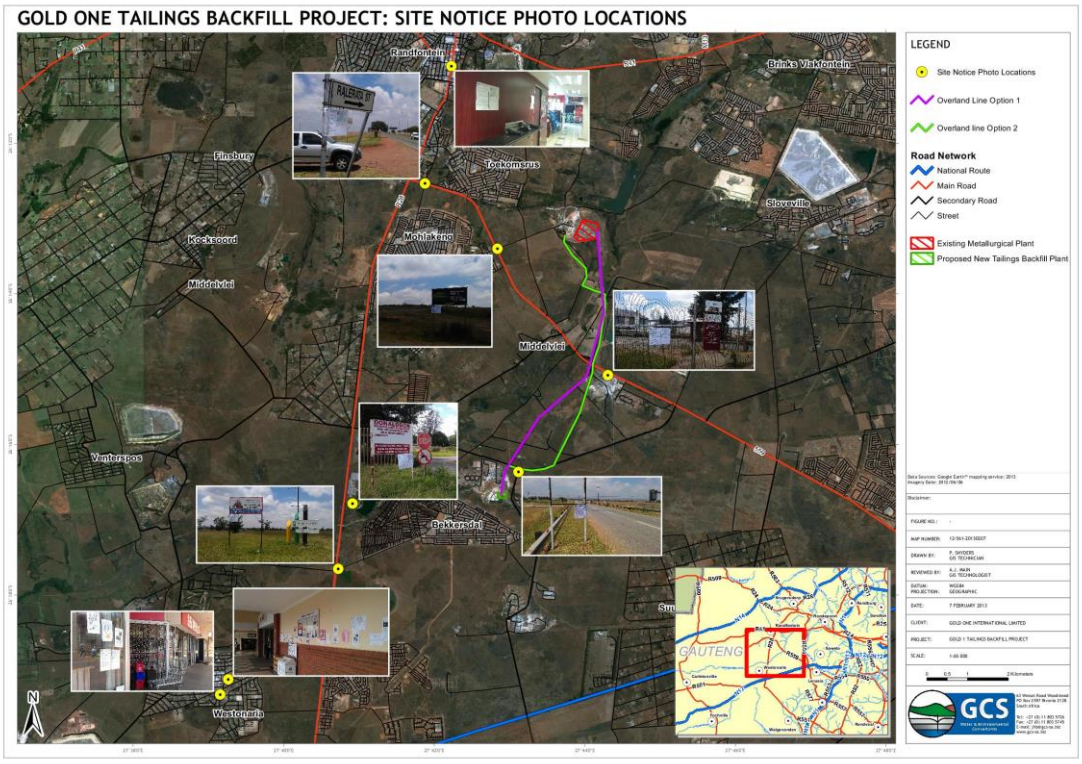
Various methods of written notification were utilized to inform the I&APs. The process undertaken thus far is described in this section of the report and proof thereof is included in Appendix B of this report.

Each of the documents which were used to notify stakeholders and the public of the project contained the following information:

- The geographic location of the project;
- The name of the applicant;
- The reference numbers issues for the environmental authorization application which were issued by the GDARD;
- The applications being undertaken in terms of the NNRA, MPRDA, NEMA and NWA;
- The listed activities being applied for in terms of the NEMA regulations;
- An invitation to register as an I&AP;
- The contact details and deadline for registration; and
- Notification that a public meeting will be held to present the project (as part of the NEMA and NWA), informing the public that all registered I&APs will be informed of the date, time and venue for the public meeting once these details have been finalized.

6.3.1 Site Notices

Site notices were placed at six (6) locations on the proposed project area. The locations where these site notices were placed are shown in Figure 6.1 and the copy of the site notices and proof of placement (photographs) is presented in the proof of public participation document included in Appendix B.



[FIGURE NOT TO SCALE- - REFER TO A3 MAP IN APPENDIX C]

Figure 6.1: Location of Site Notices

6.3.2 Media advertisement

An advertisement (Figure 6.2), according to Regulation 54 of NEMA regarding the project background and the assessment process being followed were placed on 15 February 2013 in the Randfontein/Westonaria Herald.

Randfontein/Westonaria Herald, 15 February 2013 SPORTS SCENE Page 23

GEHOU TE WESTONARIA
SAAKNR. 4487/09
TUSSEN SLADDEN & MILNE INDUSTRIAL SUPPLIES (PTY) LTD
EISER
EN FARHARD KHAN
VERWEERDER

Ingevolge uitspraak in die Hof van die Landdros van Westonaria en Lasbrief tot geregtelike verkoping gedateer die 3de dag van OKTOBER 2012, sal die ondervermelde goedere in eksekusie op die 22ste dag van **FEBRUARIE 2013** om 11h00 te 50 EDWARDSLAAN, WESTONARIA aan die hoogste bieder geregtelik verkoop word, naamlik:

1x LG TV & TV STAND & PHILLIPS DVD & COFFEE TABLE
2x BROWN LEATHER COUCHES & GREY MATCHING CHAIRS (2)
1x DININGROOM TABLE & 8 CHAIRS & SIDEBOARD
1x SAHARA LAPTOP & SANSING HI-FI
1x BEDROOM SET COMPLETE
1x BATHROOM CUPBOARD
1x WHITE & GOLD BEDROOM SET COMPLETE
1x KITCHEN TABLE & CHAIRS
1x KELVINATOR 2 MICROWAVE OVEN & CHEST FREEZER
1x KIC FRIDGE/FREEZER & DEFY DISHWASHER
1x DEFY WASHING MACHINE & DEFY TUMBLE DRYER
1x PHILLIPS TV & DELL PC COMPLETE WITH PRINTER
1x GREY TOYOTA REG: MLD 970 GP
1x SILVER KELVINATOR FREEZER

GEDATEER TE WESTONARIA OP DIE **23ste** DAG VAN **JANUARIE 2013**

VENTER & VON ABO
MCGREGORSTRAAT 7
WESTONARIA
Verw: MS2846/RVA/AD/S2846
BALJU
WA001251

RANDFONTEIN DORPSBEPLANNING SKEMA, 1988
KENNIGEWING VAN AANSOEK OM TOESTEMMING.

Kennisgewing geskied hiermee, ingevolge Klousule 13 van bogenoemde skema dat ek, die ondergetekende, van voornemens is om by die Plaaslike Munisipaliteit van Randfontein aansoek te doen om spesiale toestemming vir die oprigting, gebruik of stigting van: PAULA'S DAY CARE CENTRE op Erf No: 12 dorp RANDFONTEIN Geleë te 12 MAJUBA ROAD, FINSBURY wat binne RANDFONTEIN gebruiksone val.
Planne en/of besonderhede van hierdie aansoek is gedurende gewone kantoorure (08h00 tot 16h00) te Munisipale Kantore, Randfontein, ter insae.
Besware, indien enige, teen die goedkeuring van hierdie aansoek, met redes daarvoor, moet skriftelik by die Munisipale Besuurder, Randfontein Plaaslike Munisipaliteit, POSBUS 218, Randfontein, 1760 en by die applikant ingedien word nie later as 1 MARCH, 2013.
NAAM: PAULA SEFAKO
TEL NO: 078-854-9420
ADRES: 12 MAJUBA ROAD, FINSBURY, RANDFONTEIN, 1759.
WA001128

RANDFONTEIN TOWN PLANNING SCHEME, 1996
NOTICE OF APPLICATION FOR CONSENT

Notice is hereby given in terms of Clause 13 of the Randfontein Town Planning Scheme, 1998 that I, the undersigned, intend to apply to the Local Municipality of Randfontein for special consent to establish:
GRANNY "M" DAY CARE CENTRE On Erf / Stand No: 1396 LESHOMO STREET, township: MOHLAKENG situated at: LESHOMO STREET which falls within: MOHLAKENG, RANDFONTEIN use zone.
Plans and / or particulars of this application may be inspected between normal office hours (08h00 to 16h00) at the Municipal Offices, Randfontein.

Objections, if any, to the application, together with the grounds thereof, must be lodged in writing to the Municipal Manager, Local Municipality of Randfontein, PO Box 218, RANDFONTEIN, 1760 and to the applicant not later than 1 MARCH 2013.
WA001162

RANDFONTEIN DORPSBEPLANNINGSKEMA 1988
KENNISGEWING VAN AANSOEK OM TOESTEMMING

Kennisgewing geskied hiermee, ingevolge Klousule 13 van bogenoemde skema dat ek, die ondergetekende, van voornemens is om by die Plaaslike Munisipaliteit van Randfontein aansoek te doen om spesiale toestemming vir die oprigting, gebruik of stigting van: GRANNY "M" DAY CARE CENTRE Op Erf No: 1396 Dorp: Mohlakeng Geleë te: LESHOMO STREET, wat binne: MOHLAKENG, RANDFONTEIN gebruiksone val.
Planne en/of besonderhede van hierdie aansoek is gedurende gewone kantoorure (08h00 tot 16h00) te Munisipale Kantore, Randfontein, ter insae.

Besware, indien enige, teen die goedkeuring van hierdie aansoek, met redes daarvoor, moet skriftelik by die Munisipale Bestuurder, Randfontein Plaaslike Munisipaliteit, Posbus 218, RANDFONTEIN, 1760 en by die applikant ingedien word, nie later asw: 1 MARCH 2013.
WA001163

RANDFONTEIN TOWN PLANNING SCHEME, 1988
NOTICE OF APPLICATION FOR CONSENT.

Notice is hereby given in terms of Clause 13 of the Randfontein Town Planning Scheme, 1988 that I, the undersigned, intend to apply to the Local Municipality of Randfontein for special consent to establish: PAULA'S DAY CARE CENTRE on Erf/Stand 12 township: FINSBURY situated at: MAJUBA ROAD which falls within RANDFONTEIN use zone.
Plans and/or particulars of this application may be inspected between normal office hours (08h00 to 16h00) at the Municipal Offices, Randfontein.
Objections, if any, to the application, together with grounds thereof, must be lodged in writing to the Municipal Manager, Local Municipality of Randfontein, PO Box 218, RANDFONTEIN, 1760 and to the applicant not later than 1 MARCH 2013.
NAME: PAULA SEFAKO
TEL NO: 078-854-9420
ADDRESS 12 MAJUBA ROAD, FINSBURY, RANDFONTEIN, 1759.
WA001127

Sharing a true passion for horses

Randfontein — Litchfield Equestrian Centre is an establishment where pupils can come and practice horse riding and show jumping.
It was established in 2004, and this year marks the eighth anniversary of this prestigious riding school.

According to the owner of Litchfield, Kirsty van der Merwe, they are a very family-orientated yard that caters for both competitive and non-competitive riders.

"We host and attend many training shows, graded shows and inter-schools shows during the year. Our stable yard doubles as a registered Arabian horse breeding stud, breeding quality Arabian youngstock for the showing and endurance disciplines. We have a wonderful barn-style stable block, lunge rings, individual paddocks and arena facilities. We specialise in showing, equitation, show jumping and dressage," says Kirsty.

Many pupils from local schools in Randfontein participate in competitive and non-competitive events at Litchfield. They are guided and trained by a true, passionate trainer.

"As the owner of the yard, I have achieved many show results in my riding career. I have show jumped successfully up to 1,45m. I have also competed in dressage up to elementary levels, and have done very well in the showing discipline with my Arabian stallion. He is the champion utility horse for the National Arabian Show, Pretoria Show and summer show all in 2012," says Kirsty.

"We recently won the Reserve Champion Dressage Award for the year. I also have been ranked top 20 in the Arabian Show disciplines for 2012. We have been in the top five horses for senior show hack stallions; senior costume horse; senior hunter pleasure horse – stallions; adult riding horse, and adult rider classes."

Kirsty's riders have achieved top three spots at national level in their different disciplines. Some of these riders have received sponsorships with large companies who feel they have the potential to go very far.

The school has a super team taking part in the inter-schools competition. This allows children to represent their schools and receive recognition for this sport. The inter-schools shows are a wonderful way for children to show their best and allow them to receive colours for equestrian. "We have wonderful classes for young and old. We start classes from the age of five and up.

"We believe that you are never too old to ride. Children who join this environment benefit by learning many new aspects of horsemanship, responsibility and horse riding, and it will also help with developing concentration. It is a wonderful therapy for children with ADHD, cerebral palsy and learning difficulties," says Kirsty.

For more information, contact Jenny on 082 577 4304.

Kirsty van der Merwe on one of

NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION PROCESSES IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998) / NATIONAL NUCLEAR REGULATOR ACT (ACT NO. 47 OF 1999) / NATIONAL WATER ACT (ACT NO. 36 OF 1998) / MINERAL AND PETROLEUM RESOURCE DEVELOPMENT ACT (ACT NO. 28 OF 2002) FOR THE PROPOSED GOLD ONE INTERNATIONAL LIMITED TAILINGS BACKFILL PLANT PROJECT NEAR BEKKERSDAL IN GAUTENG

GOLD ONE COOKE OPERATIONS

GDARD REFERENCE NUMBER: GAUT: 002/12-13/E0230

GCS REFERENCE NO:12- 561

Notice is hereby given in terms of Regulation 54 of the Environmental Impact Regulations published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the National Environmental Management Act, 1998 (Act No.107 of 1998) of the Environmental Impact Assessment (EIA) process, to be undertaken by GCS (Pty) Ltd. (GCS) on behalf of Gold One International Limited (Gold One) for a proposed establishment of the Tailings Backfill Plant and associated pipeline near the Cooke 2 Shaft area, near Bekkersdal (Westonaria) in the Gauteng Province. The proposed Backfill Plant and associated pipeline is located on the on several portions of the farms Luipaardsvlei 243 and Gemsbokfontein 190.

The following authorisation is required for the proposed activity:
- **Environmental Authorisation for the following activities listed in terms of section 24 (2) the National Environmental Management Act (NEMA), (Act No. 107 of 1998).**
- **Amendment to the EIA/EMP in terms of the Mineral and Petroleum Resources Development Act (MPRDA) (ACT NO. 28 OF 2002)**
- **Integrated Water Use License in terms of the National Water Act (NWA) (Act No. 36 of 1998).**
- **Radiological assessment under the auspices of the National Nuclear Regulator Act (NNRA) (Act No. 47 of 1999).**

The NEMA activities which are triggered by the proposed establishment of the Backfill Plant are listed under Regulations R544 and R545, and as such require an application for an Environmental Authorisation in the form of an EIA process.

- GNR 544 (in GG33306 of 18 June 2010):
  - 9 (i)(ii)
  - 23 (i)
  - 28
  - 37 (a)(b)
  - 39 (i)(ii)(iii)(iv)(v)(vi)
  - 49 (i)(ii)(iii)
- GNR 545 (in GG33306 of 18 June 2010):
  - 2
  - 5
  - 25

In conjunction with the NEMA Environmental Authorisation, the applicable sections of the approved EMP will require an amendment in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) to reflect the proposed development.

You are invited to participate in the stakeholder engagement process by registering as an Interested and Affected Party (I&AP) as well as to raise any issues or concerns about the proposed environmental authorisation applications or to submit suggestions regarding the project. As a registered I&AP, you will receive further information and will be kept informed of the decisions taken by the competent authorities.

As part of this process, the draft Environmental Scoping Report will be made available for public review and comments for a 40 days period from 7 February to 19 March 2013 at the following venues:
- Cooke offices situated on the R559 (Main Road) road;
- Westonaria Public Library;
- Randfontein Public Library
- GCS Website: www.gcs-sa.biz ; and
- Electronic copies can be made available on request.

Should you wish to register as an I&AP or to receive a Background Information Document (BID), with additional details on the project, please contact Estie Retief / Riana Panaino at Tel: 011 803 5726, Fax: 011 803 5745, E-mail: estie@gcs-sa.biz / rianap@gcs-sa.biz or Post: P O Box 2597, Rivonia, 2128 before **19 March 2013.**

A public meeting will be held at the following venue to discuss the project and obtain feedback from the public with regards to the proposed project:
Westonaria Civic Centre
27 February 2013
15:00

Geniet vanjaar se Goue Leeus-rugbyseisoen in styl op Ellispark

Greenhills — Randfontein Rugbyklub is trots daarop om deel van die Goue Leeus Rugby Unie te vorm en gee nou vir elke inwoner van Randfontein die geleentheid om die rugbywedstryde op Ellispark in styl te aanskou.

Volgens 'n verteenwoordiger van Randfontein Rugbyklub, Willie Hunter, het die klub 'n baie gerieflike losie by Ellispark Rugby Stadion en wil hulle graag dié gerief met die inwoners van Randfontein deel.

Randfontein Rugbyklub het baie moeite gedoen om die losie op te gradeer en dit is beslis 'n besoek werd.

Daarom het hulle dit goed gedink om tydens vanjaar se rugbyseisoen hul hoofpaviljoenkaartjies aan die gemeenskap beskikbaar te stel sodat elke rugbyliefhebber in Randfontein die kans kan kry om 'n wedstryd by dié asemrowende stadion te beleef.

"Wanneer jy 'n kaartjie by Randfontein Rugbyklub koop, gee dit jou die geleentheid om die Randfontein Rugbyklub se losie te besoek en van ons puik geriewe daar gebruik te maak.

"Daar sal ligte vingerhappies in die losie beskikbaar wees en almal wat kom inloer mag dan ook van die kontantkroeg gebruik maak," vertel Willie.

Aangesien al die rugbyseisoendatums klaar vasgestel is, is die kaartjies vir alle wedstryde reeds by Randfontein Rugbyklub beskikbaar, so moet nie op jou laat wag nie.

Daarom is dit 'n goeie idee om jou kaartjies so gou moontlik te bespreek en af te haal.

Die geld wat die rugbyklub op dié wyse invorder gaan aangewend word vir die klub se instandhouding.

Die geld sal ook bydra om aan die einde van die jaar 'n bedrag aan elke speler van Randfontein Rugbyklub te oorhandig vir hul harde werk tydens die seisoen.

"Vanjaar se rugbyseisoen beloof om groot pret te wees en met baie bekostigbare kaartjies kan niemand dit bekostig om dié geleentheid mis te loop nie. Daarom doen ek 'n beroep op die gemeenskap om ons te help deur deel van die projek te wees," vertel Willie.

Vir kaartjiebesprekings en verdere inligting, skakel gerus vir Willie Hunter by 082 335 7348.

Figure 6.2: Scoping phase advertisement

An advertisement, according to Regulation 54 of NEMA will be placed on Wednesday, 24 July 2013 in the Randfontein/Westonaria Herald to advertise the availability of the draft EIA / EMP report for review.

Proof of placement was requested from the newspaper and will be included in the Final EIA document.

6.3.3 Background Information Documents

Background Information Documents (BIDs) were distributed via email, fax and post to the following people listed on the Gold One stakeholder database:

- Landowners of the properties within the proposed Project Area;
- Local, provincial and national authorities;
- All I&APs who contacted GCS following the placement of the advertisement in the Randfontein/Westonaria Herald on Tuesday, 15 February 2013, and
- BIDs (including registration forms) were placed on the table at the respective libraries.

6.4 Public Meetings

6.4.1 Preliminary Informal Meetings (Pre-NEMA Application)

Notification letters were hand-delivered to the landowners identified from the exiting Gold One database. The landowners detailed in Table 6.1 were visited and notified of the application for the current project.

Table 6.1: Pre-consultation informal meetings with landowners

Landowner	Comment
ZJ van Greuning	Accepted the notification and also took a notification letter for his father (Mr van Greuning Sr.)

Landowner	Comment
NJE Coetzee	Accepted the notification and commented that his farm has been severely impacted by historic mining activities. His daughter Mrs Villet was present when the notification letter was delivered and the project explained. She is the wife of Charles Villet who is one of the adjacent landowners.
JH du Plessis	Mr du Plessis' son accepted the notification on his behalf. Mrs Du Plessis' was also present when the project was explained.

6.4.2 Introductory Public Meeting

A public meeting was held on Wednesday 27 February 2013 at the Westonaria Civic Centre. Minutes and an attendance register were taken and are presented in Appendix B.

6.4.3 Authorities Consultation Meetings

An authority consultation meeting will be held after submission of the draft EIA/EMP for Authority Review to discuss the project and obtain the views and comments of the decision makers on the projects. Minutes will be taken and presented in the EIA Report.

6.5 Stakeholder Database

A stakeholder database was developed for the project. The database contains the contact details of the landowners, local, provincial and national authorities as well as all people who requested registration. This is included in Appendix B.

6.6 Issues and Responses

The issues raised during the public consultation period thus far are summarized in Table 6.2. Any issues received from I&APs will be recorded and presented as the process progresses.

Table 6.2: Issues and Response Trail

No	Comment Raised	By Whom	Designation	Date	Method of Contact	Environmental Parameter Impacted	Response by EAP
1	The farm has been severely impacted by historic mining activities	NJE Coetzee	Owner Luipaardsvlei 243, Portion 90	14-Jan-13	Personal communication	Rehabilitation plan	This does not form part of the current scope of work, however Gold One will have a rehabilitation programme for mine closure
2	How and who will be employed for the proposed project	Lucas Moloto	Resident in Bekkersdal	13-Feb-13	Personal communication	Social	Gold One will always try to appoint as many local people as possible, and they are now in a drive to get people back. Ronnie, the HR manager will do the best to serve the local community.
3	As a long-standing resident of Bekkersdal, I am interested in joining you to adding value into your project's Public Participation Process by acting as an interface/facilitator between your organisation and the local communities. I trust that you find this correspondence to be in order.	Lucas Moloto	Resident in Bekkersdal	14-Feb-13	Personal communication	Social	Comment noted, and Mr Moloto registered as I&AP
4	There is little work for him and he is looking for something new.	Lucas Moloto	Resident in Bekkersdal	27-Feb-13	Public Meeting	Social	Additional employment opportunities will be made available. The exact figures aren't finalised yet and will be more accurate as the process progresses
5	With the influx of mines into the area from years ago there were noise and tremors that seems as if they are not being addressed.	Lucas Moloto	Resident in Bekkersdal	27-Feb-13	Public Meeting	Geology and Operations	The backfill into the underground workings will aid in stabilising the geology, reducing tremors.
6	GCS should elaborate on the	Lucas	Resident in	27-Feb-13	Public Meeting	Social	Refer to Section 3 and 7 of the

No	Comment Raised	By Whom	Designation	Date	Method of Contact	Environmental Parameter Impacted	Response by EAP
	social aspect of the project.	Moloto	Bekkersdal				EIA report
7	Will the pipeline be above or below ground and will it be enclosed	Lucas Moloto	Resident in Bekkersdal	27-Feb-13	Public Meeting	Engineering	Pipeline will be above ground and enclosed at the Wonderfonteinspruit crossing
8	What mechanisms will be put in place for maintenance and spills	Lucas Moloto	Resident in Bekkersdal	27-Feb-13	Public Meeting	EIA/EMP	The EMP will dictate what management measures should be followed, also the pipeline will not operate 24/7 which allows for time to do maintenance should it be required. The pipeline will be operated eighteen hours a day.
9	Who will be liable for spills should they happen, the mine or the government.	Lucas Moloto	Resident in Bekkersdal	27-Feb-13	Public Meeting	Social	The mine will be liable, and if there are spills the mine will clean it. After closure the mine must re-establish the pre-construction environment.
10	How will this project relate to Acid Mine Drainage (AMD)	Lucas Moloto	Resident in Bekkersdal	27-Feb-13	Public Meeting	Groundwater	The project won't contribute to AMD as AMD is present in areas that are not operational. This mine is still operational and water is still being pumped to the Cooke Plant and treated.
11	Site notices be place in high density public places to inform more members of the public. Places such as Taxi ranks and churches should be considered.	Lucas Moloto	Resident in Bekkersdal	27-Feb-13	Public Meeting	Public Participation	Site notices within Bekkersdal will be considered.
12	The host community awareness around this project is still at a disappointingly low level. What steps were taken to alleviate this state of affairs?	Lucas Moloto	Resident in Bekkersdal	15-Apr-13	Email	Public Participation	Gold One will look into using members of the local union in Bekkersdal to get members of the public involved.

6.7 Document Review

The reports which have been, and will be submitted for public review are listed in Table 6.3. The reports were/will be available in the following manner:

- One (1) hard copy at the Randfontein Library, the Westonaria Library and at the Gold 1 Security Office (3 in total);
- The GCS website (www.gcs-sa.biz);
- On CD which will be posted to the I&AP upon request.

Table 6.3: Documents for public review

Report	Public Review period
Draft ESR in terms of NEMA	7 February 2013 until 19 March 2013
Final ESR in terms of NEMA for all I & AP's	5 April 2013 until 15 April 2013
Final ESR in terms of NEMA for GDARD	18 April 2013 until 9 July 2013
EIA/EMP amendment Report compiled in terms of the MPRDA	September 2013
Drat EIA/EMP in terms of NEMA	15 July until 26 August 2013
Final EIA/EMP in terms of NEMA	September until November 2013
IWULA and IWWMP in terms of the NWA	August 2013

7 IDENTIFICATION OF IMPACTS AND ISSUES WITH MANAGEMENT MEASURES AND ACTION PLANS (EMP)

This section of the report relates to Section 31 (2) and 33 of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)
2 g) 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.
2 h) An indication of the methodology used in determining the significance of potential environmental impacts
2 j) A summary of the findings and any recommendations of any specialist report or a report on a specialized process
2 k) A description of all environmental issues that were identified during the environmental impact process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
2 l) An assessment of each identified potentially significant impact including: x. Cumulative impacts; xi. The nature of the impact; xii. The extent and duration of the impact; xiii. The probability of the impact occurring; xiv. The degree to which the impact can be reversed; xv. The degree to which the impact can cause irreplaceable loss of resources and ; xvi. The degree to which the impact can be mitigated.
2 p) A draft Environmental Management Programme containing the aspects contemplated in regulation 33
REGULATION 33
b) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these regulations, including environmental impacts or objects in respect of : vi) Planning and designing; vii) Pre Construction and construction activities; viii) Operation or undertaking of the activity; ix) Rehabilitation of the Environment; and x) Closure, where relevant

c) A detailed description of the aspects of the activity that are covered by the draft environmental management programme
d) An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b)
f) As far as is reasonably practical, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principal of sustainable development ,including ,where appropriate, concurrent or progressive rehabilitation measures
g) A description of the manner in which it intends to : vi) Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
vii) Remedy the cause of pollution or degradation and migration of pollutants;
viii) Comply with any prescribed environmental management standards or practices;
h) Time periods within which the measures contemplated in the environmental management programme must be implemented
i) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity
k) Where appropriate, closure plans, including closure objectives.

This chapter contains a description of the activities to be undertaken during the construction, operation and decommissioning phases of the proposed FPT Backfill Plant project. The potential environmental impacts which may be caused by the proposed activities are also listed and assessed under this chapter. The proposed mitigation measures, management actions and responsible parties are also described in this chapter.

7.1 Activities

Before the potential environmental impacts posed by the proposed Gold One Backfill Plant project may be identified, the activities associated with the establishment, operation and decommissioning of the proposed project must be identified.

The proposed infrastructure for the project is described in detail in chapter 4 of this EIA/EMP report. The activities required to establish, operate and decommission the plant are described in the sections which follow.

The main activities which will create impacts during the different phases of the project life cycle were assessed during the EIA and mitigation and management measures developed thereto (Refer to Chapter 7 of this document). The main activities are summarised in Figure 7.1.

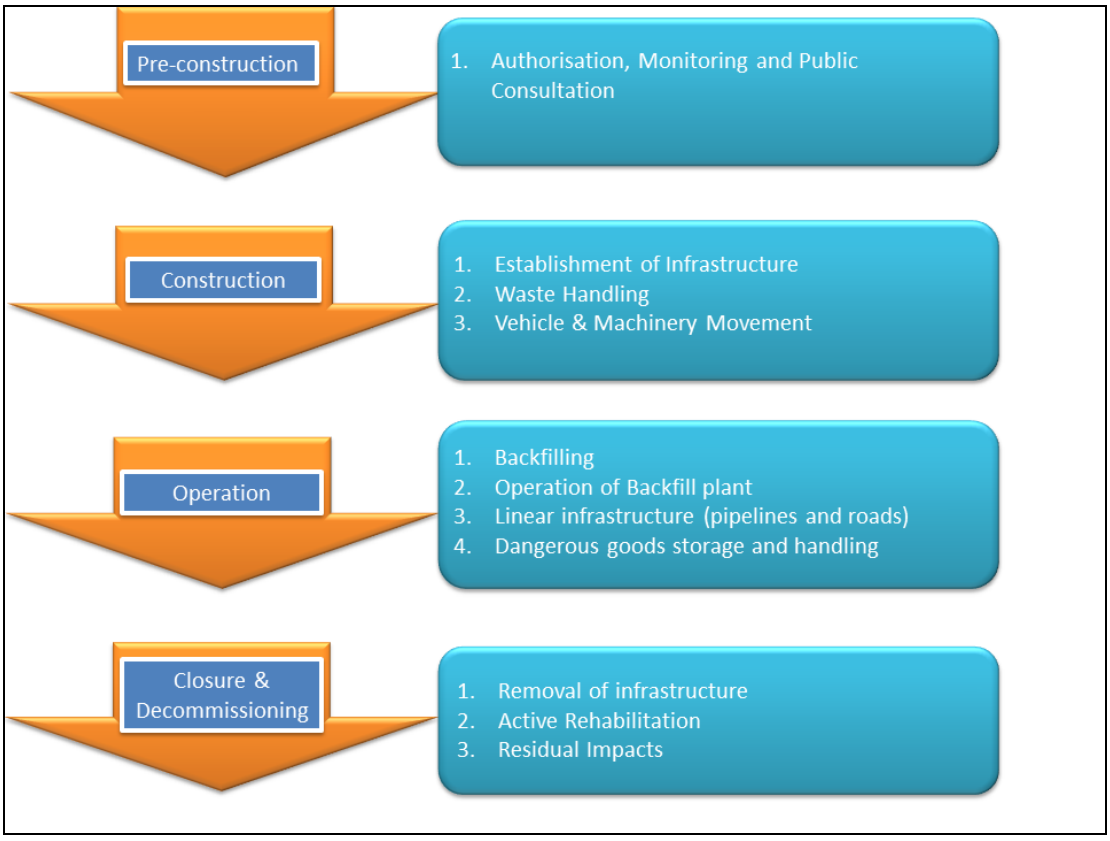


Figure 7.1: Proposed activities for the Project life cycle

7.2 Environmental Impact Significance Rating Methodology

To ensure uniformity, the assessment of potential impacts will be addressed in a standard manner so that a wide range of impacts is comparable. For this reason a clearly defined rating scale will be provided to the specialist to assess the impacts associated with their investigation.

Each impact identified will be assessed in terms of probability (likelihood of occurring), scale (spatial scale), magnitude (severity) and duration (temporal scale). To enable a scientific approach to the determination of the environmental significance (importance), a numerical value will be linked to each rating scale.

The following criteria will be applied to the impact assessment for the EIA/EMP:

Occurrence

- Probability of occurrence (how likely is it that the impact may occur?); and
- Duration of occurrence (how long may impact last?).

Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?); and
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?).

Status of Impact

- +: Positive impact
- -: Negative impact
- N: Neutral (no impact)

In order to assess each of these factors for each impact, the following ranking scales were used:

Probability:=P	*Duration:=D*
5 – Definite/don't know	5 – Permanent
4 – Highly probable	4 - Long-term (ceases with the operational life)
3 – Medium probability	
2 – Low probability	3 - Medium-term (5-15 years)
1 – Improbable	2 - Short-term (0-5 years)
0 – None	1 – Immediate
Scale:=S	*Magnitude:=M*
5 – International	10 - Very high/don't know
4 – National	8 – High
3 – Regional	6 – Moderate
2 – Local	4 – Low
1 – Site only	2 – Minor
0 – None	
Status of Impact	
+: Positive	
-: Negative	

N: Neutral

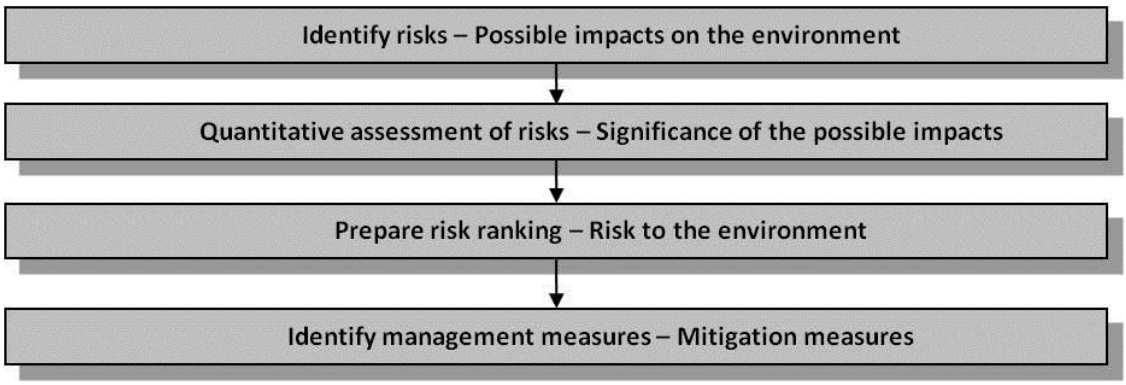
Once the above factors have been ranked for each impact, the environmental significance of each was assessed using the following formula:

SP = (magnitude + duration + scale) x probability

The maximum value that can be achieved is 100 Significance Points (SP).Environmental effects were rated as follows:

Significance	***Environmental Significance Points***	***Colour Code***
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

The following process will be followed:



No specialist findings have been modified by the EAP. The information provided within this report reflects the opinion of the specialists, in agreement with the EAP. The applicant has reviewed all the conditions.

7.3 Pre-Construction Phase

Gold One commits to obtain all necessary environmental authorisations from the relevant government departments, before undertaking any construction or operational activities.

Table 7.1 details the identified impacts and management measures for the pre-construction activities.

Table 7.1: Pre-construction - Authorisation, Monitoring and Public Consultation

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
PRE-CONSTRUCTION PHASE: Authorisation, Monitoring and Public Consultation																				
Matters pertaining to PERMITTING																				
Construction and Mining Related Activities will only commence upon approval of all environmental authorisations as required by environmental legislation. This may cause a delay with regards to the planned operational schedule of the Backfill Plant Project.	Timeframe Delays	0	0	0	0	0	N	N	Construction and mining related activities will only commence upon approval of the MPRDA EIA/EMP by the DMR.	0	0	0	0	0	N	N	Compile MPRDA EIA/EMP and obtain record of decision from the DMR.	Prior to Construction	Project Manager/Applicant	Once off
									Construction and mining related activities will only commence upon approval of the MPRDA SLP by the DMR.								Compile MPRDA SLP and obtain record of decision from the DMR.	Prior to Construction	Project Manager/Applicant	Once off
									Construction and mining related activities will only be commenced upon approval of the NEMA EIA/EMP by the GDARD.								Compile NEMA EIA/EMP and obtain record of decision from the GDARD.	Prior to Construction	Project Manager/Applicant	Once off
									Construction and mining related activities that trigger water uses in accordance with Section 21 of the NWA will only commence with upon approval of the NWA IWUL by the DWA.								Compile NWA IWUL and obtain record of decision from the DWA.	Prior to Construction	Project Manager/Applicant	Once off
									Construction and mining related activities will only be commenced upon approval by the NNR								Obtain nuclear authorisation from the NNR	Prior to Construction	Project Manager/Applicant	Once off
Matters pertaining to GEOLOGY																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to GEOHYDROLOGY																				
Baseline information is required for water quality and quantity monitoring purposes.	Baseline Monitoring	6	4	2	4	48	+	M	Gold 1 has an extensive existing groundwater quality monitoring network which provides that groundwater quality and quantity issues can be addressed accordingly.	8	4	2	5	70	+	H	Groundwater quality sampling will be undertaken on a bi-annual basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	Bi-annualy	Environmental Coordinator	Catered for in existing monitoring programme
																	Determining potentiometric water level and aquifer potential	Annually	Environmental Coordinator/Water Quality Specialist	Included in Operational Costs
																	Bi-annual groundwater monitoring reports will be generated by the mine or through a qualified water quality specialist.	Bi-annualy	Environmental Coordinator/Water Quality Specialist	Catered for in existing monitoring programme
																	In the event that water quality or quantity issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the	In the event of occurrence	Environmental Coordinator/Water Quality Specialist	To be determined - depending on severity of incident

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	situation.			
Matters pertaining to HYDROLOGY																				
Baseline information is required for water quality monitoring purposes.	Baseline Monitoring	6	4	2	4	48	+	M	Gold 1 has an extensive existing surface water quality monitoring network which provides that surface water quality issues can be addressed accordingly.	8	4	2	5	70	+	H	Surface water quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	Monthly	Environmental Coordinator	Catered for in existing monitoring programme
																	Quarterly surface water monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Coordinator/Water Quality Specialist	Catered for in existing monitoring programme
																	In the event that water quality issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Coordinator/Water Quality Specialist	To be determined - depending on severity of incident
Matters pertaining to SOIL, LAND USE AND LAND CAPABILITY																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to FAUNA AND FLORA																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to WETLANDS																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	L	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to AIR QUALITY																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to NOISE																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TRAFFIC																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	L	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	L	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HERITAGE																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Evidence of 2 sites of archaeological/cultural importance occur in close proximity to the Pipeline and can be damaged if construction activities are not controlled. Refer to Section 2.11 of the EIA/EMP report for location of structures.	Pipeline Location	6	3	2	4	44	-	M	Fence the identified areas off to avoid any damage.	4	4	2	4	40	-	M	Ensure that the identified sites are fenced off and the sites are not disturbed by pre-construction activities	N/A	N/A	N/A
Matters pertaining to RADIATION																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				
Feelings in relation to the project	N/A	6	3	2	3	33	-	M	Consultation with the surrounding residents and affected communities should take place on a continuous basis to understand, assess and mitigate their concerns where appropriate.	6	2	2	2	20	-	L	A community forum must be established with residents and affected communities in order to keep them informed and allow an opportunity to communicate issues regarding the project.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Aspirations for the future (broader community)	N/A	4	2	2	3	24	+	L	Implement according to proposed action plan.	10	4	3	4	68	+	H	• Gold One must be honest and transparent about the potential economic benefits and employment opportunities that the proposed Backfill Plant is likely to effect in these communities, in order to manage any undue expectations.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Social networks	N/A	6	3	2	3	33	-	M	Implement according to proposed action plan.	6	3	2	2	22	-	L	• Employ local residents as far as possible; • Make use of credible SMME's for the provision of goods and services; and • Embark on regular communication efforts towards the community with regards to the mine's involvement in the communities. This could be done through an already established community forum.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Mining developments are usually perceived as a positive injection to the economic standard of an area as it could lead to further developments in the area. The proposed Backfill Plant project would thus contribute to the economy due to the possible expenditure during the construction phase which could result in business opportunities for the local and regional economy, especially with regards to the local service industry.	Local Economic Contribution	8	2	3	4	52	+	M	Involve local companies in the procurement process as much as possible in order to ensure further indirect economic spin-offs and benefits to the local economy.	10	4	2	5	80	+	H	Gold One should develop a database of local companies, including credible SMMEs that could qualify as potential service providers prior to the initiation of the tender process, to enable these local companies and SMMEs to be involved with the tender process. Gold One should liaise with local stakeholders, as well as with representatives of the local municipality.	Already commenced	Procurement Manager/Project Manager/ HR Manager	To be determined

7.4 Construction Phase

After the Pre-Construction Phase has been completed and finalised, Gold One will commence with the construction phase for their project related infrastructure in line with their approved environmental authorisations.

During the construction phase the following activities will take place on site:

- Establishment of Infrastructure (Pipeline and Backfill plant);
- Waste Handling; and
- Vehicle and Machinery Movement.

7.4.1 Topography

The removal of vegetation and the associated construction activities to prepare footprint for construction will allow for increased surface water runoff, which may lead to change in topographical characteristics of the area. This is however not envisaged to be a significant impact as most of the infrastructure will be located on already existing servitudes and Brownfield's areas.

It is proposed that to avoid topographical impacts that construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Removal of vegetation must be undertaken in a phased approach to limit the amount of bare areas at a time. Erosion control measures must be implemented before construction commences.

7.4.2 Soils, Land Use, Land Capability

Topsoil removal during establishment of infrastructure will disturb the natural sequence of soil layers thereby permanently changing the soil and land capability. A change in soil capability will in turn affect the end land use. The movement of heavy vehicles in the construction area will result in compaction of soil, water runoff and soil erosion especially during the rainy season. Construction of the proposed pipeline will remove very little topsoil because relative small soil areas are impacted on through the digging of foundation trenches. Temporary storage of hazardous products may cause the pollution of soil.

It is suggested that surface runoff water from compacted areas such as roads must be controlled to indirectly also control soil erosion. Roads must be inspected and eroded shoulders repaired especially during the rainy season. Storage areas must be contained using brick walls. Any hydro-carbon spills on soil must be reported to the environmental officer and cleaned up by trained personnel using commercially available emergency clean-up kits.

7.4.3 Flora and Fauna

The existing vegetation within the proposed area of development will be impacted on as it will be removed to facilitate the construction. This in turn could affect the habitat availability of fauna species or cause mortality of burrowing animals. Furthermore it will allow for secondary growth including the growth of more robust species such as exotics and invasive species. The movement of construction vehicles could result in disturbance of fauna cycles/species. Spills from vehicles and machinery could result in toxic pollution of the project area which will result in ecological degradation and a loss in the ecological integrity.

It is suggested to keep the footprint of the disturbed area of the pipe route to the minimum and designated areas only. Make use of existing roads and/or areas and roads designated for the project operation. Remove lose earth from the road sides. Periodically spray roads with water or dust inhibitor. The digging of trenches can harm small burrowing animals, therefore before digging commences a sweep must take place to determine small mammal colonies. A waste management plan and pipeline audit will need to be implemented.

7.4.4 Wetlands

Impacts to the wetlands include wetland site disturbance and alteration due to construction of the pipe bridge through the wetland. Change in flow rates in wetland due to channel alteration is also a possibility. Construction rubble and oil spills could occur in the wetland due to poor construction practices as well as compacting of wetland soils, due to construction and maintenance vehicles entering wetland areas.

During construction activities a number of potentially polluting substances will be used and likely stored on site, including diesel, oil, cement, and waste generated during construction activities. Incorrect handling of these materials as well as accidental spills and leaks could result in pollutants entering down slope wetlands via surface runoff, leading to water quality deterioration and subsequently impacting wetland fauna and flora.

Construction should be managed according to the Environmental Management Plan. Minimize the area where construction takes place (stick to footprint) and where possible stay out of the wetland and its buffer zone. Sufficient spill clean-up materials should be kept on site at all times. All waste should be stored in clearly demarcated areas on site and disposed of at registered, licensed waste facilities.

7.4.5 Aquatic Ecosystems

Construction of the pipeline will result in the removal of riparian areas associated with the local river system, which are already impacted on by the local agricultural and mining activities. The activity will reduce the vegetation cover of the banks which will reduce the ability of the banks to resist erosion, provide structural stability and cover for instream and riparian biota (Stevenson and Mills 1999). In addition to this, according to Allan (2004) the riparian vegetation removal may also result in changes to water temperatures, increased potential for the inputs of litter and wood, the limited ability for the retention of nutrients and pollutants as well as the reduction in the sediment trapping function of the zone.

The proposed pipeline route should make use of existing river crossings where possible. In the event that a “new” crossing area is required, the pipelines spanning the river systems should be raised and supported above ground so as not to require the removal of the riparian vegetation. This will allow the river banks and riparian zones to provide important ecological services.

7.4.6 Surface Water

Stripping of vegetation may increase erosion of the stream banks, which might increase the amount of suspended solids in downstream watercourses.

Excess water runoff from the pipeline during testing of equipment may also enter the Wonderfonteinspruit or local environment. Furthermore the generation of waste may lead to surface water contamination.

Areas that may be prone to erosion or where signs of erosion are evident will be stabilised. Methods of stabilisation include: brush-cut packing, mulch or chip cover, sand bags, straw stabilising, sodding, hydroseeding, the application of soil binders and physical stabilisation methods such as gabions, reno-mattresses, armour flex or retaining walls. The total footprint area to be disturbed/developed will be kept to a minimum by demarcating the construction areas and restricting construction to these areas only. Only good quality water will be used to clean and test equipment. Uncontaminated water may be released into storm water drains in a controlled manner. Contaminated water from equipment will be drained to the plant storm-water containment dams for re-use during operations.

Surface water quality monitoring networks must be set up prior to the construction phase so that any surface water quality issues can be addressed accordingly.

7.4.7 Groundwater

Clearing topsoil for footprint areas can increase infiltration rates of water to the groundwater system and decrease buffering capacity of soils to absorb contaminants from spills on surface. This can increase the risk of contamination of the groundwater system (increases aquifer vulnerability).

Further impacts could occur during drilling of the boreholes as there is a risk of intersecting large volumes of groundwater and even transferring this groundwater into the underground workings

It is suggested to identify potential risk areas in the vicinity of the proposed boreholes and ensure that the possibility to intersect large groundwater volumes is reduced. Groundwater quality sampling should be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP. Quarterly groundwater monitoring reports should be generated by the mine or through a qualified water quality specialist.

7.4.8 Air Quality

Impacts expected to occur are the generation of nuisance dust during construction of the backfill plant and pipeline. It is proposed to establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.

7.4.9 Sites of Historical and Cultural Importance

Evidence of two sites (built complexes) of archaeological/cultural importance occurs within close proximity to the pipeline. It is thus suggested that the built structures should be fenced in order to avoid unwanted damage caused by nearby moving construction vehicles.

7.4.10 Noise

Noise disturbance to surrounding communities are expected to occur during construction activities. It is suggested that equipment be switched off when not in use. Construction activities should also be limited to daylight hours where possible.

7.4.11 Traffic

Due to vehicles using existing roads no significant construction impacts are envisaged during the construction phase.

7.4.12 Social Conditions

The employment impact of the construction of the pipeline is that direct, indirect and induced employment opportunities will be created. The construction of the pipeline will require skilled, semi-skilled and general workers. A larger proportion of general workers will be required - many of whom will be sourced from local communities. This is a positive result of the project, in light of the frequent labour disputes in South Africa regarding lack of local employment by mining companies. However, these jobs are not sustainable as they will only last for the construction period.

The increased household income will result in an increase in the quality of life of the households, albeit of a temporary nature. Poorer, less educated households may find themselves worse off after the construction phase, as they will cease to be able to uphold the elevated quality of life they would have become accustomed to. They would have qualified for and incurred more debts on retail items and purchased items (such homes or cars) that require regular maintenance.

While short term employment of less skilled individuals will provide temporary refuge from their financial poverty, it may leave them worse off once construction ends. People will become unemployed once again, and may turn to social ills such as alcohol or drug abuse as a means of coping with their deprived situation. This may contribute to the social pathologies described below

The development of the project will result in an influx of people to the project area wanting to take advantage of job opportunities. Westonaria is the nearest major town to the project, being 5 km west of the pipeline route. It is most likely that people will try to settle as close as possible to project activities where employment and economic opportunities are perceived to be highest. Bekkersdal currently experiences over-crowding due to people looking for jobs at the mines. Backyard squatting is common and it poses a serious health risk due to its informal and unregulated nature. Despite these negative impacts, it has positive economic spin-offs for these township home owners that rent out the space in their backyards.

The influx of contractors to the broader study area will likely have a small impact on the current levels and nature of social pathologies. This is largely due to the current widespread existence of these impacts, which are enabling disorganisation and poor social values, especially amongst young girls. There are reported occurrences of teenage prostitution, domestic violence and alcoholism, most notably linked to poverty. Employment of local people, which generally occurs only during the construction phase, brings short term economic relief that people all try to take advantage of - luring teenage girls with money in exchange for sex, setting up backyard shack dwellings, and high levels of alcohol consumption and domestic violence at month-end when mine workers are paid

During the construction of the pipeline, construction workers will have access to private farms via the pipeline servitude. This will afford them the opportunity to see what is of value on the farms and observe residents' daily movements. Such access can lead to stock theft and farm murders, which are considerable problems on farms across the country. As a result, farmers are very weary of the Project exposing them and their property to strangers (construction workers). Crime is unlikely to be a considerable issue in the surrounding towns because of the large number of mine worker immigrants already living in the area. Local communities are by now well adapted to receiving outsiders.

Table 7.2: Construction - Infrastructure Establishment

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
CONSTRUCTION PHASE ACTIVITY 1: Infrastructure establishment																				
Matters pertaining to GEOLOGY																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
Removal of vegetation and the associated shaping of the area to prepare footprint for construction will allow for increased surface water runoff, which may lead to change in topographical characteristics of the area.	Vegetation clearance	6	4	2	4	48	-	M	Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts.	4	4	1	3	27	-	L	Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Removal of vegetation must be undertaken in a phased approach to limit surface exposure.								The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Erosion control measures must be implemented early in the construction phase.								Employees and contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken. All workers will be made aware of the penalty systems for non compliance.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Clean and dirty water separation must be implemented early in the construction phase, especially down-gradient of construction areas.								Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Linear infrastructure must follow for as far as practically possible the natural contours of the area.								Design and construct all structures to ensure clean and dirty water separation as stipulated in Regulation 704 of the National Water Act, 1998.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
																	Maintain and monitor the implementation of dirty water separation.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
Matters pertaining to HYDROGEOLOGY																				
Clearing topsoil for footprint areas can increase infiltration rates of water to the groundwater system and decrease buffering capacity of soils to absorb contaminants from spills on surface. This can increase the risk of contamination of the groundwater system (increases aquifer vulnerability).	Footprint clearance	8	2	2	5	60	-	M	Mitigation is not possible, but water quality monitoring is essential.	8	2	2	5	60	-	M	Groundwater quality sampling will be undertaken on a bi-annual basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	Bi-annually	Environmental control officer	R 91 000.00
																	Bi annual groundwater monitoring reports will be generated by the mine or through a qualified water quality specialist.	Bi-annually	Environmental control officer/Water Quality Specialist	R 42 000.00

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	In the event that water quality or quantity issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental control officer/Water Quality Specialist	To be determined - depending on severity of incident
Matters pertaining to HYDROLOGY																				
Stripping of vegetation may increase erosion, which might increase the amount of suspended solids in downstream watercourses.	Site clearing and preparation along pipeline route	8	2	2	4	48	-	M	Areas that may be prone to erosion or where signs of erosion are evident will be stabilised.	6	2	1	3	27	-	L	On-going backfilling and vegetation of the areas as the pipeline is laid; Methods of stabilisation include: brush-cut packing, mulch or chip cover, sand bags, straw stabilising, sodding, hydroseeding, the application of soil binders and physical stabilisation methods such as gabions, reno-mattresses, armour flex or retaining walls.	Daily monitoring of areas that could result in soil erosion	Environmental Control officer and Project Engineer	Included in construction costs.
									Enforce speed control.								Traffic and movement over stabilised areas will be restricted and controlled, and damage to stabilised areas shall be repaired and maintained to the satisfaction of the Environmental Manager.	Daily monitoring of areas that could result in soil erosion	Environmental Control officer and Project Engineer	Included in construction costs.
									Monitoring for vegetation growth								The total footprint area to be disturbed / developed will be kept to a minimum by demarcating the construction areas and restricting construction to these areas only. Monitor the new vegetation growth as the project progresses.	Daily monitoring of areas that could result in soil erosion	Environmental Control officer and Project Engineer	Included in construction costs.

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Excess water runoff from the pipeline during testing of equipment may enter the Wonderfonteinspruit or local environment.	Equipment testing.	4	1	2	3	21	-	L	Ensure that no contaminated water enter the environment, and conduct tests in a controlled manner.	4	1	2	1	7	-	L	Only good quality water will be used to clean and test equipment. Water usage will be minimised to that necessary for adequate cleaning and testing of equipment. Staff and contractors will be trained to be water efficient. Uncontaminated water may be released into storm water drains in a controlled manner. Contaminated water from equipment will be drained to the plant storm-water containment dams for re-use during operations. If contaminated water is unsuitable for re-use during operations, it will be captured in water tight containers/structures on site and removed by a licensed waste management service provider for disposal at a licensed facility.	During Equipment testing	Environmental Control officer and Project Engineer	Included in construction costs.
Matters pertaining to SOILS																				
Construction of the proposed pipeline will remove very little topsoil because relative small soil areas are impacted on through the digging of foundation trenches.	Pipeline construction	4	2	1	3	21	-	L	Enforce access controls	2	2	1	3	15	-	L	Make use of existing roads and/or areas and roads designated for the mining operation where possible. Keep the footprint of the disturbed area to the minimum and designated areas only where possible.	Daily	Environmental Manager	Included in construction costs.
Construction of the Backfill Plant is not expected to have an impact on the soil as it is being built on an area previously occupied by a stockpile.	Plant construction	4	2	1	3	21	-	L	Enforce access controls	2	2	1	3	15	-	L	Make use of existing roads and/or areas and roads designated for the mining operation where possible. Keep the footprint of the disturbed area to the minimum and designated areas only where possible.	Daily	Environmental Manager	Included in construction costs.
Matters pertaining to FAUNA and FLORA																				
The existing vegetation within the proposed area of development will be impacted on as the existing vegetation will be removed to facilitate the construction. This in turn will affect the habitat availability of fauna species or cause mortality of burrowing animals. Furthermore it will allow for secondary growth including the growth of more robust species such as exotics and invasive species.	Pipeline construction	6	5	1	5	60	-	M	Keep the footprint of the disturbed area of the pipe route surrounds to the minimum and designated areas only.	4	3	1	3	24	-	L	Keep the footprint of the disturbed area of the pipe route surrounds to the minimum and designated areas only. Monitor for exotic and invasive species on an annual basis.	Prior to Construction	Environmental Co-ordinator	Included in construction costs.
Matters pertaining to WETLANDS																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Wetland site disturbance and alteration due to construction of the pipe bridge through the wetland.	??	10	2	1	5	65	-	H	Construction should be managed to ensure good construction practices.	8	2	1	4	44	-	M	Construction vehicle movement should be kept to a minimum within the wetland. Any alteration to the wetland habitat should be rehabilitated.	During Construction	Environmental Co-ordinator	Included in construction costs.
Change in flow rates in wetland due to channel alteration when constructing the pipe bridge.	??	8	2	2	5	60	-	M	Construction should be managed to ensure good construction practices.	6	2	2	3	30	-	M	Construction vehicle movement should be kept to a minimum within the wetland. Any alteration to the wetland channel should be rehabilitated to restore natural flow.	During Construction	Environmental Co-ordinator	Included in construction costs.
Construction rubble and oil spills on wetland if construction needs to take place, due to poor construction practices.	??	6	2	1	4	36	-	M	Construction should be managed according to the Environmental Management Plan.	4	2	1	3	21	-	L	Construction rubble should be removed from wetland by labourers if it does happen to be dumped within the wetland area. Avoid heavy machinery movement within the wetland.	During Construction	Environmental Co-ordinator	Included in construction costs.
Compacting of wetland soils, due to construction and maintenance vehicles entering wetland	??	8	2	1	4	44	-	M	Movement of construction vehicles should be limited within the wetland and its buffer zone.	4	2	1	4	28	-	L	Areas for construction should be fenced off to avoid entering the wetland. If compacting occurs, soils should be loosened using labourers on foot to avoid further compacting.	During Construction	Environmental Co-ordinator	Included in construction costs.
Excess dust settling in wetlands due to increased traffic of construction and maintenance vehicles	??	6	2	2	4	40	-	M	Wet soils to aid in dust suppression	4	2	1	3	21	-	L	Wherever dust forming could occur, soils should be moistened to avoid excessive dust formation.	Daily	Environmental Co-ordinator	Included in construction costs.
Possible loss of habitat and species of significance.	??	6	2	1	5	45	-	M	Minimize the area where construction takes place (stick to footprint) and where possible stay out of the wetland and its buffer zone.	4	2	1	4	28	-	L	Areas for construction should be fenced off to avoid entering the wetland. If compacting occurs, soils should be loosened using labourers on foot to avoid further compacting.	During Construction	Environmental Co-ordinator	Included in construction costs.
Matters pertaining to AQUATICS																				
Removal of riparian areas associated with the local river systems	Site Clearing and preparation along pipeline route	6	4	2	3	36	-	M	Make use of existing infrastructure where possible and construct and support the new pipeline areas above ground	4	4	1	3	27	-	L	The proposed pipelines routes should make use of existing river crossings where possible. In the event that a “new” crossing area is required, the pipelines spanning the river systems should be raised and supported above ground so as not to require the removal of the riparian vegetation.	Construction initiation	Engineer	Included in construction costs.
Changes in the services provided by the riparian zones and fragmentation of these areas will also increase as a result of the construction activity.	Site Clearing and preparation along pipeline route	6	4	2	3	36	-	M	Make use of existing infrastructure where possible and construct and support the new pipeline areas above ground	4	4	1	3	27	-	L	The proposed pipelines routes should make use of existing river crossings where possible. In the event that a “new” crossing area is required, the pipelines spanning the river systems should be raised and supported above ground so as not to require the removal of the riparian vegetation.	Construction initiation	Engineer	Included in construction costs.

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
The construction activity will reduce the vegetation cover of the banks which will reduce the ability of the banks to resist erosion, provide structural stability and cover for instream and riparian biota.	Site Clearing and preparation along pipeline route	6	4	2	3	36	-	M	Make use of existing infrastructure where possible and construct and support the new pipeline areas above ground	4	4	1	3	27	-	L	The proposed pipelines routes should make use of existing river crossings where possible. In the event that a "new" crossing area is required, the pipelines spanning the river systems should be raised and supported above ground so as not to require the removal of the riparian vegetation.	Construction initiation	Engineer	Included in construction costs.
riparian vegetation removal may also result in changes to water temperatures, increased potential for the inputs of litter and wood, the limited ability for the retention of nutrients and pollutants as well as the reduction in the sediment trapping function of the zone.	Site Clearing and preparation along pipeline route	6	4	2	3	36	-	M	Make use of existing infrastructure where possible and construct and support the new pipeline areas above ground	4	4	1	3	27	-	L	The proposed pipelines routes should make use of existing river crossings where possible. In the event that a "new" crossing area is required, the pipelines spanning the river systems should be raised and supported above ground so as not to require the removal of the riparian vegetation.	Construction initiation	Engineer	Included in construction costs.
Matters pertaining to AIR QUALITY																				
Generation of nuisance dust during construction at the backfill plant and along the pipeline route	Movement of heavy duty vehicles.	4	1	2	4	28	-	L	Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	4	1	1	2	12	-	L	Wet suppression and/or chemical stabilisation of unpaved surfaces and backfill plant surfaces; and Enforcement of low vehicle speeds.	Daily	Environmental Control Officer	Included in construction costs.
Matters pertaining to NOISE																				
Noise disturbance to surrounding communities.	Pipeline, and plant construction	4	2	2	4	32	-	M	Implement a noise monitoring programme	4	2	2	3	24	-	L	Switch off equipment when not in use. Limiting construction activities to daylight hours where possible.	During construction phase	Environmental Co-ordinator	Included in construction costs.
Matters pertaining to TRAFFIC																				
No impacts are envisioned						0	-	L						0	-	L				
Matters pertaining to VISUAL																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HERITAGE																				
Evidence of 2 sites of archaeological/cultural importance occur within close proximity to the pipeline. Potential impacts on these must be minimised. Refer to Section 2.11 for location of structures.	Construction activities	8	4	2	3	42	-	M	The built structures should then be fenced in order to avoid unwanted damage	4	4	2	2	20	-	L	The built structures should then be fenced in order to avoid unwanted damage and monitored monthly for damage to the fence.	Prior to Construction	Environmental control officer	N/A
Matters pertaining to SOCIAL																				
Additional employment opportunities will be made available.	Pipeline construction and Backfill plant establishment	4	3	2	3	27	+	L	Maximise and monitor local recruitment	8	3	2	4	52	+	M	Include preferential local employment in Gold One's recruitment policy, taking cognisance of the availability of skills Only purchase goods and services internationally if they are not available in South Africa	Ongoing	Human resources manager	Included in construction costs.

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Increased crime and decreased safety to local residents	Pipeline construction and Backfill plant establishment	8	3	1	3	36	-	M	Employ local people where possible to avoid the influx of external jobseekers.	4	3	1	2	16	-	L	Delineate buffer areas so that vast tracts of open land do not create breeding grounds for thieves Enforce rules for no-go areas to workers on the properties Employ people from surrounding communities to avoid community resentment for not reaping benefits from project, taking cognisance of the availability of skills	Ongoing	Community liaison officer Health and safety manager	Included in construction costs.
Construction disturbance	Pipeline construction and Backfill plant establishment	4	2	1	5	35	-	M	Keep open communication channels with the public.	2	2	2	2	12	-	L	Appoint a community liaison officer Put in place a grievance procedure and ensure stakeholders know how to access it	Ongoing	Community liaison officer	Included in construction costs.

Table 7.3: Construction – Waste handling

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
CONSTRUCTION PHASE ACTIVITY 2: Waste handling																				
Matters pertaining to GEOLOGY																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROGEOLOGY																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Handling of waste and transport of building material can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and contaminate the groundwater system.	Waste Handling	4	4	1	4	36	-	M	A dedicated area for the placement of waste skips must be determined prior to operational activities, and the area will have to be cemented.	2	4	1	2	14	-	L	Allowance for keeping clean water run-off away from the skip area through the correct bunding design. The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in a prescribed/correct manner, and must be stored in a designated area as part of the waste management strategy. Waste generated will be collected and disposed of in a licensed waste facility and a copy of the valid waste disposal permits will be kept on site.	Ongoing	Environmental control officer	Included in construction & operation costs
Matters pertaining to HYDROLOGY																				
The generation of waste may lead to surface water contamination.	Waste generation	8	4	2	4	56	-	M	Surface water quality monitoring networks must be set up prior to the construction phase so that any surface water quality issues can be addressed accordingly.	6	4	2	3	36	-	M	Surface water quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	Monthly	Environmental control officer	R 91 000.00
																	Quarterly surface water monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental control officer/Water Quality Specialist	R 42 000.00
																	In the event that water quality issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental control officer/Water Quality Specialist	To be determined - depending on severity of incident
Disposal of any type of waste to an area with a waste skip can impact the hydrological environment.	Waste disposal	8	2	2	5	60	-	M	A dedicated area for the placement of waste skips must be determined prior to operational activities, and the area will have to be cemented. Allowance for keeping clean water run-off away from the skip area through the correct bunding design.	4	2	1	2	14	-	L	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in a prescribed/correct manner, and must be stored in a designated area as part of the waste management strategy. Waste generated will be collected and disposed of in a licensed waste facility and a copy of the valid waste disposal permits will be kept on site.	Ongoing	Environmental control officer	Included in construction & operation costs
Builders rubble, packaging and other waste generated in the construction process could become a source of pollution for water resources.	Building waste	2	2	2	5	30	-	M	Builder contracts should include relevant stipulations regarding the storage and removal of building waste.	2	2	1	2	10	-	L	Develop a management plan for the handling of all associated building waste and make it a contractual requirement.	Once-off	Environmental control officer	Included in construction costs.
Fuels and/or toxic materials could be spilled and pollute local water resources.	Spillage	6	3	3	3	36	-	M	Measures should be in place to contain any spills and allow safe collection and disposal of waste.	4	3	2	2	18	-	L	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in a prescribed/correct manner, and must be stored in a designated area as part of the waste management strategy.	Ongoing	Environmental control officer	Included in construction & operation costs
Matters pertaining to SOILS																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Temporary storage of hazardous products and waste may cause the pollution of soil.	storage of hazardous products and waste	6	5	2	4	52	-	M	Monitoring of waste generation and soil contamination must be implemented and maintained.	6	5	2	4	52	-	M	Storage areas must be contained using impervious walls. The storage of materials and substances will be housed in suitable facilities. Management of these facilities will be on-going and this will include regular inspections to detect faults/issues. A waste management plan and pipeline audit will need to be implemented. Any hydro-carbon spills on soil must be reported to the environmental officer and cleaned up by trained personnel using commercially available emergency clean-up kits.	Ongoing	Environmental Co-ordinator	Included in construction & operation costs
Matters pertaining to FAUNA and FLORA																				
Hazardous products could potentially leak resulting in toxic pollution of the project area which will result in ecological degradation and a loss in the ecological integrity.	storage of hazardous products and waste	8	5	2	4	60	-	M	The storage of materials and substances will be housed in suitable facilities. A waste management plan and pipeline audit will need to be implemented.	6	3	1	2	20	-	L	Management of these facilities will be on-going and this will include regular inspections to detect faults/issues. Provide adequate waste disposal facilities; manage operational issues with respect to hygiene, ablution and food provision Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training. Develop and implement awareness programmes aimed at ensuring that persistent and deliberate impacts on animals in nearby natural habitat are prevented. Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training; develop hydrocarbon spill reaction and cleanup action plan.	Ongoing Ongoing	Environmental control officer/Health & Safety Officer/Contractor/Site Manager Environmental control officer/Health & Safety Officer/Contractor/Site Manager	Included in construction costs. Included in construction costs.
Matters pertaining to WETLANDS																				
During construction activities a number of potentially polluting substances will be used and likely stored on site, including diesel, oil, cement, and waste generated during construction activities. Incorrect handling of these materials as well as accidental spills and leaks could result in pollutants entering down slope wetlands via surface runoff, leading to water quality deterioration and subsequently impacting wetland fauna and flora.	Waste handling at pipeline construction site	6	4	1	3	33	-	M	All waste should be stored in clearly demarcated areas on site and disposed of at registered, licensed waste facilities.	6	3	1	2	20	-	L	All hazardous substances used during the establishment of infrastructure should be stored on impervious surfaces that allow for the containment of spills and leakages (e.g. bunded areas). Should spills occur, these should be reported to the ECO. Larger spills will require the appointment of specialist clean-up teams to rehabilitate the affected area. No hazardous materials may be stockpiled in any wetland area on site. Sufficient spill clean-up materials should be kept on site at all times.	Ongoing	Environmental control officer	Included in Construction and Operational Costs
Matters pertaining to AIR QUALITY																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to NOISE																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TRAFFIC																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HERITAGE																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A

Table 7.4: Construction – Vehicle and Machinery Movement

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
CONSTRUCTION PHASE ACTIVITY 3: Vehicle and Machinery Movement																				
Matters pertaining to GEOLOGY																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROGEOLOGY																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROLOGY																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Hydrocarbon contamination of surface water from construction equipment and/or vehicle spillages.	Oils spills from vehicles or machinery	4	3	2	2	18	-	L	Employees and contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken.	2	2	1	2	10	-	L	All workers will be made aware of the penalty systems for non compliance. Soil contaminated with fuel or oil spills, for example, from construction vehicles, will be collected and treated at a pre-determined and dedicated location, or will be treated in situ using bioremediation, in accordance with Gold One's existing procedures. If required, contaminated soil will be disposed of at a licensed facility. Vehicles will be maintained regularly and kept in a good working order. Vehicle maintenance will not be carried out on the construction site, but in existing Gold One and/or contractor workshops.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
Matters pertaining to SOILS, LAND USE, LAND CAPABILITY																				
The use of heavy machinery during the construction process may result in the compaction of soil, resulting in decreased infiltration of rain water and increased surface run-off volumes and velocities leading to a greater erosion risk. The plant location is already heavily impacted.	Heavy vehicle movement	8	2	2	4	48	-	M	All areas not directly within the proposed infrastructure footprint area where the soil has been compacted will need to be ripped to break up the compacted soil surface. This will aid infiltration and decrease run-off.	4	2	1	2	14	-	L	Develop a plan clearly defining the construction area. After construction activities determine which areas must be ripped and potentially re-vegetated. Implement the plan with proper measures in place not to compact new areas.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
Soil pollution due to the spillages of hydrocarbons along construction routes.	Heavy vehicle movement	8	2	2	4	48	-	M	Employees and contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken. All workers will be made aware of the penalty systems for non compliance.	4	2	1	2	14	-	L	Employees and contractors will be educated by means of training to make them aware of the necessity to prevent spillages through the implementation of good housekeeping practices. The management of chemicals and hydrocarbons should form part of the emergency response programme. No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
Matters pertaining to FAUNA and FLORA																				
The construction of infrastructure will result in an increase in the amount of traffic of heavy vehicles. This will result in disturbance of fauna cycles/species specifically.	Heavy vehicle movement during construction activities	6	5	2	4	52	-	M	Make use of existing roads and/or areas and roads designated for the mining operation.	4	3	1	3	24	-	L	Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training. Develop and implement awareness programmes aimed at ensuring that persistent and deliberate impacts on animals in nearby natural habitat are prevented.	Seasonal/Bi-annual	Environmental control officer/Ecologist/Proponent	Included in construction costs.

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
									The digging of trenches can harm small burrowing animals, therefore before digging commences a sweep must take place to determine small mammal colonies.								Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training. Develop and implement awareness programmes aimed at ensuring that persistent and deliberate impacts on animals in nearby natural habitat are prevented.	Seasonal/Bi-annual	Environmental control officer/Ecologist/Proponent	Included in construction costs.
Matters pertaining to WETLANDS																				
See impacts for infrastructure establishments.	Heavy vehicle movement	0	0	0	0	0	-	L	N/A	0	0	0	0	0	-	L	N/A	N/A	N/A	N/A
Matters pertaining to AIR QUALITY																				
Generation of nuisance dust during construction at the backfill plant and pipeline.	Movement of heavy duty vehicles.	4	1	2	4	28	-	L	Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	4	1	1	2	12	-	L	Maintain trees on the plant fence line or outside the plant area to provide screening and dust entrapment, taking into account security requirements around the fence area; Wet suppression and/or chemical stabilisation of unpaved surfaces and backfill plant surfaces; and Enforcement of low vehicle speeds.	Daily	Environmental Control Officer	Included in construction costs.
Matters pertaining to NOISE																				
Noise disturbance to surrounding communities.	Pipeline construction	4	2	2	4	32	-	M	Implement a noise monitoring programme and regular vehicle inspections.	4	2	2	3	24	-	L	Project-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Vehicles to be service according to service plan.	Environmental manager	Included in construction costs.
Matters pertaining to TRAFFIC																				
Heavy machinery will at times disrupt traffic.	N/A	4	1	1	3	18	-	L	Construction material to be transported with road-worthy vehicles that are well maintained and a speed limit of 40 km/h to be maintained on construction roads.	2	1	1	3	12	-	L	The contractor should communicate the construction schedule and vehicle movements to the neighbouring property owners using the community forum established during the pre-construction phase. Implement a strict penalty fine system for speeding incidents.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
Matters pertaining to VISUAL																				
Dust Pollution from transportation of construction equipment	Heavy vehicle movement	5	2	2	3	27	-	L	Effective dust suppression management programme, such as regular wetting and/or the use of non-polluting chemical that will retain moisture on the road will be undertaken.	4	2	2	2	16	-	L	Draw up a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	prior to commencement	mine	Included in construction costs.
Matters pertaining to HERITAGE																				
Evidence of 2 sites of archaeological/cultural importance occur within close proximity to the pipeline. Potential impacts on these must be minimised. Refer to section 2.11 of the EIA/EMP for location of structures.	Heavy vehicle movement	8	4	2	3	42	-	M	Prevent vehicle movement not to be within the proximity of the structures.	4	4	2	2	20	-	L	Prevent vehicle movement not to be within the proximity of the structures.	Prior to Construction	Environmental control officer	N/A
Matters pertaining to SOCIAL																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Access to the mine would increase the risk of vehicle and pedestrian accidents in the vicinity of the access point. Movement of construction vehicles and possible speeding could be a concern.	Heavy vehicle movement	4	2	2	3	24	-	L	Construction material to be transported with road-worthy vehicles that are well maintained and a speed limit of 40 km/h to be maintained on construction roads.	2	2	2	3	18	-	L	The contractor should communicate the construction schedule and vehicle movements to the neighbouring property owners using the community forum established during the pre-construction phase. Implement a strict penalty fine system for speeding incidents.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.

7.5 Operational Phase

This section comprises of the description of potential impacts associated with the proposed operation of the mine on the biophysical, socio-economic and heritage and cultural environment. These descriptions are followed by the impact tables which contain the assessment of the significance of each identified impact without, then with mitigation measures. Each mitigation measure proposed is assigned a proposed action plan, frequency, associated management cost, as well as person responsible for implementation of the mitigation measures proposed to mitigate and/or manage each impact.

7.5.1 Topography

No significant impacts are envisaged during the operational phase.

7.5.2 Soils, Land Use, Land Capability

The main impact during operation will be compaction, contamination and erosion of soil due to vehicle movement and contamination of soil if spills should occur from waste sites or the pipeline.

Surface runoff water from compacted areas such as roads must be controlled to indirectly also control soil erosion. Roads must be inspected and eroded shoulders repaired especially during the rainy season. Any hydro-carbon spills (fuel, oil and grease), or tailings spills from the pipeline on soil must be reported to the environmental officer and cleaned up by trained personnel using commercially available emergency clean-up kits.

7.5.3 Flora and Fauna

Continual human disturbance will disturb ecological processes. Furthermore if vehicles should access areas that have been rehabilitated/re-vegetated, this will result in destruction of vegetation species and the possible encroachment of exotic/invasive species. Thus vehicles must always remain on designated roads.

The pipeline should be monitored weekly to ensure that leakages do not negatively affect the surrounding ecosystems. Wetting of roads during winter months should be undertaken to limit dust creation.

7.5.4 Wetlands

Toxic contamination of the wetland could potentially occur from mine slurry and fine tailings being spilled into it. This should be avoided as the wetland plays an important role as a water source for the people living in the nearby settlements and is a possible host to sensitive wetland and aquatic species. According to Bateman (2009) the constituents of mine slurry are all used at some stage during the process. Many of the constituents are neutralized to an extent, but is still mentioned here as a possible impact when a process should fail.

It is proposed that the pipeline should be constructed with containment paddocks either sides of the stream/wetland. Maintenance of the pipelines should be done weekly to detect whether leaks are present. Where a spill occurs, the spillage should be contained and cleaned as quickly as possible.

7.5.5 Aquatic Ecosystems

The operation and maintenance of the pipeline crossing the river system may cause spillages/leaks into the systems, impacting on water quality. These spillages/leaks may be as a result of wear-and-tear and would need to be addressed.

Long pull HDPE lined pipes will be used for the project and effort will be made to avoid locating flanges in close proximity to the river crossings. A monitoring programme should be implemented to inspect the pipeline route for potential failures which could be addressed prior to an incidence occurring. This monitoring programme could include a visual inspection on a regular basis as well as fracture and weakness inspection of the pipeline by the relevant personnel.

7.5.6 Surface Water

Spillages of tailings and return water from pipelines crossing could contaminate the Wonderfonteinspruit. Waste generated at the mine could also pollute local water resources if dirty runoff is not separated from clean runoff on site.

A risk based monitoring programme should be implemented for detection of leaks and spills. If a spill occurs, it should be contained and cleaned up as quickly as possible. Tailings material that has spilled from the pipeline will be cleaned up in accordance with Gold One's existing procedures. The pipelines crossing across the Wonderfonteinspruit must be fitted either with a launder below the pipe or an outer pipe to contain any spills. The launder or outer pipe must drain to sumps on the downslope side of the pipeline. The drainage sump must be sized to contain the volume of the pipeline draining to that point.

7.5.7 Groundwater

The mine workings are located approximately 900 m below surface, below the Dolomitic aquifers, where the main water storage occurs. Improperly installed boreholes could lead to the ingress of water into the mine workings and contamination of groundwater when backfilling occurs. In addition to this the pumping of product via the pipeline route can result in spills which can infiltrate and contaminate the groundwater system. Handling of waste and transport of material and operations can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can also infiltrate and contaminate the groundwater system.

The drilling contractor should ensure that boreholes are installed properly during construction to avoid the ingress of water into the underground workings. The backfill material should be inert and contamination is not expected. Maintenance of the pipelines should be done weekly to detect whether leaks are present. Leaks should be fixed by a qualified technician. Where a spill occurs, the spillage should be contained and cleaned as quickly as possible.

7.5.8 Air Quality

Air quality impacts are not expected during the operation of the Backfill Plant.

7.5.9 Sites of Historical and Cultural Importance

No significant impacts are envisaged during the operational phase.

7.5.10 Noise

Noise disturbance from the periodic maintenance activities of the pipeline can be expected. This will however only be for short periods and will be insignificant.

7.5.11 Traffic

No significant impacts are envisaged during the operational phase.

7.5.12 Social Conditions

The operational phase of the project will see far less job creation than the construction phase. Most jobs will be for less skilled individuals, resulting in local residents standing a good chance of attaining those jobs. This, however, will only be achieved if the operation, albeit it through their contractors, prioritises local job creation.

Those land owners that will only be affected by the pipeline, will continue to have relatively free mobility on their farms once the pipeline is built. The largest part of the pipeline will be built in existing servitudes and on mine-owned property, so the potential interference to landowners can be seen as minimal.

The broader project area has seen mines buying many agricultural properties to either develop or to leave unused as a buffer around the operation. In some instances, these buffer zones are not fenced and provide easy access for criminals to enter onto adjacent properties. This Project could lead to an increase in stock theft and compromise landowner safety and livelihoods.

Farm residents are concerned about possible spillages that may occur if the pipes burst or leak. While the utmost care will be taken by Gold One to prevent spillages and although emergency response systems will be in place, the mere presence of a pipeline on a private individual's land transporting potentially hazardous slurry is a risk to the residents on the land. According to the constitution of South Africa, "*Everyone has the right to an environment that is not harmful to their health or well-being*". It is therefore important that the health of local residents not be compromised.

The Radiation Exposure Report for the project notes that the presence of naturally occurring radionuclides (NORM) has the potential to impact negatively on the health of humans that are exposed to these materials.

The influx of job-seekers to the area may lead to an increase in informal settlements throughout the broader study area and to over-crowding in nearby townships. The possible increase in crime will make people feel less safe where they live. Where incidences of crime occur, people may develop resentment towards Gold One. The same will apply should road accidents occur. Local peoples' sense of alertness will eventually increase and their current sense of rural tranquillity will diminish.

Table 7.5: Operation - Backfill of Tailings

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
OPERATION PHASE ACTIVITY 1: Backfill of Tailings																				
Matters pertaining to GEOLOGY																				
Stabilisation of the underground workings as a result of hardening of tailings backfill material.	Backfilling	8	4	1	4	52	+	M	N/A	8	4	1	4	52	+	M	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
Stabilisation of the underground workings as a result of hardening of tailings backfill material.	Backfilling	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROGEOLOGY																				
The mine workings are located approximately 450 - 900 m below surface, below the Dolomitic aquifers, where the main water storage occurs. Improperly installed boreholes could lead to the ingress of water into the mine workings and contamination of groundwater when backfilling occurs.	Backfilling	10	4	3	4	68	-	H	install boreholes properly during construction	2	1	1	2	8	-	L	Ensure that boreholes are installed properly during construction to avoid the ingress of water into the underground workings.	During construction	Engineer	Included in construction costs
									The backfill material should be inert and contamination is not expected.								The backfill material should be inert and contamination is not expected.	Monthly monitoring Quarterly reporting	Environmental control officer/Water Quality Specialist	R 133 000.00
Matters pertaining to HYDROLOGY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOIL																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	The plant will be placed on a Brownfield's area and no impacts are expected.	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to FAUNA AND FLORA																				
No significant impacts are envisaged during the operational phase of the plant as the area is within a Brownfield's area	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to WETLANDS																				
Additional impacts are not envisaged as this is already a Brownfield's area, and not in close proximity to a watercourse	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to AIR QUALITY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to NOISE																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
No significant impacts are envisaged during the operational phase of the plant as the area is within a Brownfield's area	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to RADIOLOGY																				
Radiation exposure from tailings at the backfill plant	Backfilling	2	5	1	2	16	-	L	No mitigation required	2	5	1	2	16	-	L	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				
The backfill will aid in the structural stability of the area, and reduce the potential for seismicity.	Backfilling	8	4	1	4	52	+	M	N/A	8	4	1	4	52	+	M	N/A	N/A	N/A	N/A

Table 7.6: Operation - Operation of Backfill Plant

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
OPERATION PHASE ACTIVITY 2: Operation of Backfill Plant																				
Matters pertaining to GEOLOGY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROGEOLOGY																				
Handling of waste and transport of material and operations can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and contaminate the groundwater system.	Operations	4	4	1	4	36	-	M	A dedicated area for the placement of waste skips must be determined prior to operational activities, and the area will be cemented.	2	4	1	2	14	-	L	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in a prescribed/correct manner, and must be stored in a designated area as part of the waste management strategy. Waste generated will be collected and disposed of in a licensed waste facility and a copy of the valid waste disposal permits will be kept on site. Allowance for keeping clean water run-off away from the skip area through the correct bunding design.	Ongoing	Environmental control officer	Included in operation costs
Matters pertaining to HYDROLOGY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOIL																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
The plant will be placed on a Brownfield's area and no impacts are expected.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to FAUNA AND FLORA																				
No significant impacts are envisaged during the operational phase of the plant as the area is within a Brownfield's area	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to WETLANDS																				
Additional impacts are not envisaged as this is already a Brownfield's area, and not in close proximity to a watercourse	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to AIR QUALITY																				
During the off loading of binder material, a potential for nuisance dust concentrations will be created. This will however be temporary.	N/A	0	0	0	0	0	N	N	During off loading of binder material, the dust will be contained through mechanical means (extraction or filtration)	0	0	0	0	0	N	N	Maintain good functioning of extraction and/or filtration system	Ongoing	Plant Operator	Included in operation costs
Matters pertaining to NOISE																				
Noise generated by the operation of the plant will be limited to electrical motors and pumps.	Infrastructure Operation	0	0	0	0	0	N	N	Maintain equipment in good working order and enforce the existing mine hearing protection programme.	0	0	0	0	0	N	N	Implement and maintain equipment according to management plan.	N/A	N/A	N/A
Matters pertaining to TRAFFIC																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				
Security / Operational Lighting will be maintained throughout the operational phase of the project.	Lighting from operations	7	4	3	3	42	-	M	Implement according to proposed action plan.	6	4	2	3	36	-	M	Security flood lighting and operational lighting should only be used where absolutely necessary and carefully directed, preferably away from sensitive viewing areas, i.e. the Bekkersdal community and the roads in close proximity to the site . Wherever possible, lights should be directed downwards so as to avoid illuminating the sky.	prior to commencement	mine	N/A
Matters pertaining to HERITAGE																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to RADIOLOGY																				
Radiation exposure from tailings	Operations	2	3	1	2	12	-	L	No mitigation required due to low impact significance	2	3	1	2	12	-	L	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Employment Opportunities	Operation and maintenance of infrastructure	6	4	2	3	36	+	M	Maximise and monitor local recruitment where skills exist and provide training where possible	8	4	2	4	56	+	M	Include preferential local employment in Gold One's recruitment policy, taking cognisance of the availability of skills Use local labour for maintenance during operation where skills exist Only purchase goods and services internationally if they are not available in South Africa, where commercial viability allows	Ongoing	Human resources manager	Included in operation costs
Increased crime and decrease in safety of residents	Operation and maintenance of infrastructure	8	4	1	3	39	-	M	Patrol of the pipeline route must be implemented.	4	3	1	2	16	-	L	Patrol vacant pieces of land Enforce rules for no-go areas to workers on the properties Employ people from surrounding communities to avoid community resentment for not reaping benefits from project where skills exist	Daily	Community liaison officer Health and safety manager	Included in operation costs
Decrease in land value and sense of place	Presence of mine infrastructure	8	4	1	4	52	-	M	Implement the community forum meetings throughout operational phase.	4	4	1	3	27	-	L	Communicate regularly with neighbouring land owners about any changes at the operation that may affect land owners	Bi-annually	Environmental manager Community liaison officer	Included in operation costs

Table 7.7: Operation – Linear infrastructure

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
OPERATION PHASE ACTIVITY 3: Linear Infrastructure																				
Matters pertaining to GEOLOGY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROGEOLOGY																				
The pumping of product via the pipeline route can result in spills which can infiltrate and contaminate the groundwater system.	Pipeline spills	6	4	2	4	48	-	M	Implement a monitoring plan for the pipeline	4	4	1	3	27	-	L	Maintenance of the pipelines should be done daily to detect whether leaks are present. Leaks should be fixed by a qualified technician. Where a spill occurs, the spillage should be contained and cleaned as quickly as possible.	Daily	Environmental coordinator	Included on operational costs
Matters pertaining to HYDROLOGY																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Spillages of tailings and return water from pipelines crossing the Wonderfonteinspruit.	Transport of re-processed tailings and return water.	8	1	2	3	33	-	M	Adherence to the Spill Prevention/Emergency response plan	4	1	2	3	21	-	L	A risk based monitoring programme will be implemented for detection of leaks and spills. If a spill occurs, it will be contained and cleaned up as quickly as possible. Tailings material that has spilled from the pipeline will be cleaned up in accordance with Gold One's existing procedures.	Water quality monitoring on a monthly basis	Surface water / Aquatic soecialist, Environmental Manager	Included on operational costs
									Regular maintenance and monitoring of blockages and leakages								Faults will be reinforced if detected to avoid spillage. Leaks will be repaired immediately.	Daily monitoring of the pipeline during the operational phase at the stream crossings;	Project Engineer; Environmental Manager	Included on operational costs
									Implementation of the Department of Water Affairs' Best Practice Guidelines (DWA BPGs)								The pipelines crossing across the Wonderfonteinspruit will be encased within a casing to contain any spills. The drainage sump must be sized to contain the volume of the pipeline draining to that point. Installation of shut off valves upstream of the river crossing. Installation of pressure and/or flow differential sensors to shut pumps down should a rupture occur in the pipeline. The drainage sump must be positioned outside of the1:100 year floodline. Pipeline flow directions must be marked on the outside of the pipeline using weather resistant paints or labels.	During construction	Project Engineer	Included in Construction costs
Matters pertaining to SOIL																				
Compaction, contamination and erosion of soil due to vehicle movement.	Vehicle movement on site	8	5	2	5	75	-	H	Rehabilitate impacted areas	6	5	2	4	52	-	M	Surface runoff water from compacted areas such as roads for example must be controlled to indirectly also control soil erosion.	Weekly	Environmental coordinator	Included in Operational Costs.
									Inspect areas where possble erosion can occur								Roads must be inspected and eroded shoulders repaired especially during the rainy season. Make use of existing roads and/or areas and roads designated for the mining operation where possible.	Weekly	Environmental coordinator	Included in Operational Costs.
									Maintain roads and vehicles								Roads must be inspected and eroded shoulders repaired especially during the rainy season. Make use of existing roads and/or areas and roads designated for the mining operation where possible. Proper maintenance of operating vehicles and regular vehicle inspections.	Weekly	Environmental coordinator	Included in Operational Costs.
Matters pertaining to FAUNA and FLORA																				
Operation and maintenance of infrastructure (roads and pipeline) will affect the site and the immediate surrounding ecology. Continual human disturbance will disturb ecological processes.	Operation and maintenance of infrastructure	8	4	2	4	56	-	M	Impliment a monitoring programme	6	4	2	3	36	-	M	Monitor the pipeline daily to ensure that leakages do not negatively affect the surrounding ecosystems.	Pipeline monitoring should be enforced daily.	Environmental coordinator	Included on operational costs

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Furthermore if vehicles should access areas that have been rehabilitated/re-vegetated, this will result in destruction of vegetation species and the possible encroachment of exotic/invasive species.	(roads and pipeline)								Ensure that vehicles keep to roads and speed limit.								Reduce speed of heavy vehicles to 40 km/h and standard vehicles to 60 km/h. Enforcement and fining should be implemented. Staff should be educated on health and safety as well as environmental effect of breaking road regulations.	Road rules should be enforced Daily.	Environmental coordinator	Included on operational costs
Matters pertaining to WETLANDS																				
Pollution due to spillage from the slurry and fine tailings being pumped.	Pipeline spills	8	4	2	5	70	-	H	Construct pipeline according to approved plan. Maintenance of the pipelines should be done weekly to detect whether leaks are present. Where a spill occurs, the spillage should be contained and cleaned as quickly as possible.	6	4	1	3	33	-	M	The pipeline should be constructed with containment paddocks downslope of the stream/wetland. The pipelines should be monitored daily for leaks or faults. Faults should be reinforced if detected to avoid spillage. Leaks should be fixed immediately by a qualified technician. Slurry should be cleaned by sweeping up the entire spill present and putting it into containers until it can be disposed of at the applicable site. The water quality within the wetland should be monitored giving specific attention to pH. pH values should not vary from the range of the background pH for a specific site and time of day by more than 0.5 of a pH unit, or by more than 5 %. If this does happen the pH should be rectified. The faunal and floral species present and ecological integrity should be monitored twice a year, and species and integrity shouldn't significantly decrease (decrease in occurrence, abundance and status class). Spill kits and training for use thereof to be at hand at all times	During construction Daily monitoring of the pipeline during the operational phase at the stream crossings; monthly water quality monitoring	Project Engineer Environmental control officer / Project Engineer Surface water / Aquatic soecialist, Environmental Manager	Included in Operational Costs. Included in Operational Costs. Included in Operational Costs.

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Possible loss of habitat and species of significance downstream of potential leak.	Pipeline spills	10	4	2	5	80	-	H	Where a spill occurs, The spillage should be contained and cleaned as quickly as possible.	4	2	1	4	28	-	L	Where a spill does occur, it should be contained and cleaned as quickly as possible. Slurry should be cleaned by sweeping up the entire spill present and putting it into containers until it can be disposed of at the applicable site. The water quality within the wetland should be monitored giving specific attention to pH. pH values should not vary from the range of the background pH for a specific site and time of day by more than 0.5 of a pH unit, or by more than 5 %. If this does happen the pH should be rectified. The faunal and floral species present and ecological integrity should be monitored twice a year, and species and integrity shouldn't significantly decrease (decrease in occurrence, abundance and status class). Other water quality guidelines are given in the South African Water Quality Guidelines (DWAF, 1996). Spill kits and training for use thereof to be at hand at all times	monthly water quality monitoring	Surface water / Aquatic soecialist, Environmental Manager	Included in Operational Costs.
									Maintenance of the pipelines should be done weekly to detect whether leaks are present.								The pipelines should be monitored daily for leaks or faults. Faults should be reinforced if detected to avoid spillage. Leaks should be fixed immediately by a qualified technician.	Daily monitoring of the pipeline during the operational phase at the stream crossings;	Environmental control officer / Project Engineer	Included in Operational Costs.
Matters pertaining to AQUATICS																				
The operation and maintenance of the pipelines crossing the river systems may cause spillages/leaks into the systems, impacting on water quality.	Operation and maintenance of infrastructure (roads and pipeline)	8	4	2	3	42	-	M	Daily inspections along the pipeline route will be conducted.	6	4	2	2	24	-	L	A monitoring programme should be implemented to inspect the pipeline route for potential failures which could be addressed prior to an incidence occurring. This monitoring programme could include a visual inspection on a regular basis as well as fracture and weakness inspection of the pipeline by the relevant personnel.	Daily	Environmental coordinator	Included on operational costs
Matters pertaining to AIR QUALITY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to NOISE																				
Noise disturbance from the periodic maintenance activities of the pipeline	Pipeline operation and maintenance	4	4	2	3	30	-	M	Inspect pipeline regularly to detect faults/issues.	4	4	1	3	27	-	L	Implement a noise monitoring programme. Regular pipeline inspections	As determined by engineer	Environmental Co-ordinator	
Matters pertaining to TRAFFIC																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to RADIATION																				
Radiation exposure from tailings from burst / damaged pipelines	Radioactive elements	2	2	1	2	10	-	L	No mitigation required due to low impact significance	2	2	1	2	10	-	L	N/A	N/A	N/A	N/A

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Matters pertaining to SOCIAL																				
Increased crime and decrease in safety of residents	Operation and maintenance of infrastructure (roads and pipeline)	8	4	1	3	39	-	M	Patrol vacant pieces of land	4	3	1	2	16	-	L	Delineate lands that are not in use or that do not have regular human activities Enforce rules for no-go areas to workers on the properties Employ people from surrounding communities to avoid community resentment for not reaping benefits from project where skills exist	Ongoing	Community liaison officer Health and safety manager	Included in Operational Costs.
Health at safety risks to residents near pipelines and plant	Spills from pipeline and backfill plant	8	5	2	3	45	-	M	Put in place early warning systems to detect possible spillages	6	5	1	2	24	-	L	Provide containment measures below pipes to contain possible spillages in sensitive areas	Ongoing	Health and safety manager	Included in Operational Costs.
									Train local residents in health and safety procedures for having pipeline on or near their property								Put up clear signage to alert land users of presence of pipeline and associated possible hazards. The pipelines should be monitored daily for leaks or faults.	Ongoing	Health and safety manager	Included in Operational Costs.

Table 7.8: Operation - Waste and Dangerous goods storage and handling

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
OPERATIONAL PHASE ACTIVITY 4: Waste and Dangerous goods storage and handling																				
Matters pertaining to GEOLOGY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROGEOLOGY																				
Handling of waste and transport of material and operations can cause various types of spills (domestic waste, sewage water, hydrocarbons) which can infiltrate and contaminate the groundwater system.	Operations	4	4	1	4	36	-	M	A dedicated area for the placement of waste skips must be determined prior to operational activities, and the area will be cemented. Allowance for keeping clean water run-off away from the skip area through the correct bunding design.	2	4	1	2	14	-	L	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in a prescribed/correct manner, and must be stored in a designated area as part of the waste management strategy. Waste generated will be collected and disposed of in a licensed waste facility and a copy of the valid waste disposal permits will be kept on site.	Ongoing	Environmental control officer	Included in operation costs

The use of diesel, oil and other hazardous chemical substances may lead to the contamination of surface and groundwater resources. Storage of fuel, lubricants may lead to hydrocarbon contamination by diesel and oil spillages during the re-fuelling and movement (on and off site, and the workshop area) of mining trucks.	Hydrocarbon storage and handling	8	4	2	4	56	-	M	Regular safety checks and maintenance of the storage tanks should be undertaken by suitably qualified safety officers.	4	3	1	3	24	-	L	Non mining waste that include, but are not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned machinery and other combustible materials generated during activities should be placed and stored in a controlled manner in a designated area.	Weekly	Environmental control officer	Included in Operational Costs
									All hydrocarbons should be stored in designated, bunded areas with a capacity of at least 110% of the volume stored.								Conduct inspections to determine if there are any compromises to the bunded facility.	Weekly	Environmental control officer	Included in Operational Costs
									Bunded areas should not allow seepage of pollutants into the ground or the run-off of polluted water.								Any rainfall and storm water collected within the bunded area should remain separate from other storm water and will need to be treated to an acceptable level prior to release.	Weekly	Environmental control officer	Included in Operational Costs
									Spill kits should be readily available and all employees must be trained in the utilisation thereof.								Inspect the availability and content of the spill kits in all areas of the operation.	Weekly	Environmental control officer	Included in Operational Costs
									Should a spill take place the area should be cleaned immediately and the contaminated area will be rehabilitated as appropriate.								Employees to report hydrocarbon spills that took place at the end of their shift to their supervisor, in order to record all spills.	End of shift	Supervisor	Included in Operational Costs
									Employees must undergo induction and training in terms of the Environmental Awareness Plan.								Employees will be educated by means of training and the Environmental Awareness Plan to make them aware of the necessity to prevent spillages by the implementation of good housekeeping practices.	Prior to appointment	Environmental control officer	Included in Operational Costs
									The management of chemicals and hydrocarbons should form part of the Emergency Response Programme.								Employees must undergo induction and training in terms of the Emergency Response Programme .	Prior to appointment	Environmental control officer	Included in Operational Costs
									In the event of a major spill that could result in major soil and water contamination the DWA should be informed immediately and a remediation strategy should be enforced.								Ensure that all Material Data Sheets (MSDS) is available for all material stored, and displayed properly.	Ongoing	Environmental control officer	Included in Operational Costs
									No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area.								Employees must undergo induction and training in terms of the Emergency Response Programme .	Prior to appointment	Environmental control officer	Included in Operational Costs
Matters pertaining to HYDROLOGY																			
Waste generated at the mine could pollute local water resources. (see also Hydrogeology)	Waste generation	6	4	2	3	36	-	M	Control the storage, handling and safe disposal of waste.	4	4	1	1	9	-	L	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in a prescribed/correct manner, and must be stored in a designated area as part of the waste management strategy.	Ongoing	Environmental control officer	Included in Operational Costs
Matters pertaining to SOILS																			

Temporary storage of hazardous products and waste may cause the pollution of soil.	storage of hazardous products and waste	6	5	2	4	52	-	M	Storage areas must be contained using impervious walls. A waste management plan and pipeline audit will need to be implemented.	6	5	2	4	52	-	M	The storage of materials and substances will be housed in suitable facilities. Management of these facilities will be on-going and this will include regular inspections to detect faults/issues. Any hydro-carbon spills on soil must be reported to the environmental officer and cleaned up by trained personnel using commercially available emergency clean-up kits.	Ongoing Ongoing	Environmental Co-ordinator Environmental Co-ordinator	Included in operation costs Included in operation costs
Matters pertaining to FAUNA AND FLORA																				
Impacts on surrounding habitat/species, including ecosystem functioning.	Waste generation & handling	4	4	2	3	30	-	M	Develop dedicated waste handling areas; prevent the spread of waste.	4	4	2	2	20	-	L	Develop control measures; develop a monitoring plan; implement an awareness programme; provide adequate waste disposal facilities; and implement waste sorting and the re-use of materials.	Ongoing	Environmental control officer/Health & Safety officer/ Ecologist/ Contractor/Site Manager	Included in Operational Costs
Matters pertaining to WETLANDS																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to AIR QUALITY																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to NOISE																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TRAFFIC																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HERITAGE																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to RADIATION																				
Radiation exposure from tailings at the backfill plant	Backfilling	2	5	1	2	16	-	L	No mitigation required	2	5	1	2	16	-	L	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				
No significant impacts are envisaged during the operational phase .	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A

7.6 Closure and Decommissioning Phase

This section comprises of the description of potential impacts associated with the closure, decommissioning and rehabilitation activities on the biophysical, socio-economic and heritage and cultural environment. These descriptions are followed by the impact tables which contain the assessment of the significance of each identified impact without, then with mitigation measures. Each mitigation measure proposed is assigned a proposed action plan, frequency, associated management cost, as well as person responsible for implementation of the mitigation measures proposed to mitigate and/or manage each impact.

7.6.1 Topography

No significant closure and decommissioning impacts are envisaged.

7.6.2 Soils, Land Use, Land Capability

The decommissioning of infrastructure will be positive, if undertaken in a manner which is responsible to the use of roads to support the removal process. Disturbances should be limited to the area in which the development has occurred and vegetation removal should be limited. All machinery and equipment should be removed from the area as soon as possible in order that rehabilitation can occur immediately.

7.6.3 Flora and Fauna

The removal of infrastructure will be positive, if undertaken in a manner which is sensitive to the surrounding ecology. Disturbances should be limited to the area in which the development has occurred and vegetation removal should be limited. All machinery and equipment should be removed from the area as soon as possible in order that rehabilitation can occur immediately.

7.6.4 Wetlands

During the decommissioning of the pipeline slurry or fine tailings spillage could occur. After closure of the Backfill Plant the pipelines should be cleaned and removed to avoid contamination of wetlands from the degradation of pipelines.

It is also recommended that a weed/exotics removal management program be implemented along with a wetland rehabilitation program where wetlands have already been degraded.

The rehabilitation of the project area will be a positive impact and it is suggested to re-vegetate the area with indigenous species as determined by a wetland specialist/botonist.

7.6.5 Aquatic Ecosystems

The removal of the pipeline route may result in areas of the pipeline crossing associated with river bank and riparian areas being exposed. These exposed areas may be susceptible to erosion which will result in the deterioration in the integrity and function of the river banks and riparian zones.

The proposed pipelines route should be raised and supported above ground so as not to require the removal of the riparian vegetation. This will allow the river banks and riparian zones to provide important ecological services. Should the pipeline route be raised during construction and operation, then there should be no exposed surfaces during the decommissioning phase of the project.

7.6.6 Surface Water

Possible impacts during decommissioning of the pipeline will be contamination of surface water from pipeline spills when dismantling the pipelines and hydrocarbon spillages from equipment and/or vehicles.

A detailed waste management strategy implemented during the construction and operation phases should be continuously implemented throughout the closure and decommissioning phase to avoid negative impacts to the environment.

After rehabilitation clean surface runoff will increase in the catchment as a result of the rehabilitation of the pump and pipeline footprint.

7.6.7 Groundwater

The main impact that could possibly occur during decommissioning is the contamination of soil which could indirectly impact on groundwater quality. Spills should be cleaned immediately to avoid environmental impacts.

7.6.8 Air Quality

Possible impacts could be dust generated from barren areas before re-vegetation is successfully completed. It is suggested that barren areas will be re-vegetated as soon as possible during decommissioning and closure.

7.6.9 Sites of Historical and Cultural Importance

No significant closure and decommissioning impacts are envisaged.

7.6.10 Noise

Noise disturbance due to the demolition activities of the pipeline are expected to occur. It is suggested that project-related machinery and vehicles be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Switch off equipment when not in use and limiting decommissioning activities to daylight hours where possible"

7.6.11 Traffic

No significant closure and decommissioning impacts are envisaged during the decommissioning phase of the project

7.6.12 Social Conditions

A potential socio-economic benefit of the project relates to the fact that, once the re-mining of existing historic tailings dams is complete, it will be possible to rehabilitate those tailings dams and make them available for alternative land uses. Such land uses could potentially include agriculture or other productive uses. If this land is made available to local communities, the income derived from such productive uses of the land could present them with significant economic opportunities. The success of such an endeavour would, however, greatly depend on the degree of local acceptance that such alternative use of rehabilitated tailings dams enjoys. This, in turn, would depend on the extent to which local stakeholders are involved in decision-making as to the type of alternative land use that would be implemented on the rehabilitated dams.

People will be employed during the decommissioning phase, which will provide short term employment for a few people, with social impacts likely to be similar to those experienced during the construction phase. While the number of people that will be employed is small, the impact of losing a long term source of income will have a significant adverse impact on not only the individuals that will be without work but also their dependents. Those that are unsuccessful in finding alternative employment will become a burden to family members that will need to assist them.

Table 7.9: Decommissioning and Closure - Removal of Infrastructure

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
DECOMMISSIONING AND CLOSURE PHASE ACTIVITY 1: Removal of Infrastructure																				
Matters pertaining to GEOLOGY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to GEOHYDROLOGY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROLOGY																				
Contamination of surface water from pipeline spills when dismantling the pipelines and hydrocarbon spillages from equipment and/or vehicles	De-commissioning and closure activities.	8	1	2	3	33	-	M	The detailed waste management strategy implemented during the construction and operation phases will be continuously implemented throughout the closure and decommissioning phase.	6	1	2	3	27	-	L	Contaminated water and spillages will be captured in water tight containers/structures on site and removed by a licensed waste management service provider for disposal at a licensed facility. Pipes and equipment must be drained and flushed before dismantling.	Ongoing	Mine manager/Environmental officer	Incorporated into Decommissioning phase costs
Matters pertaining to SOIL																				
The utilisation of hydrocarbons and other chemicals during the removal of infrastructure may lead to the contamination of soils.	Hydrocarbon spillage	6	2	2	4	40	-	M	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase.	4	2	1	3	21	-	L	Gold One will continue to implement the waste management strategy and monitor the effectiveness thereof to the activities taking place on site.	Ongoing	Environmental Control Officer	Included in closure costs.
The decommissioning activities may lead to increased sediment movement off the site and soil compaction.	Infrastructure removal	6	2	2	4	40	-	M	Restrict vehicle movement to existing roads.	4	2	1	3	21	-	L	Implement a strict penalty fine system for rule breaking with regard to vehicular movement.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
									Clean and dirty water systems should be maintained until closure or when the area is free-draining.								Maintain clean and dirty water systems and undertake regular monitoring and maintenance thereof.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
Discontinuation of impacts to the site due to infrastructure removal.	Removal of infrastructure and the clearing of the site	4	4	1	3	27	-	L	Infrastructure should be removed and the soil should be ripped and ameliorated.	6	5	1	4	48	+	M	Reclamation of soil includes shaping of land back to the original land forms while roads must be cleared of all pavement material, ripped and vegetated using site specific vegetation.	After closure	Environmental Control Officer	Included in closure costs.
Matters pertaining to FAUNA and FLORA																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Disturbance to the surrounding vegetation due to the removal of infrastructure	Removal of infrastructure and the clearing of the site	6	2	2	4	40	-	M	Planting of indigenous plants will aid rehabilitation of exposed areas	4	1	1	3	18	-	L	Keep the footprint of the area to the minimum and designated areas only. Vegetate immediately to limit erosion. All vehicles and activity should remain within the disturbed areas and decommissioned infrastructure should be removed from site immediately.	Weekly	Environmental Co-ordinator	
Matters pertaining to WETLANDS																				
Slurry or fine tailings spillage due to lack of maintenance or damage of pipelines	Removal of infrastructure and the clearing of the site	6	4	2	4	48	-	M	The pipelines should be removed after closure to avoid contamination of wetlands from the degradation of pipelines.	2	2	1	2	10	-	L	After closure of the mine the pipelines should be cleaned and removed to avoid contamination of wetlands from the degradation of pipelines. It is also recommended that a weed/exotics removal management program be implemented along with a wetland rehabilitation program where wetlands have already been degraded. Spill kits and training for use thereof to be at hand at all times	After closure	Environmental control Officer / Mine Manager	Included in closure costs.
Possible loss of habitat and species of significance downstream from the possible spill/leak.	Removal of infrastructure and the clearing of the site	6	5	2	4	52	-	M	After closure of the mine the pipelines should be cleaned and removed to avoid contamination of wetlands from the degradation of pipelines.	2	2	1	3	15	-	L	Where a spill occurs, the spillage should be contained and cleaned as quickly as possible. When applying for a closure certificate, a risk assessment will be done which will determine specialist studies required for rehabilitation.	After closure	Environmental control Officer / Mine Manager	Included in closure costs.
									The faunal and floral species present and ecological integrity should be monitored.								Species and integrity shouldn't significantly decrease (decrease in occurrence, abundance and status class).	After closure	Environmental control Officer / Mine Manager	Included in closure costs.
Matters pertaining to AQUATICS																				
The removal of the pipeline route may result in areas of the pipeline crossing associated with river bank and riparian areas being exposed. These exposed areas may be susceptible to erosion which will result in the deterioration in the integrity and function of the river banks and riparian zones.	Decommissioning & Removal of all infrastructure	6	2	2	2	20	-	L	If the proposed pipelines routes are raised and supported above ground it should not require the extensive removal of the riparian vegetation.	6	2	2	1	10	-	L	Keep the footprint of the area to the minimum and designated areas only. Vegetate immediately to limit erosion. All vehicles and activity should remain within the disturbed areas and decommissioned infrastructure should be removed from site immediately.	After closure	Engineer	
Matters pertaining to AIR QUALITY																				
Dust may be generated from barren areas before re-vegetation is successfully completed.	De-commissioning activities	6	1	2	2	18	-	L	Barren areas will be re-vegetated as soon as possible during decommissioning and closure.	4	1	2	2	14	-	L	Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP. In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	Monthly Dust monitoring and reporting	Environmental Control Officer/Air Quality Specialist	R 134 000.00

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Generation of nuisance dust from vehicle movement on site during decommissioning and closure.	De-commissioning activities	6	1	2	4	36	-	M	The road surface will be watered on a daily basis.	4	1	1	2	12	-	L	Wet suppression and/or chemical stabilisation of unpaved road surfaces will continue during the life of the rest of the facility, Traffic speed control measures will be implemented.	Daily wetting of roads.	Mine	Included in closure costs.
									Rehabilitate roads after closure								The roads will be rehabilitated and maintained until activities have been completed to full closure as provided for in the Financial Provision for Closure.	Ongoing	Mine	Included in closure costs.
Matters pertaining to NOISE																				
Noise disturbance due to the demolition activities of the pipeline	De-commissioning and closure activities.	4	3	2	4	36	-	M	Implement a noise monitoring programme to be followed. Regular vehicle inspections	4	3	2	3	27	-	L	Project-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Switch off equipment when not in use. Limiting decommissioning activities to daylight hours where possible	Throughout decommissioning phase	Environmental Co-ordinator	Included in closure costs.
Matters pertaining to TRAFFIC																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				
Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an impact in terms of air quality and visual characteristics.	Infrastructure removal	8	2	2	4	48	-	M	Effective dust suppression measures, such as regular road wetting and/or the use of dust suppression chemicals, must be implemented.	6	2	2	3	30	+	M	Establish and implement a dust suppression plan in consultation with the environmental control officer and an air quality specialist as part of the contractor's responsibility.	Ongoing	Environmental Control Officer	Included in closure costs.
The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	Infrastructure removal	6	5	2	4	52	+	M	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated.	8	5	2	4	60	+	M	Demarcate the decommissioning area and limit the decommissioning activities as far as possible.	Prior to Decommissioning Phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
																	Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area.	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	All material recovered from the demolition of buildings and/or structures will be transported to a permitted disposal site.	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	Linear infrastructure constructed by the mine will be removed	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	All fences erected specific for backfill plant and infrastructure will be dismantled and disposed of at a permitted disposal site.	During Closure Phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
Matters pertaining to HERITAGE																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to RADIATION																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				
Closure of the mine will result in job losses	Mine closure	6	3	2	5	55	-	M	Ensure that training provided to staff during the operational phase is certified, and that skills can be transferrable to new job opportunities.	4	3	2	5	45	-	M	Try to find alternative employment for staff at other Gold One operations Provide staff with reference letters for future possible employment Alert staff well in advance of imminent job shedding	Ongoing	Community liaison officer Human resources manager	Included in Operational costs

Table 7.10: Decommissioning and Closure – Active Rehabilitation

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
DECOMMISSIONING AND CLOSURE PHASE ACTIVITY 2: Active Rehabilitation																				
Matters pertaining to GEOLOGY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROGEOLOGY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROLOGY																				
Clean surface runoff will increase in the catchment as a result of the rehabilitation of the pump and pipeline footprint.	Rehabilitation of land	4	2	2	3	24	-	L	On-going backfilling and vegetation of the areas as the pipeline is removed.	6	4	2	3	36	+	M	It is important to ensure that in rehabilitation the area includes topsoil cover and vegetation to reduce the flow velocity and surface runoff created. It should also be ensured that contouring of the surface is achieved to prevent damming that could prevent the runoff from draining to the surface water resources.	During decommissioning phases	Environmental Control officer and Project Engineer	Included in Closure Costs
									Monitoring for vegetation growth								Monitor areas after decommisioning to ensure vegetation is re-establishing	Daily monitoring of areas that could result in soil erosion	Environmental Control officer	Included in Closure Costs
Matters pertaining to SOIL																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
The replacement of topsoil and re-vegetation thereof may result in the return of previously productive soil on the pipe route and pump stations.	Rehabilitation of land	6	2	2	3	30	-	M	Restore water infiltration, and reduce surface water runoff.	6	4	2	3	36	+	M	Planting of indigenous plants will aid rehabilitation of exposed areas. Rip compacted soils to avoid excessive runoff	Weekly	Environmental Co-ordinator	Included in Closure Costs
Matters pertaining to FAUNA and FLORA																				
The replacement of topsoil and re-vegetation thereof may result in the reduction of available space for alien invasive species, soil erosion and soil compaction. This activity will create favourable habitat for indigenous plant species, and promote rehabilitation efforts.	Rehabilitation of land	2	2	1	2	10	+	L	Planting of indigenous plants will aid rehabilitation of exposed areas.	6	4	1	3	33	+	M	The footprint of the area disturbed by the mining operation should have natural indigenous vegetation restored. This should be included in the closure plan. All exposed areas should be re-vegetated.	Weekly	Environmental Co-ordinator	Included in Closure Costs
Matters pertaining to WETLANDS																				
Wetlands can be rehabilitated effectively and the rehabilitation of the pipeline route will have a positive impact.	Rehabilitation of land	6	4	2	5	60	+	M	Re-vegetate the area with indigenous species as determined by an wetland specialist / botanist.	6	5	2	5	65	+	H	Indigenous grasses and species should be used in combination with a geomorphological model to ensure a sustainable cover.	During Rehabilitation	Wetland Specialist/Botanist/ECO	Included in Closure Costs
Matters pertaining to AIR QUALITY																				
Dust may be generated from barren areas before re-vegetation is successfully completed.	De-commissioning activities	6	1	2	2	18	-	L	Barren areas will be re-vegetated as soon as possible during decommissioning and closure.	4	1	2	2	14	-	L	Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP. In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation. Allocation of resources to ensure re-vegetation at closure.	Monthly Dust monitoring and reporting	Environmental Control Officer/Air Quality Specialist	R 134 000.00
Matters pertaining to NOISE																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Noise disturbance due to the demolition activities of the pipeline	De-commissioning and closure activities.	4	3	2	4	36	-	M	Implement a noise monitoring programme to be followed.	4	3	2	3	27	-	L	Project-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Switch off equipment when not in use. Limiting decommissioning activities to daylight hours where possible	Throughout decommissioning phase	Environmental Co-ordinator	Included in closure costs.
Matters pertaining to TRAFFIC																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				
The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	Infrastructure removal	6	5	2	4	52	+	M	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated.	8	5	2	4	60	+	M	Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area.	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	All material recovered from the demolition of buildings and/or structures will be transported to a permitted disposal site.	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	Linear infrastructure constructed by the mine will be removed if it proves to inhibit land use at decommissioning.	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	All fences erected around the backfill plant and related infrastructure will be dismantled and disposed of at a permitted disposal site.	During Closure Phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
Matters pertaining to HERITAGE																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to RADIATION																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A

7.7 Residual Impacts

Residual impacts refer to the net impacts after practicable mitigation, taking into account the background environmental conditions and impacts from existing and foreseeable future projects. Basically it is the environmental impact that remains with mitigation measures in place.

Potential residual impacts exist for the proposed project, and these are discussed herewith.

7.7.1 Geology

The geology of the area will be permanently transformed, causing a change in the chemical and flow interactions of the natural area.

7.7.2 Topography

No significant residual impacts are envisaged.

7.7.3 Soils, Land Use, Land Capability

No significant closure and decommissioning residual impacts are envisaged on the soils land use and land capability. Land will be restored to agriculture, grazing or development land after closure

7.7.4 Flora and Fauna

No significant residual impacts are envisaged.

7.7.1 Wetlands and Aquatic Ecosystems, Hydrology

Incomplete removal of infrastructure and waste following mine closure could provide sources of pollutants leading to water quality deterioration. This will affect the downstream water users if not mitigated.

Complete removal of all infrastructure and waste must be ensured following mine closure. Specialist contractors should be appointed to deal with areas of contaminated soil either through on site amelioration, if possible, or through the complete removal of the contaminated material and disposal on a registered hazardous waste facility.

7.7.2 Groundwater

The groundwater levels in the underground mining area will probably recover during the decommissioning and post-closure phases when mine dewatering is stopped. The groundwater level recovery will depend on a) the extent of interaction and b) dewatering of neighbouring mines. No decant is foreseen due to the topographic position of the mine.

7.7.3 Air Quality

No significant residual impacts are envisaged.

7.7.4 Sites of Historical and Cultural Importance

No significant residual impacts are envisaged.

7.7.5 Noise

No significant residual impacts are envisaged.

7.7.6 Traffic

No significant residual impacts are envisaged.

7.7.7 Social Conditions

There will be an increase in standard of living in the broader community and among local farmers, especially is workers attained transferrable skills that can be used elsewhere after mine closure. There will also be population changes and "out flux" of people from the area and a negative impact on the social fabric and social networks. Possible negative impact on the crime levels due to job losses is possible, adding to the unemployment rate at that stage.

Table 7.11: Residual Impacts

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
ACTIVITY 3: Residual Impacts																				
Matters pertaining to GEOLOGY																				
Stabilisation of the underground workings as a result of hardening of tailings backfill material.	N/A	8	4	1	4	52	+	M	N/A	8	4	1	4	52	+	M	N/A	N/A	N/A	N/A
Matters pertaining to TOPOGRAPHY																				
Stabilisation of the underground workings as a result of hardening of tailings backfill material will avoid subsidence occuring	N/A	8	4	1	4	52	+	M	N/A	8	4	1	4	52	+	M	N/A	N/A	N/A	N/A
Matters pertaining to GEOHYDROLOGY																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HYDROLOGY																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOIL, LAND USE AND LAND CAPABILITY																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to FAUNA AND FLORA																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to WETLANDS																				
Incomplete removal of infrastructure and waste following mine closure could provide sources of pollutants leading to water quality deterioration.	Pollutant mobilisation	6	3	2	4	44	-	M	Undertake rehabilitation in accordance with the mitigation measures proposed.	4	3	1	3	24	-	L	Complete removal of all infrastructure and waste must be ensured following mine closure. Specialist contractors should be appointed to deal with areas of contaminated soil either through on site amelioration, if possible, or through the complete removal of the contaminated material and disposal on a registered hazardous waste facility.	During closure and decommissioning phase	Environmental control officer	N/A
Matters pertaining to AIR QUALITY																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to NOISE																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to TRAFFIC																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to VISUAL																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to HERITAGE																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to RADIATION																				
No significant closure and decommissioning residual impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matters pertaining to SOCIAL																				
Increase in standard of living (local farmers)	Land availability	4	2	3	3	27	+	L	As infrastructure is removed, the surface area will become available for alternative uses.	6	3	1	3	30	+	M	NA	NA	NA	NA
Capacity building (skills transfer)	Skills Transfer	6	2	3	4	44	+	M	Implement according to the proposed action plan.	10	3	3	4	64	+	H	Workers will be trained with transferrable skills that can be used when applying for new job opportunities.	N/A	N/A	N/A
Population changes and "out flux" of people from the area and a negative impact on the social fabric and social networks.	Population change	8	3	3	4	56	-	M	Gold One will undertake a detailed Social Impact Assessment when operations cease in order to determine the actual impacts on the changing social environment at that stage.	6	2	2	3	30	-	M	Appoint a Social Scientist to conduct a Social Impact Assessment and propose measures to mitigate population changes.	Prior to closure	HR Manager/Project Manager/ Environmental Control Officer	R 87 500.00
Possible negative impact on the crime levels due to job losses adding to the unemployment rate at that stage.	Safety and security risks	8	2	3	3	39	-	M	Gold One will undertake a detailed Social Impact Assessment when operations cease in order to determine the actual impacts on the changing social environment at that stage.	6	2	2	3	30	-	M	Appoint a Social Scientist to conduct a Social Impact Study and propose measures to mitigate safety and security risks.	Prior to closure	HR Manager/Project Manager/ Environmental Control Officer	R 87 500.00

7.8 Cumulative Impacts

Section 2 of the NEMA requires the consideration of cumulative impacts as part of any environmental assessment process. Furthermore this is carried forward into Regulation 385 which requires assessment of cumulative impacts in an EIA Report. EIAs have traditionally, however, failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires co-ordinated institutional arrangements; and
- EIAs are typically carried out on specific developments, whereas cumulative impacts result from broader biophysical, social and economic considerations, which typically cannot be addressed at the project level.

A cumulative impact can be defined as an impact on the environment which results from the incremental impact of an action (i.e. mining) when added to other past, present and reasonably foreseeable future actions, regardless of who (i.e. private individual, government agency, industrial business, agricultural business, etc) undertakes such actions.

Cumulative impacts associated with this type of mining development could lead to initial, incremental or augmentation of existing types of environmental degradation, due to existing activities such as farming, including impacts on the air, soil and water present within available habitat. Pollution of these elements might not always be immediately visible or readily quantifiable, but incremental or fractional increases might rise to levels where biological attributes could be affected adversely on a local or regional scale. In most cases are these effects are not bound and is dispersed, or diluted over an area that is much larger than the actual footprint of the causal factor. Similarly, developments in untransformed and pristine areas are usually not characterised by visibly significant environmental degradation and these impacts are usually most prevalent in areas where continuous and long-term impacts have been experienced.

The nature of the development is such that pollution and degradation of the surrounding areas are expected to some extent, but this is incredibly difficult to quantify initially and will require monitoring and management throughout the life of the mine. Cumulative impacts are, for this very reason, assessed over the entire lifespan of the project operation. Since the cumulative impacts can occur at any point within any of the identified phases it is preferable to present them separately in order to understand what aspects will require monitoring and management throughout the life of the project as well as after successful closure and decommissioning of the Backfill Plant (i.e. such as when the area is operated as another functional entity like agricultural practises).

7.8.1 Topography

Change in topographical characteristics of the site will be evident. It is proposed to rehabilitate the area concurrent with mining activities and ensure that the area is free draining at completion of the rehabilitation.

7.8.2 Soils, Land Use, Land Capability

Every additional mining operation that may open in the region will result in areas with potential agricultural soil being degraded to low production potential. This will result in lower yields possible for farmers in the area.

Once mining has ceased, land may not be restored back to a desired land capability that will sustain crop production. Land capability is rarely restored back to grazing capability and most land is usually left to wilderness land capability.

7.8.3 Flora and Fauna

The pipeline route on its own will have a limited ecological effect on the project site and surrounding area as the development will occur largely upon already disturbed areas i.e. where pipelines are in existence such as proposed for the majority of the route. Should there be leakages from the pipeline this is expected to result in significant negative impacts to the local area. Wetland ecosystem and riparian ecosystems are identified as being most sensitive, as water and the associated species act as distributors of the spillage contents, having negative repercussions within the greater area.

7.8.4 Wetlands

The increasing deterioration of the Wonderfonteinspruit due to surrounding industries can cause fish fatalities at downstream local fishing attraction, Donaldson dam, due to unforeseen contamination. Diseases affecting people due to contamination will also be a risk as downstream people from Bekkersdal utilise the wetlands for cleaning and agriculture.

7.8.5 Aquatic Ecosystems

The cumulative impacts associated with the project are considered to be low. The aquatic resources associated with the catchment areas are in a modified state owing to the surrounding agricultural and mining activities. These activities have contributed to the deterioration in the general ecological state of the systems. The focus for the specialist study was the local river systems which would be crossed by the proposed pipeline route. The severity of the cumulative impacts associated with the pipeline crossing is thus considered to be low. This was determined by the fact that existing infrastructure would be used where possible and that crossing areas would only impact on a considerably small extent of the associated systems. In addition to this, the fact that the potential impacts could be successfully mitigated was also considered in order to determine the cumulative impact.

7.8.6 Surface Water

Increased contamination into the Wonderfonteinspruit due to leaks from pipeline adding to pollution from surrounding mining activities and residential areas is a potential risk.

7.8.7 Groundwater

Possible impacts could be an increase in environmental degradation due to groundwater contamination and/or availability.

7.8.8 Air Quality

Increase in environmental degradation and pollution due to increasing mining activities in the area. It is suggested that Air Quality monitoring be undertaken as specified in the Air Quality monitoring programme.

7.8.9 Sites of Historical and Cultural Importance

No significant cumulative impacts are envisaged.

7.8.10 Noise

Additional noise could lead to an increase in environmental degradation and pollution.

7.8.11 Traffic

No significant cumulative impacts are envisaged.

7.8.12 Social Conditions

Mining and related activities are increasingly changing agricultural areas into industrial areas. The result is that there is less land available for agriculture, and this threatens food security in South Africa. It is often impossible to restore mined land back to agricultural use and so the loss of high yielding agricultural land is a significant loss for the agricultural industry.

The impact for this project is however very low as most of the infrastructure will be in existing servitudes and on Brownfield areas.

Table 7.12: Cumulative Impacts

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
CUMULATIVE IMPACT ASSESSMENT																				
Matter pertaining to GEOLOGY																				
Stabilisation of the underground workings as a result of hardening of tailings backfill material.	N/A	8	4	1	4	52	+	M	N/A	8	4	1	4	52	+	M	N/A	N/A	N/A	N/A
Matter pertaining to TOPOGRAPHY																				
Change in topographical characteristics of the site.	Mining	6	4	2	4	48	-	M	Rehabilitation of the area to be free-draining.	4	4	1	3	27	-	L	Rehabilitate the area concurrent with mining activities and ensure that the area is free draining at completion of the rehabilitation.	Ongoing	Environmental Control Officer	Included in operational costs.
Matter pertaining to GEOHYDROLOGY																				
Increase in environmental degradation - groundwater contamination and/or availability.	Contamination	10	5	3	5	90	-	H	Groundwater quality monitoring networks must be set up prior to the construction phase so that any water quality issues can be addressed accordingly. Groundwater sampling must be undertaken to establish a database of plume movement trends, to aid eventual mine closure.	8	3	2	5	65	-	M	Groundwater quality sampling will be undertaken on a bi-annual basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	Bi-annually	Environmental Control Officer	R 91 000.00
																	bi-annual groundwater monitoring reports will be generated by the mine or through a qualified water quality specialist.	Bi-annually	Environmental Control Officer/Water Quality Specialist	R 42 000.00
																	In the event that water quality or quantity issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Water Quality Specialist	To be determined - depending on severity of incident
Matter pertaining to HYDROLOGY																				
Increased contamination into the Wonderfonteinspruit due to leaks from pipeline adding to pollution from surrounding mining activities and residential areas.	Contamination	10	4	3	4	68	-	H	Surface water quality monitoring networks must be set up prior to the construction phase so that any surface water quality issues can be addressed accordingly.	6	4	2	3	36	-	M	Surface water quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMP.	Monthly	Environmental Control Officer	R 91 000.00
																	Quarterly surface water monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Control Officer/Water Quality Specialist	R 42 000.00
																	In the event that water quality issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Water Quality Specialist	To be determined - depending on severity of incident
Matter pertaining to SOIL, LAND USE AND LAND CAPABILITY																				
Once mining has ceased, land may not be restored back to a desired land capability that will sustain crop production. Land capability is rarely restored back to grazing capability	Loss of high potential agricultural soil	6	4	3	4	52	-	M	Rehabilitate productive land back to original conditions where possible.	4	3	1	3	24	-	L	During closure and decommissioning phases the land capability of agriculture and/or grazing should be restored to as near as pre-mining conditions as possible.	During Closure and Decommissioning Phase	Environmental Control Officer	Included in operational costs.

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
and most land is usually left to wilderness land capability.	Loss of arable land capability	6	4	3	4	52	-	M												
Matter pertaining to FAUNA AND FLORA																				
Impacts on SA's conservation obligations & targets.	Land clearance	8	5	4	2	34	-	M	Limit development footprint within approved area only; prevent impacts in adjacent natural habitat.	6	5	2	2	26	-	L	Early identification and prevention of impacts.	Ongoing	Environmental control officer/Proponent	Included in operational costs.
Increase in local & regional fragmentation/isolation of habitat.	Land clearance	6	5	2	4	52	-	M	Limit development footprint within approved area only; prevent impacts in adjacent natural habitat.	4	5	2	2	22	-	L	Early identification and prevention of impacts.	Ongoing	Environmental control officer/Proponent	Included in operational costs.
Increase in environmental degradation, pollution of air, soils and water.	Land clearance	6	4	2	4	48	-	M	Prevent peripheral impacts from affecting nearby sensitive areas.	4	4	2	2	20	-	L	Early identification and prevention of impacts.	Ongoing	Environmental control officer/Proponent	Included in operational costs.
Matter pertaining to WETLANDS and AQUATICS																				
Fish fatalities at downstream local fishing attraction, Donaldson dam, due to unforeseen contamination.	Spills	8	5	3	4	64	-	H	Monitor and maintain the pipeline structures, and avoid spills.	4	2	2	3	24	-	L	Maintenance of the pipelines should be done daily to detect whether leaks are present. Automatic detection system is proposed. Leaks should be fixed by a qualified technician. Where a spill occurs, the spillage should be contained and cleaned as quickly as possible.	Daily monitoring for spills	Environmental Coordinator	Included in operational costs.
Diseases affecting people due to contamination. Downstream people from Bekkersdal utilise the wetlands for cleaning and agricultural activities.	Spills	8	4	3	4	60	-	M		6	2	2	2	20	-	L	The in stream water quality should be monitored and kept to the water quality guidelines.	Monthly water quality monitoring	Environmental Coordinator	Included in operational costs.
Matter pertaining to AIR QUALITY																				
Increase in environmental degradation and pollution.	Air Quality pollution	8	4	2	4	56	-	M	Air Quality monitoring will be undertaken as specified in the Air Quality monitoring programme.	6	4	2	3	36	-	M	Air Quality monitoring will be undertaken as specified in the Air Quality monitoring programme.	Ongoing	Environmental Control Officer	Included in operational costs.
Matter pertaining to NOISE																				
Increase in environmental degradation and pollution.	Noise pollution	8	4	2	4	56	-	M	Noise monitoring will be undertaken as specified in the noise monitoring programme.	6	4	2	3	36	-	M	Implement acoustic screening measures as specified in noise monitoring programme.	Ongoing	Environmental Control Officer	Included in operational costs.
Matter pertaining to TRAFFIC																				
No significant cumulative impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matter pertaining to VISUAL																				
No significant cumulative impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matter pertaining to HERITAGE																				
No significant cumulative impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Matter pertaining to RADIATION																				

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	FREQUENCY	RESPONSIBLE PERSON	ANNUAL MANAGEMENT COST
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Impact on public safety as a result of exposure to radioactivity.	Radioactive elements	10	4	2	5	80	-	H	Develop a Radiation Management Plan.	6	4	1	4	44	-	M	Implement the Radiation Management Plan throughout the life of mine and monitor exposure of the public to radioactivity in accordance therewith.	Ongoing	Environmental control officer/Health & Safety officer	Included in Construction and Operational Costs
Matter pertaining to SOCIAL																				
Increase is nuisance activities (noise, environmental degradation, dust) etc to surrounding land owners and communities	Nuisance	8	3	3	4	56	-	M	Gold One will establish a community forum	6	2	2	3	30	-	M	A community forum will be established to allow a open channel of communication	Ongoing	HR Manager/Project Manager/ Environmental Control Officer	N/A

8 MONITORING AND AUDITING

This section of the report relates to Section 33 of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 33
e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon

8.1 Surface Water Monitoring Program

8.1.1 Surface Water Quality

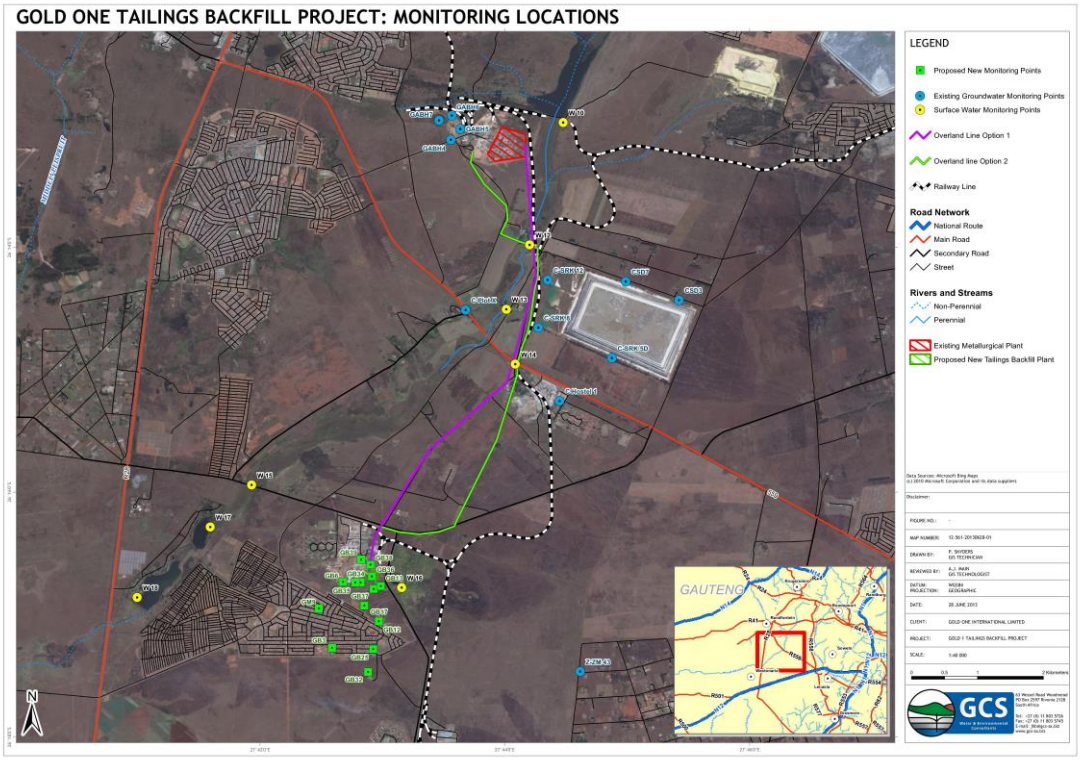
Various water quality variables will be monitored particularly the Variables of Concern (VoC) identified in the baseline analyses such as SO_4, pH and heavy metals on a frequency prescribed by the activities (e.g. weekly during construction and decommissioning and monthly during operation). Since the mine will process tailings dumps and underground resources of Uranium and Gold, the process could include the use of cyanide, it is also recommended that the analysis of cyanide and uranium be included. These variables can be monitored in line with the NNR requirements. Most gold mining tailings dumps have been identified as radioactive. This parameter can be monitored on an annual basis. Other parameters that will be included in the annual water analysis will also include cyanide, uranium and radionuclide concentrations.

Surface water monitoring will be conducted at strategically identified locations (Table 8.1 and Figure 8.1).

Table 8.1: Surface Water Monitoring Locations

Name	east	South
W 4	27.76474	-26.1414
W 5	27.76449	-26.156
W 6	27.76691	-26.1646
W 7	27.7778	-26.1728
W 8	27.76629	-26.1776
W 9	27.77027	-26.1821

W 10	27.74132	-26.2163
W 12	27.73676	-26.233
W 13	27.73358	-26.2417
W 14	27.7348	-26.2492
W 15	27.69887	-26.2657
W 16	27.71933	-26.2796
W 17	27.69323	-26.2714
W 18	27.68329	-26.281



(FIGURE NOT TO SCALE – REFER TO A3 MAP IN APPENDIX C)

Figure 8.1: Monitoring locations

8.1.2 Objectives of Monitoring Programme

The objective of the monitoring plan would be to monitor the impact of the pipeline through the continuous analyses of water quality and quantity (where possible).

8.1.3 Monitoring Frequency

The proposed monitoring programme for surface water quality will be implemented at different frequencies over the duration of the project as follows.

Table 8.2: Monitoring frequencies

Phase	Variables	Frequency
Construction	All SANS and Water Quality Objectives (WQO)	Weekly
Operation	All SANS, WQO, Include Uranium and Cyanide	Monthly; Where water quality deterioration is detected as a result of leaks/spillage, the frequency of monitoring is to be increased for the variables of concern. Mitigation measures are to be implemented and the frequency can be reduced to monthly once the water quality has recovered/seems stable.
Decommissioning	All	Weekly

8.2 Groundwater Monitoring Programme

Groundwater monitoring has to continue at all phases of the mine operation to identify impact on the groundwater on time, and effective measures can be undertaken at the early stage before serious damage to the environment takes place. There are several pieces of legislations that deal with the water management and water contamination prevention and the monitoring programme has to be conducted to ensure compliance with these legislations.

In total 14 monitoring points are recommended for water monitoring at the points detailed in Table 8.3 and Figure 8.1.

Table 8.3: Proposed Groundwater Monitoring Points

ID	Borehole_type	East (WGS84 DD)	South (WGS84 DD)
GB34	New Exploration Boreholes	27.713718	-26.278965
GB35	New Exploration Boreholes	27.71297	-26.278965
GB36	New Exploration Boreholes	27.715233	-26.278145
GB37	New Exploration Boreholes	27.715477	-26.279855
GB38	New Exploration Boreholes	27.715053	-26.276517

GB39	New Exploration Boreholes	27.713776	-26.27584
GB3	Old Exploration Boreholes	27.709803	-26.287862
GB6	Old Exploration Boreholes	27.711313	-26.278864
GB12	Old Exploration Boreholes	27.716168	-26.284249
GB13	Old Exploration Boreholes	27.716462	-26.279444
GB17	Old Exploration Boreholes	27.71421	-26.282091
GB25	Old Exploration Boreholes	27.71541	-26.288044
GB32	Old Exploration Boreholes	27.714719	-26.291161
GM9	Old Exploration Boreholes	27.708031	-26.28249

It is recommended that monitoring take place prior to the construction phase to establish the baseline conditions of the groundwater resources within and around the project area.

Groundwater levels must be recorded on a monthly basis using an electrical contact tape or pressure transducer, to detect any changes or trends in groundwater flow direction. Depending on the variation amongst these values, future sampling may be re-scheduled.

At gold mining facilities, analyses of the following constituents are recommended:

- Macro Analysis i.e. Ca, Mg, Na, K, SO_4, NO_3, F, Cl;
- Initial full suite metals and then As, Al, Fe, Mn and other metals identified according to results of the initial analyses;
- pH and Alkalinity;
- TDS and EC; and
- Radio-active constituents, particularly uranium and its daughter decay nuclides.

8.3 Terrestrial Ecology (Biodiversity)

On site monitoring must take place to identify negative trends in the ecosystem, adaptive management will then be applied to correct these negative trends, included here are bush encroachment and alien invasive plant species;

- It is recommended that the pipeline length be monitored on a daily basis to ensure that no leakages of potentially harmful waste enter the surrounding ecological system.

8.4 Aquatic Ecology (Biomonitoring)

The recommendations for the project have primarily considered any threats to the water quality of the systems assessed. In order to monitor the water quality of the system, the following recommendations have been prescribed:

- Complete a fish health and bioaccumulation assessment of selected fish species for the surveyed aquatic resources prior to construction for baseline;
- Conduct a biomonitoring programme for the project area which considers the selected pipeline route crossing the WonderfonteinSpruit. This programme should be conducted on a bi-annual basis; and
- Include the assessment of fish health, bioaccumulation of metals in selected fish species, chemicals, toxics and nutrients as a study component for the biomonitroing programme.

8.5 Performance Assessment/Audit

Performance assessment audits are required in terms of Regulation 55(1) of the MPRDA Regulations, R527. In order to comply with this regulation, the following will be undertaken:

- Monitoring which will be conducted on an ongoing basis;

- Performance assessments of the environmental management programme annually, with an external performance assessment audit every two (2) years or as agreed by the Minister in writing. The annual performance assessment will be undertaken by a suitably qualified person, while the audit will be undertaken by an external, independent third party; and
- Submission of a performance assessment report to the Director: Minerals of the DMR Gauteng.

9 ENVIRONMENTAL AWARENESS AND EMERGENCY RESPONSE PLAN

This section of the report relates to Section 33 of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 33
j) An environmental awareness plan describing the manner in which- iii) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and iv) Risks must be dealt with in order to avoid pollution or the degradation of the environment

This chapter of the EIA/EMP Report also relates to sections of the MPRDA.

Regulation 527 (GNR 527) of 23 April 2004 promulgated in terms of the MPRDA:

In accordance with Regulation 51(b)(vi) of the MPRDA, 2004), an EA Plan is needed which states that an EMP contemplated in Section 39(1) of the MPRDA, 2002 must include an EA Plan as contemplated in Section 39(3)(c) of the Act. According to Section 39(3)(c) of the MPRDA, 2002 (Act 28 of 2002), "an applicant who prepares an environmental management programme or an environmental management plan must develop an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment".

The purpose of this part of this EMP is to anticipate the occurrence of environmental crises, which may occur due to unforeseen circumstances. Since these events can never be predicted, a procedure has been prepared that must be followed in the event of such an incident, which will assist in the mitigation, remediation and conservation of the environment and contribute to the safety of workers and I&APs.

The Environmental Emergency Response Plan and Environmental Awareness Plan for the Gold One Project is attached as Appendix E.

10 INFORMATION GAPS AND FURTHER WORK REQUIRED

This section of the report relates to Section 31 (2) of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)
2 m) A description of the assumptions, uncertainties and gaps in knowledge

Information contained in this EIA/EMP Report is based on conceptual technical information received from the Applicant and final plans were not yet available. The Specialist Studies used were conducted for the Gold One Mega Tailings Storage Facility EIA/EMP which followed the same pipeline route, as well as the U-plant EIA/EMP which had a pipeline also crossing the Wonderfonteinspruit. The Specialist Studies undertaken only took into account the area identified for infrastructure placement. The final backfill borehole localities still has to be confirmed.

10.1 Groundwater

The study was largely based on available data and a desktop review. Field investigations were limited to a geophysical study.

10.2 Fauna and Flora

A dry season survey as well as an in depth desktop study of the area has been undertaken. It recommended that a wet season survey is undertaken for this project in order to have a higher confidence regarding the ecology of the site.

10.3 Heritage and Cultural Assessment

Although the report has been written as comprehensively and inclusive as possible, it should be noted that some archaeological and heritage sites may be located on a sub-surface level. This report may therefore not give a full perspective of the heritage sites found within the project area and consequently chance find procedures must be implemented.

This implies that an archaeologist or heritage specialist must immediately be contacted should any additional archaeological or heritage features be uncovered during the construction or operational phase (i.e. environmental monitoring). Such heritage features and/or objects may not be disturbed or removed in any way until such time that the specialist has been able to do an assessment of the site/object.

10.4 Social Study

The socio-economic profile is partially based on data from the 2001 Census undertaken by Statistics South Africa. Characteristics of the study area may have changed significantly since then and, although every attempt was made to supplement this with more recent data, some aspects of the profile may still not be completely accurate. Despite this limitation, however, the authors are confident that in all respects where the nature or magnitude of potential socio-economic impacts is dependent on accurate and current baseline data, these have been sufficiently updated from the aforementioned supplementary sources.

11 BENEFIT/MOTIVATION FOR THE PROJECT

This section of the report relates to Section 31 (2) of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)
2 n) A reasoned opinion as to whether the activity should or should not be authorised, and if it should be authorized any conditions that should be authorized, any conditions that should be made in respect of that authorization.
2 o) An environmental impact statement which contains : xvii. A summary of the key finding of the Environmental Impact Assessment ; and xviii. A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.

The purpose of backfill is to provide support for mined out areas up to 4 m in height in order to maximise ore extraction as well as reduce the ventilation requirements underground. The risk of fires is also reduced, and surface environmental pollution is mitigated by the transfer of tailing underground. Furthermore it will:

- Reduce tailing material to be placed on the tailings storage facility; and
- Improve geotechnical safety in the workplace.

12 ENVIRONMENTAL IMPACT STATEMENT

This section of the report relates to Section 31 (2) of the GNR543 published in Government Notice R.543 in Government Gazette No.33306 of 18 June 2010, under Section 24(5) of the NEMA.

REGULATION 31 (2)
2 n) A reasoned opinion as to whether the activity should or should not be authorised, and if it should be authorized any conditions that should be authorized, any conditions that should be made in respect of that authorization.
2 o) An environmental impact statement which contains : i. A summary of the key finding of the Environmental Impact Assessment ; and ii. A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.

The EAPs and environmental consultants responsible for the compilation of this document, and PPP feel that the Gold One Tailings Backfill Plant project should be approved, on condition that the mine implements all identified management measures, implements the monitoring plan, as well as address all identified information gaps. Approval must also be subject to the applicant implementing the social and labour plan as approved by the DMR.

In addition, the Applicant must continue with public consultation in order to ensure that the communities surrounding the operation are informed of developments on site throughout the life of mine. A detailed communication strategy must be developed and implemented together with the development of a complaints register to be kept on site for the life of mine.

13 CONCLUSION

The objectives of the environmental processes undertaken is to identify the positive/negative impacts associated with the proposed operation as well as to propose potential mitigation/management measures that may lessen the identified impacts. In order to mitigate potentially negative impacts and to identify any potential fatal flaws that may render the project environmentally unacceptable, GCS have adopted an integrated, step-by-step process to identify issues of concern and to thoroughly investigate these issues. The environmental impact assessment undertaken will address all phases related to the proposed mining operation, which include the following phases:

- Pre-construction Phase;
- Construction Phase;
- Operation Phase; and
- Closure and Decommissioning Phase.

During the pre-construction, construction, operation and closure phase, the following activities need to be undertaken:

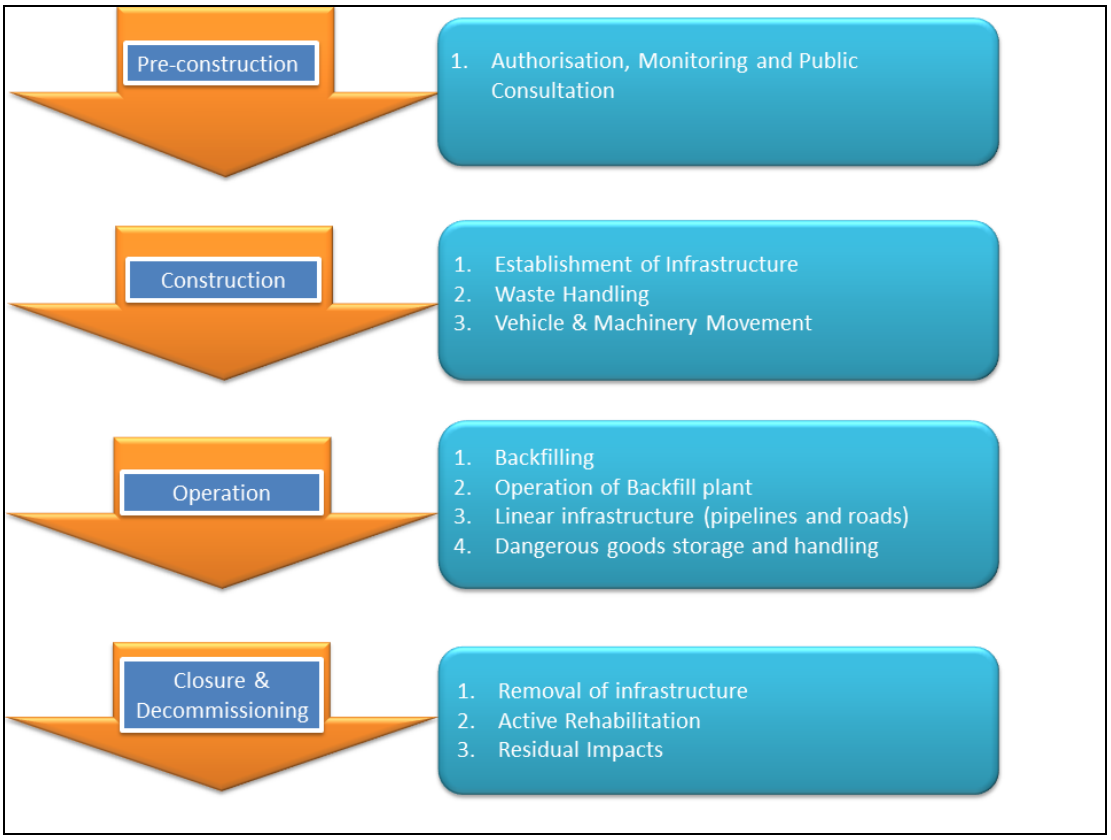


Figure 13.1: Proposed activities for the Project life cycle

Possible impacts

The main possible impacts identified for each of the phases of the project are as follows:

Construction Phase

- Topography

  The removal of vegetation and the associated construction activities to prepare footprint for construction will allow for increased surface water runoff, which may lead to change in topographical characteristics of the area.

- Soils, Land Use, Land Capability

  Topsoil removal during establishment of infrastructure will disturb the natural sequence of soil layers The movement of heavy vehicles in the construction area will result in compaction of soil, water runoff and soil erosion.

- Flora and Fauna

The existing vegetation within the proposed area of development will be impacted on. This in turn could affect the habitat availability of fauna species. Furthermore it will allow for secondary growth such as exotics and invasive species.

- Wetlands

  Impacts to the wetlands include wetland site disturbance and alteration, change in flow rates in wetland, construction rubble and oil spills could occur as well as compacting of wetland soils.

- Aquatic Ecosystems

  Construction of the pipeline will result in the removal of riparian areas associated with the local river system, The activity will reduce the vegetation cover of the banks which will reduce the ability of the banks to resist erosion, provide structural stability and cover for instream and riparian biota. Riparian vegetation removal may also result in changes to water temperatures, increased potential for the inputs of litter and wood, the limited ability for the retention of nutrients and pollutants as well as the reduction in the sediment trapping function of the zone.

- Surface Water

  Stripping of vegetation may increase erosion of the stream banks, which might increase the amount of suspended solids in downstream watercourses. Excess water runoff from the pipeline during testing of equipment may also enter the Wonderfonteinspruit or local environment. Furthermore the generation of waste may lead to surface water contamination.

- Groundwater

  Clearing topsoil for footprint areas can increase infiltration rates of water to the groundwater system and decrease buffering capacity of soils to absorb contaminants from spills on surface. This can increase the risk of contamination of the groundwater system. Further impacts could occur during drilling of the boreholes as there is a risk of intersecting large volumes of groundwater and even transferring this groundwater into the underground workings

- Air Quality

  Impacts expected to occur are the generation of nuisance dust during construction

- Sites of Historical and Cultural Importance

  Damage to built structures.

- Noise

Noise disturbance to surrounding communities

- Social Conditions

  Employment opportunities will be created. However, these jobs are not sustainable as they will only last for the construction period. Eventual unemployment may contribute to social pathologies. The development of the project will result in an influx of people. Backyard squatting is common and it poses a serious health risk due to its informal and unregulated nature. Despite these negative impacts, it has positive economic spin-offs for these township home owners that rent out the space in their backyards. Access to farms during construction can lead to stock theft and farm murders.

Operational Phase

- Soils, Land Use, Land Capability

  The main impact during operation will be compaction, contamination and erosion of soil

- Flora and Fauna

  Continual human disturbance will disturb ecological processes. Destruction of vegetation species and the possible encroachment of exotic/invasive species.

- Wetlands

  Toxic contamination of the wetland could potentially occur from mine slurry and fine tailings being spilled into it.

- Aquatic Ecosystems

  The operation and maintenance of the pipeline crossing the river system may cause spillages/leaks into the systems, impacting on water quality. These spillages/leaks may be as a result of wear-and-tear and would need to be addressed.

- Surface Water

  Spillages of tailings and return water from pipelines crossing could contaminate the Wonderfonteinspruit. Waste generated at the mine could also pollute local water resources if dirty runoff is not separated from clean runoff on site.

- Groundwater

Improperly installed boreholes could lead to the ingress of water into the mine workings and contamination of groundwater when backfilling occurs. In addition to this the pumping of product via the pipeline route can result in spills which can infiltrate and contaminate the groundwater system. Handling of waste and transport of material and operations can cause various types of spills which can also infiltrate and contaminate the groundwater system.

- Noise

  Noise disturbance from the periodic maintenance activities of the pipeline can be expected. This will however only be for short periods and will be insignificant.

- Social Conditions

  The operational phase of the project will see far less job creation than the construction phase. Most jobs will be for less skilled individuals. Buffer zones not fenced provide easy access for criminals to enter onto adjacent properties. Farm residents are concerned about possible spillages that may occur if the pipes burst or leak. The influx of job-seekers to the area may lead to an increase in informal settlements

Closure and Decommissioning Phase

- Soils, Land Use, Land Capability

  The decommissioning of infrastructure will be positive

- Flora and Fauna

  The removal of infrastructure will be positive.

- Wetlands

  During the decommissioning of the pipeline slurry or fine tailings spillage could occur.

- Aquatic Ecosystems

  The removal of the pipeline route may result in areas of the pipeline crossing associated with river bank and riparian areas being exposed. These exposed areas may be susceptible to erosion which will result in the deterioration in the integrity and function of the river banks and riparian zones.

- Surface Water

  Possible impacts during decommissioning of the pipeline will be contamination of surface water from pipeline spills when dismantling the pipelines and hydrocarbon spillages from equipment and/or vehicles.

- Groundwater

  The main impact that could possibly occur during decommissioning is the contamination of soil which could indirectly impact on groundwater quality.

- Air Quality

  Possible impacts could be dust generated from barren areas before re-vegetation is successfully completed.

- Noise

  Noise disturbance due to the demolition activities

- Social Conditions

  A potential socio-economic benefit of the project relates to the fact that, once the re-mining of existing historic tailings dams is complete, it will be possible to rehabilitate those tailings dams and make them available for alternative land uses. People will be employed during the decommissioning phase. While the number of people that will be employed is small, the impact of losing a long term source of income will have a significant adverse impact on not only the individuals that will be without work but also their dependents.

Residual Impacts

- Geology

  The Geology of the area will be permanently transformed

- Wetlands and Aquatic Ecosystems, and Hydrology

  Incomplete removal of infrastructure and waste following mine closure could provide sources of pollutants leading to water quality deterioration. This will affect the downstream water users if not mitigated.

- Groundwater

  The groundwater levels in the underground mining area will probably recover during the decommissioning and post-closure phases when mine dewatering is stopped.

- Social Conditions

There will be an increase in standard of living in the broader community and among local farmers, especially is workers attained transferrable skills that can be used elsewhere after mine closure. There will also be population changes and "out flux" of people from the area and a negative impact on the social fabric and social networks. Possible negative impact on the crime levels due to job losses is possible, adding to the unemployment rate at that stage.

Cumulative Impacts

- Topography

  Change in topographical characteristics of the site

- Soils, Land Use, Land Capability

  Every additional mining operation that may open in the region will result in areas with potential agricultural soil being degraded to low production potential.

- Flora and Fauna

  Should there be leakages from the pipeline this is expected to result in significant negative impacts to the local area.

- Wetlands

  The increasing deterioration of the Wonderfonteinspruit due to surrounding industries can cause fish fatalities at downstream local fishing attraction, Donaldson dam, due to unforeseen contamination. Diseases affecting people due to contamination will also be a risk as downstream people from Bekkersdal utilise the wetlands for cleaning and agriculture.

- Aquatic Ecosystems

  The aquatic resources associated with the catchment areas are in a modified state owing to the surrounding agricultural and mining activities. These activities have contributed to the deterioration in the general ecological state of the systems. The severity of the cumulative impacts associated with the pipeline crossing is thus considered to be low.

- Surface Water

  Increased contamination into the Wonderfonteinspruit due to leaks from pipeline adding to pollution from surrounding mining activities and residential areas is a potential risk.

- Groundwater

Possible impacts could be an increase in environmental degradation due to groundwater contamination and/or availability.

- Air Quality

  Increase in environmental degradation and pollution due to increasing mining activities in the area.

- Noise

  Additional noise could lead to an increase in environmental degradation and pollution.

- Social Conditions

  Mining and related activities are increasingly changing agricultural areas into industrial areas. The result is that there is less land available for agriculture, and this threatens food security in South Africa. It is often impossible to restore mined land back to agricultural use and so the loss of high yielding agricultural land is a significant loss for the agricultural industry. The impact for this project is however very low as most of the infrastructure will be in existing servitudes and on brownfield areas.

Most impacts can be mitigated and will therefore not have a significant impact on the environment.

Information Gaps and Limitations

Information contained in this EIA/EMP Report is based on conceptual technical information. The Specialist Studies used were conducted for the Gold One Mega Tailings Storage Facility EIA/EMP which followed the same pipeline route, as well as the U-plant EIA/EMP which had a pipeline also crossing the Wonderfonteinspruit. The final backfill borehole localities still has to be confirmed.

The groundwater study was largely based on available data and a desktop review. Field investigations were limited to a geophysical study. A wet season Fauna and Flora survey is recommended. An archaeologist or heritage specialist must immediately be contacted should any additional archaeological or heritage features be uncovered during the construction or operational phase

Motivation for Project

The purpose of backfill is to provide support for mined out areas up to 4 m in height in order to maximise ore extraction as well as reduce the ventilation requirements underground. The risk of fires is also reduced, and surface environmental pollution is mitigated by the transfer of tailing underground. Furthermore it will:

- Reduce tailing material to be placed on the tailings storage facility.
- Improve geotechnical safety in the workplace.

The EAPs and environmental consultants responsible for the compilation of this document, and PPP thus feel that the Gold One Tailings Backfill Plant project should be approved, on condition that the mine implements all identified management measures, implements the monitoring plan, as well as address all identified information gaps. The applicant must implement the social and labour plan as well as continue with public consultation in order to ensure that the communities surrounding the operation are informed of developments on site throughout the life of mine.

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APPENDIX A: ACCEPTANCE OF PLAN OF STUDY

APPENDIX B: PROOF OF PUBLIC PARTICIPATION

APPENDIX C: FIGURES

APPENDIX D: ENVIRONMENTAL AWARENESS AND EMERGENCY RESPONSE PLAN

APPENDIX E: SPECIALIST STUDIES

APPENDIX F: MOTIVATIONS