

Water Resource Planning Systems Series

Water Quality Planning

Feasibility Study for a Long-Term Solution to address the Acid Mine Drainage associated with the East, Central and West Rand underground mining basins

Status of Available Information

Study Report No. 2 P RSA 000/00/16212

> July 2013 EDITION 1





C



water affairs

Department: Water Affairs REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF WATER AFFAIRS

Water Resource Planning Systems Series

Feasibility Study for a Long-Term Solution to address the Acid Mine Drainage associated with the East, Central and West Rand underground mining basins

Status of Available Information

Study Report No. 2 P RSA 000/00/16212 Aurecon Report No. 6164

July2013

EDITION 1



aurecon 🛹 srk consulting 🚏 Turner & Townsend

Published by

The Department of Water Affairs Private Bag X313 PRETORIA, 0001 Republic of South Africa

Tel: (012) 336 7500/ +27 12 336 7500 Fax: (012) 336 6731/ +27 12 336 6731

Copyright reserved

No part of this publication may be reproduced in any manner without full acknowledgement of the source ISBN No. 978-0-621-41496-7

This report should be cited as:

Department of Water Affairs (DWA), 2013: Feasibility Study for a Long-Term Solution to address the Acid Mine Drainage associated with the East, Central and West Rand underground mining basins. Study Report No. 2: Status of Available Information - DWA Report No.: P RSA 000/00/16212.

Disclaimer:

The study was very dynamic in nature and the available information is continuously being updated and expanded. It is confirmed that each report has been prepared for the purpose of the study using the information relevant and available at the time of compilation of the report. All necessary skill, care and diligence were exercised by the authors, contributors and reviewers during the compilation and approval of the reports. The reader needs to determine the relevance, reliability or usefulness of the information and data reported in this study, if it is used in whole or in part, for their own purpose. Reports should not be interpreted in isolation, but in the context of the study and all its deliverables as a whole.

The reader takes full responsibility for their use, interpretation or modification of the report and the information presented and will have no recourse to the Department of Water Affairs or the study team for any misinterpretation, misuse, or reuse of the report.

DWA Report No.: P RSA 000/00/16212

DOCUMENT INDEX

Reports as part of this study:

| Study Report Number | DWA Report Number | Reports | SC | Conf. |
|---------------------------|----------------------|--|----|-------|
| 1 | P RSA 000/00/16112 | Inception Report | 1 | |
| 2 | P RSA 000/00/16212 | Status of Available Information | 2 | |
| 3 | P RSA 000/00/16312 | Legal Considerations for Apportionment of Liabilities | C | # |
| 4 | P RSA 000/00/16412 | Alternative Approaches for Apportioning Liabilities | 3 | # |
| 5 | P RSA 000/00/16512 | Technical Prefeasibility Report | | |
| 5.1 | P RSA 000/00/16512/1 | Current Status of Technical Management of Underground AMD | | |
| 5.2 | P RSA 000/00/16512/2 | Assessment of the Water Quantity and Quality of the Witwatersrand Mine Voids | 4 | |
| 5.3 | P RSA 000/00/16512/3 | Options for Use or Discharge of Water | | |
| 5.4 | P RSA 000/00/16512/4 | Treatment Technology Options | | |
| 5.5 | P RSA 000/00/16512/5 | Options for the Sustainable Management and Use of Residue Products from the Treatment of AMD | | |
| 6 | P RSA 000/00/16612 | Concept Design | | # |
| 6.1 | P RSA 000/00/16612/1 | Concept Design Drawings | 5 | # |
| 6.2 | P RSA 000/00/16612/2 | Concept Design: Costing | | # |
| 7 | P RSA 000/00/16712 | Institutional, Procurement and Financing Options | 6 | # |
| 8 | P RSA 000/00/16812 | Implementation Strategy and Action Plan | 7 | |
| 9 | P RSA 000/00/16912 | Key Stakeholder Engagement and Communications | 0 | |
| 9.1 | P RSA 000/00/16912/1 | Communication Strategy and Action Plan | ð | |
| 10 | P RSA 000/00/17012 | Feasibility Report | | |

SC: Study Component

Conf: Indication of Confidentiality

- These reports will not be made available until the appropriate implementation process stages have been reached as they may potentially compromise future procurement and legal processes.

PREFACE

1. Background to the Study

Gold mining in the East, Central and West Rand underground mining basins of the Witwatersrand goldfields (hereafter referred to as the Eastern, Central and Western Basins) started in the late 1880s. It is estimated that in the 1920s approximately 50% of the world's gold production came from the Witwatersrand mining belt, while in the 1980s South Africa was still the largest gold producer in the world. The large-scale mining in South Africa, in particular on the Witwatersrand, has decreased since the 1990s, and underground mining on the Witwatersrand essentially ceased in 2010. The mines of the Western, Central and Eastern Basins have produced a total of approximately 15 600 tons of refined gold since mining commenced. While the mines were operating, they pumped water to the surface to dewater their mine workings, but since mining stopped, the underground voids that were left after the mining have been steadily filling with water. The water in the mine voids interacts with the exposed sulphide bearing minerals in the rock formations to form Acid Mine Drainage (AMD), also known internationally as Acid Rock Drainage (ARD). AMD is characterised by a low pH and an excessive concentration of dissolved metals and sulphate salts.

In the case of the Western Basin, the AMD gradually reached the surface and started to drain out (decant) into surface streams in 2002. The water in the mine voids of the Central and Eastern Basins is rising steadily and will continue to do so until the water is pumped from the voids. It is predicted that the critical water levels will be reached in the Central Basin in late 2013 and in the Eastern Basin in mid-2014. If nothing is done, the water is predicted to reach the surface and decant at the lowest points in the Central Basin in the second half of 2015 and to reach the surface and decant in the Eastern Basin in late 2016. Decant would be uncontrolled and is likely to occur at several identified points, as well as at unexpected locations across each basin, due to varying water levels and connectivity between the near-surface aquifers and the voids.

If AMD, which has not been desalinated, is discharged into the Vaal River System, the high salt load will require large dilution releases to be made from the Vaal Dam to achieve the fitness-for-use objectives set for the Vaal Barrage and further downstream. This would result in unusable surpluses developing in the Lower Vaal River. Moreover, if dilution releases are still required after 2015, the acceptable levels of assurance of water supply from the Vaal Dam would be threatened. This will mean that there would be an increasing risk of water restrictions in the Vaal River water supply area, which will have negative economic and social implications. These negative impacts will be much greater if the catchment of the Vaal River System enters a period of lower-than-average rainfall with drought conditions. Since decant started in the Western Basin in 2002 the continuous flow of untreated AMD, and now

the salt load from the continuous flow of the neutralised AMD from the Western Basin, impact on the Crocodile (West) River System.

The importance of finding a solution to the rising AMD and the need for inter-departmental cooperation led to the establishment of an Inter-Ministerial Committee (IMC) on AMD, comprising the Ministers of Mineral Resources, Water and Environmental Affairs, and Science and Technology, and the Minister in the Presidency: National Planning Commission. The first meeting of the IMC took place in September 2010.

The IMC established a Technical Committee, co-chaired by the Directors-General of Mineral Resources and Water Affairs, which instructed a Team of Experts to prepare a report advising the IMC on solutions to control and manage AMD in the Witwatersrand goldfields. In February 2011, Cabinet considered the IMC report and instructed that the recommendations be implemented as a matter of urgency. Funds were then allocated to the Department of Water Affairs (DWA) by National Treasury with the purpose of implementing some of the IMC recommendations, namely to:

- Investigate and implement measures to pump the underground mine water in order to prevent the violation of the Environmental Critical Levels (ECLs), i.e. specific underground levels in each mining basin above which mine water should not be allowed to rise so as to prevent adverse environmental, social and economic impacts;
- Investigate and implement measures to neutralise AMD (pH correction and removal of heavy metals from AMD); and
- Initiate a Feasibility Study to address the medium- to long-term solution.

The investigations and implementation actions proposed in the first two recommendations commenced in April 2011, when the Minister of Water and Environmental Affairs issued a Directive to the Trans-Caledon Tunnel Authority (TCTA) to undertake "Emergency Works Water Management on the Witwatersrand Gold fields with special emphasis on AMD":

When the proposed pumping and neutralisation commences in the Central and Eastern Basins the situation will be similar to that which prevailed when underground mining and dewatering of the mine voids, and partial treatment of the water, were being carried out by the active mining companies. The saline AMD will flow into the Vaal River System and specifically into the Vaal Barrage. The high salt load will have the same impact on the Vaal River System as described earlier.

The third recommendation resulted in the Terms of Reference (ToR) for this Feasibility Study (DWA 2011a) being issued in July 2011. The ToR noted that the IMC had recommended that a Feasibility Study should be initiated as soon as possible, since the Short-Term Interventions (STI) might influence the roll-out of the desired medium- to long-term solution.

In January 2012, DWA commissioned the Feasibility Study for the Long-Term Solution (LTS). The Study period was 18 months, with completion at the end of July 2013. It was

emphasised that this Study was very urgent, would be in the public eye, and that recommendations to support informed decision-making by DWA were required. The recommended solution must support the Water Resource Strategies for the Vaal and Crocodile West River Systems and take account of the costs, social and environmental implications and public reaction to the various possible solutions.

The urgency of reducing salt loading on the Vaal River System and the relatively short study period for such a complex study means that implementation decisions have to be based on the current understanding of the best available information and technical analyses that have been completed by the time the decisions must be made. Thus, a precautionary and conservative approach was adopted during the Study.

Opportunities have been identified where the solutions that are implemented can be refined, during operation, as more information becomes available.

2. Integration with the Short-Term Intervention

The final TCTA Due Diligence Report (TCTA, 2011) was submitted to DWA in August 2011, and tenders for construction in all the basins were invited in November 2011. Immediate works were implemented in the Western Basin in 2012, and construction in the Central Basin commenced in January 2013. It is anticipated that construction of the Eastern Basin will commence in the first quarter of 2014.

The Scope of Work (SoW) of this Feasibility Study, with respect to the STI, is to understand the proposed STI in sufficient detail to:

- Undertake a Feasibility Study of all options, irrespective of the STI, in the interests of finding the best LTS;
- Determine how to integrate the STI and LTS, and influence the STI as far as appropriate or practical;
- Identify any potential long-term risks associated with the proposed STI, and propose prevention or mitigation measures; and
- Assess the implications of the proposed STI for the suggested institutional model for the implementation, operation, maintenance and/or management of the preferred LTS.

3. Approach to the Study

The focus areas of the Feasibility Study comprise technical, legal, institutional, financial/economic and environmental assessments, as well as public communication and key stakeholder engagement. The Feasibility Study comprises three phases; the Initiation, Prefeasibility and Feasibility Phases. The main components and key deliverables of each phase are shown in **Figure 1**, and each phase is discussed in more detail below.

The technical assessments run in parallel with the legal assessment, and both feed into the options assessment. The component on stakeholder engagement and communication was started early in the Study so that a stakeholder engagement and public communication strategy could be developed as soon as possible and be implemented throughout the Study.

The planning showed the Feasibility Phase as following the Prefeasibility Phase, but the short study period meant that it was necessary for the Feasibility Phase components to commence during the Prefeasibility Phase and run in parallel.

In conducting the Study, it was important that each component developed key information and recommendations, which were then used in subsequent components. The logical and timeous flow of information and recommendations was essential in order to develop solutions and meet the Study programme.

Figure 2 gives an overview of the technical, institutional/financial and implementation components and the flow of information throughout the Study. It can be seen how the fixed information (e.g. ECLs, raw water quality, ingress, etc.) and the decisions to be made, or the options to be investigated (e.g. abstraction points, qualities and quantities required by potential users, locations of users, treatment technologies) feed into the options assessment and identification of the Reference Project. The Reference Project will define the option that uses proven technologies, has the least associated risk, and is used for financial modelling and budgeting. It will probably not be the same as the option that is implemented, but constitutes the benchmark against which implementation proposals will be judged.

The Concept Design is based on the Reference Project and includes the costing and land requirements. This in turn provides input for the evaluation of the institutional procurement and financing options and the Implementation Strategy and Action Plan.

The phases of the Study, the key components and their inter-relationships are described below and illustrated in **Figures 1 and 2**.

DWA Report No.: P RSA 000/00/16212



Figure 1: Study phases and components





Figure 2: Flow of information throughout the Study

PHASE 1: Initiation

The objective of the Initiation Phase was to determine the approach and principles for the Study and understand the work already done by others. Numerous reports from previous studies, maps and research findings, relating to all components of the Study, were collated and reviewed. The SoW, proposed approach and the study programme were reviewed after initial consideration of the available information. The study objectives and priorities were reviewed and the results are presented in Study Report No. 1: *"Inception Report"*.

The results of the complete literature survey, which continued after the Initiation Phase, are presented in Study Report No. 2: *"Status of Available Information"*.

The Study Report No. 9.1: *"Communication Strategy and Action Plan"* was prepared so that key stakeholder engagement and communicators could commence as soon as possible and continue throughout the Study.

PHASE 2: Prefeasibility

The purpose of this phase was to understand and describe the current status and the environment for managing AMD and then to identify all apparently viable alternative solutions and, from those, identify the more feasible options, on the basis of technical feasibility, social and environmental acceptability and cost effectiveness. These were then considered in more detail, and the most feasible options were investigated in the Feasibility Phase.

The assessment of the legal liabilities and mechanisms for the apportionment of liabilities is a key stand-alone component that was commenced in the Prefeasibility Phase and finalised in the Feasibility Phase. This work is described in the confidential Study Report No. 3: *"Legal Considerations for Apportionment of Liabilities"* and confidential Study Report No. 4: *"Alternative Approaches for Apportioning Liabilities"*.

The objectives of the Prefeasibility Phase were to:

- Understand the status quo;
- Define the problem;
- Understand the quantity and quality of water in the mine voids and how fast is it rising in each basin;
- Identify possible uses for the water;
- Identify treatment technologies that can treat the necessary volumes of AMD to the standard required by various users;
- Understand the residues (or waste products) produced by each process and how they can be managed;
- Define a wide range of options for possible solutions by combining alternatives for abstraction, water use, treatment and management of residues;
- Screen the alternatives to identify viable options; and

• Carry out prefeasibility costing of the most viable options and identify the most appropriate option to be used as the Reference Project.

To achieve these objectives, the Prefeasibility Phase needed to provide the team with:

- i. A sound understanding of the STI, how it can be integrated into the LTS, and the impact of the STI on the selection and procurement of the LTS. This is described in Study Report No. 5.1: *"Current Status of Technical Management of Underground AMD"*.
- ii. A sound understanding of the hydrogeology, underground water resources, sources of surface water ingress, spatial distribution and connectivity of mined voids; and the current water quality and projections of future volumes, levels and water qualities. This was based on the substantial information from previous studies and is presented in Study Report No. 5.2: *"Assessment of the Water Quantity and Quality of the Witwatersrand Mine Voids"*.
- iii. An understanding of the DWA Water Resource Management Strategies for the Vaal River System and Crocodile West River System. These strategies provided the framework within which to develop a range of possibilities for the use or discharge of raw, neutralised or desalinated AMD to meet the objective of reducing the salt load in the Vaal River System and associated catchments to acceptable levels without having an unacceptable social or environmental impact. These possibilities are described in Study Report No. 5.3: "Options for Use or Discharge of Water".
- iv. An assessment of suitable technologies for treating either raw AMD or the discharges from the STI to standards that will not negatively impact on the environment and will be acceptable to a range of users. This assessment is described in Study Report No. 5.4: "Treatment Technology Options".
- v. Locality plans for the possible disposal of waste, or potential uses for residue products generated by treatment processes. These plans are described in Study Report No. 5.5: *"Options for the Sustainable Management and Use of Residue Products from the Treatment of AMD"*.

The knowledge and data from the Prefeasibility Phase were used to combine the alternative locations for the abstraction, treatment and use or discharge of water and the disposal of waste, as well as the layouts of the infrastructure required (including pipelines and pump stations), into a large number of options. The alternatives were screened at a high level to give a short-list of practical technical options.

The capital and operating costs of the short-listed options were determined to give a present value of lifetime cost. Social and environmental screening for fatal flaws was carried out, and possible financial benefits from the sale of water or waste were considered. The anticipated public reaction to the options was also considered. The identification of the Reference Project was then completed on the basis of the costs, benefits and impacts. The costs and implications of possible alternatives were also defined. The results and an overview of all the

components of this Prefeasibility Phase are described in Study Report No. 5: "*Technical Prefeasibility Report*".

PHASE 3: Feasibility

The main objective of this phase was to carry out intensive feasibility level investigations and optimisation of the most feasible layouts for each basin and to select a preferred option to be used as a Reference Project for each basin. The requirements for implementation were also considered and evaluated.

The Feasibility Phase comprises a number of components that build on the results of the Prefeasibility Phase; the results of the various components are reported separately and then integrated in a Feasibility Report for the solution to AMD.

The components in this Phase comprise:

i. Concept Development:

Once the Reference Project for each basin had been agreed, the layout for the treatment works, pipelines and waste storage and disposal sites was planned and costed. Environmental screening was undertaken for each of the identified sites that form part of the Reference Project. The results are presented in the confidential Study Report No. 6: "Concept Design", the confidential Study Report No. 6.2: "Concept Design: Drawings" and the confidential Study Report No. 6.2: "Concept Design: Costing".

ii. Institutional Procurement and Financing Options:

The following alternative procurement models for implementation were evaluated:

- a 'traditional' Government-funded and a traditionally procured Employer Design, Procure, Construct and Operate solution, which is the Public Sector Comparator model (PSC);
- a Design, Build, Operate and Maintain (DBOM) scenario funded by an Implementing Agent, using Private Sector or Government funding, which is also a Public Sector Comparator model (PSC); and
- a private sector-funded Public–Private Partnership (PPP).

The approach included a detailed risk-adjusted value assessment of the PSC and PPP models for the Reference Project in each of the three basins. The possible institutional arrangements were assessed in terms of the roles and responsibilities of the responsible organisations.

A due diligence assessment was carried out to establish the legal mandates of the institutions, as well as ownership of the land required for the Reference Project. These assessments are described in the confidential Study Report No. 7: *"Institutional, Procurement and Financing Options"*.

iii. Implementation Strategy and Action Plan:

Throughout the Study, the requirements for implementation were considered in developing an Implementation Plan. Where necessary, the activities required for implementation that must commence in parallel with this Study were identified. This included the preparation of a Request for Information (RfI), which initiated a process through which service providers could register their interest with DWA. All the requirements for implementation are described in Study Report No. 8: *"Implementation Strategy and Action Plan"*.

iv. Key Stakeholder Engagement and Public Communication:

Engagement with key stakeholders and public communication were very important components of the Study and were on-going from the commencement of the Study to the completion of the work. Study Stakeholder Committee meetings, Focus Group meetings, aRfl, one-on-one meetings, newsletters and a website were key elements. The process and results are presented in Study Report No. 9: "*Key Stakeholder Engagement and Communications*".

The final deliverable, Study Report No. 10: *"Feasibility Report"*, summarises the results of the Study.

The Prefeasibility Phase and Concept Development in the Feasibility Phase are typical components of many planning studies. Solving the technical issues is not normally the biggest challenge, although this project does have several unique aspects. However, the Feasibility Phase components that lead to recommendations for appropriate institutional, financial and procurement models for implementation, particularly the assessment of the options for procurement, are not common components of DWA studies and were the most challenging, and certainly as important for a sustainable solution as all the technical components combined.

4. Way Forward

Completion of the Study will provide all the information required for implementation to proceed, although DWA plans to start the preparations required for implementation in parallel with Phase 3 of this Study.

Following from the Feasibility Study, implementation should be carried out as soon as possible. The key activities required for implementation include the following:

- DWA submitting the Feasibility Study Reports to National Treasury for their review and approval. The project has been registered with National Treasury, and Treasury Approval 1 (TA 1) may be required before procurement can commence;
- Conducting an Environmental Impact Assessment (EIA); and
- The preparation of procurement documents.

If procurement is for a Design, Build, Operate and Maintain (DBOM) contract, the procurement documents will comprise:

• A Request for Qualifications (RfQ) to allow DWA to short-list suitably qualified service providers.

This will allow any service provider, especially those with proprietary technologies that may well be more cost effective than that used as the reference technology, to submit detailed information. Those that best meet the selection criteria, which will have to be agreed, will be short-listed; and

 A Request for Proposals (RfP) to be issued to the short-listed service providers, inviting them to submit tenders to implement a project that will deliver water to the specified standards.

If procurement is to follow the traditional process (with three sequential tenders for a service provider to prepare design and tender documentation, followed by tenders for construction, and then tenders for operation and maintenance), then the two-phase RfQ and RfP route may also be followed, with appropriate requirements specified at each stage.

The Reference Project could be implemented, but may not be the most effective solution. It will provide the yardstick methodology and costing which will be used to evaluate the tenders which are submitted.

DWA will also need to source the technical and contractual expertise required to enable them to manage the implementation of the desired long-term solution in each of the three basins.

NOTE: A List of Acronyms and Glossary of Terms appear on pages "xxiv" and "xxvi" respectively.

DWA Report No.: P RSA 000/00/16212

APPROVAL

| TITLE: | Status of Available Information |
|---|--|
| DATE: | July 2013 |
| AUTHORS: | Hentie Viviers, Bernice Bothma, Johan van Zyl, André Hindley |
| REVIEWER: | Andrew Tanner |
| LEAD CONSULTANT: | Aurecon South Africa (Pty) Ltd |
| DWA FILE NO.: | 14/15/13/3 |
| DWA REPORT NO .: | P RSA 000/00/16212 |
| AURECON REPORT NO .: | 107748/Aurecon/6164 |
| FORMAT: | MS Word and PDF |
| WEB ADDRESS: | www.dwa.gov.za/projects/AMDFSLTS |
| Approved for Aurecon South Africa (Pty) Ltd / Project Team: | |

Mr Johan van Zyl Component's Team Leader

Mr Andrew Tanner Lead Technical Advisor

Approved for the Department of Water Affairs by:

Mr Fanie Vogel

Study Leader

Mr Jurgo van Wyk Scientist Manager: Water Quality Planning - Central

den

Mr Pieter Viljoen Scientist Manager: Water Quality Planning

Dr Beason Mwaka Director: Water Resource Planning Systems

ACKNOWLEDGEMENTS

The following individuals and organisations are thanked for their contributions to the study:

Study Administration Committee (SAC)

| Jurgo van Wyk | Department of Water Affairs (DWA): Water Resource | Chairman / Study Manager |
|----------------|---|-----------------------------|
| | Planning Systems (WRPS) | |
| Jacqueline Jay | DWA: WRPS | Member / Study co-ordinator |
| Peter Pyke | DWA: Options Analysis | Member |
| Seef Rademeyer | DWA: National Water Resource Planning | Member |
| Rod Schwab | DWA: WRPS | Member |
| Pieter Viljoen | DWA: WRPS | Study Deputy Director |
| Fanie Vogel | Aurecon SA (Pty) Ltd | Study Leader |
| Andrew Tanner | Aurecon SA (Pty) Ltd | Technical Advisor |
| Joanne Henrico | Aurecon SA (Pty) Ltd | Project Administrator |
| André Hindley | SRK Consulting SA (Pty) Ltd | Legal Advisor |
| John Samuel | Turner & Townsend (Pty) Ltd | Institutional and Financial |
| | | Advisor |

Study Management Committee (SMC)

Chairman and Co-Chairman:

| Beason Mwaka | DWA: Water Resource Planning Systems | Study Director |
|----------------|--------------------------------------|-------------------|
| Pieter Viljoen | DWA: Water Resource Planning Systems | Study Deputy Dire |

SAC plus the following members / alternative members:

| Yacob Beletse | Agricultural Research Council (ARC)- Roodeplaat |
|----------------------|---|
| Henk Coetzee | Council for Geoscience (CGS) |
| Fortress Netili | Council for Geoscience |
| HumbertoSaeze | Council for Geoscience |
| Peter Kelly | Department of Mineral Resources (DMR) |
| MahloriMashimbye | Department of Science and Technology (DST) |
| UmeeshaNaidoo | Department of Science and Technology |
| Shanna Nienaber | Department of Science and Technology |
| Henry J. Roman | Department of Science and Technology |
| Candice Willard | Department of Science and Technology |
| Nigel Adams | DWA: Compliance Monitoring and Enforcement |
| Kurt Fortuin | DWA: Capital Projects |
| Ernst Bertram | DWA: Hydrological Services |
| Nico de Meillon | DWA: Hydrological Services |
| Fanus Fourie | DWA: Water Resource Planning Systems |
| Bashan Govender | DWA: Gauteng Regional Office |
| Marius Keet | DWA: Gauteng Regional Office |
| Alice Mabasa | DWA: Hydrological Services |
| DumisaniMaluleke | DWA: Resource Protection and Waste |
| ZachariaMaswuma | DWA: Hydrological Services |
| Paul Meulenbeld | DWA: Water Abstraction and Instream Use |
| Nancy Motebe | DWA: Reserve Requirements |
| ThivhafuniNemataheni | DWA: Resource Protection and Waste |
| Linda Page | DWA: Communication Services |
| Sputnik Ratau | DWA: Communication Services |
| Anil Singh | DWA: Legal Services |
| Eddie van Wyk | DWA: Hydrological Services |
| MaswumaZacharia | DWA: Hydrological Services |
| StroverMaganedisa | National Treasury |
| TawandaNyandoro | Rand Water |
| Johann Claassens | Trans-Caledon Tunnel Authority (TCTA) |
| Craig Hasenjager | Trans-Caledon Tunnel Authority |

ctor

Study Stakeholder Committee (SSC)

Chairman: SollyMabuda

DWA: Integrated Water Resource Planning

Chief Director

SMC plus the following members/ alternative members:

| Mairing du Dlaccia | Agri Cautonal Drivato Concultant |
|--|---|
| Stophing UU Plessis | Chamber of Minos |
| Eroddio Lotsoko | City of Johannoshurg Motropolitan Municipality (Coll) |
| Pule Makena | City of Johannesburg Metropolitan Municipality |
| Antonino Manus | City of Johannesburg Metropolitan Municipality |
| Danial Masamala | City of Johannesburg Metropolitan Municipality |
| Daniel Waselliua MukopdiMasithi | City of Johannesburg Metropolitan Municipality |
| NUKUIUINASIIII DumisaniTinghitai | City of Johannesburg Metropolitan Municipality |
| Duffilsafii Filiyfillsi Keith Drietow | City of Johannesburg Metropolitan Municipality |
| Nellii Diislow | Comministry Commission Commission Commission Commission |
| | Council for Scientific and Industrial Research (CSIR) |
| PIIII HODDS | Council for Scientific and Industrial Research |
| Allialiua Billz DumozoSkono Mnaoito | Department of Environmental Affairs |
| PumezaSkepe-Ivingula | Department of Mineral Descurses (DMD) |
| | Department of Mineral Resources (DMR) |
| Max Madubane | Department of Mineral Resources |
| | Department of Mineral Resources |
| Susah Malebe | Department of Mineral Resources |
| Ethel Sinthumule | Department of Mineral Resources |
| I revor Balzer | DWA: Chief Operations Officer |
| Herman Keuris | DWA: Information Programmes |
| MbangiseniNepfumbada | DWA: Water Resources Information Management |
| Pieter de Vries | Ekurhuleni Metropolitan Municipality |
| SekhonyanaLerothi | Ekurhuleni Metropolitan Municipality |
| Elsabeth van der Merwe | Ekurhuleni Metropolitan Municipality |
| Mariette Liefferink | Federation for a Sustainable Environment (FSE) |
| Koos Pretorius | Federation for a Sustainable Environment |
| VukosiNdlopfu | Gauteng Department of Agriculture and Rural Development (GDARD) |
| RinaTaviv | Gauteng Department of Agriculture and Rural Development |
| Elias Sithole | Gauteng Department of Local Government and Housing |
| Ariel Mafejane | Johannesburg Water |
| Jones Mnisi | Johannesburg Water |
| NtshavheniMukwevho | Johannesburg Water |
| Stephan du Toit | Mogale City Local Municipality |
| Emily Mathe | Mogale City Local Municipality |
| Andy Mathibe | Mogale City Local Municipality |
| Jacques Hugo | National Economic Development and Labour Council (NEDLAC) |
| SharnaJohardien | National Economic Development and Labour Council |
| TumiMonageng | National Economic Development and Labour Council |
| MahandraNaidoo | National Economic Development and Labour Council |
| PetrusMatji | National Treasury |
| TumisangMoleke | National Treasury |
| NokwaziNdlala | Randfontein Local Municipality |
| MadibaRamatIhape | Randfontein Local Municipality |
| ReveckHariram | Rand Water |
| VusimuziKhubeka | Rand Water |
| Percy Khumalo | Rand Water |
| Solomon Mathebula | Rand Water |
| Sipho Mosai | Rand Water |
| Trevor Stubbs | Save the Vaal |
| Angela Kariuki | South African Human Rights Commission (SAHRC) |
| Janet Love | South African Human Rights Commission |
| DelysiaWeah | South African Human Rights Commission |
| William Moraka | South African Local Government Association (SALGA) |

DWA Report No.: P RSA 000/00/16212

| Jacky Samson | South African Local Government Association |
|----------------------|--|
| LulamaXongwana | South African Local Government Association |
| Immanda Louw | South African Nuclear Energy Corporation |
| Solwazi Majola | Technology Innovation Agency (TIA) |
| Lynette du Plessis | Transvaal Agricultural Union SA |
| Bennie van Zyl | Transvaal Agricultural Union SA |
| Richard Holden | Trans-Caledon Tunnel Authority (TCTA) |
| Sophia Tlale | Trans-Caledon Tunnel Authority |
| John Annandale | University of Pretoria |
| Wayne Truter | University of Pretoria |
| Michael van der Laan | University of Pretoria / Agri Gauteng |
| Zain Mohamed | Vaal Barrage Reservoir, Leeuspruit and Taaibosspruit Forum/ Sasol |
| Phineas Malapela | Vaal Environmental Justice Forum |
| Jo Burgess | Water Research Commission (WRC) |
| Zakhele Dlamini | West Rand District Municipality |
| Danny Govender | West Rand District Municipality |
| HerinaHamer | West Rand District Municipality |
| Susan Stoffberg | West Rand District Municipality |
| Musa Zwane | West Rand District Municipality |
| Johnny de Araujo | Witkoppie Farm |
| Mike Muller | Wits University School of Public and Development Management/ National Planning |
| | Commission |
| Manuel Marino | World Bank |
| David Sislen | World Bank |
| Marcus Wishart | World Bank |

In addition to the contributions received from the study committees mentioned above, inputs were also received from the following broad groups and sectors through focused discussions (a more comprehensive list is available on the DWA AMD website):

Academic institutions; Funding organisations; Global perspectives on AMD management; Environmental and conservation groups; Independent individuals in their private capacity; Institutions, parastatals and research facilities; Local, provincial and national government; Mining sector; Non-governmental organisations; Organised agriculture; Organised business, industry and labour; Other specialist fields/consultants; Tourism and recreation; Utilities/water service providers; and Various technology providers who offered information.

Organisations that provided considerable data and inputs for assessment and consideration, including the but not limited to, FSE, The Centre for Environmental Rights, Sasol, DST, WRC, Ekhuruleni Municipality, Rand Water, GDARD, DEA, CGS, DMR as well as various individuals in their private capacity, are thanked for their contributions.

WISA Mine Water Division, a division of the Water Institute of Southern Africa, agreed to peer review selected key reports from the Feasibility Study for the Department of Water Affairs. The Division offered to identify and carry the cost of the appointment of the independent external experts. The assistance of WISA Mine Water Division and the inputs from their experts are duly appreciated and acknowledged. The comments and suggestions by the following experts contributed significantly to the quality of the study: Achim Wurster (Private Consultant), Ingrid Dennis (North-West University), André van Niekerk (Golder and Associates) and Phil Hobbs (CSIR).

The World Bank is thanked for the provision of their international expertise on a number of the reports in the Feasibility Study as well as for funding the appointment of independent external experts to peer review selected key reports from the Prefeasibility Study for the Department of Water Affairs. The comments and suggestions by the following experts contributed significantly to the quality of the study: Marcus Wishart, David Sislen, Manuel Marino, Joel Kolker, Wolfhart Pohl (World Bank); Christian Wolkersdorfer (International Mine Water Association) and Peter Camden-Smith (Camden Geoserve).

The firms comprising the Professional Services Provider team for this study were: Aurecon South Africa (Pty) Ltd; SRK Consulting (South Africa) (Pty) Ltd; Turner & Townsend (Pty) Ltd; Shango Solutions; Ledwaba Mazwai Attorneys; IGNIS Project & Finance Solutions (Pty) Ltd; Kayamandi Development Services (Pty) Ltd; Thompson & Thompson Consulting Engineers and Legal Services; Shepstone & Wylie Attorneys; and Various independent consultants, not mentioned separately.

EXECUTIVE SUMMARY

The Acid Mine Drainage (AMD) in the Witwatersrand area has been the subject of many studies and investigations over a number of years by numerous organisations. A number of private sector organisations, including the mines, have also invested heavily, in developing possible solutions to the AMD problem. There is thus a wealth of information available. This information is however not that easily accessible and is dispersed amongst a large number of organisations, studies, authors, etc. In order to properly address the AMD problem and meet this study's objectives, it is imperative that those previous studies and information that have been compiled are identified and made available to the study team.

The primary objective of this report is to present the information that was required, and subsequently used, by the study team for the execution of the study. A secondary objective is to convey details on the stakeholders from whom information and data was obtained.

Besides the wealth of information that already existed among the Study Team members, information was also obtained from alternative sources which included, but were not limited to:

- Key Stakeholders Stakeholders affected by and involved in AMD have accumulated information that proved invaluable to the Feasibility Study. Various national government departments, as well as local and provincial government, parastatals, academic institutions and Non-Governmental Organisations, especially the Federation for a Sustainable Environment (FSE) are among those that contributed to the study.
- Websites For some of the past work that has been done, the reports are made publicly available via the internet. News articles were also downloaded from several newspapers' websites, which helped the study team to gain a better understanding of the public perception around AMD.
- Technology providers To enable the study team to formulate the best possible solution with the most appropriate treatment technology, information was obtained from various technology providers on technology which they own or have rights to. Technology providers were requested by the study team to provide information, or made submissions in response to a Request for Information (RfI), which was published in three major newspapers and on the DWA website in December 2012.

All literature and spatial data what was obtained was listed and categorised on a database. The study team utilised this data for the purpose of the study. The complex and dynamic nature of the Feasibility Study ensured that data was forthcoming on a continual basis. Even during the end of the study, new information was still surfacing and was added to the databases which are included as appendices to this report (all data and information that was sourced up to the end of July 2013 has been included).

Both the literature and the spatial data that was sourced cover various topics, which include the emergency measures instituted to protect the environment through pumping and partial treatment forming part of the Short-Term Intervention (STI), the environment, topography, geology and existing infrastructure amongst others. In the databases compiled for the literature and spatial data, the file description, source, date, etc. were recorded for each file where such information was available. These databases are attached in Appendix A (Literature Database), Appendix B (Spatial Database) and Appendix C (Media Articles). It is recommended that persons wanting to source the information listed in these databases contact the authors directly.

The identification and sourcing of legal documents for this study proved to be an exceptionally challenging task. Significant effort was required to obtain data on land and mine rights / ownership, as well as information on legal opinions held by other parties.

The sharing and distribution of information amongst study members and stakeholders is just as important as the sourcing thereof. For this purpose two web sites were created, with the one being a web portal with controlled access where draft reports were made available for comments by key stakeholders and the minutes and presentations of committee meetings could be accessed. The other site was a Department of Water Affairs' web page where the public could access newsletters and study deliverables as well as information on the study background, progress, and contact details.

It should be noted that some of the data that was used is confidential and that for those reports the Professional Service Provider (PSP) has signed confidentially and non-disclosure agreements.

Since AMD management is still in its early development and is still growing in South Africa, the manner in which AMD will be managed can be expected to constantly evolve over the next decades and it is expected that during the next phases of the LTS, more innovative ideas will surface.

It is therefore suggested that DWA create and maintain a platform (e.g. a web portal) for interactions with interested parties to continue even after the LTS is implemented. Such a platform can include a database of information where interested parties should be able to add to the database.

Table of Contents

| 1. | INTRODUCTION | 1 |
|-----|--|-------------|
| 1.1 | Introduction to this Report 1.1.1 Report Objective 1.1.2 Structure of Report | 1 1 1 |
| 2. | INFORMATION REQUIREMENTS | 3 |
| 2.1 | Legal Considerations and Apportionment of Liabilities | 3 |
| 2.2 | Assessment of the Status Quo of Managing AMD | 3 |
| 2.3 | Assessment of the Water Quantity and Quality in the Mine Voids | 4 |
| 2.4 | Assessment of Options for Use or Discharge of Water | 4 |
| 2.5 | Assessment of Treatment Technologies | 5 |
| 2.6 | Assessment of Options for Management and Use of Residue Products | 6 |
| 2.7 | Communication Strategy | 6 |
| 3. | SOURCES OF INFORMATION AND PROCESS OF COLLECTION | 7 |
| 3.1 | Web Sites | 7 |
| 3.2 | Key Stakeholders | 7 |
| 3.3 | Technology Providers (Request for Information) | 8 |
| 3.4 | Study Team | 9 |
| 4. | INFORMATION MANAGEMENT PROCESS | 11 |
| 4.1 | Document Database | |
| 4.2 | Document Sharing Site | 12 |
| 4.3 | AMD Website | 13 |
| 5. | INFORMATION AVAILABILITY AND GAPS IDENTIFIED | 15 |
| 5.1 | Information Availability | |
| 6. | CONCLUSION AND RECOMMENDATIONS | 21 |

Tables

| Table 3.1: Request for Information Registration: Summary Table | 8 |
|--|----|
| Table 5.1: Information utilised for the legal component | |
| Table 5.2: Information utilised for status quo assessment | 16 |
| Table 5.3: Main Sources of data acquired. | 16 |
| Table 5.4: Summary of data reviewed for the assessment of surface water ingress. | |
| Table 5.5: Information utilised for assessment of options for use or discharge of water | 18 |
| Table 5.6: Information utilised for assessment of treatment technologies | |
| Table 5.7: Information utilised for assessment of options for management and use of residue products | 19 |
| Table 5.8: Gaps and Shortcomings in Data / Information | 20 |
| | |

Appendices

Appendix A: Appendix B: Appendix C:

Literature Database Spatial Database Media Articles

LIST OF ACRONYMS

| AKTEX | Deeds Office Deeds Summary |
|-------|--|
| AMD | Acid Mine Drainage |
| ARC | Agricultural Research Council |
| BKS | BKS Group (Pty) Ltd |
| CAPEX | Capital Expenditure |
| СВ | Central Basin |
| CGS | Council for Geoscience |
| CSIR | Council for Scientific and Industrial Research |
| DMR | Department of Mineral Resources |
| DST | Department of Science and Technology |
| DWA | Department of Water Affairs |
| DWAF | Department of Water Affairs and Forestry |
| EB | Eastern Basin |
| EC | Electrical Conductivity |
| ECL | Environmental Critical Level |
| GIS | Geographic Information System |
| GRC | Gold Reef City Museum |
| GRCTF | Gold Reef City Tourist Facility |
| HDS | High Density Sludge |
| IMC | Inter-Ministerial Committee |
| LHWP | Lesotho Highlands Water Project |
| LTS | Long-Term Solution |
| mamsl | meters above mean sea level |
| NGO | Non-Governmental Organisation |
| OPEX | Operating Expenditure |
| Rfl | Request for Information |
| RfQ | Request for Qualifications |
| RfP | Request for Proposals |
| RWQO | Resource Water Quality Objective |
| SECL | Socio-Economic Critical Level |
| SMC | Study Management Committee |
| SRK | SRK Consulting (Ptv) Ltd |
| SSC | Study Stakeholder Committee |
| STI | Short-Term Intervention |
| STS | Short-Term Solution |
| SWB | Soil Water Balance |
| TA 1 | Treasury Approval 1 |
| ТСТА | Trans-Caledon Tunnel Authority |
| TDS | Total Dissolved Solids |
| TOL | Target Operating Level |
| ToR | Terms of Reference |
| T&T | Turner & Townsend |
| WB | Western Basin |
| WRC | Water Research Commission |
| WUC | Western Utilities Corporation |

GLOSSARY OF TERMS

| An adit is an entrance to an underground mine which is horizon or nearly horizontal, by which the mine can be entered, drained water, and ventilated. | |
|---|---|
| AMD | Acid mine drainage is formed when sulphide minerals in the geological strata, are exposed through mining activities and interact with oxygen and water to form a dilute solution of sulphuric acid and iron that leaches other metals from the material in which it forms. Acid mine drainage in the Witwatersrand typically has a pH value around 3 and is enriched in sulphate, iron and a number of metals, often including uranium. |
| Appendix | Documents produced by the Feasibility Study attached to the report. |
| Aquifer | Zone below the surface capable of holding groundwater. |
| Central Basin | Central Rand underground mining basin. |
| Decant (surface) | Spontaneous surface discharge of water from underground mine workings. |
| Decant (subsurface) | Subsurface flow of water from one mine compartment or geological structure to another, typically occurring when underground mine voids fill and cascade consecutively from one underground compartment to another adjacent connected compartment. |
| Discharge (groundwater) | Seepage of groundwater at the surface. |
| Eastern Basin | East Rand underground mining basin. |
| Environmental Critical Level | The level above which the water in the mine voids at the critical locations (that is where the environmental features to be protected are at the lowest elevations) should not be allowed to rise, to protect specific environmental features, including groundwater |
| | resources. |
| Feasibility Study | An analysis and evaluation of a proposed project to determine if it is technically sound, socially acceptable, and economically and environmentally sustainable. |
| Feasibility Study Freeboard | An analysis and evaluation of a proposed project to determine if it is technically sound, socially acceptable, and economically and environmentally sustainable. The vertical distance below the Socio Economic or Environmental Critical Level and the current water level in the mine void at the abstraction point. |
| Feasibility Study Freeboard Groundwater | An analysis and evaluation of a proposed project to determine if it is technically sound, socially acceptable, and economically and environmentally sustainable. The vertical distance below the Socio Economic or Environmental Critical Level and the current water level in the mine void at the abstraction point. Water occupying openings below surface |
| Feasibility Study Freeboard Groundwater Key stakeholder | An analysis and evaluation of a proposed project to determine if it is technically sound, socially acceptable, and economically and environmentally sustainable. The vertical distance below the Socio Economic or Environmental Critical Level and the current water level in the mine void at the abstraction point. Water occupying openings below surface Defined as directly affected parties, those who have a high level of negative or positive influence (in government and civil society domains, and on the direction and success of AMD long-term initiatives) and those whose input is critical to the study (for e.g., representatives of various National, Provincial, and Local Government, NGOs, organised business, mining, industry, labour, agriculture, affected mines, affected water utilities, community leaders, academics, etc.). |

| DWA Report No.: P RSA 000/00/16212 |
|------------------------------------|
|------------------------------------|

| Long-Term Solution | A solution that is sustainable in the long term with regards to the technical, ecological, legal, economic, financial and institutional aspects. |
|--------------------------------------|--|
| Mine plan | Accurate drawing showing the positions of mine excavations. |
| Option | One of a number of combinations of abstraction works, treatment processes, and solutions for the disposal of waste and utilisation of treated water. |
| Preferred option | The solution, or combination of solutions, for the three basins respectively and collectively, that will be selected for further investigation in the feasibility phase, and if found feasible, that would eventually be recommended for implementation. |
| Reef | Term used on the Witwatersrand mines for conglomerate containing gold deposits. |
| Reference Project | The option which uses proven technologies, has minimum risk and which, is used for financial modelling and budgeting. It will probably not be the option which is implemented but is the benchmark against which implementation proposals will be judged. |
| Reserve | The quantity and quality of water required to satisfy basic human needs and to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource. |
| Resource Quality Objectives | Resource Quality Objectives (RQOs) capture the Management Class of the Classification System and the ecological needs determined in the Reserve into measurable management goals that give direction to resource managers as to how the resource needs to be managed. RQOs may relate to, the Reserve, the instream flow, the water level, the presence and concentration of particular substances in the water, the characteristics and quality of the water resource and the instream and riparian habitat, the characteristics and distribution of aquatic biota, the regulation or prohibition of instream or land-based activities which may affect the quantity of water in, or quality of the water resource; and any other characteristic, of the water resource in question. |
| Resource Water Quality Objectives | Is a numeric or descriptive instream (or in-aquifer) water quality objective, typically set at a finer resolution (spatial or temporal) than Resource Quality Objectives to provide greater detail upon which to base the management of water quality. (Resource Directed Management of Water Quality, 2007). |
| Request for Information | A Request for Service Providers to provide information (RFI) on their product or service, e.g. technologies. It is not part of a procurement process. |
| Request for Qualifications | A Request for Qualifications (RFQ) from Service Providers to allow a shortlist to be prepared. It is normally the first step in the procurement process. |
| Request for Proposals | A request for technical and financial proposals (RFP) in compliance with a defined Scope of Work (SoW) and adjudication criteria from (Pre-Qualified) bidders to allow one of the bidders to be appointed to provide an agreed service. Equivalent to Expression of Interest (EOI) but used in infrastructure projects |
| Scenarios | An alternative projection of the macro environment which affects AMD, such as climate change, electricity load shedding, and changes in quality or quantity of water ingress to the mine void. |

| DWA Report No .: P RSA | 000/00/16212 |
|------------------------|--------------|
|------------------------|--------------|

| Service Provider | The generic term for the Special Purposes Vehicle (SPU) or contracting consortium that will design, build, operate and maintain and possibly finance the works. |
|---|--|
| Short-Term Interventions (Short-Term Solution as stated in Terms of Reference) | Emergency measures that are being implemented by the TCTA in the short-term in all three the basins while the long-term Feasibility Study is undertaken to protect the ECL, to neutralise the AMD and to remove metals from the AMD. |
| Socio-Economic Critical Level | The level above which the water at the critical location in the mine void must not be allowed to rise, to protect specific social or economic features, such as the Gold Reef City museum and active or planned mining. |
| Target Operating Level | The level in the mine void at each abstraction point, below which the water level should generally be maintained by pumping or gravity flow to allow for hydraulic gradient across the underground mining basin, seasonal peak ingress, pump down time, and the like, i.e. to provide sufficient buffer capacity, or freeboard required below the ECL or SECL across the basin. |
| Western Basin | West Rand underground mining basin. |

1. INTRODUCTION

1.1 Introduction to this Report

Mining in the Witwatersrand and the benefits and impacts associated therewith has been the subject of numerous multi-disciplinary studies and investigations dating as far back as the early 1900's.

As with most planning level studies, the purpose of this study was not to conduct research *per sé* but to devise suitable measures and interventions for implementation based on previous studies and existing information. It was thus necessary to, as a first step, identify those sources of information that would be relevant to the study and on which various recommendations could be based.

The "bird's eye view" at which a feasibility study is conducted is done to focus the attention of further research and investigation on the right issues without spending time and money to conduct detailed investigations on alternatives that can be identified as unviable with the available information at feasibility stage.

1.1.1 Report Objective

The main objective of this report is to:

- Present the information that has been made available to the study team for the execution of the study. Databases of the literature, spatial data and media articles are included as appendices to this report;
- Create a theoretical framework for the study with regard to the knowledge areas that form
 part of the study and also to identify gaps in the information which should preferably be
 the subject of future research. Where such information gaps may affect this study,
 recommendations will be made on how to address this;
- Convey details on the type of information required, as well as the stakeholders from whom it was obtained.

1.1.2 Structure of Report

The report is structured to cover the following aspects:

- Preface: Gives a brief overview of the entire study and indicates how all the study components and deliverables relate to each other.
- Chapter 1: Provides an introduction to the purpose, objectives and structure of this report;
- Chapter 2: Provides an overview of the information required by the various study components;
- Chapter 3: Describes the sources of information and the collection process that was followed;

- Chapter 4: Explains the information and data management approach that was followed during the study;
- Chapter 5: Provides an overview of the availability of information and identifies the gaps;
- Chapter 6: Provides conclusions regarding the availability and use of information in the study (recommendations for future studies are provided in the respective reports).
- Appendices Literature and Spatial Databases, as well as a list of media articles.
2. INFORMATION REQUIREMENTS

A wide range of information was required for the various components of this study. Components 1 to 4 were mostly dependent on existing information, whereas Components 5 to 9 were more dependent on information that was generated in the previous components of this study. The requirements for the legal, technical and communication study components are discussed in the sections below.

2.1 Legal Considerations and Apportionment of Liabilities

The legal issues associated with AMD are complex and multifaceted. In order to examine these issues and provide the necessary legal opinions and recommendations required by the study, the following information would be needed:

- Deeds Office Deeds Summary (AKTEX)information on land and land rights ownership for selected mining related properties in the three basins;
- Mine ownership information from the Department of Mineral Resources (DMR);
- Specific Council for Geoscience studies, particularly those pertaining to apportionment of liabilities;
- Information on mine ownership and tonnage of gold produced;
- Legislation and legal case studies; and
- Various articles, opinions, reports or publicly accessible information related to AMD management that touches on legal liability;

2.2 Assessment of the Status Quo of Managing AMD

The following information was required in order to compile a comprehensive report on the current initiatives that were being undertaken in terms of the management of AMD in the three basins by the various spheres of government.

The most essential information required for this component was that which was compiled in the 'build-up' to this study, i.e. the following:

- The report to the Inter-Ministerial Committee (IMC) on AMD, compiled by the Team of Experts (December 2010);
- The Government Directives that were issued to the Trans-Caledon Tunnel Authority (TCTA);
- The TCTA Due Diligence report (2011) that was compiled by BKS and Golder;
- The TCTA Tender documents for the construction of the Short-Term Intervention (STI) that was compiled by BKS and Golder (2011);
- Any agreements that TCTA have concluded with mining companies or any other entity; and

- Published information on international AMD management approaches for areas that are similar in nature to the study area (e.g. with regards to water quality and geology).
- Municipal position papers on the management of AMD.

It must be noted that this component focused on the technical management of underground AMD, and not on AMD generated on the surface by e.g. runoff from mine residue areas. It also did not intend to evaluate the STI on a financial or institutional basis, but merely on the basis of its technical viability.

2.3 Assessment of the Water Quantity and Quality in the Mine Voids

This component required a vast amount of information and was crucial to the rest of the study as it essentially defined the nature and extent of the problem that would have to be addressed during the remainder of the study.

The data required for this study sub-component includes the key components highlighted in **Figure2.1**.





2.4 Assessment of Options for Use or Discharge of Water

To assess the options that are available for the use or discharge of treated AMD, information on the following was required:

- The requirements of the Vaal and Crocodile Rivers Integrated Water Quality Management (IWQM) and reconciliation strategies;
- Location of the abstraction / treatment sites;
- The water quantity that will have to be abstracted from the mine voids and which could be supplied to a potential user;

- The water quality that can be expected to be abstracted from the mine voids (raw AMD quality) and also the quality of water that is expected from various neutralisation and desalination treatment processes;
- General re-use options for raw, partially-treated (neutralised) or fully-treated (desalinated) AMD;
- Possible users of raw, partially-treated or fully-treated AMD within a reasonable distance of the point of abstraction / treatment;
- Quality and quantity required by possible users that have been identified; and
- Information related to social and environmental considerations and requirements, e.g. water resource classification and Reserve information, potential discharge points of treated AMD, etc.
- Information related to in stream fitness-for-use requirements (i.e. Resource Water Quality Objectives (RWQO)).

2.5 Assessment of Treatment Technologies

For the assessment of treatment technologies very much the same information as for the assessment of options for use or discharge of water was required, i.e.:

- Location of the abstraction sites. This information was needed so that the study team could identify available land in the vicinity that could be used for the treatment facilities;
- The water quantity that will have to be abstracted from the mine voids;
- The water quality that can be expected to be abstracted from the mine voids (raw AMD quality) or produced by the HDS treatment process of the STI (i.e. the feed water quality for the desalination process); and
- The quality of water that must be produced in each of the basins (which is dependent on the user(s) that will receive the water).

In addition to the above information, the study team also required the following information, which primarily pertains to alternative treatment technologies:

- The type of treatment process and its level of development;
- The feed water quality that can be accommodated by the treatment process;
- The quality of water that can be produced the treatment technologies;
- The quantity of water that can be treated by each of the technologies;
- The footprint area that is required for treatment facilities so that suitable areas could be identified; and
- Capital and operating expenditure (CAPEX and OPEX) of the treatment processes.

2.6 Assessment of Options for Management and Use of Residue Products

Information required for the assessment of options for the management and use of residue products was similar to that required for the preceding components or was an output of preceding components, i.e.:

- Location of the treatment sites. This information was needed so that the study team could identify available land in the vicinity that could be used for storage and/or disposal facilities; and
- The volume and chemical characteristics of the residue products that is generated by each of the treatment processes.

Other information that was required for this component included:

- Geological information of identified sites for storage and/or disposal facilities;
- Standards / guidelines on the classification of waste (hazardous / non-hazardous);
- Standards / guidelines for the design of waste storage and/or disposal facilities; and
- Estimates for CAPEX and OPEX for waste storage and/or disposal facilities; and
- Information on treatment residue products and possible markets for such products.
- Environmental considerations pertaining to the transport and storage of waste e.g. existing management plans and conservation plans.

2.7 Communication Strategy

The current and future management of AMD in the Witwatersrand is a contentious issue and before embarking on the implementation of a communications strategy for this study it was important to gather information that would assist the study team in understanding what the public perception and levels of awareness were. The following was required to gain such an understanding:

- Newspaper articles and media interviews;
- Previous DWA press releases;
- Parliamentary questions;
- Minutes of relevant forums (e.g. Klip, Blesbokspuit); and
- Existing communication strategies pertaining to AMD

3. SOURCES OF INFORMATION AND PROCESS OF COLLECTION

3.1 Web Sites

Numerous studies have been done on the subject of AMD, locally and internationally. In order to provide the best possible platform for this study, the study team made use of this vast resource of information.

For some of the past work that has been done, the reports are made publicly available via the internet. General internet and reference searches were undertaken to add to the extensive public domain information already available. Internet sources such as industry news, academic, company and state websites were investigated. A particularly good resource was the website of the Water Research Commission (WRC) from where numerous reports on past research by the WRC were downloaded.

News articles were also downloaded from several newspapers' websites, which helped the study team to gain a better understanding of the public perception around AMD and actions taken by government to manage it.

3.2 Key Stakeholders

Key stakeholders affected by and involved in AMD have accumulated information on the matter that proved invaluable to the Feasibility Study. Information was sourced internally from DWA officials, as well as from other national government departments such as the Departments of Mineral Resources (DMR) and Science and Technology (DST).

Local and provincial government with an interest in AMD also provided significant input to the study, not only by means of the literature they shared, but also through their contributions at workshops and subsequent discussions.

Valuable information was obtained from parastatals involved with the study, including but not limited to the Council for Scientific and Industrial Research (CSIR), Agricultural Research Council (ARC), Council for Geoscience (CGS) and the Water Research Commission (WRC). Academics from several institutions also provided reports and gave insights to their research on AMD and related matters (e.g. saline agriculture).

In addition, Non-Governmental Organisations (NGOs) were involved at every opportunity (especially through Study Stakeholder Committee (SSC) and Focus Group meetings) where they provided input and comments which ensured that gaps in information that may have been present with regards to legal, environmental or human health concerns were identified and addressed. Comments received from the SSC and at the Focus Group meetings are included in DWA AMD FS 2013, Study Report No 9: "**Key Stakeholder Engagement and Communications**". These inputs contributed immensely to the Study. In particular, the

Federation for a Sustainable Environment (FSE) provided the study team with several reports that proved immensely useful to the study.

3.3 Technology Providers (Request for Information)

The management of AMD has received enormous attention in recent times, and has been debated in numerous forums. The Department of Water Affairs in particular received several statements by service providers that they are able to treat AMD water to the required standards. In order to assess all relevant technologies, all service providers that previously showed interest or were already familiar to the study team were invited to present their respective solutions to the study team.

This approach allowed parties that have technology available, or that believe they can supply a solution, to present their information. In order to expand the investigation to include possible alternative technologies and solutions, a Request for Information (RfI) was compiled for placement in the press by DWA and was published in December 2012. The RfI invited companies to register their interest in providing any component for the management of AMD, i.e. funding, treatment, management of water and waste, and also the design, construction, operation and maintenance of infrastructure. Those companies that registered their interest are shown in **Table 3.1** below. This list represents all those companies which responded up to the 31 July 2013.

| No. | Company | No. | Company |
|-----|--|-----|--|
| 1 | Abengoa Water | 28 | Ngonyezi |
| 2 | Aqua Dynamics Process Technology Ltd | 29 | NuWater (Pty) Ltd |
| 3 | Aveng Water | 30 | Optima Agrik (Pty) Ltd |
| 4 | Blue Waste to Energy | 31 | P2W Ltd |
| 5 | Cape Peninsula University of Technology | 32 | PD Naidoo& Associates |
| 6 | Coffees of the World (Acid Solutions) | 33 | Prentec (Pty) Ltd |
| 7 | Cwenga Technologies (Pty) Ltd | 34 | Probus |
| 8 | Dow Southern Africa (Pty) Ltd | 35 | Process & Business Consultants |
| 9 | East Rand Water Care Company (ERWAT) | 36 | Project Assignments (SA) (Pty) Ltd (Projass) (Paques) |
| 10 | Eclipse Management (Pty) Ltd | 37 | PROXA |
| 11 | Enviro-Sec Ltd | 38 | PWC |
| 12 | Fraser Alexander (FAWT) &MiWaTek | 39 | QFS |
| 13 | Galactic Minerals | 40 | RNE Pumps |
| 14 | Gemini Environmental Group Ltd | 41 | Schlumberger Water Services |

| Table 3.1: Request for | Information | Registration: | Summarv | Table |
|-------------------------|-------------|---------------|---------|--------|
| rubio orri rioquoot ior | mormation | nogion anom | Gammary | I GOIO |

| No. | Company | No. | Company |
|-----|--------------------------------------|-----|--|
| 15 | General Electric South Africa | 42 | Sembcorp Utilities SA (Pty) Ltd |
| 16 | Imbewu Ventures cc | 43 | SMEC South Africa |
| 17 | Individuals | 44 | SOLACE |
| 18 | IWT – Industry AG | 45 | SYNCHRONA |
| 19 | Marubeni Corporation | 46 | Tenova Bateman Technologies |
| 20 | Minetek | 47 | Torquip Mining |
| 21 | Mintails SA (Pty) Ltd | 48 | TUT (Tshwane University of Technology) and Key Structure Holdings |
| 22 | Minus Engineering | 49 | TWP Projects |
| 23 | Mitsubishi Heavy Industries Ltd | 50 | Umlingo Solutions |
| 24 | Mixtec cc | 51 | Veolia Water Solutions & Technologies (Pty) Ltd |
| 25 | Mott MacDonald | 52 | Westech Process Equipment Africa |
| 26 | Murray & Roberts Ltd | 53 | Western Utilities Corporation (WUC) |
| 27 | Nano Water Technologies Africa (Ptv) | | |

The information gathered from the registered service providers was mainly for the provision of a treatment technology and provided a good indication of the different technologies available on the market and their capabilities. This information contributed to a large extent to the recommendations detailed in DWA AMD FS 2013, Study Report No. 5.4: "**Treatment Technology Options**".

3.4 Study Team

Ltd (Blue Gold)

The study team comprised of various firms and individuals who have considerable experience on AMD and related issues. Documents, data and other information generated through past work by members of the study team were made available for this study. This does not apply for cases where the clients for whom such work was performed own the copyrights to the work or where the PSP who performed the work is bound by a confidentiality agreement.

INFORMATION MANAGEMENT PROCESS 4.

4.1 **Document Database**

4.1.1 **Reports and Research Articles**

Given the complexity of this study, a large amount of information and data from different areas of expertise, past projects and entities were identified for consideration. A complete list of the documents that were identified is included as Appendix A. Those documents that the study team was able to source are marked as "Yes" in the column titled "Available". Where the Study Team was unable to obtain copies of the reports, it was marked as "No".

All information was categorised according to the area of expertise. The categories created for sorting and storing the information are as follows:

•

•

•

- Coal Pumping
- Decant •
- Dolomite
- Hydrogeology •
- Geology
- Impacts
- Ingress •
- Mine Closure •
- Mine Voids •
- Multi-Disciplinary •
- Institutional
- Communication
- Short-Term Interventions

Treatment Technologies

Water Management

Water Quality

Water Quantity

Water Sampling

- Economic
- Environment

If reports or other literature is required by any party, it is recommended that the authors or publishers of such literature be contacted directly, especially in those cases where information or reports are confidential.

4.1.2 **Spatial Database**

A comprehensive list of spatial data was compiled between the firms comprising the PSP and is included as Appendix B. This list comprises all the data that were requested or deemed necessary at the start of the study and that was obtained.

The data was categorised according to the study aspect that it related to. These categories include:

Cadastral Data

- Hydrology
- Environmental Mining Maps

Public-Private Partnerships Legal •

Scenarios

- Existing Infrastructure •
- General Study Area Maps •
- Short-Term Intervention •
- Topography and related

Geology •

All data files were tagged with a unique ID and, where available, the following information was provided:

Description; •

Source:

Projection; • Basin;

- Copyright issues (Yes/ No); and
- Date created.

The spatial data was essential in the execution of most of the technical components. This is especially true for Component 4.2 - Assessment of the Water Quantity and Quality in the Mine Voids, since this component required extensive data to investigate the mine voids and the critical water levels (Environmental Critical Level (ECL), Socio-Economic Critical Level(SECL), decant levels, etc.). Spatial data was also required for the identification and evaluation of potential abstraction locations, treatment sites, pipeline routes, waste disposal sites and possible environmental problems with the various options that were analysed.

4.1.3 **Media Articles**

Efforts were made to keep track of articles in the media, including radio interviews related to AMD, especially those concerned with the study area. A complete list of the articles that were sourced is included as **Appendix C**.

4.2 **Document Sharing Site**

The sharing and distribution of information amongst study members and stakeholders is just as important as the sourcing thereof. The most convenient and cost-effective method to share information and distribute the reports to the various committees was by means of a project portal. Selected users are given a URL-link to follow where they need to register and create a password. Before being able to access the portal, the portal administrator gives the user the appropriate permissions. This also allowed the study to control access to confidential reports, which were restricted where necessary.

Users are not able to upload any documents (only the portal administrator can do this) but submit their comments via email to the appropriate party. The portal was also used to distribute agendas, minutes or proceedings and presentations of the committees' meetings.

4.3 AMD Website

Since AMD is an issue that affects everyone living in or near the mining basins, it is a very sensitive topic among the public and there are many opinions and questions that are raised by the various interested parties.

In order to act in a transparent manner, keep the public informed and provide accurate information on a timely basis, DWA set up a website for the study where the background, progress, contact details, deliverables, etc. could be published. The website can be accessed at http://www.dwa.gov.za/Projects/AMDFSLTS/ and also allows the public to provide inputs for the duration of the study via a dedicated email address. It may be that this website and e-mail address will be taken up into a larger departmental AMD website in the future.

5. INFORMATION AVAILABILITY AND GAPS IDENTIFIED

5.1 Information Availability

The availability of information and what it was utilised for are discussed below for the legal and technical study components. If reports or other literature is required by any party external to this study, it is recommended that the authors or publishers of such literature be contacted directly,

5.1.1 Legal Considerations and Apportionment of Liabilities

The following data was accessible and thus utilised for the purposes of DWA AMD FS 2013, Study Reports No. 3: "Legal Considerations for Apportionment of Liabilities" and No.4: "Alternative Approaches for Apportioning Liabilities". It was also used to inform the legal opinions that were drafted during the study.

| Data | Source | Utilised for |
|--|---|---|
| AKTEX data on land and land rights ownership for selected mining related properties in the three basins | AKTEX System | Identification of owners of land and land rights, including mines, where applicable in the three basins. |
| Mine ownership data | DMR Gauteng Regional Office and National Office | Identification of mines and information on closure certificates. |
| Data on mine ownership and tonnage of gold produced | Book: Historic Overview of Witwatersrand Gold Fields (2004), Handley, JRF | Background information for Report No.4. |
| Apportionment of liabilities | CGS | Background information for Reports No.3 and 4. |
| Legislation and legal case studies | Legal team members | Study components 3, 6 and 7. |
| Various articles, opinions and reports | The Federation for a Sustainable Environment (FSE) and the Centre for Environmental Rights (CER) | Background information for Report No.3. |
| Various general public accessible data and information | Various-refer to the data list | Background information for Report No.3. |
| Agreements with Mining companies | ТСТА | Assessing the status quo legal situation |

Table 5.1: Information utilised for the legal component

Study Reports No. 3 and 4 will not be made available until the appropriate implementation process stages have been reached as they may potentially compromise future legal processes.

5.1.2 Assessment of the Status Quo of Managing AMD

In the execution of this sub-component, the Study Team relied heavily on reports that were published as part of the STI. The main information that was utilised for the status quo assessment is summarised in **Table 5.2**.

| Data | Source | Utilised for |
|---|-----------|--|
| TCTA Due Diligence Report 2011, including Report Appendices | ТСТА | For an overview of the STI as provided in the Due Diligence Report. |
| TCTA Tender Documents 2011 | ТСТА | For an overview of the STI as provided in the TCTA Tender Documents. |
| IMC Report Dec 2010 | DWA | For an overview of the international experience in the management of AMD problems. |
| Directives issued to TCTA | DWA | To gain an understanding of the background and objectives of the STI. |
| STI progress reports | TCTA/ DWA | Ensuring that information on the STI is as up to date as possible |

Table 5.2: Information utilised for status quo assessment

5.1.3 Assessment of the Water Quantity and Quality in the Mine Voids

Extensive datasets across the basins, generated by various studies over the past 8 years was collected. Gaps in this data were identified and then explored. Where information was not readily available, workshops were held with various stakeholders and experts in an effort to address these gaps, which has enabled a comprehensive database to be established. **Table 5.3** lists the main contributors during the project to date.

| Table | 5.3: | Main | Sources | of | data | acquired. |
|-----------|------|------|---------|----|------|-----------|
| 1 4 5 1 5 | •.•. | | 0000 | • | ~~~~ | augunoai |

| C | Source | Basin | Water Data | | | | General Data | | |
|-----------------------|-----------------------|-----------------------------|------------|----------|-------|---------------------|--------------|------------|----------|
| Company | | | Quality | Quantity | Level | Pumping | Spatial | Literature | Rainfall |
| DWA | Eddy Van Wyk | Central, East and West Rand | > | | > | | | | • |
| CGS | Henk Coetzee | West Rand | > | > | > | > | > | > | |
| Shango Solutions | In-house Database | Central, East and West Rand | • | > | > | > | > | > | |
| Gold One | Richard Sterward | East Rand and West Rand | | | ۲ | | > | | |
| Rand Uranium | Basie van der Walt | West Rand | V | < | > | > | | | |
| Wits University | Prof Terence McCarthy | East Rand | • | > | | > | | > | |
| The Weather Service | General personnel | Central, East and West Rand | | | | | | | K |
| CSIR | Phil Hobbs | West Rand | < | | | | > | • | |
| WRC | WRC | Central, East and West Rand | < | < | > | > | | < | |
| Goortvlei | R. Scott | Central and East Rand | • | ~ | > | | | • | |
| ERPM/DRD | Vivian Labuschagne | Central Rand | > | > | > | > | | | |
| North West University | Frank Winde | Central Rand | | < | > | | > | | |
| SRK/Aurecon | SRK/Aurecon | Central, East and West Rand | | | | | | > | |
| Camden Geoserve | Peter Camdem-Smith | Central Rand | | | < | ✓ | | | |

For the assessment of surface water ingress, the most relevant data and information that was reviewed is tabulated in **Table 5.4** below.

| Table 5.4: Summary of data reviewed for the assessment of surface water ingre- | ss. |
|--|-----|
|--|-----|

| Report Title | Authors and Date | Brief Summary |
|--|---|---|
| Witwatersrand Gold Fields Acid Mine Drainage : Contract TCTA 08-041 Water Balance and levels | BKS in association with Golder Associates, (2011) | Status quo of expected water levels and summary of water balance for Witwatersrand gold fields |
| Ferret Mining & Environmental Services (Pty) Ltd. A strategic Water Management Plan for the Prevention of Water Ingress into Underground Workings of the Witwatersrand Basin- Phase 1. | Boer et al., (2004) | Study to determine the main sources of water ingress and the possible measures to prevent water ingress into the mine workings |
| Report to the Inter-Ministerial Committee on Acid Mine Drainage – Mine Water Management in the Witwatersrand Gold Fields with special emphasis on Acid Mine Drainage. | Expert Team of the Inter-Ministerial Committee (2010) | Study to determine impacts and possible solutions to the AMD problems for the Western , Central and Eastern basin |
| Witwatersrand Gold Fields Acid Mine Drainage – Due Diligence Report by BKS (Pty) Ltd, BKS Report no J01599/05 | BKS in association with Golder Associates (2011) | Study to determine possible ways of decreasing the AMD problem |
| Sustainable Development through Mining – West Rand Goldfield: Regional Closure Strategy. | Henk Coetzee (Draft report, 2011) | Study to determine possible remediation measures to decrease the ingress of surface water into the mine workings |
| Sustainable Development through Mining – Regional Closure Strategy for the Central Rand Goldfield. | Strachan, L. et al. (Draft report, 2011) | Study to look at short and long term measures to reduce the ingress of surface water into the mine workings as part of mine closure planning |
| Sustainable Development through Mining – Regional Mine Closure Strategies for the East Rand Basin | Mafanya, T., Esterhuyse, S. (Draft report, 2011) | Study to give guidance on future mine closure strategies regarding the control and management of AMD |
| Desktop assessment of the risk for basement structures of buildings of Standard Bank and Absa in Central Johannesburg to be affected by rising mine water levels in the Central Basin | Winde et al., (2011) | Study undertaken by the Mine Water Research Group NWU and includes in depth assessment of possible ingress sources to Central Basin |
| Feasibility Study on the Reclamation on Mine Residue Areas (MRA's) for Development Purposes, by Umvoto and Touchstone Resources, for the Gauteng Department of Agriculture and Rural Development (GDARD). | GDARD (2011) | Study to identify the types and locations of MRA's and provide a strategy for their rehabilitation. |

5.1.4 Assessment of Options for Use or Discharge of Water

The information that was utilised for the assessment of options for use or discharge is summarised in **Table 5.5**.

| Data | Source | Utilised |
|--|---|---|
| Raw and treated water quality and quantity | Study Report No 5.2: Mine Voids & Study Report No 5.4: Treatment Technology Options | Assessing if qualities and quantities will match the requirements of any of the potential users |
| Quality and quantity requirements of potential users | Potential Industrial recipients (e.g. Rand Water, Sasol and Mintails) | Assessing if qualities and quantities will match the requirements of any of the potential users |
| Environmental requirements | Classification and Reserve requirements published by DWA | Setting limits for possible environmental discharge |
| River reconciliation strategies | Crocodile and Vaal reconciliation and IWQMS studies by DWA | Setting the context for the use or discharge of AMD and provide objectives for ensuring instream fitness for use for downstream users |
| Information on general re-use options | Various published guidelines (e.g. DWA, UNEP, GEC, WRC, USEPA) | To gain an understanding on what potential options might exist for the use or discharge of water |

| Table 5.5: Information util | lised for assessment | of options for u | use or discharge of water |
|-----------------------------|----------------------|---|---------------------------|
| | | ••••••••••••••••••••••••••••••••••••••• | |

5.1.5 Assessment of Treatment Technologies

The information that was utilised for the assessment of treatment technology options are summarised in **Table 5.6**.

| Table 5.6: Information | n utilised for asses | ssment of treatmer | t technologies |
|------------------------|----------------------|--------------------|----------------|
|------------------------|----------------------|--------------------|----------------|

| Data required | Source | Utilised for |
|---|---|---|
| Raw water quality and quantity | Study Report No 5.2: Mine Voids | Providing criteria to technology providers |
| Information on alternative treatment technologies | Technology providers invited by the study team, referred to the study by DWA representatives and in response to the Request for Information (RfI) | Assessing alternative technologies |
| Potential users' quality requirements | Study Report No 5.3: Options for Use or Discharge of Water | Assessing if alternative technologies can meet requirements |
| International guidelines for AMD management | Global Acid Rock Drainage (GARD) guidelines | Background information on passive treatment |

5.1.6 Assessment of Options for Management and Use of Residue Products

The information that was utilised for the assessment of options for the sustainable management and use of residue products from the treatment of AMD are summarised in **Table 5.7**.

| Data required | Source | Utilised for: |
|------------------------|---|---|
| Waste quantities | During prefeasibility study stage, from technology providers and design engineers | Sizing of waste facilities |
| Samples of waste | During prefeasibility study stage, from technology providers and design engineers | Settling and consolidation characteristics, permeability, strength, drying, water retention, evaporative modelling, etc. |
| Site information | Various GIS sources, including topographical surveys and provincial conservation plans. | Siting studies and site selection |
| Waste Management | Various literature and Guidelines – see Appendix A | Options Assessment |
| Waste characterisation | Determined from waste samples | Determining waste site classification and liner requirements |

Table 5.7: Information utilised for assessment of options for management and use of residue products

5.1.7 Conclusion on Information Requirements

The study components forming part of the Feasibility Phase is not discussed in the preceding sub-sections, as it mainly used information derived during the Prefeasibility Phase.

The complex and dynamic nature of the Feasibility Study ensured that information was forthcoming on a continual basis. Throughout the study all effort was made to maintain an up to date, comprehensive database of available data and information. New information will in all likelihood continue to be generated and should be made use of during the implementation of the LTS or for future studies regarding AMD.

In Chapter 2 of this report an overview was given of the information required for the execution of the study as per the Terms of Reference. In most instances the Study Team were able to locate and source the necessary information. The gaps and shortcomings in the information / data that have been identified by the Study Team are shown in **Table 5.8**.

|--|

| Component | Information | Source | Reason for gaps / shortcomings |
|-----------|--|---|---|
| 3 | Information on land ownership | Survey General's Office | Information not easily accessible (only available as hard copies), and additional personnel and time is required to sort through and obtain all relevant data on land ownership. |
| 4.2 | Mine void connectivity | CGS / DMR / Mines | The mine plans that were used to assess the mine void connectivity are inaccurate and out-of-date. Also, the study by CGS relating to 3D modelling of the void was not yet available for all three basins. |
| 4.2 | Shaft stability | - | Camera surveys on very few shafts were done. Although not required for this study, it might be necessary during implementation of the LTS. |
| 4.2 | Raw AMD quality and quantity | Hydrological Monitoring Committee on AMD, past study reports | Data is limited, but further/ improved monitoring as recommended by this study will improve data availability and distribution |
| 4.3 | Existing infrastructure and future requirements of potential users | Various potential users | In some cases, institutions were reluctant to make information available regarding their infrastructure and ability to use treated AMD |
| 4.3 | Published guidelines for the use of saline water for agriculture | - | No published guidelines for the use of saline water for agriculture exist, or such guidelines have not been proven to be sustainable in the long- term |
| 4.4 | Details on alternative technologies | Various technology providers | In many cases, technology providers were reluctant to make detailed information available, since they fear that their intellectual property will become public knowledge. |

| Table 5.8: | Gaps a | nd Shortc | omings in | Data / | Information |
|------------|--------|-----------|-----------|--------|-------------|
| | | | | | |

6. CONCLUSION AND RECOMMENDATIONS

This AMD Long-Term Feasibility Study is the first of its kind in many respects, mainly because of the technical complexity, but also because of the technical and geographic breadth of the problem. Being on the forefront meant that there was no firm framework according to which this study could be conducted.

The various disciplines that had to be integrated to execute the study required extensive information, some of which could not be sourced or doesn't exist. As can be seen from the information listed in the appendices, a large number of literature and spatial data was sourced by the study team (the literature inventory included in Appendix A lists more than 600 reports and articles that's been identified, of which more than 250 could be obtained. Appendix B lists more than 200 spatial data files that were sourced). Although a number of information gaps were identified by the study team (refer to Chapter 5), adequate information was obtained to enable the study team to make confident recommendations, i.e. the information gaps did not influence the outcome of the study.

The gathering of information is a very dynamic process and new information was forthcoming on a continual basis during the study, something that is expected to keep occurring well into the future. Furthermore, since AMD management is still in its early development and is to a large extent still an emerging field of study in South Africa, the manner in which AMD will be managed can be expected to constantly evolve over the next few decades. If the right measures are put in place to encourage this evolvement, it will speed up the process to find more effective and cost-efficient approaches to the management of AMD, originating from both the surface and the mine void in the future. It is therefore suggested that DWA create and maintain a platform (e.g. a web portal) for interactions with interested parties to continue even after the Long-Term Solution is implemented. Such a platform can include a database of information where interested parties should be able to add to the database.



Appendix A Literature Database

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|----|-------------|---|-------------------------------|---------------------------|-------------------|----------------------------|-----------------|--------------|
| 1 | Multi-Basin | "IMC Report" Expert Team of the Inter-Ministerial Committee (2010) Mine water management in the Witwatersrand gold fields with special emphasis on Acid Mine Drainage. Report to the Inter- Ministerial Committee on Acid Mine Drainage. Council for Geoscience. December 2010, 128 pp. | DWA | Water Management | N/A | Yes | 2010 | No |
| 2 | Multi-Basin | "TCTA Report (2011a)", Seath, S.G. and van Niekerk, J.A. Due Diligence Report: Witwatersrand Gold Fields Acid Mine Drainage (Phase 1). Report compiled by BKS (Pty) Ltd in association with Golder Associates on behalf of Trans Caledon Tunnel Authority (TCTA). 126 pp. | ТСТА | Multi-Disciplinary | N/A | Yes | 2011 | No |
| 3 | Multi-Basin | TCTA. (2011). Letter: Dr Snowy Khoza - Emergency works water management on the Witwatersrand Gold Fields with special emphasis on Acid Mine Drainage: Directive interims of the National Water Act, 1998 (Act 36 of 1998). | ТСТА | Water Management | Water Quality | Yes | 2011 | No |
| 4 | Multi-Basin | TCTA - MCWAP Fitch Ratings | TCTA | STI | N/A | Yes | 2012 | No |
| 5 | Multi-Basin | TCTA - MCWAP Press Release Final Fitch Ratings | TCTA | STI | N/A | Yes | 2012 | No |
| 6 | Multi-Basin | TCTA - Contract TCTA 08-041, Construction of AMD Phase 1 Treatment Facilities Tender Document | ТСТА | STI | N/A | No | 2011 | No |
| 7 | Multi-Basin | "WUC Report" (2009), by Golder and Associates Africa. Water resource estimation and quality assessment of the Witwatersrand mining basins (multiple reports). Report 11590-8757 No's 14 to 17. | Golder & Associates | Water Quantity | Water Quantity | Yes | 2009 | Yes |
| 8 | General | Akwetey, E. (No Date). Ashanti Goldfields Company (Obuasi): Case study regarding Cavity Monitoring System (CMS) involvement as an input in mining and production. 7p | Ashanti Goldfields Company | Mine Voids | N/A | No | Not Recorded | No |
| 9 | General | Alexander, W.V. and Ristow, N. (2010). Ambient Temperature Ferrite Process: Adapting the laboratory-scale process to treat acid mine drainage. WRC Report No. 1640/1/10. Water Research Commission. 64p. | WRC | Treatment Technologies | N/A | No | 2009 | Yes |
| 10 | General | Annandale, J.G., Jovanovic, N.Z., Tanner, P.D., Benadé, N. and du Plessis, H.M. (no date). The sustainability of irrigation with gypsiferous mine water and implications for the mining industry in South Africa. 9p. | IMWA Springer- Verlag 2002 | Treatment Technologies | N/A | Yes | 2002 | No |
| 11 | General | Anon. (2010). AMD: Local solutions for local challenges. The Water Wheel. 3p. | WRC | Treatment Technologies | Article | No | 2010 | No |
| 12 | General | Anton, N.R., Nelson, M.N., Fundingsland, S.D. and Ketellapper, V. (no date). Acid Rock Drainage Treatment Sludge Disposal in Mine Voids and Pit Lakes: Analysis of Environmental Risks. 15p. | WRC | Treatment Technologies | Mine Voids | Yes | Not Recorded | No |
| 13 | General | Anton, R <i>et al</i> . Acid Rock Drainage Treatment Sludge Disposal in Mine Voids and Pit Lakes: Analysis of Environmental Risks. Research for various academic institutions in the USA | Other | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 14 | General | Antrobus, E.S.A. (1986). Witwatersrand Gold – 100 years, The Geological Society of South Africa. 298p. | Other | Geology | N/A | No | 1986 | No |
| 15 | General | Antrobus, E.S.A., and Whiteside, H.C.M. (1964). The geology of certain mines in the East Rand. In: The geology of some ore deposits in Southern Africa: Vol 1. (Ed: S. H. Haughton), pages 125-160 | Other | Geology | N/A | No | 1964 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|----|---------|--|------------------|---------------------------|-------------------------|----------------------------|-----------------|--------------|
| 16 | General | Antrobus, R and De Waal, S. (2009). Mine Water Quality and Recommendations towards Appropriate Dewatering Indarama Mine, Zimbabwe. Final Report. Shango Solutions. 27p. | Shango Solutions | Water Quality | N/A | No | 2009 | No |
| 17 | General | Antrobus, R. (2009). Turgis Mine Water Quality, Inderama Mine, Zimbabwe Progress Report. Shango Solutions. 8p. | Shango Solutions | Water Quality | N/A | No | 2009 | No |
| 18 | General | ANZMEC (1995) Baseline environmental guidelines for new and existing mines. Australia and New Zealand Minerals and Energy Council (ANZMEC), Canberra. Report 95.02. | ANZMEC | Multi-Disciplinary | N/A | No | 1995 | No |
| 19 | General | Arnold, V and Schweitzer, J. (2005). Aflease Uranium Mine. Dominion Section De-watering Project: Inner and Outer Basin Interconnectivity and Water Storage Potential. Shango Solutions. 26p. | Shango Solutions | Multi-Disciplinary | N/A | No | 2005 | No |
| 20 | Central | Arnold, V. (2006). Central Rand: Water monitoring and sampling. Proposal. Shango Solutions. 3p. | Shango Solutions | Water Sampling | Water Managemen t | No | 2006 | Yes |
| 21 | Central | Arnold, V. and Collister, G. (2007). Central Rand: Water Monitoring and Sampling. Final Report. Shango Solutions. 32p. | Shango Solutions | Water Sampling | Water Managemen t | No | 2007 | Yes |
| 22 | Central | Arnold, V. and Schweitzer, J. (2006). Central Rand Goldfield. Water pollution source apportionment Proposal. Shango Solutions. 19p. | Shango Solutions | Water Sampling | N/A | No | 2006 | Yes |
| 23 | Central | Arnold, V. and Schweitzer, J. (2006). Randfontein Estates No.9 Shaft. In-situ Depth Profile. 28p. Shango Solutions | Shango Solutions | Water Quality | N/A | No | 2006 | Yes |
| 24 | Central | Arnold, V., Kramers, C.P. and Schweitzer, J.K. (2005). Conceptual Study – Wits Intermine Project. Controlled decanting options. ERPM. 90p. | ERPM | Decant | Water Managemen t | Yes | 2005 | Yes |
| 25 | Central | Arnold, V., Schweitzer, J.K., De Waal, S., (2005). Progress Report: Controlled Decanting, Central Rand Goldfield. Quantification of the Geohydrological Environment. Shango Solutions Consultancy Report, Council for Geoscience, 58p. | CGS | Decant | N/A | No | 2005 | Yes |
| 26 | Central | Arnold, V.A., Kramers, P. and Schweitzer, K. (2005). Wits Inter-Mine Project, Controlled Decanting Options: East Rand Proprietary Mines. Compiled for the Council for Geoscience. Shango Solutions Report No. S028/04. 90 pp. | CGS | Decant | Water Managemen t | Yes | 2005 | Yes |
| 27 | General | Aubé, B. (no date). The Science of Treating Acid Mine Drainage and Smelter Effluents. 23p. | WRC | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 28 | Central | Audouin, J. (1997). Geophysical study of Acid rock drainage in the City Deep area,, Johannesburg, Gauteng. Unpublished. M.Sc. Thesis, University of the Witwatersrand. 111p. | Wits University | Hydrogeology | N/A | No | 1997 | No |
| 29 | Eastern | Barradas and Loggenberg (1996). Investigation of surface water ingress into the Eastern, DME report, July 1996. | DME | Ingress | N/A | No | 1996 | No |
| 30 | General | Bell. F.G. (2001). The effects of acid mine drainage from an old mine in the Witbank coalfield, South Africa. 13p. | Other | Coal | N/A | No | 2001 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|----|-------------|--|--|---------------------------|-----------------|----------------------------|-----------------|--------------|
| 31 | General | Bezuidenhout, N. and Rousseau, P.D.S. (2005). An investigation into the depth and rate of weathering on gold tailings dam surfaces as key information for long-term and risk assessments. WRC Report No. 1347/1/05. Water Research Commission. | WRC | Hydrogeology | ulti-Disciplina | a Yes | 2005 | No |
| 32 | General | Bezuidenhout, N. and Rousseau, P.D.S. (2006). An evaluation of the performance and effectiveness of improved soil cover designs to limit through-flow of water and ingress of air. 1350/1/06. Water Research Commission. | WRC | Hydrogeology | ulti-Disciplina | a Yes | 2005 | No |
| 33 | General | BKS and Golder Associates. (2011). Contract TCTA 08-041, Constructing of AMD Phase 1 Treatment Facilities Tender Document. Volumes 1-5 & 7. TCTA Report No. 08-042. | ТСТА | Treatment Technologies | N/A | No | 2011 | No |
| 34 | General | BKS (2012). BKS 1039 Issues and response Table Rev 4 07-02-2012 | TCTA | Impacts | N/A | Yes | 2012 | No |
| 35 | General | BS Associates.(2006). Assessment of the Radiological Impact of the Mine Water Discharges to Members of the Public Living around Wonderfonteinspruit Catchment Area. RRD/RP01/2006 (Contract No). | BS Associates | Impacts | N/A | Yes | 2006 | No |
| 36 | Multi-Basin | Boer, R., Schweitzer, J., Wade, P., Ramsden, M. and Viviers, K. (2004). A strategic water management plan for the prevention of water ingress into the underground workings of the Witwatersrand mining basin – Phase 1. Compiled for: Ferret Mining and Environmental Services (Pty) Ltd. Contract. Shango Solutions. 419 pp. | Ferrent Mining and Industrial Services | Water Management | Ingress | No | 2004 | Yes |
| 37 | General | Botha, M; Bester,L. & Hardwick, E. Removal of Uranium from Mine Water using Ion Exchange at Driefontein Mine. | Other | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 38 | General | Bowell, R.J. (2000) Sulphate and salt minerals: the problem of treating mine waste. Mining Environmental Management, May 2000, p. 11-13. | Other | Treatment Technologies | N/A | No | 2000 | No |
| 39 | Central | Brand, Q. (2004). Rise of water levels in various basins. Internal Report. E.R.P.M. 3p. | ERPM | Water Quantity | N/A | No | 2004 | Yes |
| 40 | General | Brink, A. B. A., (1979) Engineering Geology of Southern Africa Vol 1, Building Publications. | Other | Geology | N/A | No | 1979 | No |
| 41 | General | Brink, D (2008). Crisis Situation in Krugersdorp Game Reserve. Letter to Department of Water Affairs | Other | Other | N/A | Yes | 2008 | No |
| 42 | General | Brown, H.T. (1991). Pumping of extraneous water from underground at S.A. Land & Exploration Company Limited. The South African Land & Exploration Company Limited. 2p. | SALECL | Pumping | N/A | No | 1991 | No |
| 43 | General | Brown, S.A.P. (1991). An authority's perspective of the EMPR. Directorate of Water Quality Management. 15p. | Other | Water Quality | N/A | No | 1991 | No |
| 44 | General | Bryson, R.H., Clausen, H.T., and Moyers, W.H. (1961). Brackish waters of the mines of the Orange Free state Goldfields. Transactions of the seventh commonwealth mining and metallurgical congress, Johannesburg, Vol 1: 359-373. | Other | Multi-Disciplinary | N/A | No | 1961 | No |
| 45 | General | Buchanan, M. (2007). Mine acid decant AMD recommendations for affected areas in South Africa. Pollution of the upper Olifants and Loskop Dam. 5p. | Other | Decant | N/A | No | 2007 | No |
| 46 | General | Bureau of Land Management (2008). Abandoned Mine Lands. Available from http://www.blm.gov/wo/st/en/prog/more/Abandoned_Mine_Lands.2.html. | Bureau of Land Management | Multi-Disciplinary | N/A | Yes | 2008 | No |
| 47 | General | Bureau of Land Management (undated). Abandoned Mine Lands Portal. Available from http://www.abandonedmines.gov/aa.html. | Bureau of Land Management | Multi-Disciplinary | N/A | Yes | Not Recorded | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|----|-------------|--|------------------------|---------------------------|------------------|----------------------------|-----------------|--------------|
| 48 | General | Cameron Cross Inc. Environmental-Legal Memorandum: Legal Principal for Appointment of Legal Liability (Legally Privileged and Confidential, prepared doe the rendering of legal advice). AGES. | AGES | Multi-Disciplinary | N/A | Yes | Not Recorded | No |
| 49 | General | Canadian Institute for Environmental Law and Policy (2000). Mining's many faces: Environmental Mining Law and Policy in Canada, Toronto. 66p. | Other | Multi-Disciplinary | N/A | Yes | 2000 | No |
| 50 | Multi-Basin | CBEC, WBEC and EBEC. (2010). WBEC Long term solution letter and proposal with Annexure C - G : Industry Proposal to the Department of Water and Environmental Affairs on a Regional Solution to Acid Mine Drainage for the Witwatersrand Goldfields. | WBEC | Treatment Technologies | ter Managem | n Yes | 2010 | No |
| 51 | Multi-Basin | WBEC (2010). Long-term solution letter and proposal to acting DDG DWAE: Industry proposals for the Management of the Acid Mine Drainage in the Witwatersrand Goldfields Basin. | WBEC | Treatment Technologies | ter Managem | n Yes | 2010 | No |
| 52 | Central | Central Rand Gold (2008). Media release – Central Rand Gold: Central Rand Gold awarded new order Mining Right for South Africa's Central Rand Gold Field Tenements. 2p. http://www.centralrandgold.com/documents/press/Award%20of%20Mining%20Right.pdf | CRG | Other | N/A | No | 2008 | No |
| 53 | General | Charlesworth, E.G. and McCarthy, T.S. (1990). Structural aspects of the eastern part of the Rietfontein Fault System. S. Afr. J. Geol., 93(1). pp.211-223. | SA Journ of Geology | Geology | N/A | No | 1990 | No |
| 54 | General | Chatwin, T. (2010). The GARD Guide. P 1 - 20. | Other | Other | N/A | No | 2010 | No |
| 55 | General | Clark, I.H. (1986). Optimisation of the placement water / solids ratio for crushed-and-milled waste backfill. Chamber of Mines. 14p. | Chamber of Mines | Multi-Disciplinary | N/A | No | 1986 | No |
| 56 | General | CGS. (2005). Estimate of Water Quantities entering the underground workings of the Eastern at selected positions. | CGS | Ingress | N/A | Yes | 2005 | No |
| 57 | General | CGS. (2005). Estimate of Water Quantities entering the underground workings of the Eastern at selected positions - Progress Report. | CGS | Ingress | N/A | Yes | 2005 | No |
| 58 | General | Coetzee, H. (2007). A regional approach to mine closure in complex mining areas. Department of Minerals and Energy. | CGS | Mine Closure | N/A | Yes | 2007 | No |
| 59 | Central | Coetzee, H. (2012). Calculations by Henk Coetzee to estimate the volume of the mining void in the Central Basin. | CGS | Hydrogeology | Water Quality | Yes | 2012 | No |
| 60 | Western | Coetzee, H. (2008). Regional mine closure strategies for the West Rand Goldfield. Department of Mines and Energy. | CGS | Mine Closure | N/A | No | 2008 | No |
| 61 | General | Coetzee, H et al . (2008). Strategy for the management of derelict and ownerless mines in South Africa. | CGS | Mine Closure | N/A | Yes | 2005 | No |
| 62 | General | Coetzee, H. (2010). Mine water management in the Witwatersrand Gold Fields with special emphasis on acid mine drainage. Report to the inter-ministerial committee on acid mine drainage. Council for Geoscience. 146p. | CGS | Hydrogeology | N/A | Yes | 2010 | No |
| 63 | Western | Coetzee, H., Croukamp, L., Venter, J. and De Wet, L. (2005). Contamination of the Tweelopie Spruit and environs by water from the Western Basin decant point on Harmony Gold's property: Council for Geoscience, Pretoria, Report No. 2005-0148. 28p. | CGS | Decant | Impacts | No | 2005 | Yes |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|----|-------------|--|------------------|---------------------------|-------------------------|----------------------------|-----------------|--------------|
| 64 | General | Coetzee, H., Venter, J & Ntsume,G. (2005). Contamination of wetlands by Witwatersrand gold mines - processes and the economic potential of gold in wetlands | CGS | Decant | Impacts | Yes | 2005 | No |
| 65 | Western | Coetzee, H., Erasmus, E., Van Wyk, N., Kwata, G. and Horstmann, U. (2005). Preliminary investigation of a suspected ingress point in the Western Basin – Intersection of the Wonderfonteinspruit with the Witpoortjie Fault. Department of Minerals and Energy | DME | Ingress | N/A | No | 2005 | No |
| 66 | General | Coetzee, H., Vorster, C & Nengobela, N. (no date). Sustainable Development through mining - First order estimate of the State's financial liability with respect to derelict and ownerless mines | CGS | Multi-Disciplinary | Scenarios | Yes | Not Recorded | No |
| 67 | General | Coetzee, H., Nengobela, N.R., Vorster, C., Sebake, D. and Mudau, S. (2008). South Africa's strategy for the management of derelict and ownerless mines. In: Mine Closure 2008: Proceedings of the third international seminar on mine closure, (A. Fourie, M.Tibbett, I. Weiersbye and P. Dye, eds). Johannesburg: Australian Centre for Geomechanics. | CGS | scenarios | N/A | No | 2008 | No |
| 68 | Multi-Basin | Coetzee, H., Singh, M. and Roux, R. (2008). Risks related to the flooding of gold mines in the Central Rand, West Rand and KOSH Gold Fields: Department of Minerals and Energy, Pretoria, Council for Geoscience, Report No: 2008-0241. 21p. | CGS | Hydrogeology | Impacts | Yes | 2008 | No |
| 69 | General | Coetzee, H., Van Tonder, D., Wade, P., Esterhuyse, S., Van Wyk, N., Ndengu, S., Venter, J. and Kotoane, M. (2007). Acid mine drainage in the Witwatersrand: Department of Minerals and Energy, Pretoria, Council for Geoscience Report No 2007-0260. 81p. | CGS | Multi-Disciplinary | N/A | No | 2007 | No |
| 70 | General | Coetzee, H., Wade, P. and Winde, F. (2006). An assessment of sources, pathways, mechanisms and risks of current and future pollution of water and sediments in the Wonderfontein Spruit Catchment, Water Research Commission, WRC Report No.1214/1/06. 202p. | WRC | Hydrogeology | N/A | Yes | 2006 | Yes |
| 71 | General | Coetzee, H., Wade, P.W. and Winde, F. (2002). Reliance on existing wetlands for pollution control around the Witwatersrand gold/uranium mines of South Africa. Are they sufficient? In Uranium in the aquatic environment: Uranium Mining and Hydrogeology III, | CGS | Treatment Technologies | N/A | No | 2002 | No |
| 72 | General | Cousens, R.R.M & Garrett, W.S. (1969). The Flooding at the West Driefontein Mine. | Other | Hydrogeology | Water Managemen t | Yes | 1969 | No |
| 73 | General | Cole, D.I. (1998) Uranium in The Mineral Resources of South Africa (M.G.C. Wilson and C.R. Anhaeusser, eds): Handbook, Council for Geoscience, 16, p. 642–658. | CGS | Geology | N/A | No | 1998 | Yes |
| 74 | General | Coleman, T.J. (2003). A Decision Support System for the Controlled Release of Saline Mine Water during Flood Conditions in the Witbank Dam Catchment Report to the WRC by Wates, Meiring and Barnard, & Ninham Shand Consulting Engineers. Water Research Commission | WRC | Treatment Technologies | N/A | No | 2003 | No |
| 75 | General | Collister, G. (2006). Uranium and Gold Extraction from Water. Shango Solutions. 18p. | Shango Solutions | Treatment Technologies | N/A | No | 2006 | Yes |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|----|---------|--|---------------------------------|---------------------|-------------------------|----------------------------|-----------------|--------------|
| 76 | General | Columbia Analytical Services (2011). Acid mine drainage testing. Available from http://www.caslab.com/Acid-Mine-Drainage-Testing/ | Columbia Analytical Services | Water Quality | N/A | Yes | 2011 | No |
| 77 | General | Comarmond, J. Appendix A: Chemical Methods for predicting the acid mine drainage/acid rock drainage potential of mine wastes in Australian. p24. Environmental Division ANSTO. | Other | Scenarios | N/A | Yes | Not Recorded | No |
| 78 | General | Conference Proceedings No.2, (1996). A Strategic Integrated Water Management Plan for the Gauteng Gold Mines. Conference Proceedings no.2. 250p. | Other | Water Management | N/A | No | 1996 | No |
| 79 | Central | Cook B.J., Connelly RJ., Geldenhuis S.J.J., Watson M.A., van der Merwe, C.G. and Schoonbee H,J. (1990). Environmental Impact of Closing E.R.P.M. 39p. | Other | Hydrogeology | N/A | No | 1990 | Yes |
| 80 | General | Council for Geoscience (2004). A strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins. A Geohydrological Model of the Florida Lake and Canal. Progress Report number 7, vol.2. Unpublished | CGS | Ingress | N/A | No | 2004 | Yes |
| 81 | General | Council for Geoscience (2004). A strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins. Progress Report number 9, vol. 1. Unpublished Report, Council for Geoscience. 221p. | CGS | Ingress | N/A | No | 2004 | Yes |
| 82 | General | Council for Geoscience (2004). A strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins: Progress Report no 10, Volume 1. Witwatersrand Water Ingress Project, Department of Minerals | CGS | Ingress | Water Managemen t | No | 2004 | Yes |
| 83 | General | Council for Geoscience (2005). A strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins. A progress report for the period 15 October to 14 December 2005. Volume 1, report No. 16. | CGS | Ingress | Water Managemen t | No | 2005 | Yes |
| 84 | General | Council for Geoscience (2005). A strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins. Progress Report number 15. Unpublished Report, Council for Geoscience. 216p. | CGS | Ingress | Water Managemen t | No | 2005 | Yes |
| 85 | Eastern | Council for Geoscience (2008) Strategic Water Management Plan for the prevention of water ingress into underground workings of the Eastern — Witwatersrand Mining Area: A summary for the work conducted during the period 2004–2006. | CGS | Ingress | Water Managemen t | No | 2008 | Yes |
| 86 | General | Council for Geoscience. (2007). Minutes of the Regional Mine Closure Strategy Steering Committee Meeting. | CGS | Mine Closure | N/A | Yes | 2007 | No |
| 87 | General | Council for Geoscience (2011). Pollution Source Apportionment in the Eastern: Phase 1 | CGS | Mine Closure | ter Managem | Yes | 2011 | No |
| 88 | General | Council for Geosciences (2005). Hydrogeological Investigation to Determine Inflow Rates, Water Quality and Predicted Impacts at East Rand Proprietary Mines. 33p. | WRC | Water Quality | Ingress | No | 2005 | No |
| 89 | General | Court Proceedings - Mintails vs. DWA & Water Tribunal | Other | Water Management | N/A | Yes | 2009 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|---|-------------------------|---------------------------|----------|----------------------------|------|--------------|
| 90 | General | Cowan, D.A. (2011). Identification of Arsenic Resistance Genes in Microorganisms from Maturing Fly Ash-Acid Mine Drainage Neutralised Solids. WRC Report No. 1655/1/10. Water Research Commission. 90p. | WRC | Treatment Technologies | N/A | No | 2011 | No |
| 91 | General | Cowan, D.A., Shitandi, A., van IJperen, C., Kuhn, E., Musingarimi, W. and Petrik, L. (2007). The Microbiology of Fly Ash - Acid Mine Drainage Neutralization Systems. WRC Report No. 1549/1/07. Water Research Commission. 70p. | WRC | Treatment Technologies | N/A | Yes | 2007 | No |
| 92 | General | Cramer, T. (2012). TCTA again warns of funding shortfall for acid water projects. Mining Weekly Online. Creamer Media (Pty) Ltd. 2p. | Mining Weekly Online | STI | N/A | No | 2010 | No |
| 93 | Central | Crown Gold Recoveries (2004). The impact of the discharge of underground water into the Klip River catchment. Internal Report. E.R.P.M. 65p. | ERPM | Decant | N/A | No | 2004 | Yes |
| 94 | General | CSIR (2010). A CSIR perspective on water in South Africa. 78p. | CSIR | Hydrogeology | N/A | No | 2007 | No |
| 95 | General | CSIR Natural Resources and the Environment (2007). Technologies for waste and wastewater | CSIR | Treatment Technologies | N/A | Yes | 2007 | No |
| 96 | General | Dallas, H.F. (2004). The Effect of Water Quality Variables on Aquatic Ecosystems: A Review Report to the WRC by Freshwater Research Unit, University of Cape Town. Water Research Commission. 222p. | WRC | Water Quality | N/A | No | 2004 | No |
| 97 | General | Davidson, C. (2003). Catchment Diagnostic Framework for the Klip River Catchment, Vaal Barrage, October 1998 –September 1999. Unpublished. M.Sc. thesis: University of the Witwatersrand. 154p. | Wits University | Hydrogeology | N/A | No | 2003 | No |
| 98 | General | De Beer, M. (2005). Treatment of acid mine drainage and acidic effluents. Thesis. 91p. | Other | Treatment Technologies | N/A | Yes | 2005 | No |
| 99 | General | De Groot, P.A. (1997). Water/rock ratio calculations in hydrothermal systems: A case study from Bergslagen, Central Sweden. University of the Witwatersrand. EGRU 314. 21p. | Wits University | Hydrogeology | N/A | No | 1997 | No |
| 100 | Western | De Roer, K. (2004). The hydrological impact of the rewatering of the Gemsbokfontein dolomitic compartment on the Wonderfonteinspruit. Thesis. 170p. | Other | Impacts | Dolomite | Yes | 2004 | No |
| 101 | Multi-Basin | De Waal, S. (2006). Water and salt balance for the Central and potential linkage to the Eastern Interim Progress Report. Shango Solutions. 35p. | Shango Solutions | Treatment Technologies | N/A | No | 2007 | Yes |
| 102 | Multi-Basin | De Waal, S. (2006). Water and salt balance for the Central and potential linkage to the Eastern Interim Progress Report. Shango Solutions. 80p. | Shango Solutions | Treatment Technologies | N/A | No | 2006 | Yes |
| 103 | Eastern | De Wet, L. (2004). Toxicity potential monitoring of HDS-Plant treated effluent from GVPM # 3 Shaft: Discussion of conditions from April 1996 to November 2004, Waterlab Report GVPM/11- 1/2004. | Other | Water Sampling | N/A | No | 2004 | Yes |
| 104 | General | Department of Mineral & Energy Affairs & DWAF. (1995). Grootvlei Socio-Economic and Environmental cost-benefit analysis. | Other | Water Management | N/A | Yes | 1995 | No |
| 105 | General | Department of Minerals and Energy (2008). Strategy for the Management of Mine Water Ingress and Decant Problems in the Witwatersrand Gold Mining and KOSH Areas, South Africa (report prepared by L K C Strachan), Council for Geoscience, unpublished, Pretoria. | DME | Multi-Disciplinary | N/A | No | 2008 | Yes |
| 106 | Western | Department of Minerals and Energy (2009). Overview of acid mine drainage impacts in the West Rand Goldfield. Presentation. 18 slides | DME | Impacts | N/A | Yes | 2009 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|----------------|---------------------------|-------------|----------------------------|------|--------------|
| 107 | General | Department of Mines and Petroleum Environment (2009). Acid Mine Drainage. Government of Western Australia. 3p. | DME | Hydrogeology | N/A | Yes | 2009 | No |
| 108 | General | Department of Water Affairs & Forestry. (2011). Annual Report 1 April 2010 to 31 March 2011. 261pp. | DWAF | Multi-Disciplinary | N/A | Yes | 2011 | No |
| 109 | General | Department of Water Affairs & Forestry and the Water Research Commission (1996). Application of the UK benefit assessment methodology to the Grootvlei min discharge problem (2 hard copies). | Other | Water Management | N/A | No | 1996 | No |
| 110 | General | Department of Water Affairs & Forestry. (2000). Assessment of the influence of the Amanzi Project on the surface water resources of the Vaal River System | DWAF | Water Management | N/A | Yes | 2000 | No |
| 111 | General | Department of Water Affairs & Forestry. (2005). Disposal of Water found underground in the mine: issue of permit 50m in terms of Section 12B(2)(b) of the water act 1956. Act 54 of 1956 only for the period up to 31st March. Grootvlei Proprietary Mines Ltd. | DWAF | Water Management | N/A | Yes | 2005 | No |
| 112 | General | Department of Water Affairs & Forestry. (2008). Best Practice Guideline H1: Integrated Mine Water Management | DWAF | Multi-Disciplinary | N/A | Yes | 2008 | No |
| 113 | General | Department of Water Affairs & Forestry. (2008). The Development of a Reconciliation Strategy for the Crocodile West Water Supply System - Water Resource Reconciliation Strategy. BKS & Arcus Gibb. | DWAF | Multi-Disciplinary | N/A | Yes | 2008 | No |
| 114 | General | Department of Water Affairs & Forestry. (2007). Vaal River System: Large Bulk Supply Reconciliation Strategy: Irrigiation Water Use and Return Flows. | DWAF | Multi-Disciplinary | N/A | No | 2007 | No |
| 115 | General | Department of Water Affairs & Forestry. (2006). Best Practice Guidelines H3: Water Reuse and Reclamation | DWAF | Multi-Disciplinary | N/A | Yes | 2006 | No |
| 116 | General | Department of Water Affairs. (2011). Draft National Strategy for Water Use. Golder Associates. | DWAF | Water Management | N/A | Yes | 2011 | No |
| 117 | General | Department of Water Affairs & Forestry and Amanzi Joint Technical Committee (2000). Impact of mine water desalination on the Vaal River System | DWAF | Water Management | N/A | Yes | 2000 | No |
| 118 | General | Department of Water Affairs. (2011). National Desalination Strategy. Golder Associates. | DWAF | Other | N/A | Yes | 2011 | No |
| 119 | General | Department of Water Affairs & Forestry. (2009). Green Drop Report Version 1: South African Waste Water Quality Management Performance. 127p. | DWAF | Multi-Disciplinary | N/A | Yes | 2009 | No |
| 120 | General | Department of Water Affairs & Forestry. (2011). Strategic Plan (Annual Performance Plan), 2011/12 - 2013/14. 89p. | DWAF | Multi-Disciplinary | N/A | Yes | 2011 | No |
| 121 | General | Department of Water Affairs & Forestry. (2000). Guideline document for the implementation of regulations on use of water for mining and related activities aimed at the protection of water resources. Operational Guideline No.M6.1. Water Quality Management. 32p. | DWAF | Treatment Technologies | N/A | No | 2000 | No |
| 122 | Multi-Basin | Department of Water Affairs. (2012). Feasibility study for a long-term solution to address the acid mine drainage associated with the East, Central and West Rand Underground Mining Basins: Hard Copy Reports. Project Number WP 0137 (WTE). 1p. | WRC | Treatment Technologies | ter Managem | n No | 2012 | No |
| 123 | Eastern | Department Water Affairs & Forestry. (1988). Report on the Proposed Water Pollution Control Works at Abandoned Coal Mines in Northern Natal. | DWAF | Treatment Technologies | ter Managem | No No | 1988 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|----------------|---------------------------|-------------------------------|----------------------------|-----------------|--------------|
| 124 | Eastern | Department of Water Affairs & Forestry. (1993). Report on the Proposed Water Pollution Control Works at Abandoned Coal Mines in the Witbank and Ermelo Districts. | DWAF | Treatment Technologies | ter Managem | n No | 1993 | No |
| 125 | General | Department of Water Affairs & Forestry (1996). South African Water Quality Guidelines. Volume 3: Industrial Water Use. 127p. | DWAF | Water Quality | N/A | Yes | 1996 | No |
| 126 | General | Department of Water Affairs & Forestry (1996). South African Water Quality Guidelines. Volume 4: Agricultural Water Use: Irrigation. 209p. | DWAF | Water Quality | N/A | Yes | 1996 | No |
| 127 | General | Department of Water Affairs (2009). Green Drop Report Version 1. South African Waste Water Quality Management Performance. 127p. | DWAF | Water Quality | N/A | No | 2009 | No |
| 128 | General | Department of Water Affairs (2010). Projects/Programmes. | DWAF | Hydrogeology | N/A | Yes | 2010 | No |
| 129 | General | Department of Water Affairs & Forestry. (2008). Impact Prediction: Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. G4. 135p. | DWAF | Impacts | N/A | Yes | 2008 | No |
| 130 | General | Department of Water Affairs & Forestry (1996). South African Water Quality Guidelines (second edition), Volume 5: Agricultural Use: Livestock Watering. 163p. | DWAF | Water Quality | N/A | Yes | 1996 | No |
| 131 | General | Department of Water Affairs & Forestry (1998). Minimum requirements for waste monitoring at waste management facilities. 54p. | DWAF | Water Sampling | N/A | Yes | 1998 | No |
| 132 | General | Department of Water Affairs & Forestry (2006). Small-scale Mining. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. A1.1. 47p. | DWAF | Treatment Technologies | Water Managemen t | Yes | 2006 | No |
| 133 | General | Department of Water Affairs & Forestry (2006). Storm Water Management. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. G1. 48p. | DWAF | Water Management | Treatment Technologie s | No | 2006 | No |
| 134 | General | Department of Water Affairs & Forestry (2006). Water and Salt Balances. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. G2. 52p. | DWAF | Water Sampling | Water Managemen t | Yes | 2006 | No |
| 135 | General | Department of Water Affairs & Forestry (2006). Water Management Aspects for Mine Closure. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. G5. 52p. | DWAF | Mine Closure | Water Managemen t | Yes | 2006 | No |
| 136 | General | Department of Water Affairs & Forestry (no date). Western Basin Mines "apportionment of liability" | DWAF | Mine Closure | Water Managemen t | Yes | Not Recorded | No |
| 137 | General | Department of Water Affairs & Forestry (2007). Pollution Control Dams. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. A4. 81p. | DWAF | Treatment Technologies | Water Managemen t | Yes | 2007 | No |
| 138 | General | Department of Water Affairs & Forestry (2008). Pollution Prevention and Minimisation of Impacts. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. H2. 34p. | DWAF | Treatment Technologies | N/A | Yes | 2008 | No |
| 139 | General | Department of Water Affairs & Forestry (2007). Water Management in Hydrometallurgical Plants. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. A3. 79p. | DWAF | Water Management | N/A | Yes | 2007 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|----------------|---------------------------|---------|----------------------------|------|--------------|
| 140 | General | Department of Water Affairs & Forestry (2007). Water Monitoring Systems. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. G3. 52p. | DWAF | Water Management | N/A | Yes | 2007 | No |
| 141 | General | Department of Water Affairs & Forestry (2007). Water Treatment. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. H4. 86p. | DWAF | Treatment Technologies | N/A | Yes | 2006 | No |
| 142 | General | Department of Water Affairs & Forestry (2008). Water Management for Mine Residue Deposits. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. A5. 94p. | DWAF | Water Management | N/A | Yes | 2008 | No |
| 143 | General | Department of Water Affairs & Forestry (2008). Water Management for Surface Mines. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. A5. 94p. | DWAF | Water Management | N/A | Yes | 2008 | No |
| 144 | General | Department of Water Affairs & Forestry (2008). Water Management for Underground Mines. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. A6. 119p. | DWAF | Water Management | N/A | No | 2008 | No |
| 145 | General | Department of Water Affairs & Forestry (2009). Blue Drop Report - South African Drinking Water Quality Management Performance 2009. 139p. | DWAF | Water Quality | N/A | No | 2009 | No |
| 146 | General | Department of Water Affairs & Forestry (2009). Vaal River System: Large bulk water supply reconciliation strategy: second stage reconciliation strategy (March 2009). DWAF Report Number P RSA C000/00/4406/08. 130p. | DWAF | Hydrogeology | N/A | No | 2009 | No |
| 147 | General | Department of Water Affairs & Forestry (2002). Southern Kwa-Zulu-Natal Water Resources Prefeasibility Study. | DWAF | Hydrogeology | N/A | No | 2002 | No |
| 148 | General | Dickens, C. and Kotze, D. (2003). Guidelines for Integrating the Protection, Conservation and Management of Wetlands into Catchment Management Planning Prepared for the WRC and WWF by Umgeni Water, & University of KZN. Water Research Commission. 104p. | WRC | Water Management | N/A | Yes | 2003 | No |
| 149 | Multi-Basin | Digby Wells Environmental (2011). Background information document for the activities associated with the immediate and short term interventions regarding acid mine drainage in the Western, Central and Eastern Witwatersrand Basins. 10p. | Digby Wells | Multi-Disciplinary | N/A | No | 2011 | Yes |
| 150 | General | Dill, S. and James, A (2003). The assessment of the impacts on groundwater quality associated with the backfilling of dolomitic cavities with gold mine tailings. Report no 3, final; unpublished., Metago project 115-002. | Other | Dolomite | N/A | Yes | 2003 | Yes |
| 151 | General | Dill, S., Cloete, T.E., Coetser, L and Zdyb, L. (2001). Determination of the Suitability of Alternative Carbon Sources for Sulphate Reduction in the Passive Treatment of Mine Water Report to the WRC by CSIR Div. of Water, Environment and Forestry Tech. Water Research Commission | WRC | Treatment Technologies | N/A | No | 2001 | No |
| 152 | General | Dolan, J. (1961). Water problems of the Transvaal and Orange Free State Mines. Transactions of the seventh commonwealth mining and metallurgical congress, Johannesburg, Vol 3: 1357-1386. | Other | Water Management | N/A | Yes | 1961 | No |
| 153 | General | Donaldson, A. (2004). Letter: Standardised PPP Provision available. National Treasury PPP Manual. | Other | Institutional | N/A | No | 2004 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|-------------------|---------------------------|------------------------|----------------------------|------|--------------|
| 154 | General | Durrheim, R.J., Anderson, R.L., Cichowicz, A, Ebrahim-Trollope, R, Hubert, G, Kijko, A, McGarr, A, Ortlepp, W.D. and Van der Merwe, N. (2006). Investigation into the risks to miners, mines, and the public associated with large seismic events in gold mining | Other | Geology | N/A | Yes | 2006 | No |
| 155 | General | DWAF. (1988). Report on the Proposed Water Pollution Control Works at Abandoned Coal Mines in Northern Natal. Report No. WP E-87 | DWAF | Treatment Technologies | Coal | No | 1988 | No |
| 156 | General | DWAF. (1988). Report on the Proposed Water Pollution Control Works at Abandoned Coal Mines in the Witbank and Ermelo Districts. Report No. WP F-92 | DWAF | Treatment Technologies | Coal | No | 1988 | No |
| 157 | Central | E.R.P.M. (1966). Effect of increased water flow on profitable mine life. No pages given | ERPM | Water Quantity | N/A | No | 1998 | Yes |
| 158 | Central | E.R.P.M. (1982). Treatment of pumped water. 14p. | ERPM | Treatment Technologies | N/A | No | 1982 | Yes |
| 159 | Central | E.R.P.M. (1990). An analysis of the Central Rand Water Compartment, rainfall and geological controls and their influence on plug pressures and pumping rates at South West Vertical Shaft, E.R.P.M. 14p. | ERPM | Hydrogeology | N/A | No | 1990 | Yes |
| 160 | Central | E.R.P.M. (1997). Desktop Study: Alternative Pumping Scenarios. 24p. | ERPM | Treatment Technologies | N/A | No | 1997 | Yes |
| 161 | Central | E.R.P.M. (1999). Plugs and Flooding Scenario's. Sundry notes and photographs. | ERPM | Scenarios | N/A | Yes | 1999 | Yes |
| 162 | General | E.R.P.M. (2001). Findings of the Holding Investigation in the Area from ERPM to DRD. | ERPM | Hydrogeology | Multi- Disciplinary | No | 2001 | No |
| 163 | Central | E.R.P.M. (2004). Assistance with the pumping and treatment of extraneous water and the installation of underground bulkheads. Investigation for the inter-departmental committee for state assistance to the mining industry. Internal Report. 83p. | ERPM | Treatment Technologies | N/A | No | 1997 | Yes |
| 164 | Central | E.R.P.M.,(1998). Evaluation of the Risk to E.R.P.M. Employees Regarding Flooding of the Underground Workings. 60p. | ERPM | scenarios | N/A | No | 1999 | Yes |
| 165 | Central | E.R.PM. (1982). Underground water pumped and treated according to the high density sludge process at SWV, ERPM Internal Report. | ERPM | Treatment Technologies | N/A | No | 1982 | Yes |
| 166 | Central | EcoSat ERM and Helio Alliance (2002). Environmental Management Programme Report. Internal Report. E.R.P.M. 100p. | ERPM | Hydrogeology | N/A | No | 2002 | Yes |
| 167 | Central | EcoSat ERM and Helio Alliance (2004). Water monitoring for the period: June – August 2003. Quarterly Progress Report. Internal report, East Rand Proprietary Mines. 10p. | ERPM | Water Sampling | N/A | No | 2004 | Yes |
| 168 | General | Eglington, B.M. (2001). Assessment of the effectiveness of isotope chemistry for quantifying acid rock drainage. Contributions from different sources to ground and surface water report to the Water Research Commission by the CSIR, Pretoria. Water Research | WRC | Hydrogeology | N/A | Yes | 2001 | No |
| 169 | General | Engert, P.A. and Landsdowne, Z.F. (1999). Risk Matrix User's Guide, Version 2.2. The MITRE Corporation, Bedford, Massachusetts, MP99B0000029. 52p. | MITRE Corporation | Other | N/A | No | 1999 | No |
| 170 | General | Environmental Engineering (1996). A Strategic Integrated Water Management Plan for the Gauteng Gold Mines. Conference Proceedings no.1. 250p. | Other | Water Management | N/A | Yes | 1996 | No |
| 171 | Eastern | Esterhuyse, S., Van Tonder, D.M., Coetzee, H. and Mafanya, T. (2008) Draft Regional Closure Strategy for the East Rand Gold Field, Council for Geoscience Report No. 2008-0176, Council for Geoscience, Pretoria. 167p. | CGS | scenarios | N/A | Yes | 2008 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|---|--|---------------------------|------------------|----------------------------|------|--------------|
| 172 | General | European Commission (2000). White Paper on Environmental Liability. Prepared by the Director- General for the Environment, European Commission, Luxembourg. 56p. | European Commision | Legal | N/A | No | 2000 | No |
| 173 | General | F.S.E. (2009). Approach towards the management of Acid Mine Drainage (AMD) problems emanating from the underground water basins within the Witwatersrand. DG Briefing notes on response to Federation for Sustainable Environment. 12p. | FSE | Water Management | N/A | Yes | 2009 | No |
| 174 | Western | F.S.E. (2009). Augmentation of comments on the background information document and invitation to comment on Gold Fields West Wits Project (DWEA Reference No. 12/12/20/1451) pursuant to focus meetings. 12P. | FSE | Communication | N/A | No | 2009 | No |
| 175 | General | Ferguson, K.D. and Erickson, P.M. (1988). Pre-Mine Prediction of Acid Mine Drainage. Dredged Material and Mine Tailings. W. Salomons and U. Forstner. Berlin Heidelberg, Springer Verlag. | Springer Verlag | scenarios | N/A | No | 1988 | No |
| 176 | General | Ferret Mining and Environment Services (2005). A Qualitative Salt Balance for Grootvlei Proprietary Mines Limited and Surrounding Area, 78p. | Ferrent Mining and Industrial Services | Water Quality | N/A | No | 2005 | Yes |
| 177 | General | Ferret Mining and Shango Solutions (2006). Central Rand Goldfield: Water and salt balance and potential linkage with the East Rand goldfield. Consulting Report to CGS. 82p. | Ferrent Mining and Industrial Services | Water Quality | N/A | No | 2006 | Yes |
| 178 | General | Fetter (2001). Applied Hydrology. 4th Ed. | Other | Hydrogeology | N/A | No | 2001 | No |
| 179 | General | Forstner, U. and Salomans, W. (eds) (1988). Environmental Management of Solid Waste. Berlin, Heidelberg, Springer Verlag. | Springer Verlag | Treatment Technologies | N/A | No | 1988 | No |
| 180 | General | Frommurze, H.F. (1937). The Water-Bearing Properties of the more important Geological Formations in the Union of South Africa Memoir No.34. Department of Mines, Geological Survey. 186p. | Department of Mines | Hydrogeology | N/A | No | 1937 | No |
| 181 | General | Garrett, W.S. and Campbell Pitt, L.T. (1961). Design and construction of underground bulkheads and water barriers. Transactions of the seventh commonwealth mining and metallurgical congress, Johannesburg, Vol 3: 1287-1301. | Other | Multi-Disciplinary | N/A | Yes | 1961 | No |
| 182 | General | GDARD (2012). Study on Reclamation and Rehabilitation of Mine Residue Areas for Development Purposes: Phase II: Strategy and Implementation Plan (Final). | Other | Multi-Disciplinary | N/A | Yes | 2012 | No |
| 183 | General | Geldenhuys, A.J. (2004). Water treatment technologies for removal of acid, sulphate and metals. Thesis. 177p. | Other | Treatment Technologies | N/A | Yes | 2004 | No |
| 184 | General | Gencor Case | Other | Other | N/A | No | 2005 | No |
| 185 | General | Goba Moahali and Associates. (2002). Southern KwaZulu-Natal Water Resources Prefeasibility Study. Report No. P U000-00-0301. DWAF. | Goba Moahali and Associates | Water Management | N/A | No | 2002 | No |
| 186 | Multi-Basin | Goga, P.W. (2011) The relative contributions of point sources of Acid Mine Drainage to the salt load in the Klip River and Blesbokspruit. Unpubl.B.Sc Hons Thesis. Univ. Witwatersrand. 44 pp. | Wits University | Water Management | Water Quality | No | 2011 | No |
| 187 | General | Goldbach, O.D. (2009). Flooding induced seismicity in mines. 11th SAGA Biannual Technical Meeting, Swaziland, September 2009, pp.391–401. | Other | Geology | N/A | Yes | 2009 | No |
| 188 | General | Goldbach, O.D. (2010). What is the seismic risk of mine flooding? In Science real and relevant conference. CSIR, Pretoria: CSIR. 20p. | CSIR | Geology | N/A | Yes | 2010 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|--|---------------------------|-------------|----------------------------|-----------------|--------------|
| 189 | General | Govender, B. (2010). Rand Uranium - (Revised) Directive in terms of Section 19(3) of the National Water Act of 1998, (Act 36 of 1998) to dispose of treated water that is decanting/extracted from the Western Basin underground mine workings into the Tweelopies - Eastspruit. | DWAF | Hydrogeology | N/A | No | 2010 | No |
| 190 | General | Greben, H., Sigama, J., Burke, L. and Venter, S.N. (2009). Cellulose Fermentation Products As An Energy Source For Biological Sulphate Reduction Of Acid Mine Drainage Type Wastewaters. WRC Report No. 1728/1/08. Water Research Commission. 134p. | WRC | Treatment Technologies | N/A | No | 2009 | No |
| 191 | Central | Grohmann, G. (1986). The subsurface geological structure of the Central Rand Gold Mines. Abstr. Geocongr. '86, Geol. Soc. S. Afr., Johannesburg. pp.31-34. | Geological Society of SA | Hydrogeology | N/A | No | 1986 | No |
| 192 | Central | Grohmann, G. (1988). Faulting and dyking in the mines of the Central Rand Goldfield. Inf. Circ. Econ. Geol, Res. Unit, Univ. Witwatersrand, Johannesburg. 39p. | Wits University | Hydrogeology | N/A | No | 1988 | No |
| 193 | Central | Groundwater Consulting Services (2005). Hydrogeological investigation to determine inflow rates, water quality and predicted impacts at E.R.P.M. 33p. | ERPM | Ingress | N/A | Yes | 2005 | No |
| 194 | General | Günther, P., Maree, J.P., Strobos, G and Mtimikulu, J.S. (no date). Neutralisation of acid leachate in a coal processing plant with calcium carbonate. 8th International Congress on Mine Water & the Environment, Johannesburg, South Africa. 16p. | Other | Coal | N/A | No | Not Recorded | No |
| 195 | Eastern | Haarhoff, D., Bruce, R.W. and Schoeman, J.L. (1993). Report on the potential impact of the use of mine water for irrigation on farms adjacent to the Blesbokspruit in the East Rand, ISCW Report No GW/A/92/34, Institute for Soil, Climate and Water, Pretori | Institute for Soil, Climate and Water | scenarios | N/A | No | 1993 | Yes |
| 196 | General | Hagen, M. and Jakubick, A.T. (2006). Returning the WISMUT legacy to productive use. In: Uranium in the Environment. B.J. Merkel and A. Hasche-Berger. Berlin, Heidelberg, Springer. pp.11–26. | Springer Verlag | Treatment Technologies | N/A | No | 2006 | No |
| 197 | General | Hallbauer, D.K., (1986). The mineralogy and geochemistry of the Witwatersrand pyrite, gold, uranium and carbonaceous matter. In: The Mineral Resources of South Africa, (C.R. Anhaeusser and S. Maske, eds): Handbook, Council for Geoscience, 1: pp.731 – 752. | CGS | Geology | N/A | No | 1986 | No |
| 198 | General | Hallbauer-Zadorozhnaya, V. and Stettler, E.H. (2006). The detection of hydrocarbon contaminated of groundwater by using the IP effect in TDEM soundings. 12p. | Other | Water Quality | N/A | No | 2006 | No |
| 199 | General | Handley, J.R.F. (2004). Historic overview of the Witwatersrand Goldfield. 224p. | Other | Geology | N/A | No | 2004 | No |
| 200 | General | Hansen R.N. (2010) Grootvlei water sample analysis report. Strategic water management report Project report. 3p. | Other | Water Management | N/A | No | 2010 | Yes |
| 201 | General | Harries, J. (1997) Acid mine drainage in Australia: Its extent and potential future liability. Supervising Scientist Report 125, Supervising Scientist, Canberra. 111p. | Other | scenarios | N/A | Yes | 1997 | No |
| 202 | General | Harrison, S., Broadhurst, J., van Hille, R., Oluwaseun, O., Bryan, C., Hesketh, A. and Opitz, A. (2010). A Systematic Approach to Sulphidic Waste Rock and Tailings Management to Minimise Acid Rock Drainage Formation. WRC Report No. 1831/1/10. Water Research Commission. 87p. | WRC | Treatment Technologies | ter Managem | Yes | 2001 | No |
| 203 | General | Hartnady,C , Turton, A and Mlisa, A. (2011). Feasibility Study on Reclamation of mine Residue Areas for Development Purposes: Phase II Strategy and Implementation Plan. Final: Umvoto Africa. | DRD | Multi-Disciplinary | N/A | No | 2011 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|----------------|---------------------------|---------|----------------------------|-----------------|--------------|
| 204 | Central | Hattingh, C. (1996). Water analyses. E.R.P.M. 2p. | ERPM | Water Sampling | N/A | No | 1996 | Yes |
| 205 | General | Hattingh, J.M. (2004). The effect of the Chemical Properties of Tailings and Water Application on the establishment of a Vegetative Cover on Gold Tailings Dams Report to the Water Research Commission by Envirogreen (Pty) Ltd. Water Research Commission. 16 | WRC | Treatment Technologies | N/A | No | 2004 | No |
| 206 | General | Hattingh, R.P. (2003). Guidance for the Rehabilitation of Contaminated Gold Tailings Dam Footprints. Report to the WRC by R.P Hattingh of Pulles, Howard and de Lange Inc. Report No. 1001/2/03. Water Research Commission. 31p. | WRC | Mine Closure | N/A | No | 2003 | Yes |
| 207 | General | Haywood, L.K. (2004). Tadpoles as biological indicators of aquatic health: assessing the mining industries' impact on water quality. Unpubl. M.Sc. thesis. 174p. | Other | Water Quality | N/A | No | 2004 | No |
| 208 | General | Heath, R. (2004). Freshwater Fish and Human Health Reference Guide From Project: Protocol Manual for the Transfer of Methodology required to link Ecosystem Health and Human Health | Other | Water Quality | N/A | No | 2004 | No |
| 209 | General | Heath, R. (2004). Water Related Impacts of Small Scale Mining Report to the WRC by Pulles, Howard and de Lange Inc. Water Research Commission. 100p. | WRC | Impacts | N/A | No | 2004 | No |
| 210 | General | Henry, T.B., Irwin, E.R. and Grizzle, J.M. (2001). Gill Lesions and Death of Bluegill in an Acid Mine Drainage Mixing Zone. SetacPress. 7p. | SetacPress | Water Quality | N/A | No | 2001 | No |
| 211 | General | Herold, C.E. (2001). Modelling the long-term effect of atmospheric deposition on the salinity of runoff from the klip river catchment Final Report to the Water Research Commission on the project, with special reference to the Vaal Dam catchment. Water Res | WRC | Water Quality | N/A | Yes | 2001 | No |
| 212 | Eastern | Herold, C; Coleman, T and van Niekerk, A.M. (2009) Directorate National Water Resource Planning. Department of Water Affairs & Forestry, South Africa, September 2009. Integrated Water Quality Management Plan for the Vaal RiverSystem: Task 3: Salinity Balance of the Vaal River System. Report No. P RSA C000/00/2305/2. | DWAF | Water Quality | N/A | Yes | 2009 | No |
| 213 | Western | Hobbs, P. and Cobbing, J. (2007). A hydrogeological assessment of acid mine drainage impacts in the Western, Gauteng Province. Report no. CSIR/NRE/WR/ ER/2007/0097/C. Council for Scientific and Industrial Research. Pretoria. 109p. | CGS | Hydrogeology | Impacts | Yes | 2007 | No |
| 214 | Western | Hobbs, P. and Cobbing, J. (undated). The hydrogeology of the Krugersdorp Game Reserve Area and implications for the management of mine water decant. 9p. | Other | Hydrogeology | Decant | Yes | Not Recorded | No |
| 215 | General | Hobbs, P.J. (2011) Situation assessment of the surface water and groundwater resource environments in the cradle of humankind world heritage site. Project: Establishment of a monitoring system for surface water and groundwater in the cradle of humankind world heritage site. Project no. BIQ005/2008. CSIR. Pretoria. South Africa, 202 pp. | CSIR | Water Management | N/A | Yes | Not Recorded | Yes |
| 216 | General | Hobbs, P.J. and Mill P.J (2011) The Koelenhof Farm fish mortality event of mid-January 2-11. Report prepared for the Management Authority. Department of Economic Development. Gauteng Province.South Africa. 19pp | CSIR | Hydrogeology | Impacts | Yes | 2011 | No |
| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|---------------------------------------|---------------------------|------------------|----------------------------|-----------------|--------------|
| 217 | General | Hodgson, F.D.I., Usher, B.H., Scott, R., Zeelie, S., Cruywagen, L.M. and de Necker, E. (2001). Prediction Techniques And Preventative Measures Relating To The Postoperational Impact Of Underground Mines On The Quality And Quantity Of Groundwater Resources. WRC Report No 699/1/01. Water Research Commission. 286p. | WRC | Water Quality | Vater Quantit | No | 2001 | No |
| 218 | Eastern | Hohne, S. and Joubert, C. (2005). Water Sampling Protocol – Far Eastern Basin. CGS. Unpublished Internal Report. 7p. | CGS | Water Sampling | N/A | No | 2005 | Yes |
| 219 | Western | Holland, M. and Witthüser, K. T. (2009) Geochemical characterization of karst groundwater in the cradle of humankind world heritage site, South Africa. Environmental Geology, v 57, p. 513-524. | Other | Dolomite | Geohydrolog y | Yes | 2009 | No |
| 220 | General | Holden. R. Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage - Report on Stakeholder Engagement | Other | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 221 | Central | Holden, R, Bosman, D and Nkabinde, N. (2011). Discussion Document: Considerations in the Development of Sustainable Long Term Solution to Acid Mine Drainage on the Witwatersrand | Other | Impacts | N/A | No | 2011 | No |
| 222 | General | Holmes, S. (Ed.) (1996). South African Water Quality Guidelines (second edition), Volume 4: Agricultural Use: Irrigation. Department of Water Affairs and Forestry. 194p. | DWAF | Water Quality | N/A | Yes | 1996 | No |
| 223 | General | Holmes, S. (Ed.). (1996). South African Water Quality Guidelines (second edition), Volume 3: Industrial Use. Department of Water Affairs and Forestry. 122p. | DWAF | Water Quality | N/A | No | 1996 | No |
| 224 | General | Holmes, S. (Ed.). (1996). South African Water Quality Guidelines. Volume 5: Agricultural Water Use: Livestock Watering. Department of Water Affairs and Forestry. 179p. | DWAF | Water Quality | N/A | No | 1996 | No |
| 225 | General | Horstmann, U.E. (2003). Stable isotope analyses of 53 Witwatersrand water samples – Confidential Report, Council for Geoscience Project No 6820-5512, April 2003. | CGS | Water Quality | N/A | No | 2003 | No |
| 226 | Western | Horstmann, U.E. and Coetzee, H. (2004). A strategic water management plan for prevention of water ingress into underground workings of the Witwatersrand mining basins – Western Basin Stable Isotope Study – report on project period up to 15 December 2004: | CGS | Water Management | Ingress | No | 2004 | Yes |
| 227 | General | Horstmann, U.E., Coetzee H. and Ntsume, G. (2004). A strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand Mining Basins – Task 2: Isotope Study – Preliminary Confidential Report, March 2004. | CGS | Water Management | Ingress | No | 2004 | Yes |
| 228 | General | Horstmann, U.E., Coetzee, H., Ntsume, G. and Croukamp, L. (2004). Isotopic fingerprinting of water entering abandoned and working mines on the Witwatersrand. In Geoscience Africa. Johannesburg: Geological Society of South Africa. | Geological Society of South Africa | Water Sampling | Ingress | No | 2004 | No |
| 229 | General | Howard, M.R. (2001). An Internet Service Centre on Water Modelling Systems for the Mining Industry. Water Research Commission. 173p. | WRC | Water Management | Geohydrolog y | No | 2001 | No |
| 230 | General | http://www.dwa.gov.za/projects.aspx_ | DWAF | Multi-Disciplinary | N/A | Yes | Not Recorded | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|---|---------------------------|-------------------------|----------------------------|------|--------------|
| 231 | General | Hutton, B., Kahan, I., Naidu, T. and Gunther, P. (2009). Operating and maintenance experience at the eMalahleni Water Reclamation Plant. Proceedings of the International Mine Water Association/WISA Mine Water Division Conference, 19th–23rd October 2009, P | International Mine Water Association | Treatment Technologies | Water Managemen t | Yes | 2009 | No |
| 232 | General | Institute for Groundwater Studies (1994). Catchment water quality deterioration as a result of water-level recovery in abandoned gold mines on the eastern and central Witwatersrand, Seminar to DWAF Rep. No.: 5/12/1994. 23p. | Institute for Groundwater Studies | Water Quality | N/A | No | 1994 | No |
| 233 | General | International Network for Acid Prevention (INAP) (2009). Global Acid Rock Drainage Guide, http://www.gardguide.com | INAP | Treatment Technologies | N/A | Yes | 2009 | No |
| 234 | General | Jacobs, P., Eksteen, M. and Pulles, W. (2007). Water Reuse and Reclamation. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. H3. Department of Water Affairs and Forestry. 33p. | DWAF | Water Management | N/A | Yes | 2007 | No |
| 235 | General | Jacobs, P., Eksteen, M. and Pulles, W. (2007). Water Reuse and Reclamation. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. H4. Department of Water Affairs and Forestry. | DWAF | Water Management | N/A | No | 2007 | No |
| 236 | General | James, A. (2004). A Strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basin. Annexure to Task 5. 60p. | Other | Water Management | Ingress | No | 2004 | Yes |
| 237 | General | James, A.R. (1997). The Prediction of Pollution Loads from Coarse Sulphide-Containing Waste Materials report to the WRC by Steffen Robertson & Kirsten, and Metago Environmental Engineers. Water Research Commission. Various paginations. | WRC | Treatment Technologies | Water Quality | No | 1997 | No |
| 238 | General | Johan Fourie & Associates. (2005). Documentation related to the Grootvlei Action Plan. Grootvlei Proprietary Mines | Grootvlei Proprietary Mines | Mine Closure | N/A | Yes | 2005 | No |
| 239 | General | Johan Fourie & Associates. (2005). Grootvlei Proprietary Mines Limited: Application for assistance and support in securing jobs and ore reserves in the East Rand coupled to the East Rand strategic water management plan (documentation J Fourie & Ass) | Grootvlei Proprietary Mines | Water Management | N/A | Yes | 2005 | No |
| 240 | General | Johnson, B.D., Wade, P.W. and Daneel, R. (2005). The potential of Permeable Reactive Barrier (PRB) technology as a remediation tool for contaminated groundwater: Literature review; preliminary laboratory analysis and assessment. Water Research Commission. 145p. | WRC | Treatment Technologies | Water Quality | No | 2005 | No |
| 241 | Central | Journal of the SA Institute of Mining and Metallurgy (1981). The stability of the strata overlying the mined-out areas of the Centram Witwatersrand | Other | Geology | Water Managemen t | No | 1981 | No |
| 242 | General | Jovanovic, N.Z., Barnard, R.O., Rethman N.F.G. and Annandale, J.G. (1998). Crops can be irrigated with lime-treated acid mine drainage. Water SA.7p. | University of Pretoria | Treatment Technologies | N/A | No | 1998 | No |
| 243 | General | Jovanovic, N.Z., Barnard, R.O., Rethman, N.F.G. and Annandale J.G. (1998). Crops can be irrigated with lime-treated acid mine drainage. Water SA Vol.24 No.2. pp.113-122 | WRC | Treatment Technologies | N/A | No | 1998 | No |
| 244 | General | Jovanovic, N.Z, Annandale, J.G, van der Westhuizen A.M and Steyn, J.M. (2004). Monitoring the effect of irrigation with gypsiferous mine wastewater on crop production potential as affected by soil water and salt balance. | WRC | Treatment Technologies | Water Quality | No | 2004 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|-------------------------------|---------------------------|-------------------------------|----------------------------|-----------------|--------------|
| 245 | Multi-Basin | Kafri, U. and Foster, M. J. B. (1989) Hydrogeology of the Malmani Dolomite in the Klip River and Natalspruit basins, South Africa. Env. Geol. Water Sci., v 13, p. 153-166. | Other | Hydrogeology | Dolomite | No | 1989 | No |
| 246 | General | Kalin, M., Wheeler, W.N. and Meinrath, G. (2004). The removal of uranium from mining waste water using algal/microbial biomass. 26p. | Other | Treatment Technologies | N/A | Yes | 2004 | No |
| 247 | Western | Keet, M. (2009) Mintails - Directive in terms of Section 19(3) of the National Water Act of 1998, (Act 36 of 1996) to dispose of treated water that is decanting/extracted from the western basin underground mine workings into the tweelopies - Eastspruit. (LETTER) | DWAF | Hydrogeology | Geology | No | 2009 | No |
| 248 | Western | Keet, M. (2009) Rand Uranium - Directive in terms of section 19(3) of the National Water Act of 1998, (Act 36 of 1998) to dispose of treated water that is decanting/extracted from the Western Basin underground mine workings into the tweelopies - Eastspruit. (LETTER) | DWAF | Hydrogeology | Geology | Yes | 2009 | No |
| 249 | Western | Keet, M. (2009) DRDGold SA - Directive in terms of section 19(3) of the National Water Act of 1998, Act 36 of 1998 to dispose of treated water that is decanting/extracted from the Western Basin underground mining workings in the tweelopies - Eastspruit. (LETTER) | DWAF | Hydrogeology | Geology | No | 2009 | No |
| 250 | General | Kempster, P.L., Hattingh, W.H.J. and Van Vliet, H.R. (1980). Summarized Water Quality Criteria - Technical Report No. TR108. Dept of Water Affairs and Forestry. 45p. | DWAF | Water Quality | N/A | Yes | 1980 | No |
| 251 | General | Klip River Wetland Integrated Management Strategy Workshop (Invitation). | Other | Water Management | N/A | No | Not Recorded | No |
| 252 | General | Klose, C.D. (2007). Mine water discharge and flooding: a cause of severe earthquakes. Mine Water and Environment 2007 (26):172–180. | Mine Water and Environemnt | Decant | Impacts | No | 2007 | No |
| 253 | General | Kramers, C.P. (1986). The influence of the treatment of wash water and fines on the design and equipment costs of underground screening and sorting plants. Chamber of Mines. 22p. | Chamber of Mines | Impacts | Treatment Technologie s | No | 1986 | No |
| 254 | Western | Kramers, P. (2005). Water sampling and monitoring. Sub-compartment D, Tau Tona Gold Mine Proposal. Shango Solutions. 10p. | Shango Solutions | Water Sampling | Water Managemen t | No | 2005 | Yes |
| 255 | Multi-Basin | Kramers, P. and Arnold, V. (2005). Analysis of the Potential of Linking the East Rand and Central Rand Goldfields Water Compartments Appendix 3. Shango Solutions. 41p. | Shango Solutions | Mine Voids | Geology | No | 2005 | Yes |
| 256 | Multi-Basin | Kramers, P. and Arnold, V. (2005). Central Rand Goldfield: Water and Salt Balance and the Potential Linkage with the East Rand Goldfield Interim Progress Report. Shango Solutions. 41p. | Shango Solutions | Water Management | Mine Voids | No | 2005 | No |
| 257 | Western | Krantz, R.M. (1996). Groundwater modelling exercise for the Western Basin. Environmental Modelling Centre. Report submitted on behalf of JCI Limited | JCI Lmited | Hydrogeology | N/A | Yes | 1996 | Yes |
| 258 | General | Krige, W.G. (1999). An investigation into groundwater recharge derived from the upper Klip River tributaries where these cross the Main, Bird and Kimberley reef outcrops and associated shallow mine workings: African Environmental Development. 14 p. | Other | Hydrogeology | Decant | Yes | 1999 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|--------------------------------|---------------------------|-------------------------|----------------------------|-----------------|--------------|
| 259 | General | Krige, W.G. (2008). Background to the calculations of the ingress of water resulting from the tributaries of the Klipriver, where these cross the gold-bearing of the Central | Other | Hydrogeology | Ingress | No | 2008 | No |
| 260 | Eastern | Kroupa, P. (1973). Isopach Maps of the Ecca Series and of the Dolomite Series, Pre-Karoo Geology and Pre-Karoo Sub-Surface Maps of Portions of the East Rand. Geological Survey, Department of Mines. 5p. | Department of Mines | Dolomite | N/A | No | 1973 | Yes |
| 261 | General | Kruger, W. (2004). Water Quality in the Upper KlipRiver, City of Johannesburg. M.Sc. Environmental Management Mini-dissertation. Rand Afrikaans University. | Rand Afrikaans University | Water Quality | Geology | Yes | 2004 | No |
| 262 | Western | Labuschagne, C. (2008). Investigation of the acid mine drainage potential of the Kopanang rock dump, Vaal Reefs. Thesis. 63p. | Other | Hydrogeology | N/A | No | 2008 | No |
| 263 | General | Le Roux, F. and Kriel, M. (1999). Manual on conventional current gauging. Unpagenated. | Other | Water Management | N/A | No | 1999 | No |
| 264 | Eastern | Lea, I.M. (2004). Grootvlei Desalination Project – Description of the source of sodium and chloride found in the Eastern underground workings, Grootvlei Internal Confidential Report, September 2004. | Grootvlei Proprietary Mines | Water Sampling | N/A | No | 2004 | Yes |
| 265 | Eastern | Lea, I.M. (2004). Sustainable Desalination Options for Grootvlei Mine – Implementation Strategy. Grootvlei Internal Confidential Report, April 2004. | Grootvlei Proprietary Mines | Treatment Technologies | N/A | Yes | 2004 | Yes |
| 266 | Central | Leslie, K.C., et al. (2008). Regional closure strategy for the Central Rand Goldfield. Department of Minerals and Energy. | DME | Mine Closure | N/A | Yes | 2008 | Yes |
| 267 | Central | Leyland, R.C, Witthuser, K.T and van Rooy, J.L. (2008). Vulnerability Mapping in Karst Terrains, Exemplified in the Wider Cradle of Humankind World Heritage Site. | WRC | Geology | N/A | Yes | 2008 | No |
| 268 | Western | Lieferrink, M. (2009). Augmentation of comments on the background information document and invitation to comment on Gold Fields West Wits Project (DWAE Reference No. 12/12/20/1451) pursuant to focus meetings. 12P. | FSE | Communication | N/A | No | 2009 | No |
| 269 | General | Lieferrink, M. (2012). Federation for Sustainable Environment: Additional Issues of Concern | FSE | Impacts | N/A | Yes | 2012 | No |
| 270 | General | Lieferrink, M. (2011). Request for registration: Basic assessment process for the proposed upgrade of the Rand Uranium water treatment works in the Western Basin. 12p. | FSE | Treatment Technologies | Water Managemen t | Yes | 2011 | Yes |
| 271 | General | Lieferrink, M. (no date) Environmental risks and hazards pertaining to AMD and radioactivity within the Witwatersrand Goldfields. 82p. | FSE | Impacts | Water Managemen t | No | Not Recorded | Yes |
| 272 | Western | Lieferrink, M. (2009). Submissions to the Parliamentary Portfolio Committee on water quality and pollution in response to call for input towards compilation of the legacy report reflecting on the activities over the past five year parliamentary term. Fed | FSE | Water Quality | N/A | Yes | 2009 | No |
| 273 | General | Lieferrink, M. (2012) Comments on the EIA/EMP amendment in support of a mining right conversion. Ergo Mining Operations (Pty) Ltd. May 2012. The Federation for a Sustainable Environment, 19 pp. | FSE | Environment | N/A | Yes | 2012 | No |
| 274 | Multi-Basin | Lieferrink, M. Mine Dumps around Gauteng. | FSE | Other | ter Managem | Yes | Not Recorde | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|---|----------------|---------------------------|-------------|----------------------------|------|--------------|
| 275 | General | Lieferrink, M & Pretorius, K. (2011). The Federation for Sustainable Environment - Submission to the Parliamentary Portfolio Committee on Environment and Water | Other | Environment | ter Managem | No | 2011 | No |
| 276 | Central | Lin, L. and Hansen, R.N. (2010) Mine Flooding, Identification of Decant Site and determination of Environmental Critical Level on the Central Rand Gold Field, Council for Geoscience Report Number 2010-0199, Council for Geoscience, Pretoria. 75p. | CGS | Decant | N/A | No | 2010 | No |
| 277 | Multi-Basin | Lloyd, P.J.D. (2007). Comment on: [Nengovhela A.C., Yibas B. and Ogola J.S. (2006) Characterisation of gold tailings dams of the Witwatersrand Basin with reference to their acid mine drainage potential, Johannesburg, South Africa (Water SA 32 (4) 499-506)]. Water SA Vol. 33 No. 1. pp.143-144 | WRC | Water Sampling | N/A | No | 2006 | No |
| 278 | General | Loos, M.A. (1990). Research on the Inhibition of Bacterial Oxidation of Pyrite and the Concomitant Acid Mine Drainage Part 2: Investigations on Coal Waste Dumps. Water Research Commission. 169p. | WRC | Treatment Technologies | N/A | No | 1990 | No |
| 279 | General | Loos, M.A. and Cleghornandh, C. (2000). Occurrence of Bacteria Causing Acid Mine Drainage in the Outer Layers of Coal Waste Dumps; In Relation to Abiotic Ecological Determinants and Soil Covers used for Dump Rehabilitation. Water Research Commission. 157p. | WRC | Coal | N/A | No | 2000 | No |
| 280 | General | Loos, M.A. and Conradie, J.M. (1990). Research on the Inhibition of Bacterial Oxidation of Pyrite and the Concomitant Acid Mine Drainage: Part 1. Investigations on Gold Mine Sand Dumps. Water Research Commission. 167p. | WRC | Treatment Technologies | N/A | No | 1990 | No |
| 281 | General | Loos, M.A., Bosch, C. and Maré, J. (1990). Research on the Inhibition of Bacterial Oxidation of Pyrite and the Concomitant Acid Mine Drainage: Part 2. Investigations On Coal Waste Dumps. WRC Report No.132/2/90. Water Research Commission. 180p. | WRC | Treatment Technologies | N/A | No | 1990 | No |
| 282 | General | Loos, M.A., Cleghorn, C. and Modinger, H. (2000). Occurrence Of Bacteria Causing Acid Mine Drainage In The Outer Layers Of Coal Waste Dumps In Relation To Abiotic Ecological Determinants And Soil Covers Used For Dump Rehabilitation. WRC Report No. 454/1/2000. Water Research Commission. 170p. | WRC | Coal | ment Techno | l No | 2000 | No |
| 283 | General | Loos, M.A., Conradie, J.M., Whillier, P.A., Maré, J. and Bosch, C. (1990). Research on the Inhibition of Bacterial Oxidation of Pyrite and the Concomitant Acid Mine Drainage: Part 1. Investigations on Gold Mine Sand Dumps. WRC Report No.132/1/90. Water Research Commission. 177p. | WRC | Treatment Technologies | N/A | No | 1990 | No |
| 284 | General | Lucas, E. (1995). The use of geographic information systems and other computer aided drafting facilities for the production of geohydrological maps Report to the Water Research Commission; Extended Executive Summary. Water Research Commission. | WRC | Hydrogeology | Geology | Yes | 1995 | No |
| 285 | General | Macfarlane D.M and Muller, P.J (2011). Blesbokspruit Ransar Management Plan: Draft: Report prepared for the Department of Environmental Affairs. | Other | Hydrogeology | N/A | Yes | 2011 | No |
| 286 | Eastern | Mafanya T. and Esterhuyse S. (2011) Regional Mine closure strategies for the Eastern – Draft report. Council for Geoscience. | CGS | Mine Closure | N/A | No | 2011 | Yes |
| 287 | Eastern | Mafanya, T. and Estheruyse, S. (2008). Regional mine closure strategies for the Eastern (draft). Department of Mines and Energy. | DME | Mine Closure | N/A | No | 2008 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|--|---------------------------|-------------------------|----------------------------|-----------------|--------------|
| 288 | General | Malherbe, G.F, Morkel, C.E. and Bezuidenhout, D. (1995). Industrial applications of membranes Final Report to the Water Research Commission by the Institute for Polymer Science, University of Stellenbosch. Water Research Commission. 106p. | WRC | Treatment Technologies | N/A | No | 1995 | No |
| 289 | Multi-Basin | Manders, P, Godfrey, L and Hobbs, P. (2009). Acid Mine Drainage in South Africa. | CSIR | Treatment Technologies | Hydrogeolog y | No | 2009 | No |
| 290 | General | Maree, J.P, Strydom, W,F, Adlem, C.J.L. (2004). Neutralization of Acid Mine Water and Sludge Disposal Report to the WRC by the Div. of Water, Environment & Forestry Tech, CSIR. Water Research Commission. 129p. | DWAF | Treatment Technologies | N/A | No | 2004 | No |
| 291 | General | Maree, J.P. (1996). Underground Neutralisation of Mine Water with Limestone. Water Research Commission. 51p. | WRC | Treatment Technologies | N/A | Yes | 1996 | No |
| 292 | General | Maree, J.P. (2006). Treatment of industrial effluents for neutralization and sulphate removal. Thesis. 129p. | Other | Treatment Technologies | N/A | Yes | 2006 | No |
| 293 | General | Maree, J.P., de Beer, M., Strydom, W.F., Christie, A.D.M. and Waanders, F.B. (no date). Neutralizing Coal Mine Effluent with Limestone to Decrease Metals and Sulphate Concentrations. Technical Article. 6p. | Other | Scenarios | Coal | No | Not Recorded | No |
| 294 | General | Maree, J.P., de Beer, M., Strydom, W.F., Christie, A.D.M. and Waanders, F.B. (no date). Limestone Neutralisation of Acidic Effluent, Including Metal and Partial Sulphate Removal. 7p. | Other | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 295 | General | Maree, J.P., Strydom, W.F., Adlem, C.J.L., de Beer, M., van Tonder, G.J. and van Dijk, B.J. (2004). Neutralization of Acid Mine Water and Sludge Disposal. WRC Report No. 1057/1/04. Water Research Commission. 149p. | WRC | Treatment Technologies | N/A | No | 2004 | No |
| 296 | General | Marsden, D.D. (1986). The current limited impact of Witwatersrand gold-mine residues on water pollution in the Vaal River system. SAIMM. 23p. | SAIMM | Impacts | N/A | No | 1986 | No |
| 297 | General | Matthews, G. and Fraser, M. (2003). Field Testing of Real-Time Continuous Flow and Water Quality Monitoring Instrumentation Report to the WRC by Wates, Meiring and Barnard (Consulting Engineers), & Anglo Coal Environmental Services. Water Research Commission | WRC | Water Quality | Water Managemen t | No | 2003 | No |
| 298 | General | McCarthy, T. (2010). The decanting of acid mine water in the Gauteng city-region: Analysis, prognosis and solutions. Gauteng City-Region Observatory. 40p. | Gauteng City- Region Observatory | Decant | Water Managemen t | Yes | 2010 | No |
| 299 | General | McCarthy, T. (2010). The decanting of acid mine water in the Gauteng city-region - Analysis prognosis and solutions. | Other | Decant | Water Managemen t | Yes | 2010 | No |
| 300 | General | MEND (1995). Economic evaluation of acid mine drainage technologies, MEND Report 5.8.1, Energy Mines and Resources Canada, January, Ottawa | MEND | Treatment Technologies | N/A | No | 1995 | No |
| 301 | General | Metago Environmental Engineer (Pty) Ltd. (2000). The evaluation of the impact of mine water desalination from gold mines on the Vaal River Systems | Other | Treatment Technologies | Water Managemen t | Yes | 2000 | No |
| 302 | General | Klip River Study (email) | Other | Other | N/A | Yes | Not Recorded | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|-------------------------------------|---------------------------|---------|----------------------------|------|--------------|
| 303 | General | Middleton, B. J. and Bailey, A. K. (2005) Water Resources of South Africa (WR2005), Water Research Committee Report No TT 382/08. | WRC | Hydrogeology | Article | No | 2005 | Yes |
| 304 | Central | Mitchell, P.D. (1999). Pumping of water on ERPM during liquidation and the option of plugging on the mines Notes for the record, minutes and discussions. East Rand Proprietary Mines. 26p. | ERPM | Water Quantity | N/A | No | 1999 | No |
| 305 | Multi-Basin | Molewa, B.E.E. (2011). Emergency Water Management on the Witwatersrand Gold Fields with special emphasis on acid mine drainage: Directive in term of the National Water Act, 1998 (Act 36 of 1998). Department of Water and Environmental Affairs. 2p. | DWAF | Water Management | N/A | No | 2011 | No |
| 306 | General | Morgan, B., Lahav, O., Hearne, G. and Loewenthal, R.E. (2004). A Novel One-Step Ambient Temperature Ferrite Process for the Removal of Metals from Acid Mine Drainage. WRC Report No. 1244/1/04. Water Research Commission. 78p. | WRC | Treatment Technologies | N/A | No | 2004 | No |
| 307 | General | Morgan, B., Lahav, O., Hearne, G. and Loewenthal, R.E. (2005). Dehydroxylation-crystallization (aging) and oxidation rate in the one-step ambient temperature ferrite process: Removal of non-ferrous metals from acid mine drainage. WRC Report No. 1454/1/05. Water Research Commission. | WRC | Treatment Technologies | N/A | Yes | 2005 | No |
| 308 | General | Morgan, B.E., Hearne, L.O. and Loewenthal, R.E. (2003). A seede ambient temperature ferrite process for the treatment of AMD waters Magnetite formation in the presence and absence of calcium ions under steady state operation. 7p. | Other | Treatment Technologies | N/A | No | 2003 | No |
| 309 | General | Morgan, B.E., Loewenthal, R.E. and Lahav, O. (2001). Fundamental study of a one-step ambient temperature ferrite process for treatment of acid in drainage waters. Water SA Vol. 27 No. 2. pp.277-282 | WRC | Treatment Technologies | N/A | Yes | 2001 | No |
| 310 | General | Morley-Jepson, W.P, Olivier, O & SAIMM Colloquium Water. (2004). Risk of Considerations and options associated with the protection of South deep against the sudden ingress of extraneous water. | WRC | Treatment Technologies | N/A | Yes | 2004 | No |
| 311 | Eastern | Mrost, M. (1987). Transvaal and Orange Free State Chamber of Mines - Biologicial and Chemical Research Laboratory: Mine effluents Investigation. | Chamber of Mines | Treatment Technologies | N/A | No | 1987 | No |
| 312 | Central | Mphephu, N.F. (2002) Rehabilitation of Tailings Dams on the Central Rand; Johannesburg. Mining and the Environment Conference Proceedings, Sudbury, 25 - 28 May 2003. 7p. | Other | Treatment Technologies | N/A | No | 2002 | No |
| 313 | Central | Mphephu, N.F. (2004). Environmental impacts of 118 years of gold recovery from the Central Rand Goldfield. De Beers Consolidated Mines. 10p. | De Beers | Scenarios | Impacts | No | 2004 | No |
| 314 | Multi-Basin | Munroe, J. (2011). Overview of Activities by Gold Mining Companies active in the West, Central and Eastern Basins. Parliamentary Portfolio Committee on Water & Environmental Affairs 28th June 2011. Presentation. 8 slides | Other | Geology | N/A | No | 2011 | No |
| 315 | General | Musvoto, E.V., Ubisi, M.F., Sneyders, M.J. and Lakay, M.T. (2003). The Treatment of Wastewaters with high Nutrients (N and P) but Low Organic (COD) Contents. The Water Research Commission. Various paginations | WRC | Treatment Technologies | N/A | No | 2003 | No |
| 316 | General | Myers, R.E., McCarthy, T.S. and Stanistreet, I. G. (1990). A tectono-sedimentary reconstruction of the development and evolution of the Witwatersrand Basin, with particular emphasis on the Central Rand Group. S. Afr. J. Geol., Johannesburg, 93(1). pp.180 | South African Journal of Geology | Geology | N/A | No | 1990 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|--|---------------------------|------------------|----------------------------|-----------------|--------------|
| 317 | General | Naicker, K., Cukrowska, E. and McCarthy T. (2003) Acid mine drainage arising from gold mine activity in the Johannesburg, South Africa and environs. Environmental Pollution, 122, p. 29 - 40 | Other | Multi-Disciplinary | N/A | No | 2003 | No |
| 318 | General | National Association of Abandoned Mine Lands Programmes (undated). "National Association of Abandoned Mine Lands Programmes." From http://www.onenet.net/~naamlp/overview.htm | National Association of Abandoned Mine Lands Programmes | Mine Closure | N/A | No | Not Recorded | No |
| 319 | General | National Treasury (2004). PPP Manual Modules 1–9. Pretoria. | National Treasury | Institutional | N/A | No | 2004 | No |
| 320 | General | National Treasury (2004). PPP Practice Notes 1–10. Pretoria. | National Treasury | Institutional | N/A | No | 2004 | No |
| 321 | General | National Treasury (2004). Standardised PPP Provisions. Pretoria. 388p. | National Treasury | Institutional | N/A | No | 2004 | No |
| 322 | General | National Treasury (2012). Estimates of National Expenditure 2012. | Other | Multi-Disciplinary | N/A | Yes | 2012 | No |
| 323 | Central | Ndasi, M. (2004). The geochemistry and mineralogy of mine tailings sediment in the Fleurhof dam and their contribution to pollution in the Fleurhof Wetland, Central Rand. B.Sc.Hons. Witwatersrand University. | Wits University | Hydrogeology | N/A | No | 2004 | No |
| 324 | General | Neba, A; Whittington-Jones, K.; Rose, P.D. (2007). Salinity, sanitation and Sustainability: Volume 4 - The Rhodes BioSure Process - part 4: Process Scale-Up in the Treatment of Mine Drainage Wastewaters and the Disposal of Sewage Sludge | WRC | Treatment Technologies | N/A | Yes | 2007 | No |
| 325 | General | Nell, J.P. and Lea, I.M. (2004). The effect of the Blesbokspruit Wetland system and gold mine effluent water on use on irrigated agriculture. South African National Committee on Irrigation and Drainage National Congress, November 2004. | SA National Committee on Irrigation and Drainage National Congress | Impacts | Scenarios | No | 2004 | No |
| 326 | Multi-Basin | Nengovhela, A.C., Yibas, B. and Ogola, J.S. (2006). Characterisation of gold tailings dams of the Witwatersrand Basin with reference to their acid mine drainage potential, Johannesburg, South Africa. Water SA Vol. 32 No. 4. pp.499-506 | WRC | Multi-Disciplinary | N/A | No | 2006 | No |
| 327 | Multi-Basin | Nengovhela, A.C., Yibas, B. and Ogola, J.S. (2007). An investigation into the availability and role of oxygen gas in gold tailings dams of the Witwatersrand basin with reference to their acid mine drainage potential. Water SA Vol. 33 No. 2. pp.271-274 | WRC | Multi-Disciplinary | N/A | No | 2007 | No |
| 328 | General | Netili, K.F., Van Tonder, D., Coetzee, H., Rust, U. and Yibas, B. (2010). Strategic Water Management Project: Proposed way forward prepared by CGS. Council for Geoscience, Pretoria. 21p. | CGS | Water Management | N/A | No | 2010 | No |
| 329 | General | Ntsume, G. M. & McCarthy, T. S. (2005) A preliminary study of the relative contributions of diffuse and point sources of pollution arising from gold mining activity in a Witwatersrand goldfield. In Loredo, J. & Pendás, F. Mine Water 2005 – Mine Closure. Oviedo (University of Oviedo). p. 169-175. | University of Oviedo | Ingress | Hydrogeolog y | No | 2005 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|--|---------------------------|-------------------------------|----------------------------|------|--------------|
| 330 | General | Oelofse,S. (2008). Emerging Issues Paper: Mine Water Pollution. | Other | Water Management | N/A | Yes | 2008 | No |
| 331 | General | Oelofse,S., et al (2008). The Pollution and destruction threat of gold mining waste on the Witwatersrand - A west Rand case study | CSIR | Water Management | Treatment Technologie s | Yes | 2008 | No |
| 332 | General | Office of Surface Mining (2006). Surface Mining Law. From http://www.osmre.gov/smcra.htm. | Office of Surface Mining | Legal | N/A | No | 2006 | No |
| 333 | Eastern | Olivier, H. (1994). Aansoek om 'n tydelike ontginningsmagtiging vir die verwydering en verwerking van mynsandhoop No. 5 A8 geleë op 'n sekere gedeelte van die plaas Modderfontein 76 IR, Distrik Benoni: Benoni Gold Mining Co. Ltd. Dept of Water Affairs and Forestry | DWAF | Treatment Technologies | N/A | No | 1994 | No |
| 334 | General | Oosthuizen, E.M. (1995). Boorgat moniteringsprosedure. Dept of Water Affairs and Forestry. 5p. | DWAF | Water Sampling | N/A | No | 1995 | No |
| 335 | General | Organisation for Economic Cooperation and Development (OECD) International Forum on International Investment (2002). Environmental Impacts of Foreign Direct Investment in the Mining Sector in Sub-Saharan Africa. 35p. | OECD | Impacts | N/A | Yes | 2002 | No |
| 336 | Eastern | Oryx (2003). Project to reduce and treat the volume of water pumped from underground at Grootvlei Proprietary Mines Limited – Scoping Report and Plan of Study for EIA, Oryx Environmental Report No OE46, May 2003. | Огух | Treatment Technologies | N/A | No | 2003 | Yes |
| 337 | Eastern | Oryx (2004). Environmental impact Report for measures to prevent ponding on the northern Black Reef Outcrop, Oryx Environmental Report No OE85, March 2004. | Oryx | Scenarios | N/A | No | 2004 | Yes |
| 338 | General | Parsons, R. (2004). Surface Water - Groundwater Interaction in a Southern African Context. Water Research Commission. Various paginations. | WRC | Hydrogeology | N/A | No | 2004 | No |
| 339 | Central | Patterson, G. (2006). An Environmental baseline study of the Central Rand mining area. Ferret Mining & Environmental Services (Pty) Ltd. 107p. | Ferret Mining & Environmental Services | Hydrogeology | N/A | No | 2006 | Yes |
| 340 | General | Peake, A. (2002). In stop water control and the control of excess water and backfill placement SIMRAC 1. DME. Proposal for a project to be funded in terms of the Minerals Act. CSIR. Division of Mining Technology. 17p. | CSIR | Water Management | Ingress | No | 2002 | No |
| 341 | General | Petersen, F., Aldrich, C., Esau, A. and Qi, B.C. (2005). Biosorption of heavy metals from aqueous solutions. WRC Report No. 1259/1/05. Water Research Commission. | WRC | Treatment Technologies | N/A | Yes | 2005 | No |
| 342 | General | Petrik, L. White, R. Klink M., Somerset , V., Key, D., Iwuoha, E. Burgers, C. and Fey, M.V. (2005). Utilization of Fly Ash for Acid Mine Drainage Remediation. WRC Report No. 1242/1/05. Water Research Commission. 174p. | WRC | Treatment Technologies | N/A | No | 2005 | No |
| 343 | General | Petrik, L., Burgers, C., Gitari, W., Surender, D., Reynolds, K., Ellendt, A., Etchebers, O., Kumar Vadapalli, V.R., Key, D. and Iwuoha, E. (2006). Stability And Neutralisation Capacity Of Potential Mine Backfill Material Formed By Neutralisation Of Fly Ash And Acid Mine Drainage. WRC Report No: 1458/1/06. Water Research Commission. 254p. | WRC | Treatment Technologies | N/A | Yes | 2006 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|---------------------------------------|---------------------------|-------------------------------|----------------------------|------|--------------|
| 344 | General | Pilson, R., van Rensburg, H.L. and Williams, C.J. (2000). An economic and technical evaluation of regional treatment options for point source gold mine effluents entering the Vaal Barrage catchment. Final Report. Report No. 800/1/00. Water Research Commission. Various pagination. | WRC | Treatment Technologies | Decant | Yes | 2000 | Yes |
| 345 | General | Pinetown, K.L. and Boer, R.H. (2006). A Quantitative Evaluation of the Modal Distribution of Minerals in Coal Deposits in the Highveld Area and the Associated Impact on the Generation of Acid and Neutral Mine Drainage. WRC Report No. 1264/1/06. Water Research Commission. 103p. | WRC | Coal | N/A | No | 2006 | No |
| 346 | Central | Pretorius, D.A. (1964). The geology of the Central Rand Goldfield. In: Some ore deposits of Southern Africa, S.H. Haughton (Ed.), Geol. Soc. S. Afr: pp.64-108. | Geological Society of SA | Geology | N/A | No | 1964 | No |
| 347 | General | Pretorius, J.A. (2003). Development of Internal Strategic Perspectives: Groundwater overview for middle Vaal catchment management area. Darcy Groundwater and Consultants. 13p. | Darcy Groundwater & Consultants | Hydrogeology | Treatment Technologie S | No | 2003 | Yes |
| 348 | Eastern | Proxa (2003). Evaluation of sustainable desalination options for Grootvlei Mine, Proxa Report No P-000/1, August 2003. | Proxa | Treatment Technologies | N/A | No | 2003 | Yes |
| 349 | General | Pulles, W. (2008). Best Practice Guideline H1: Integrated Mine Water Management. Department of Water Affairs & Forestry. | DWAF | Treatment Technologies | N/A | Yes | 2008 | No |
| 350 | General | Pulles, W. (2006). Best Practice Guideline H3: Water Reuse and Reclamation | DWAF | Treatment Technologies | N/A | Yes | 2006 | No |
| 351 | General | Pulles, W. (2006). Integrated Mine Water Management, Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. H1. Department of Water Affairs and Forestry. 67p. | DWAF | Treatment Technologies | N/A | Yes | 2006 | No |
| 352 | General | Pulles, W., Banister, S. and Biljon, M. (2005). The development of appropriate procedures towards and after closure of underground gold mines from a water management perspective. WRC Report No.1215/1/05. Unpaginated. | WRC | Mine Closure | Water Managemen t | No | 2005 | Yes |
| 353 | General | Pulles, W., Banister, S. and Heath, R. (2002). Prevention and management of water pollution from small scale mining practices. Department of Water Affairs and Forestry. 50p. | DWAF | Water Management | Impacts | No | 2002 | No |
| 354 | General | Pulles, W., du Plessis, P. and Howie, D. (2001). Pilot scale development of Integrated passive water treatment systems for mine effluent streams. Report to the Water Research Commission by Pulles Howard & de Lange Inc. Report No. 700/1/01. Water Research Commission. Various paginations. | WRC | Treatment Technologies | N/A | No | 2001 | No |
| 355 | General | Pulles, W., Heath, R. and Howard, M. (1996). A Manual to assess and manage the impact of gold mining operations on the surface water environment. Report No. TT 79/96. | WRC | Water Management | Impacts | No | 1996 | No |
| 356 | General | Pulles, W., Howie, D., Otto, D. and Easton, D. (1996). A manual on mine water treatment and management practices in South Africa. Report No. TT 80/96. | WRC | Treatment Technologies | ter Managem | No | 1996 | No |
| 357 | General | Pulles, W., Howie, D., Otto, D. and Easton, D. (1996). A manual on mine water treatment and management practices in South Africa. Volume 1: Literature Reviews. Report No. 527/1/96. | WRC | Treatment Technologies | ter Managem | n No | 1996 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|---|---|---------------------------|-------------------------|----------------------------|------|--------------|
| 358 | General | Pulles, W., Howie, D., Otto, D. and Easton, D. (1996). A manual on mine water treatment and management practices in South Africa. Volume 2: Coal Mine site visit reports. Report No. 527/2/96. | WRC | Treatment Technologies | ter Managem | No | 1996 | No |
| 359 | General | Pulles, W., Howie, D., Otto, D. and Easton, D. (1996). A manual on mine water treatment and management practices in South Africa. Volume 3: Gold Mine site visit reports. Report No. 527/3/96. | WRC | Treatment Technologies | ter Managem | No | 1996 | No |
| 360 | General | Pulles, W., Howie, D., Otto, D. and Easton, D. (1996). A manual on mine water treatment and management practices in South Africa. Volume 4: Overseas study tour report. Report No. 527/4/96. | WRC | Treatment Technologies | ter Managem | No | 1996 | No |
| 361 | General | Pulles, W., Howie, D., Otto, D. and Easton, D. (1996). A manual on mine water treatment and management practices in South Africa. Volume 5: Catalogue of relevant WRC research reports. Report No. 527/5/96. | WRC | Treatment Technologies | ter Managem | No | 1996 | No |
| 362 | General | Pulles, W., Juby, G.J.G. and Busby, R.W. (1992). Development of the Slurry Precipitation and Recycle Reverse Osmosis (SPARRO) Technology for Desalination Scaling Mine Water. IAWPRC Specialised Conference on Membrane Technology in Wastewater Management, Ca | Other | Treatment Technologies | Water Managemen t | No | 1992 | No |
| 363 | General | Pybus, P.J. (1995). Preliminary guidelines for private sector participation in water supply and sanitation services. Research Report KV81/96, Water Research Commission, Pretoria | WRC | Water Management | N/A | No | 1995 | No |
| 364 | General | Pybus, P.J. (1995). Preliminary Guidelines for Private Sector Participation in Water Supply and Sanitation Services. WRC Report No. KV 81/96. Water Research Commission. 60p. | WRC | Multi-Disciplinary | N/A | Yes | 1995 | No |
| 365 | General | Du Randt, J.F. (2012). The Impact of gold mining on the Witswatersrand on the rivers and karst system of Gauteng and North West Province, South Africa. | Other | Multi-Disciplinary | N/A | Yes | 2012 | No |
| 366 | Central | Rall, V.E. and Rall, J.L. (1996). Ecological Health Assessment of the Elsburgspruit/Natalspruit catchment. E.R.P.M. 29p. | ERPM | Multi-Disciplinary | N/A | No | 1996 | No |
| 367 | General | Rawlings, D.E. and Kusano, T. (1994) Molecular genetics of Thiobacillus ferrooxidans. Microbiogical. Reviews, 58, p. 39–55. | Other | Environment | Hydrogeolog y | No | 1994 | No |
| 368 | General | Richardson and Tanner (2010). Canadian Environmental Law — Some recent developments. IUCN Academy of Environmental Law. 6p. | IUCN - Academy of Environmental Law | Environment | Legal | Yes | 2010 | No |
| 369 | Central | Rison Consulting (1999). Central Basin Groundwater Modelling Exercise. Internal Report. E.R.P.M. 46p. | ERPM | Hydrogeology | N/A | No | 1999 | No |
| 370 | Central | Rison Consulting Pty (Ltd). (2001) E.R.P.M. Geological and geohydrological control on the groundwater ingress into the Central. 28 pp plus Annexure. | Rison Consulting | Hydrogeology | Ingress | No | 2001 | Yes |
| 371 | Multi-Basin | Rison Consulting Pty (Ltd). (2006). Geohydrological review of the potential impact on the Sterkfontein Dolomite during increased surface water run-off. Harmony Gold. | Other | Multi-Disciplinary | Hydrogeolog y | Yes | 2006 | No |
| 372 | General | Ristow, N.E, Sötemann, S.W, Loewenthal, R.E. (2005). Hydrolysis of Primary Sewage Sludge under Methanogenic, Acidogenic and Sulfate-reducing Conditions. Water Research Commission. 174p. | WRC | Treatment Technologies | Geohydrolog y | No | 2005 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|----------------------------------|---------------------------|------------------|----------------------------|-----------|--------------|
| 373 | General | Robb, G.A. (1995). Acid drainage from mines. The Royal Geographical Society. 7p. | Royal Geographical Society | Impacts | N/A | No | 1995 | No |
| 374 | General | Rogers, K.H., and Herrera, G. 1986. Sulphate Reduction in the Rietspruit Vleis. Department of Botany: University of the Witwatersrand. | Wits University | Treatment Technologies | N/A | No | 1986 | No |
| 375 | General | Roig, M.G., Manzano, T. and Diaz, M. (1997). Biochemical process for the removal of Uranium from Acid Mine Drainages. Pergamon Press. 10p. | Pergamon Press | Treatment Technologies | N/A | No | 1997 | No |
| 376 | Central | Rolfe, D. (1990). Data - Central Rand water compartment. Various paginations | Other | Mine Voids | N/A | No | 1990 | No |
| 377 | Central | Rolfe, D. (1990). An analysis of the Central Rand water compartment, rainfall and geological controls and their influences on plug pressures and pumping rates at south west vertical shaft, ERPM Ltd. 14p. | ERPM | Water Quantity | Hydrogeolog y | No | 1990 | Yes |
| 378 | Western | Rolfe, D. et. Al. (1991-2001). Correspondence Re: Cessation of pumping at D.R.D. 46p. | Other | Pumping | N/A | No | 1991-2001 | Yes |
| 379 | Central | Rolfe, D.G. (2000). An investigation into surface holdings from Stanhope Mine to the ERPM. A surface investigation of holdings along the outcrops and sub-outcrops from ERPM to Stanhope Mine. E.R.P.M. 56p. | ERPM | Ingress | N/A | No | 2000 | Yes |
| 380 | Central | Rolfe, D.G. (2000). Preliminary investigation of surface holdings and water ingress in the area adjacent to the Jesus dump. E.R.P.M. (Pty) Ltd. 14p. | ERPM | Ingress | N/A | No | 2000 | Yes |
| 381 | Central | Rolfe. D.G. (2001). An investigation into surface holdings from Stanhope Mine to the East Rand Proprietary Mine. Internal report, East Rand Proprietary Mines: pp. 14. | ERPM | Ingress | N/A | No | 2001 | Yes |
| 382 | Central | Rolffe, D.G. (1999). An Investigation into the Flooding Scenario's and Plug Positions Resulting from Limited Further Mining Activities. ERPM. 150p. | ERPM | Hydrogeology | Scenarios | No | 1999 | Yes |
| 383 | General | Rose, P.D. (2002). Integrated Algal Ponding Systems and the Treatment of Domestic and Industrial Wastewaters. Volume 3, Part 1: The AIWPS Model Salinity, Sanitation & Sustainability: A Study in Environmental Biotechnology and Integrated Wastewater Benefication, Water Research Commission | WRC | Treatment Technologies | N/A | No | 2002 | No |
| 384 | General | Rose, P.D. (2002). Integrated Algal Ponding Systems and the Treatment of Domestic and Industrial Wastewaters. Volume 3, Part 2: Abattoir Wastewaters Salinity, Sanitation & Sustainability: A Study in Environmental Biotechnology and Integrated Wastewater Benefecation, Water Research Commission | WRC | Treatment Technologies | N/A | No | 2002 | No |
| 385 | General | Rose, P.D. (2002). Integrated Algal Ponding Systems and the Treatment of Domestic and Industrial Wastewaters. Volume 3, Part 3: Mine Drainage Wastewaters. The ASPAM Model Salinity, Sanitation & Sustainability: A Study in Environmental Biotechnology and Integrated Wastewater Benefecation, Water Research Commission | WRC | Treatment Technologies | N/A | No | 2002 | No |
| 386 | General | Rose, P.D. (2004). The Rhodes BioSURE Process(R). Volume 4, Part 1: Biodesalination of Mine Drainage Wastewaters Salinity, Sanitation & Sustainability: A Study in Environmental Biotechnology and Integrated Wastewater Beneficiation in South Africa. Water Research Commission | WRC | Treatment Technologies | N/A | No | 2004 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|----------------|---------------------------|------------------|----------------------------|-----------------|--------------|
| 387 | General | Rose, P.D. and Dunn, K.M. (2002). Integrated Algal Ponding Systems and the Treatment of Saline Wastewaters. Volume 2, Part 1 - Meso-saline Wastewaters: The Spirulina Model Salinity, Sanitation & Sustainability: A Study in Environmental Biotechnology and Integrated Wastewater Beneficiation, Water Research Commission | WRC | Treatment Technologies | N/A | No | 2002 | No |
| 388 | General | Rose, P.D., Moffett, M; Pulles, W; Nell, J.P; Louw, D.; Melville, A; Leucona,S; Kumalo,S and De Wet, C.J. (2009). Salinity, Sanitation and Sustainability: Biotechnology of Saline and Sewage Wastewater Co-Treatment. Volume 2 - Integrated Beneficiation of Mine Wastewaters. | WRC | Treatment Technologies | N/A | Yes | 2009 | No |
| 389 | General | Rösner, T. and Boer, R. (2001). A preliminary assessment of pollution contained in the unsaturated and saturated zone beneath reclaimed gold-mine residue deposits Report to the WRC by Pulles Howard & De Lange Inc. for Geo-Hydro-Technologies (Pty) Ltd. Water Research Commission | WRC | Hydrogeology | N/A | No | 2001 | No |
| 390 | General | Rösner, T., Boer, R., Reyneke, R. Aucamp, P. and Vermaak, J. (2001). A Preliminary Assessment Of Pollution Contained In The Unsaturated And Saturated Zone Beneath Reclaimed Gold - Mine Residue Deposits. WRC Report No 797/1/01. Water Research Commission. 314p. | WRC | Multi-Disciplinary | N/A | Yes | 2001 | No |
| 391 | General | Rosner, T., Boer, R., Reyneke, R., Aucamp, P. and Vermaak, J. (2001). A preliminary assessment of pollution contained in the unsaturated and saturated zone beneath reclaimed gold-mine residue deposits, Water Research Commission Report No.797/01/01. 210p. | WRC | Hydrogeology | N/A | No | 2001 | No |
| 392 | General | Ryan, B. (2005). Financial Mail Article on May 20,2005. | Other | Institutional | N/A | Yes | 2005 | No |
| 393 | General | Salem, H.M., Eweida, M.E., Khalil, R.M. and Farag, A. (no date). Contaminated drinking water with heavy metals and their impact on human health, Cairo, Egypt. 6p. | Other | Impacts | Water Quality | No | Not Recorded | No |
| 394 | General | Sanderson, R.D. (1990). Research on the inhibition of bacterial oxidation of pyrite and the concomitant acid mine drainage: Part 3. Development and testing of slow release systems. Water Research Commission. 341p. | WRC | Treatment Technologies | N/A | No | 1990 | No |
| 395 | General | Sanderson, R.D. and Eimmelman, E. (1990). Research on the Inhibition of Bacterial Oxidation of Pyrite and the Concomitant Acid Mine Drainage: Part 3. Development And Testing Of Slow Release Systems. WRC Report No.132/3/90. Water Research Commission. 369p. | WRC | Multi-Disciplinary | N/A | No | 1990 | No |
| 396 | General | Schlemmer, L; Stewart, G & Whittles, J. (1989). The Socio-Economic Effects of Water Restrictions on Local Authorities, Selected Industrial and Commercial Establishments and other Private Agencies | WRC | Multi-Disciplinary | N/A | No | 1989 | No |
| 397 | General | Schulze, R.E., 2010. Atlas of Climate Change and the South African Agricultural Sector: A 2010 Perspective. Department of Agriculture, Forestry and Fisheries, WRC Report 1843/1/10. Pretoria, South Africa. 387pp. | WRC | Multi-Disciplinary | N/A | No | 2010 | No |
| 398 | General | Schutte, C.F and Focke, W/ (2007). Evaluation of Nanotechnology for application in water and wastewater treatment and related aspects in South Africa. KV 195/07 | WRC | Treatment Technologies | N/A | Yes | 2007 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|------------------|---------------------------|-------------------------|----------------------------|------|--------------|
| 399 | Western | Schwartz, H.J and Midgley, D.C. (1975) Evaluation of geo-hydrologic contrants for the Far West Rand dolomitic formations. In: Die Siviele Ingenieu, South Africa. February 1975, p. 31-36 | Other | Dolomite | Hydrogeology | No | 1975 | No |
| 400 | General | Schweitzer, J. (2004). Ferret Mining: A strategic water management plan for the prevention of water ingress into the underground workings of the Witwatersrand mining basin. Contract. Shango Solutions. 39p. | Shango Solutions | Water Management | Ingress | No | 2004 | Yes |
| 401 | Western | Schweitzer, J. (2004). The Potential Effect of Water Ingress on Mining Sub-compartment D, Tau Tona Mine Final Project Report. Shango Solutions. 17p. | Shango Solutions | Ingress | N/A | No | 2004 | Yes |
| 402 | Western | Schweitzer, J. (2004). The Potential Effect of Water Ingress on Mining Sub-compartment D, Tau Tona Mine. CSIR Miningtek. Appendices A – E. | CSIR | Ingress | N/A | No | 2004 | Yes |
| 403 | Western | Schweitzer, J. (2004). Water sampling and monitoring. Sub-compartment D, Tau Tona Gold Mine Proposal. Shango Solutions. 31p. | Shango Solutions | Water Sampling | Water Managemen t | No | 2004 | Yes |
| 404 | Western | Schweitzer, J. and Kramers, P. (2004). Water Sampling and Monitoring Sub-compartment D TauTona Gold Mine Proposal. Shango Solutions. 7p. | Shango Solutions | Water Sampling | Water Managemen t | No | 2004 | Yes |
| 405 | Central | Schweitzer, J. and Stewart, D. (2010). Gold Reef City: No 14 Shaft Water Investigation – Proposal. Shango Solutions. 4p. | Shango Solutions | Water Sampling | N/A | No | 2010 | Yes |
| 406 | Central | Schweitzer, J. and Stewart, R. (2005). Central Rand Goldfield water management plan. Controlled decanting: ERPM Gold Mine feasibility study Draft proposal. Shango Solutions. 55p. | Shango Solutions | Decant | Water Managemen t | No | 2005 | Yes |
| 407 | Central | Schweitzer, J. and Stewart, R. (2005). Proposal. Central Rand Goldfield water management plan controlled decanting: ERPM Gold Mine tunnel design and implementation feasibility study Requested by CGS. Shango Solutions. 132p. | Shango Solutions | Decant | Water Managemen t | No | 2005 | Yes |
| 408 | Western | Schweitzer, J., Kramers, P., Stewart, R. and Arnold, V. (2004). A strategic water management plan for the prevention of water ingress into the underground workings of the Witwatersrand mining basin Task 2, Task 3, Appendices, Final Report. Shango Solution | Shango Solutions | Water Management | Ingress | No | 2004 | Yes |
| 409 | Western | Schweitzer, J., Stewart, R. and Arnold, V. (2005). Shaft Water Quality Monitoring. Kloof Gold Mine - 9 Sub Shaft Proposal. Shango Solutions. 10p. | Shango Solutions | Water Management | Water Quantity | No | 2005 | Yes |
| 410 | General | Seath, S. & van Niekerk, A. (2012). Summarised Technology Cost Final - Response to question by Dr Koos Pretorius on the additional cost of adding portable reverse osmosis plants to the HDS plants. | Other | Treatment Technologies | N/A | No | 2012 | No |
| 411 | General | Schweitzer, J.K., Kramers, C.P., Stewart, R.S., Crafford, J., Arnold, V. and Khumalo, B. (2004). A strategic water management plan for the prevention of water ingress into the underground workings of the Witwatersrand mining basin. 444p. | Shango Solutions | Water Management | Ingress | No | 2004 | No |
| 412 | General | Scott, R. (1995). Flooding Of Central And East Rand Gold Mines: An Investigation Into Controls Over The Inflow Rate, Water Quality And The Predicted Impacts Of Flooded Mines. WRC Report No 486/1/95. Water Research Commission. 275p. | WRC | Multi-Disciplinary | N/A | Yes | 1995 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|----------------|---------------------------|---------------|----------------------------|-------------|--------------|
| 413 | Multi-Basin | Seath, S.G. and van Niekerk, J.A. (2011). TCTA: Witwatersrand Gold Fields Acid Mine Drainage - Due Diligence - Consulting Services for AMD Phase 1 Portion 1. TCTA Report No. 08-041. BKS and Golder Associates. | ТСТА | Multi-Disciplinary | N/A | Yes | 2011 | No |
| 414 | Multi-Basin | Seath, S.G. et al. (2011). TCTA: Witwatersrand Gold Fields Acid Mine Drainage - Design Criteria Memorandum - Consulting Services for AMD Phase 1 Portion 2. TCTA Report No. 08-041. BKS and Golder Associates. | ТСТА | Multi-Disciplinary | N/A | Yes | 2011 | No |
| 415 | General | Seath, S.G., Van Niekerk, J.A., Van Niekerk, A.M., Wimberley, F., De Villiers, G.H. and Augere, A. (2011). Witwatersrand Gold Fields Acid Mine Drainage. Contract TCTA 08-041. Consulting Services For AMD. Phase 1 Portion 1. 154p. | ТСТА | STI | N/A | Yes | 2011 | No |
| 416 | General | Shepherd, P.J. (2005). Estimation of Flows entering shallow underground workings at the Geldenhuys Interchange | CGS | Ingress | N/A | Yes | 2005 | No |
| 417 | General | Shepherd, P.J. (2005). Identification of Potential Remedial Measures at the Identified Surface Water Ingress Points in the Eastern Basin - Progress Report | CGS | Ingress | N/A | Yes | 2005 | No |
| 418 | General | Small, Gary et al. (2004). Ground Water in South Africa - Our Most Valuable Future Resource. A practical overview of all aspects of ground water in South Africa. GSSA. Various paginations. | GSSA | Hydrogeology | Geology | No | 2004 | No |
| 419 | General | Smit, J. and van Zyl, H.C. (2004). Electrochemical treatment for the removal of sulphates from acid mine drainage Report for the Water Research Commission by Anglo Coal. Water Research Commission. 102p. | WRC | Treatment Technologies | Coal | No | 2004 | No |
| 420 | General | Smit, J. and van Zyl, H.C. (2004). Electrochemical Treatment for the Removal of Sulphates from Acid Mine Drainage. WRC Report No 940/1/04. Water Research Commission. 118p. | WRC | Treatment Technologies | N/A | Yes | 2004 | No |
| 421 | General | Snyman, H.G., Herselman, J.E. and Kasselman, G. (2004). A metal content survey of South African sewage sludge and an evaluation of analytical methods for their determination in sludge. WRC Report No. 1283/1/04. Water Research Commission. | WRC | Treatment Technologies | Water Quality | , Yes | 2004 | No |
| 422 | General | Statomet Bureau of Statistical and Survey Methodology (no date). An assessment of economic and socio-economic impact of dewatering mines into the Blebokspruit and the effect thereof on eco-tourism, agriculture and other economic activities (2 hard copies). | Other | Water Management | N/A | Yes | Not Recorde | No |
| 423 | General | Stander. G.J. (1963). A Survey of River Pollution in the Witswatersrand Catchment area of the Vaal River. | Other | Water Management | N/A | No | 1963 | No |
| 424 | General | Stanford, K.N. (1996). East Rand Proprietary Mines Limited Enquiry No. ERPM 01/96. Tender Enquiry Document for remedial works to dams 1 and 3 st ERPM Boksburg, East Rand | ERPM | Treatment Technologies | Water Quality | No | 1996 | No |
| 425 | Central | Steele, K.E. (1955). Water Pollution. Contamination of Boreholes Elsburg Agricultural Plots. ERPM Ltd. Various paginations. | ERPM | Water Quality | Impacts | No | 1955 | No |
| 426 | General | Steffen , Robertson and Kirsten (1988). Research On The Contribution Of Mine Dumps To The Mineral Pollution Load In The Vaal Barrage. WRC Report No 136/1/89. Water Research Commission. 199p. | WRC | Scenarios | N/A | No | 1988 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|--------------------------------------|---------------------------|-------------------------|----------------------------|-----------------|--------------|
| 427 | Central | Steffen, R. and Kirsten CE. (1996). Report on the potential for reducing the risk of unacceptable water discharge to the Dixie Spruit East Rand Proprietary Mines Limited. 22p. | ERPM | scenarios | Decant | No | 1996 | No |
| 428 | General | Steffen, Roberston and Kirsten (1989). Research on the contribution of mine dumps to the mineral pollution load in the Vaal Barrage, Water Research Commission Report no.136/1/89, Water Research Commission, Pretoria, South Africa. 199p. | WRC | Impacts | Geohydrolog y | No | 1989 | No |
| 429 | General | Steffen, Robertson and Kirsten (1996). Report on the Potential for Reducing the Risk of Unacceptable Water Discharge to the Dixie Spruit, 22p. | Other | Treatment Technologies | Decant | No | 1996 | No |
| 430 | General | Stephenson, D & Barta, B. (2005). Impacts of Sotrmwater and Groundwater Ingress on Municipal Sanitation Services: WRC Report No. 1386/1/05. Water Research Commission | Other | Treatment Technologies | N/A | Yes | 2005 | No |
| 431 | Central | Stewart, B.D. (1978). Water Compartments: Cooke Section Memorandum to: Mr. M.A. Madeyski. JCI Co. Ltd. 2p. | JCI | Mine Voids | Hydrogeolog y | No | 1978 | No |
| 432 | Central | Stewart, B.D. (1982). Cooke Section water statistics Memorandum to: Mr. G.H.S. Bamford. JCI Co. Ltd. 10p. | JCI | Water Sampling | N/A | No | 1982 | No |
| 433 | Central | Stewart, D. (2011). CGS: Water Level Monitoring at Crown Mines and Catlin Shafts – Proposal. Shango Solutions. 5p. | Shango Solutions | Water Quantity | Water Managemen t | No | 2011 | No |
| 434 | Western | Stewart, R.A. (2001). Investigation into the position of dolomitic water compartments in the West Rand and Far West Goldfields. CSIR Miningtek. 24p. | CSIR | Dolomite | Hydrogeolog y | No | 2001 | No |
| 435 | Central | Stewart, R.A. (2004). Controls on gold distribution in the Central Rand Goldfield, South Africa. Unpublished PhD Thesis. 572p. | Other | Geology | N/A | No | 2004 | No |
| 436 | Western | Stoch, Winde, Erasmus (2008). Karst, Mining and Conflict, A Historical Perspective of the consequences of mining on the Far West Rand | Other | Impacts | N/A | Yes | 2008 | No |
| 437 | General | Stumm, W. and Morgan, J.J. (1996) Aquatic Chemistry. Third edition. New York, John Wiley and Sons. 1022pp. | John Wiley and Sons | Water Quality | N/A | No | 1996 | Yes |
| 438 | Eastern | SWaMP Steering Committee (1998). An Integrated Strategic Water Management Plan (SWaMP) for Gauteng Gold Mines | Other | Water Management | N/A | Yes | 1998 | No |
| 439 | General | Summers, W.K. and Spiegel, Z. (1974). Ground Water Pollution A Bibliography. Ann Arbor Science Publishers Inc. 83p. | Ann Arbor Science Publishers Inc. | Hydrogeology | N/A | No | 1974 | No |
| 440 | General | Sutton, M.W. & Weiersbye, I.M. (2007). South African Legislation Pertinent to Gold Mine Closure and Residual Risk. Wits University. ISBN 978-0-9804185-0-7. | Other | Multi-Disciplinary | Mine Closure | Yes | 2007 | No |
| 441 | General | Syrett, B.C. (1969). The limitations of measuring pH by colour indicators. DME. 14p. | DME | Water Sampling | N/A | No | 1969 | No |
| 442 | General | Taggart, A.F. (1951). Handbook of Mineral Dressing. Ores and Industrial Minerals. 1905p. | Other | Geology | N/A | No | 1951 | No |
| 443 | General | TCTA (no date). Communication Strategy on the Roll out of the work of the Inter-governmental task team (IGTT) on AMD | Other | Communication | N/A | No | Not Recorded | No |
| 444 | General | TCTA (no date). Information Session. AMD Presentation. 27p. | ТСТА | Other | N/A | Yes | Not Recorded | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|---|---------------------------|-------------------------|----------------------------|-----------------|--------------|
| 445 | General | TCTA (2012). Mine Water Management in the Witwatersrand Gold Fields with special emphasis on acid mine drainage. | Other | Hydrogeology | Water Managemen t | Yes | 2012 | No |
| 446 | General | TCTA (2011). Acid Mine Drainage Communication Action Plan. | Other | Hydrogeology | Water | Yes | 2011 | No |
| 447 | General | TCTA (2011). WUC Shopping List Information - Includes prices and Table of Contents | Other | Hydrogeology | ter Managem | n Yes | 2011 | No |
| 448 | General | Treatment. Focus on CSIR Research in Pollution and Waste. 2p. | CSIR | Treatment Technologies | N/A | No | Not Recorded | No |
| 449 | General | Trudinger, P.A. (1971) Microbes, Metals and Minerals. Minerals Science and Engineering, 3, p. 13-25. | Other | Other | N/A | No | 1971 | No |
| 450 | General | Turton, A. (2008). Three Strategic Water Quality Challenges that Decision-makers need to know about how the CSIR should respond | CSIR | Water Quality | N/A | Yes | 2008 | No |
| 451 | General | Turton, M; Mampane,S. (2004). A Hydropolitical History of South Africa's International River Basins | WRC | Other | N/A | Yes | 2004 | No |
| 452 | General | Tutu, H., McCarthy, T.S. and Cukrowska, E. (2008). The chemical characteristics of acid mine drainage with particular reference to sources, distribution and remediation: The Witwatersrand Basin, South Africa as a case study. Applied Geochemistry, 23, pp.3 | Other | Water Sampling | Multi- Disciplinary | No | 2008 | No |
| 453 | General | U.S. Environmental Protection Agency (1995). Mining metallic ores and minerals, Technical Support Document, International Training Workshop, Principles of Environmental Enforcement | US EPA | Water Management | N/A | No | 1995 | No |
| 454 | General | United Nations Development Programme (UNDP) (2009). Statistics of the Human Development Report. Accessed at http://hdr.undp.org | UN Development Programme | Other | N/A | No | 2009 | No |
| 455 | General | United States Government Accountability Office (2008). Superfund: Funding and Reported Costs of Enforcement and Administration Activities. 33p. | United States Government Accountability Office | Other | N/A | Yes | 2008 | No |
| 456 | General | United States' Geological Survey (2007). USGS Abandoned Mine Lands Initiative. From http://amli.usgs.gov/index.html. | USGS | Mine Closure | N/A | No | 20077 | No |
| 457 | General | Unknown (1946). Symposium on pH Measurement. Forty-Ninth Annual Meeting. American Society for Testing Materials. 79p. | American Society for Testing Materials. | Water Sampling | N/A | No | 1946 | No |
| 458 | General | Unknown (1966). Pumping of Water from Abandoned Mines Geological on H2O. ERPM Ltd. Various paginations. | ERPM | Pumping | N/A | No | 1966 | No |
| 459 | General | Unknown (1968). Metric Units: Methods of testing water used in industry Chloride and Sulphate. British Standards Institution. 23p. | British Standards Institution. | Treatment Technologies | N/A | No | 1968 | No |
| 460 | Central | Unknown (1970). Water. Go through and remove Interesting items. Notes, 1970's. Files 5, 6, 6(a). ERPM, Ltd. Various paginations. | ERPM | Multi-Disciplinary | N/A | No | 1970 | No |
| 461 | General | Unknown (1972). Radioisotopes in underground water investigations in Rhodesia. Transactions GSSA. 1972: 75 (1) April p.1-70 | GSSA | Water Sampling | N/A | No | 1972 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|---|---|---------------------------|-------------------------|----------------------------|-----------------|--------------|
| 462 | General | Unknown (1972). The morphology of stromatolites from the Transvaal dolomite north-west of Johannesburg, South Africa. Transactions of GSSA. 1972: 75 (2) August p.71-164 | GSSA | Dolomite | Geology | No | 1972 | No |
| 463 | General | Unknown (1985). Dewatering of strip coal mines in South Africa. Transactions GSSA. 1985: 88 (3) December p.483-580 | GSSA | Coal | Water Quantity | No | 1985 | No |
| 464 | General | Unknown (1985). Geostatistiek in grondwater studies. Transactions GSSA. 1985: 88 (1) April p.1- 194 | GSSA | Hydrogeology | Geology | No | 1985 | No |
| 465 | General | Unknown (1985). Ground-water modelling; present and future. Transactions GSSA. 1985: 88 (3) December p.483-580 | GSSA | Hydrogeology | N/A | No | 1985 | No |
| 466 | General | Unknown (2006). Guideline for the Assessment, Planning and Management of Groundwater Resources within Dolomitic Area in South Africa. Volume 3: Process and Related Activities. | Other | Dolomite | Water Managemen t | Yes | 2006 | No |
| 467 | General | Unknown (1985). Parameteridentifikasie in grondwaterstudies. Transactions GSSA. 1985: 88 (3) December. p.483-580 | GSSA | Hydrogeology | N/A | No | 1985 | No |
| 468 | General | Unknown (1988). Seminar: Water Hydraulic Power in Gold Mine Stopes. Various Authors at Seminar. Chamber of Mines of South Africa Research Organization. 149p. | Chamber of Mines | Hydrogeology | N/A | No | 1988 | No |
| 469 | General | Unknown (1975). The Fanie Botha Accord (Summary). | Other | Legal | N/A | Yes | 1975 | No |
| 470 | Multi-Basin | Unknown (1994). Catchment water quality deterioration as a result of water-level recovery in abandoned gold mines on the Eastern and Central Witwatersrand Mine Water Project. Institute for Groundwater Studies. 23p. | Institute for Groundwater Studies | Water Quality | N/A | No | 1994 | No |
| 471 | Central | Unknown (1994). Catchment Water Trends and Deterioration Central Rand Flooding. ERPM Ltd. Various paginations | ERPM | Water Quantity | N/A | No | 1994 | No |
| 472 | General | Unknown (1995 - 2007). Blesbokspruit cost-benefit analysis in respect of two options of water treatment. Grootvlei Mine Project. Addendum 1. | Other | Multi-Disciplinary | N/A | Yes | 1995 - 2007 | No |
| 473 | General | Unknown (1996). Assessment of the Impact of South African Water Law on Mining (Phase I) - Project No.AE9501. CSIR, Miningtek and Andre Moolman Inc. Attorneys. 95p. | CSIR | Impacts | N/A | No | 1996 | No |
| 474 | Central | Unknown (2000). Application for State Assistance for: "The Pumping of Extraneous Water". E.R.P.M. 21p. | ERPM | Water Quantity | N/A | No | 2000 | No |
| 475 | General | Unknown (1998).Continued assistance with the pumping of extraneous water at Grootvlei Proprietary Mines Limited (2 hard copies). | DME | Water Management | N/A | Yes | 1998 | No |
| 476 | General | Unknown (2000). Grootvlei Proprietary Mines Limited Strategy Water Management Plan Integration with the entire Eastern Basin | Other | Treatment Technologies | N/A | Yes | 2000 | No |
| 477 | Central | Unknown (no date). Grootvlei Technical Task Team Report to the Inter-Departmental Committee for State Assistance to the Mining Industry | Other | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 478 | Central | Unknown (no date). Grootvlei Gold Mine - A preliminary Assessment of the Environmental, Social, Economic and Financial Implications of dewatering the Eastern into the Bokspruit, or alternatively allowing it to flood. Wensley Environmental Consultants. | Other | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 479 | Central | Unknown (2000). Rainfall. 1980 to 2000 Physical, Chemical and Biological Water Quality Criteria. ERPM Ltd. Various paginations. | ERPM | Water Quality | N/A | No | 2000 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|--|---------------------|-------------------------------|----------------------------|------------|--------------|
| 480 | Central | Unknown (2001). East Rand Proprietary Mines: Water Quality Analysis Report 2001. EcoSat Remote Monitoring (Pty) Ltd. 62p. | ERPM | Water Quality | N/A | No | 2001 | No |
| 481 | General | Unknown (2001). East Rand Proprietary Mines: Water Quality Analysis Report. EcoSat Remote Monitoring (Pty) Ltd. 62p. | ERPM | Water Quality | N/A | No | 2001 | No |
| 482 | General | Unknown (2002). Prevention and Management of Water Pollution from Small-Scale Mining Practices Development of Best Practice Guidelines for Water Quality Management in the South African Mining Industry - Best Practice Guideline 2.1b. Dept of Water Affairs | DWAF | Water Management | Water Quality | No | 2002 | No |
| 483 | General | Unknown (2001/2002). Application in terms of Section 40 of the National Water Act 1998 (Act 36 of 1998) for a Section21(g). Water Use Licence: Disposal of Water Underground in the Mine | Other | Water Management | N/A | Yes | 2001/ 2002 | No |
| 484 | Eastern | Unknown (2003). 8th International Congress on Mine Water and the Environment. International Mine Water Association. Articles: Towards sustainable mine water treatment at Grootvlei Mine ; Acid mine drainage treated electrolytically for recovery of hydrogen | International Mine Water Association | Hydrogeology | N/A | No | 2003 | No |
| 485 | General | Unknown (2003). A Strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins Progress report for the 15 August 2003 to 14 September 2003. Council for Geoscience. 32p. | CGS | Water Management | Ingress | Yes | 2003 | No |
| 486 | General | Unknown (2003). A Strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins Progress Report for the 15 July 2003 to 14 August 2003. Council for Geoscience. 32p. | CGS | Water Management | Ingress | Yes | 2003 | No |
| 487 | General | Unknown (2003). A Strategic water management plan for the prevention of water ingress into underground workings of the Witwatersrand mining basins Progress report for the 15th October 2003 to 14 December 2003. Council for Geoscience. 55p. | CGS | Water Management | Ingress | Yes | 2003 | No |
| 488 | General | Unknown (2003). An Environmental Management Action Plan and Rehabilitation Programme for Arnot Colliery Technical Proposal. Ferret Mining & Environmental Services. 26p. | Ferret Mining & Environmental Services | Water Management | N/A | No | 2003 | No |
| 489 | General | Unknown (2003). Report on the Radioactivity Monitoring Programme in the Klip River Catchment. Dept of Water Affairs and Forestry. Resource Quality Services.45p. | DWAF | Water Sampling | N/A | No | 2003 | No |
| 490 | General | Unknown (2004). A strategic water management plan for the prevention of water ingress into the underground workings of the Witwatersrand mining basin Technical & Financial Proposal. Ferret Mining (Pty) Ltd. 21p. | Ferret Mining & Environmental Services | Water Management | Ingress | Yes | 2004 | No |
| 491 | General | Unknown (2004). Assistance with the pumping and treatment of extraneous water and the installation of underground bulkheads Investigation for the Inter-Departmental Committee for State Assistance to the Mining Industry for the Fiscal Year 2004/2005. ERPM. | ERPM | Pumping | Treatment Technologie s | No | 2004 | No |
| 492 | Western | Unknown (2004). Driefontein's groundwater risk management strategy. Mining Mirror. Vol.17 No.3 August 2004 | Mining Mirror | Hydrogeology | Water Managemen t | No | 2004 | No |
| 493 | Western | Unknown (2004). Randfontein saves West Rand from decanting mine water – Harmony Gold. Mining Mirror. Vol.17 No.3 August 2004 | Mining Mirror | Decant | N/A | No | 2004 | Yes |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|--|---------------------------|-------------------------------|----------------------------|------|--------------|
| 494 | General | Unknown (2005). "Shaft Wolf" Pilot Test 1 October 2005, Miracle Waters. Sampling strategy and protocol. Shango Solutions. 5p. | Shango Solutions | Water Sampling | N/A | No | 2005 | Yes |
| 495 | Central | Unknown (2005). A Cumulative Water and Salt Balance for the Central Rand Goldfield. Shango Solutions. 9p. | Shango Solutions | Water Sampling | N/A | No | 2005 | Yes |
| 496 | Eastern | Unknown (2005). A Water and Salt Balance for the Grootvlei Proprietary Mines Limited, Eastern. Technical and Financial Proposal Prepared by Ferret Mining & Environmental Services (Pty) Ltd, for CGS. Ferret Mining & Environmental Services (Pty) Ltd | CGS | Treatment Technologies | N/A | No | 2005 | Yes |
| 497 | Central | Unknown (2005). ERPM installs plugs to control water inflow. Modern Mining. July 2005. | ERPM | Ingress | N/A | No | 2005 | No |
| 498 | General | Unknown (2005). Location of the test pits, ves sites, mine pits Proposed plant sites and the water pipeline. Rida Mining Company. Various pagination. | Rida Mining company | Water Management | Treatment Technologie s | No | 2005 | No |
| 499 | Central | Unknown (2005). Progress Report: System Dynamics Modelling of the Central Water Levels. Ferret Mining and Environmental Services (Pty) Ltd. 35p. | Ferret Mining & Environmental Services | Water Quantity | N/A | No | 2005 | Yes |
| 500 | Central | Unknown (2005). Quarterly Progress Report 2005 - ERPM Ltd Water monitoring for the Period: June - August 2004. EcoSat Environmental Services Group (Pty) Ltd. 28p. | ERPM | Water Sampling | N/A | No | 2005 | No |
| 501 | General | Unknown. (2005). Science real and relevant conference 2010: What is the seismic risk of mine flooding? P1-20 | Other | Geology | N/A | Yes | 2005 | No |
| 502 | General | Unknown (2005). Shaft Sampling and Monitoring 2005 Water Quality Sampling Field Book. Shango Solutions. Various pagination. | Shango Solutions | Water Sampling | Water Quantity | No | 2005 | Yes |
| 503 | Central | Unknown (2006). Assessment of the risk of plug or water barrier failure due to seismicity at south deep mine. SAIMM. May 2006. | SAIMM | scenarios | N/A | No | 2006 | Yes |
| 504 | General | Unknown (2006). Automatic metering aids efficient water usage. Modern Mining. April 2006. | Modern Mining | Water Management | N/A | No | 2006 | Yes |
| 505 | General | Unknown (2006). History of the development and deployment of the parallel sided mortar intrusion concrete watertight bulkhead in underground mines. SAIMM. May 2006. | SAIMM | Treatment Technologies | N/A | No | 2006 | Yes |
| 506 | General | Unknown (2006). Mine Water Drainage (South African Perspective). Water Institute of Southern Africa. 50p. | ater Institute of Southern Africa | Hydrogeology | N/A | No | 2006 | No |
| 507 | Western | Unknown (2007). In-service monitoring of water barrier project at South Deep Gold Mine. SAIMM. May 2007. | SAIMM | Water Quality | Water Sampling | No | 2007 | Yes |
| 508 | General | Unknown (2007). Systems offered for monitoring mine waste. Modern Mining. May 2007 | Modern Mining | Water Management | N/A | No | 2007 | No |
| 509 | General | Unknown (2008). Package water plants find application in mining. Modern Mining. March 2008 | Modern Mining | Treatment Technologies | N/A | No | 2008 | No |
| 510 | General | Unknown (2008). Prevention of chemical contamination of groundwater by mine water. SAIMM. March 2008. | SAIMM | Water Management | Scenarios | No | 2008 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|------------------|---------------------------|-------------------------------|----------------------------|-----------------|--------------|
| 511 | General | Unknown (2009). Approach towards the management of Acid Mine Drainage (AMD). Problems emanating from the underground water basins within the Witwatersrand. DG briefing notes on response to federation for sustainable environment. Water Utilities Corporation | WUC | Water Management | N/A | Yes | 2009 | No |
| 512 | General | Unknown (2009). Environmental Impact Assessment: Western Utilities Corporation Mine Water Reclamation Project - Comment and Response Report | WUC | Water Management | N/A | Yes | 2009 | No |
| 513 | General | Unknown (2009). Environmental Impact Assessment: Western Utilities Corporation Mine Water Reclamation Project - Final Scoping Report | WUC | Water Management | N/A | No | 2009 | No |
| 514 | General | UE Urban-Econ. (2000). Downstream Cost Impacts. Amanzi Project | Other | Water Management | Water Quality | Yes | 2000 | No |
| 515 | General | Unknown (2009). Environmental Impact Assessment: Western Utilities Corporation Mine Water Reclamation Project - Map Set and Property Registers for Public Comment | WUC | Water Management | N/A | Yes | 2009 | No |
| 516 | General | Unknown (2009). Impact of deep-hole opencast blasting on the stability of water dams of a close- by underground coal. SAIMM. July 2009. | SAIMM | Impacts | Coal | No | 2009 | Yes |
| 517 | General | Unknown (2009). Quantification of the impacts of coalmine water irrigation on the underlying aquifers. SAIMM. July 2009. | SAIMM | Impacts | Coal | No | 2009 | Yes |
| 518 | General | Unknown (2009). Strategic water management and the global financial crisis: transparency in the mining sector. The AusIMM Bulletin. No.4. August 2009. | AusIMM Bulletin. | Water Management | N/A | No | 2009 | No |
| 519 | Eastern | Unknown (2009). Vlakfontein No.4 Shaft - Water Investigation. 2p. | Other | Water Sampling | N/A | No | 2009 | Yes |
| 520 | General | Unknown (2009). Western Utilities Corporation (WUC) Fact Sheet. Issue 1, September 2009. 4p. | WUC | Other | N/A | No | 2009 | No |
| 521 | General | Unknown (2010). Acid Mine Drainage – a real crisis but it is solvable. SA Mining. September 2010. | SA Mining | Other | N/A | No | 2010 | No |
| 522 | General | Unknown (2010). Acid Mine Drainage – an obvious solution, overlooking. SA Mining. September 2010. | SA Mining | Treatment Technologies | N/A | No | 2010 | No |
| 523 | General | Unknown (2010). Acid Mine Drainage – stemming the tide. Mining Mirror. Vol.22 No.11 May 2010. | Mining Mirror | Other | N/A | No | 2010 | No |
| 524 | Central | Unknown (2010). First Lowering of the Transducer for Water Testing Catlin Shaft Preliminary Report. Shango Solutions. 7p. | Shango Solutions | Water Sampling | N/A | No | 2010 | Yes |
| 525 | General | Unknown (no date). Gold Mining Management Options - Post-mining Impacts | Other | Treatment Technologies | Water Managemen t | Yes | Not Recorded | No |
| 526 | General | Unknown (2010). Grootvlei's heydays are over – in deep water. Mining Mirror. Vol 23. No.3. September 2010 | Mining Mirror | Mine Closure | Water Quantity | No | 2010 | No |
| 527 | General | Unknown (2010). Johannesburg Acid Mine Drainage – an alternative solution: is a pipeline to the sea an answer? SA Mining. September 2010. | SA Mining | Pumping | Treatment Technologie s | No | 2010 | No |
| 528 | General | Unknown (2010). Mining under water. SA Mining. September 2010. | SA Mining | Other | N/A | No | 2010 | No |
| 529 | General | Unknown (2010). Optimum opens high-tech water treatment plant. Modern Mining. June 2010. | Modern Mining | Treatment Technologies | Article | No | 2010 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|-------------------------|---------------------------|-------------------------------|----------------------------|-----------------|--------------|
| 530 | General | Unknown (2010). Water dilemma – political leadership essential to mitigate acid mine drainage problem. Mining Weekly. November 5 – November 11, 2010. | Mining Weekly | Water Management | N/A | No | 2011 | No |
| 531 | General | Unknown (2011). Watermark Global Update. Watermark Global PLC. 3p. | Watermark Global PLC | Other | N/A | No | 2009 | No |
| 532 | General | Unknown (no date). A Strategic Integrated Water Management Plan for the Gauteng Gold Mines. Environmental Engineering. 306p. | Other | Water Management | N/A | No | Not Recorded | No |
| 533 | General | Unknown (no date). Civil society organisations' statement in regard to the inter ministerial committee on Acid Mine Drainage (IMC) and the release of heavily polluted, toxic acid mine drainage into our streams and rivers. Water Utilities Corporation. 7p. | WUC | Hydrogeology | N/A | No | Not Recorded | No |
| 534 | General | Unknown (no date). Investigation into alternative water treatment technologies for the treatment of an underground mine water discharged by Grootvlei Proprietary Mines LTD into the Blesbokspruit. | Other | Treatment Technologies | N/A | Yes | Not Recorded | No |
| 535 | General | Unknown (no date). Historic court decision on Rietspruit Wetland Mining Issue. 3p. | Other | Other | N/A | No | Not Recorded | No |
| 536 | General | Unknown (no date). Our Specialist Services. Rand Water. 15p. | Rand Water | Water Management | N/A | No | Not Recorded | No |
| 537 | General | Unknown (no date). The Impact of Acid Mine Drainage in the Witwatersrand on the Mining Industry in Mpumalanga, Free State, Limpopo, North West and Northern Cape Provinces. 10p. | Other | Impacts | N/A | Yes | Not Recorded | No |
| 538 | Central | Unknown (no date). The Impact of the Discharge of Underground Water into the Klip River Catchment. ERPM Ltd. 65p. | ERPM | scenarios | Decant | No | Not Recorded | No |
| 539 | General | Unknown (no date). The Treatment of Acid Mine Drainage using the Savmin Process. 7p. | Other | Treatment Technologies | N/A | No | Not Recorded | No |
| 540 | General | Unknown (no date). Wetlands for the treatment of Acid Mine Drainage. 12p. | Other | Treatment Technologies | N/A | No | Not Recorded | No |
| 541 | General | US Environmental Protection Agency (1994). Acid mine drainage prediction. Technical Report. 52p. | US EPA | Water Management | N/A | Yes | 1994 | Yes |
| 542 | General | Usher, B.H. and Cruywagen, L.M. (2003). Acid Base: Accounting, Techniques and Evaluation (ABATE): Recommended Methods for Conducting and Interpreting Analytical Geochemical Assessments at Opencast Collieries in South Africa. Water Research Commission. 56p | WUC | Coal | Treatment Technologie s | No | 2003 | No |
| 543 | General | Usher, B.H. and Cruywagen, L.M. (2003). On-site and Laboratory Investigations of Spoil in Opencast Collieries and the Development of Acid-Base Accounting Procedures Report to the WRC by the Inst. for Groundwater Studies, UOFS. Water Research Commission. | WUC | Coal | Treatment Technologie s | No | 2003 | No |
| 544 | General | Uys, M (2008).Water Law of South Africa. Water Research Commission. | WRC | Water Management | N/A | Yes | 2008 | No |
| 545 | Central | Van Biljon, M. and Krige, G. (2002). Executive Summary Report: Flooding of the Central. 5p. | WRC | Water Quantity | N/A | Yes | 2002 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|---|--|---------------------------|-------------------------|----------------------------|------|--------------|
| 546 | Central | Van Biljon, M. and Walker, A. (2001) ERPM. Geological and geohydrological control on the groundwater ingress into the Central. Rison Consulting Pty (Ltd.), Pretoria, September 2001. Unpublished Report, 32 pp. | Rison Consulting | Hydrogeology | Ingress | No | 2001 | Yes |
| 547 | Central | Van Biljon, M., Krantz, R. and Walker, A. (1999). Central Basin Groundwater Modelling Exercise. Rison Consulting. 46p. | Rison Consulting | Hydrogeology | N/A | No | 1999 | Yes |
| 548 | General | Van der Berg, J.J. and Cruywagen, L. (2001). The suitability and impact of power station fly ash for water quality control in coal opencast mine rehabilitation Report to the WRC by the Institute for Groundwater Studies, UOFS, Bloemfontein. Water Research Commission | WRC | Impacts | Coal | No | 2001 | No |
| 549 | Eastern | Van der Merwe, W. and Lea, I. (2003). Towards sustainable mine water treatment at Grootvlei Mine, International Mine Water Association Conference, Sandton, October 2003. | International Mine Water Association Conference | Treatment Technologies | N/A | No | 2003 | No |
| 550 | Eastern | Van der Westhuisen, H. (1996). Proposal to Grootvlei Property Mines Ltd for Pres-ex sludge dewatering plant 15 tons per day dry solids. Explochem Water Treatment (Pty) Ltd. 35p. | Grootvlei Proprietary Mines | Treatment Technologies | N/A | No | 1996 | No |
| 551 | Western | Van Eeden, E.S., Lieferink, M. and Durand, J.F. (2009). Legal issues concerning mine closure and social responsibility on the West Rand. TD: The Journal for Transdisciplinary Research in Southern Africa, Vol. 5 no. 1, July 2009. pp.51-71 | The Journal for Transdisciplinary Research in Southern Africa | Mine Closure | N/A | No | 2009 | No |
| 552 | Western | Van Eeden, E.S., Liefferink, M. and Tempelhoff, E. (2008). Environmental ethics and crime in the water affairs of the Wonderfontein Spruit Catchment, Gauteng, South Africa. TD: The Journal for Transdisciplinary Research in Southern Africa, Vol. 4 no. 1, | The Journal for Transdisciplinary Research in Southern Africa | Environment | N/A | Yes | 2008 | No |
| 553 | General | Van Hille, R.P. & N Mooruth, N. (2010). Investigation of Sulphide Oxidation Kinetics and Impact of Reactor Design During Passive Treatment of Mine Water. WRC Report No. KV 268/11. Water Research Commission. 49p. | WRC | Treatment Technologies | N/A | No | 2010 | No |
| 554 | General | Van Hille, R.P., Antunes, A.P.M., Sanyahumbi, D., Nightingale, L. and Duncan, J.R. (2003). Development of integrated biosorption systems for the removal and/or recovery of heavy metals from mining and other industrial wastewaters, and determination of the toxicity of metals to bioremediation processes | WRC | Treatment Technologies | Water Sampling | Yes | 2003 | No |
| 555 | General | Van Niekerk, A.M. (1997). Generic Simulation Model for Opencast Mine Water Systems Report to the Water Research Commission by Wates, Meiring & Barnard. Water Research Commission. 142p. | WRC | Scenarios | Water Managemen t | No | 1997 | No |
| 556 | General | Van Rooyen, K. (1997). Water Standards Drinking water. Digby Wells & Associates. 20p. | Digby Wells | Water Quality | N/A | No | 1997 | No |
| 557 | General | Van Rooyen, P.G (1996). Grootvlei Socio-Economic and Environmental Cost Benefit Analysis - Grootvlei Mine Direct Cost Analysis | Other | Economic | N/A | Yes | 1996 | No |
| 558 | Multi-Basin | Van Tonder, D. and Coetzee, H. (2007). Identification of regional closure areas in the Witwatersrand Goldfields. Department of Minerals and Energy. | DME | Mine Closure | N/A | Yes | 2007 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|---|--|---------------------------|-------------------------|----------------------------|------|--------------|
| 559 | Multi-Basin | Van Tonder, D., Funke, N., Tutor, A. and Coetzee, H. (2007). Defining the closure management areas for the Witwatersrand gold mining sector: a governance and geo-environmental perspective. Department of Minerals and Energy. | DME | Mine Closure | N/A | Yes | 2007 | No |
| 560 | Western | van Tonder, D.M. (2008). Regional closure strategy for the Far West Rand Gold Field. Open File Report Council for Geoscience. Department of Minerals and Energy | DME | Mine Closure | N/A | Yes | 2008 | No |
| 561 | General | Van Tonder, D.M., Coetzee, H., Esterhuyse, S., Msezane, N., Strachan, L., Wade, P.W., Mafanya, T. and Mudau, S. (2008). South Africa's challenges pertaining to mine closure — The concept of regional mine closure strategy. Mine Closure 2008: Proceedings of the third international seminar on mine closure. A. Fourier, M. Tibbett, I. Weiersbye and P. Dye. Johannesburg, Australian Centre for Geomechanics: pp. 87–98. | Australian Centre for Geomechanics | Mine Closure | N/A | No | 2008 | No |
| 562 | General | Van Tonder, D.M., Coetzee, H., Esterhuyse, S., Strachan, L., Wade, P.W. and Mudau, S. (2009). South Africa's challenges pertaining to mine closure — development and implementation of regional mining and closure strategies. Mine Closure 2009. Proceedings of the forth international seminar on mine closure. A. Fourier, M. Tibbett, I. Weiersbye and P. Dye. Johannesburg, Australian Centre for Geomechanics | Australian Centre for Geomechanics | Mine Closure | N/A | No | 2009 | No |
| 563 | General | Van Tonder, D.M., Coetzee, H., Strachan, L.K.C., Mafanya, T., Wade, P.W., Msezane, N., Kwata, M.G., Roos, M., Sebake, D., Mengistu, H., Yibas, B. and Esterhuyse, S. (2008). Regional gold mining closure strategy for the Witwatersrand Basin. Department of Minerals and Energy. | DME | Mine Closure | N/A | Yes | 2008 | No |
| 564 | General | Van Zyl, H.C, Maree, J.P, van Niekerk, A.M, van Tonder, G.J & Naidoo,C. (2001). Collection treatment and reuse of mine water in the Olifants River Catchment | Other | Treatment Technologies | N/A | Yes | 2001 | No |
| 565 | General | Vegter, J.R. (2001). Groundwater development in South Africa and an introduction to the hydrogeology of groundwater regions. Water Research Commission. 106p. | WRC | Hydrogeology | N/A | No | 2001 | No |
| 566 | General | Vegter, J.R. and Ellis, G.J. (1968). Boorplekaanwysing vir Water op die Serie Ecca en meegaande Doleriet van Suidoos-Transvaal Bulletin 50. Department of Mines, Geological Survey. 81p | Department of Mines, Geological Survey | Dolomite | Water Managemen t | No | 1968 | No |
| 567 | General | Vermaak, J.J.G., Wates, J.A., Bezuidenhout, N. and Kgwale, D. (2004). The Evaluation of Soil Covers Used in The Rehabilitation of Coal Mines. WRC Report No. 1002/1/04. Water Research Commission. 334p. | WRC | Coal | N/A | Yes | 2004 | No |
| 568 | General | Vermaak, J.J.G., Wates, J.A., Bezuidenhout, N. and Kgwale, D. (2004). The evaluation of soil covers used in the rehabilitation of coal mines. Research Report 1002/1/04, Water Research Commission, Pretoria. | WRC | Treatment Technologies | Coal | No | 2004 | No |
| 569 | General | Vermaak, V. (2006). Shaftwolf project. Council for Geoscience Field Monitoring Book: 2006. "Spot"and "Wolf"Sampling and Water Levels. Shango Solutions. Various paginations. | Shango Solutions | Water Sampling | N/A | No | 2006 | Yes |
| 570 | General | Versfeld, D.B. and Everson, C.S. (1998). The use of vegetation in the amelioration of the impacts of mining on water quality - an assessment of species and water use Report to the WRC by the Division of Water, Environment and Forestry Technology, CSIR. | CSIR | Treatment Technologies | Water Quantity | No | 1998 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|--|---------------------------|-------------|----------------------------|------|--------------|
| 571 | General | Wade, P.W. and van Tonder, D.M. (2008) Regional Mine Closure Strategy KOSH (Klerksdorp, Orkney, Stilfontein, Hartbeesfontein) Gold Field. Open File Report. Council for Geoscience. Department of Minerals and Energy Resources. | CGS | Mine Closure | N/A | Yes | 2008 | No |
| 572 | General | Wade, P.W., Woodborne, S., Morris, W.M., Vos, P. and Jarvis, N.W. (2002). Tier 1 Risk Assessment of Selected Radionuclides in Sediments of the Mool River Catchment. WRC Report No. 1095/1/02. Water Research Commission. 108p. | WRC | Multi-Disciplinary | N/A | Yes | 2002 | No |
| 573 | General | Wade, P.W., Woodbourne, S., Morris, W., Vos, P. and Jarvis, N. (2002). Tier 1 risk assessment of radionuclides in selected sediments of the Mooi River, Water Research Commission, WRC Report 1095/1/02, Pretoria: 93 p. | e, P.W., Woodbourne, S., Morris, W., Vos, P. and Jarvis, N. (2002). Tier 1 risk assessment of nuclides in selected sediments of the Mooi River, Water Research Commission, WRC Report WRC Hydrogeology Sampling Sampling Sampling Sampling | | No | 2002 | Yes | |
| 574 | General | nsley Environmental Consultants. (1995). A preliminary assessment of the environmental leconomic and financial implications of dewatering the Eastern into the Blesbokspruit or Other Management N/A management. | | N/A | Yes | 1995 | No | |
| 575 | Eastern | Walmsley, R.D, Smithen, A, Harroway, T. (1996). Monitoring of the Blesbokspruit: Impacts of treated mine effluents from Grootvlei Mine for the Grootvlei Proprietary Mines Ltd. Steffen, Robertson and Kirsten CE (Pty) Ltd. 7 Sections, various paginations. Grootvlei Treatment Technologies Impacts | | No | 1996 | No | | |
| 576 | General | Wates Meiring and Barnard (1994). Surface and groundwater aspects related to the environmental management programme. ERPM consultancy report, REP. No.: 2829/803/1/w. ERPM Hydrogeology 50p. 50p. Hydrogeology Hydrogeology | | Water Managemen t | No | 1994 | Yes | |
| 577 | Central | Wates Meiring and Barnard (1995). Investigation into Reclamation and Re-use of Mine Water, East Rand Proprietary Mines Ltd. 29p. | ERPM | Treatment Technologies | N/A | Yes | 1995 | Yes |
| 578 | General | Wates, J.A. and Rykaart, E.M. (1999). The performance of natural soil covers in rehabilitating opencast mines and waste dumps in South Africa. Research Report 575/1/99, Water Research Commission, Pretoria. | WRC | Treatment Technologies | N/A | Yes | 1999 | No |
| 579 | General | Wates, J.A. and Rykaart, E.M. (1999). The Performance Of Natural Soil Covers In Rehabilitating Opencast Mines And Waste Dumps In South Africa. WRC Report No. 575/1/99.Water Research Commission. 246p. | WRC | Treatment Technologies | N/A | No | 1999 | No |
| 580 | General | Wates, J.A., Lorentz, S.A., Marais, H., Baxter, B.J.M., Theron, M. and Dollar, L. (2006). An evaluation of the performance and effectiveness of improved soil cover designs to limit through-flow of water and ingress of air. WRC Report No. 1350/1/07. Water Research Commission. | WRC | Treatment Technologies | Ingress | No | 2006 | No |
| 581 | Multi-Basin | WBEC. (2010). WBEC Long term solution letter and proposal to Acting DDG DWAE: Industry Proposal for the Management of the Acid Mine Drainage in the Witwatersrand Goldfields. | WBEC | Treatment Technologies | ter Managem | n Yes | 2010 | No |
| 582 | General | Wendel, G. (1998). Radioactivity in mines and mine water - sources and mechanisms. 5p. | Other | Water Quality | N/A | No | 1998 | No |
| 583 | General | Western Utilities Corporation and Golder Associates (2009). Environmental Impact Assessment: Western Utilities Corporation Mine Water Reclamation Project - Comment and Response Report. EIA Ref No. Gaut 002/09-10/N0095 & Golder Report No. 12064-8755-1 | WUC / Golder | Impacts | N/A | No | 2009 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|---|---|---------------------------|----------|----------------------------|------|--------------|
| 584 | General | Western Utilities Corporation and Golder Associates (2009). Environmental Impact Assessment: Western Utilities Corporation Mine Water Reclamation Project - Final Scoping Report. EIA Ref No. Gaut 002/09-10/N0095 & Golder Report No. 12064-8964-12 | WUC / Golder | Impacts | N/A | Yes | 2009 | No |
| 585 | General | Western Utilities Corporation and Golder Associates (2009). Environmental Impact Assessment: Western Utilities Corporation Mine Water Reclamation Project - Map Set and Property Registers. EIA Ref No. Gaut 002/09-10/N0095 & Golder Report No. 12064-8755-1 | iolder Associates (2009). Environmental Impact Assessment: Water Reclamation Project - Map Set and Property Registers. & Golder Report No. 12064-8755-1 | | 2009 | No | | |
| 586 | General | Western Utilities Corporation and Golder Associates (2009). Environmental Impact Assessment: WUC / Golder Impacts N/A Western Utilities Corporation Mine Water Reclamation Project - Map Set and Property Registers. WUC / Golder Impacts N/A EIA Ref No. Gaut 002/09-10/N0095 & Golder Report No. 12064-8964-12 Impacts N/A | | Yes | 2009 | No | | |
| 587 | General | tcutt, J.M, Brown, L., Taqljaard, P., Du Toit, S. and Du Toit, P. (2007). Monitoring ronmental Water for the presence of toxic agents: A pilot study in the Vaal Barrage WRC Hydrogeology N/A hment | | Yes | 2007 | No | | |
| 588 | General | Whittington-Jones, K.J. (2002). The Rhodes BioSURE Process. Volume 4, Part 2: Enhanced Hydrolysis of Organic Carbon Substrates - Development of the Recycling Sludge Bed Reactor Salinity, Sanitation & Sustainability: A Study in Environmental Biotechnology | Other | Treatment Technologies | N/A | Yes | 2002 | No |
| 589 | General | Wikipedia (2007). Surface Mining Control and Reclamation Act of 1977. From http://en.wikipedia.org/wiki/Surface_Mining_Control_and_Reclamation_Act_of_1977. | kipedia (2007). Surface Mining Control and Reclamation Act of 1977. From p://en.wikipedia.org/wiki/Surface_Mining_Control_and_Reclamation_Act_of_1977. | | Yes | 2007 | No | |
| 590 | General | Wildeman, T. (1993). Wetland design for mining operations. BiTech Publishers Ltd. 16-5 parts. | BiTech Publishers Ltd | Treatment Technologies | N/A | No | 1993 | No |
| 591 | General | Wilson, J; Trollip, D. (2009). National Standards for Drinking water Treatment Chemicals.Water Research Commission. | WRC | Treatment Technologies | N/A | Yes | 2009 | No |
| 592 | Western | Winde,F. (2009). Uranium Pollution of water resources in mined-out and active goldfields of South Africa - A case study in the Wonderfonteinspruit catchment on extent and sources of U-contamination and assosciated health risks | Other | Treatment Technologies | N/A | Yes | 2009 | No |
| 593 | Western | Winde, F. and Stoch, E.J. (2009). Threats and opportunities for post-closure development in dolomitic gold mining areas of the West Rand and Far West Rand (South Africa) – a hydraulic view. Part 1: Mining legacy and future threats. 6p. | Other | Mine Closure | Dolomite | No | 2009 | No |
| 594 | Western | Winde, F. and Stoch, E.J. (2009). Threats and opportunities for post-closure development in dolomitic gold-mining areas of the West Rand and Far West Rand (South Africa) – a hydraulic view. Part 2: Opportunities. 8p. | Other | Mine Closure | Dolomite | Yes | 2009 | No |
| 595 | Central | Winde, F., (2011) Desktop assessment of the risk for basement structures of buildings of Standard Bank and ABSA in Central Johannesburg to be affected by rising mine water levels in the Central Basin. Mine Water Research Group, NWU, Potchesfstroom Campus, Geography, School of Environmental Sciences and Development. 164 pp. | NWU | Hydrogeology | N/A | Yes | 2011 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|-------------|--|--|---------------------------|---------|----------------------------|------|--------------|
| 596 | General | Winde, F., Wade, P. and Van Der Walt, I.J. (2004). Gold tailings as a source of water-borne uranium contamination of streams - The Koekemoerspruit (South Africa) as a case study Part III of III: Fluctuations of stream chemistry and their impacts on uranium | NWU | Impacts | N/A | N/A No | | No |
| 597 | General | Wismut (2008). 'Wismut GmbH — a government-financed company in Saxony and Thuringia.' | Other | Other | N/A | No | 2008 | No |
| 598 | Eastern | WMB (1993). Grootvlei Mine - Hydrological and flood line investigation, Job 2715, August 1993. Grootvlei Proprietary Mines | | Hydrogeology | N/A | No | 1993 | No |
| 599 | Eastern | WMB (1996). Blesbokspruit Catchment – Proposed Terms of Reference for a Catchment Impact Assessment, Report No 3501/1344/1W, September 1996, in collaboration with Walmsley Environmental Consultants. | Walmsley Environmental Consultants | Treatment Technologies | N/A | No | 1996 | No |
| 600 | General | Wylie, G.F. (1996). Review of Underground Water with particular reference to the Bank Dyke East Area South Deepening Project. Western Deep Levels Ltd. 9p. | Other | Hydrogeology | N/A | No | 1996 | No |
| 601 | General | Yibas, B., Pulles, W. and Nengovhela, C. (2010). Kinetic Development of Oxidation Zones in Tailings Dams with specific reference to the Witwatersrand Gold Mine Tailings Dams. Report to the Water Research Commission, WRC Report No. 1554/1/10. 105p. | | Water Sampling | N/A | Yes | 2010 | Yes |
| 602 | Multi-Basin | is, B., Pulles, W. and Nengovhela, C. (2010). Kinetic Development of Oxidation Zones in Tailings ins with Specific Reference to the Witwatersrand Gold Mine Tailings Dams. WRC Report No. 4/1/10. Water Research Commission. 105p. Treatment Technologies | | N/A | No | 2010 | No | |
| 603 | General | Younger, P.L. (1997). The longevity of mine water pollution: a basis for decision-making. The Science of the Total Environment, 194–195: 45–466. | Other | Water Management | N/A | Yes | 1997 | No |
| 604 | General | Younger, P.L. (1997). The longevity of mine water pollution: a basis for decision-making. The Science of the Total Environment 194/195. pp.457-466. | Other | Multi-Disciplinary | N/A | Yes | 1997 | No |
| 605 | General | Zinck, J. (2006). Disposal, reprocessing and reuse options for acidic drainage treatment sludge. 16p. | Other | Treatment Technologies | N/A | Yes | 2006 | No |
| 606 | General | F Wimberley; J Jordaan; W Pulles (2008). Water Management for mine Residue Deposits. Best Practice Guidelines for Water Resource Protection in the SA Mining Industry. A2. 87p. | DWAF | Water Management | N/A | Yes | 2008 | No |
| 607 | General | Jacobs, P., Eksteen, M. and Pulles, W. (2007). Water Treatment. Best Practice Guidelines for Water Resource Protection in the South African Mining Industry. H4. | DWAF | Treatment Technologies | N/A | Yes | 2007 | No |
| 608 | General | National Treasury (2004). Standardised PPP Provisions. National Treasury PPP proactive note number 01 of 2004 - p 1-189 | National Treasury | Institutional | N/A | Yes | 2004 | No |
| 609 | General | Pulles Howard & de Lange Inc. & Golder Associates Africa. W. Pulles (2008). Department of Water Affairs and Forestry, 2008. Best Practice Guideline H1: Integrated Mine Water Management. | DWAF | Water Management | N/A | Yes | 2008 | No |
| 610 | General | Pulles Howard & de Lange Inc. P. Jacobs, M. Eksteen, W. Pulles (2006). Department of Water Affairs and Forestry, 2006. Best Practice Guideline H3: Water Reuse and Reclamation. | DWAF | Treatment Technologies | N/A | Yes | 2006 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|---|---------------|---------|----------------------------|-----------------|--------------|
| 611 | General | CSIR Environmental Services. (1996). Not specified Department of Water Affairs and Forestry, 1996. South African Water Quality Guidelines (second edition). Volume 5: Agricultural Use: Livestock Watering. P 1 - 163 | DWAF | Water Quality | N/A | Yes | 1996 | No |
| 612 | General | Minister of Water and Environmental Affairs (2011). Letter: Dr Snowy Khoza - Emergency works water management on the Witwatersrand Gold Fields with special emphasis on Acid Mine DWAF STI N/A Yes 2 Drainage: Directive in terms on the national Water Act, 1998 (ACT 36 OF 1998) | | 2011 | No | | | |
| 613 | General | Government of Western Australia Dept of Mines and Petroleum Environment (2009). Acid Mine Drainage. Environmental Notes on Mining | Government of Western Australia Dept of Mines and Petroleum Environment | Impacts | N/A | Yes | 2009 | No |
| 614 | General | Dr Josick Comarmond APPENDIX A Chemical methods for predicting the acid mine drainage/acid Environment vater Quality N/A | | | | Yes | Not Recorded | No |
| 615 | General | National Treasury PPP Manual Module 1: South African Regulations for PPPs p1-28 National Treasury PPP practice not number 02 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 616 | General | National Treasury PPP Manual Module 2: Code of good practice for BEE in PPPs p1-38 National Treasury PPP practice not number 03 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 617 | General | National Treasury PPP Manual Module 3: PPP inception p1-103 National treasury PPP practice note number 04 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 618 | General | National Treasury PPP Manual Module 4: PPP feasibility study p 1-76 National treasury PPP practice note number 05 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 619 | General | National Treasury PPP Manual Module 5: PPP Procurement p 1-95 National treasury PPP practice note number 06 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 620 | General | National Treasury PPP Manual Module 6: Managing the PPP agreement p 1-48 National treasury PPP practice note number 07 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 621 | General | National Treasury PPP Manual Module 7: Auditing PPPs p 1-48 National treasury PPP practice note number 08 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 622 | General | National Treasury PPP Manual Module 8: Accounting treatment for PPPs p 1-1 National treasury PPP practice note number 09 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 623 | General | National Treasury PPP Manual Module 9:Introduction to project finance p 1-1 National treasury PPP practice note number 10 of 2004 | National Treasury | РРР | N/A | Yes | 2004 | No |
| 624 | General | Andrew Donaldson (2004). Letter: Standardised PPP Provisions available | National Treasury | РРР | N/A | Yes | 2004 | No |
| 625 | General | Public Law 95-87: Surface mining control and reclamation Act of 1977 p1-197 | Other | Legal | N/A | Yes | 1977-2006 | No |
| 626 | General | National Treasury Standardised PPP Provisions (2004). Part J: Relief events, compensation events and force majeure | National Treasury | РРР | N/A | Yes | 2004 | No |
| 627 | General | Terrence Chatwin (2010). The GARD Guide. P 1 - 20 | INAP | Other | N/A | Yes | 2010 | No |
| 628 | General | National Treasury PPP Manual PPP Project Cycle - Reflecting Treasury Regulation 16 to the Public Finance Management Act, 1999 | National Treasury | РРР | N/A | Yes | 1999 | No |

| ID | Area | Reference | Source / Owner | Topic 1 | Topic 2 | Available to Study Team | Date | Confidential |
|-----|---------|--|---|-----------------|-----------------|----------------------------|-----------------|--------------|
| 629 | General | Conclusions / Reference of unknown report | Other | Other | N/A | Yes | Not Recorded | No |
| 630 | General | 1 Introduction (part of a report) p1-2 Other N/A Yes Re | | Not Recorded | No | | | |
| 631 | General | 1.1 OSS/ACMRR Study of Acid Mind Drainage in Australia (part of a report) p 2 - 19 | ACMRR Study of Acid Mind Drainage in Australia (part of a report) p 2 - 19 Other Other N/A Yes | | Yes | Not Recorded | No | |
| 632 | General | 3 Survey of Acid drainage at mine sites in Australia (part of a report) p 19 - 38 | es in Australia (part of a report) p 19 - 38 Other Other N/A | | Yes | Not Recorded | No | |
| 633 | General | Estimate of liability for current mines (part of a report) p 39 - 45 Other Legal N/A Yes | | Yes | Not Recorded | No | | |
| 634 | General | 5 Liability of historic mine sties (part of a report) p 45-51 Other Legal N/A Yes | | Yes | Not Recorded | No | | |
| 635 | General | 5.2 Potential costs of rehabilitating historic mines (part of a report) p 51-65 | Other | Economic | N/A | Yes | Not Recorded | No |
| 636 | General | SRK. Not Specified (1988). RESEARCH ON THE CONTRIBUTION OF MINE DUMPS TO THE MINERAL POLLUTION LOAD IN THE VAAL BARRAGE | WRC | Geology | N/A | No | 1988 | No |
| 637 | General | L Schlemmer, G Stewart and J Whittles (1989). The Socio - Economic Effects of Water Restrictions on Local Authorities, Selected Industrial and Commercial Establishments and other Private WRC Water Agencies | | Yes | 1989 | No | | |
| 638 | General | Department of Microbiology, University of Stellenbosch. M.A. LOOS, C. CLEGHORNANDH. MODINGER (2000) OCCURRENCE OF BACTERIA CAUSING ACID MINE DRAINAGE IN THE OUTER LAYERS OF COAL WASTE DUMPS IN RELATION TO ABIOTIC ECOLOGICAL DETERMINANTS AND SOIL COVERS USED FOR DUMP REHABILITATION | WRC | Water Quality | N/A | Yes | 2000 | No |



Appendix B Spatial Database

| Category | ID | File Name | Description | Projection Basin | | Source | Copyright | Date |
|---------------------------------------|-------|---------------------------------------|--|-------------------------------|---------------|-----------------------|-----------|-----------|
| | | | | | | | issues | created |
| General Study Area Maps | S001 | Basin Study areas | Polygon Of The 3 Basin Areas: Eastern, Central And Western | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | BKS | No | Not given |
| Existing Infrastructure | S002 | City of Jhb Water infrastructure | Bulk Water Pipes In The JHB Area | Lo 29 WGS 84 | Central Basin | City of Jhb | Yes | Not given |
| Topography and related | S003 | Contours - 5metres | 5 Meter Contour Line Swith Elevation | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Surveyor General | Yes | Not given |
| Other | S004 | Dams_llwgs | Dams In The Study Area | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | DWA | Yes | Not given |
| Geology | S005 | Dolomite areas | Polygons Indicatin The Dolomitic Areas | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | GIS aurecon | Yes | Not given |
| Other | S006 | EKH_Cad_llwgs | Polygons Indicating The Cadastral Data | Lo 29 WGS 84 | Eastern Basin | GIS aurecon | Yes | Not given |
| Other | S007 | Enpat99_Ilwgs | Polygons With Enpat Data | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Enpat | Yes | Not given |
| Existing Infrastructure | S008 | Existing Treatment points | Points Captures From The Golders/BKS Report | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Golders | Yes | Not given |
| Geology | S009 | Geology_llwgs | Polygons With Geology Data | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | RSA Geology | Yes | Not given |
| Hydrology | S010 | Hydrological Zones_IICape | Polygons Indicating Hydrological Zones With ID | Cape Lat/Long | Multibasinal | ?? | Yes | Not given |
| Other | S011 | JHB_Cad_lo29wg | Polygons Indicating The Cadastral Data | Lo 29 WGS 84 | Central Basin | GIS aurecon | Yes | Not given |
| Other | S012 | Land Cover | Ploygons | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | GIS aurecon | Yes | Not given |
| Other | S013 | Land Use | Ploygons | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | GIS aurecon | Yes | Not given |
| Environmental | S014 | NFEPA Wetlands Ilwg | Wetlands In The Study Area | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | NFEPA | Yes | Not given |
| Other | S015 | Population | Polygons With Census Data On Sub-Place Level | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Census 2001 | Yes | 2001 |
| Environmental | S016 | Protected Area Ilwgs | Polygons Indicating The Gauteng C-Plan Protected Areas | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Gauteng C-Plan | Yes | Not given |
| Environmental | S017 | Ridges Ilwg | Polygons Indicating The Gauteng C-Plan Transformed Ridge Areas | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Gauteng C-Plan | Yes | Not given |
| Environmental | S018 | Ridges Transformed Ilwgs | Polygons Indicating The Gauteng C-Plan Ridge Areas | Hartbeesthoek Lat/Long WGS 85 | Multibasinal | Gauteng C-Plan | Yes | Not given |
| Environmental | \$019 | River Conservation Status Ilwas | Lines Indicating The Rivers And Their Concerrvation Status | Hartbeesthoek Lat/Long WGS 85 | Multibasinal | Gauteng C-Plan | Yes | Not given |
| Topography and related | 5020 | Rivers&Streams Ilwgs | Rivers & Streams In The Study Area | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | DWA | Yes | Not given |
| Environmental | 5020 | Sensitive Feature Sites Ilwg | Polygons Indicating The Gauteng C-Plan Sensistive Areas | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Gauteng C-Plan | Yes | Not given |
| Other | 5022 | SG Dams Ilwg | Dams In The Study Area | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Surveyor General | Yes | Not given |
| Other | 5022 | SG_Erf_llwgs | Polygons Indicating The Cadastral Data | Hartbeesthoek Lat/Long WGS 84 | Multibasinal | Surveyor General | Ves | 2010 |
| Other | 5023 | SG_Earm Portion Ilwas | Polygons Indicating The Cadastral Data | Hartbeesthoek Lat/Long WGS 84 | Regional | Surveyor General | Ves | 2010 |
| Topography and related | 5024 | Slime Dams | Polygons Captured From The 1 : 50 000 Topo Maps | Hartbeesthoek Lat/Long WGS 85 | Multibasinal | Surveyor General | No | Not given |
| Goology | 5025 | Soil types llwg | Polygons With Soil Type Data | Hartbeesthoek Lat/Long WGS 83 | Multibasinal | ARC Soil Mans | Voc | Not given |
| Environmental | 5020 | Vegetation | Polygons With Vegetation Data | Hartboostbook Lat/Long WGS 84 | Multibasinal | Riodivorsity data | Voc | Not given |
| Othor | 5027 | Waterbodies Illugs | Dams In The Study Area | Hartboostbook Lat/Long WGS 84 | Multibasinal | Goutong C Blan data | Voc | Not given |
| Other | 5020 | Waterboules_liwgs | Pallis III file Study Area | Lo 27 cono | Wastern Basin | Gauteing C-Piali uata | Yes | Not given |
| Utiel | 5029 | WPO0 Moon Appual Presinitation IICana | Polygons Indicating M/R00 ID For Moon Annual Provinitation | Cana Lat/Lang | Multibasinal | WIDOO | Vec | Not given |
| Hydrology | 5050 | WR90_Wean_Annual_Precipitation_licape | Polygons Indicating WR90 ID For Mean Annual Pupoff | Cape Lat/Long | Multibasinal | WR90 | Yes | Not given |
| Fuisting Inforetructure | 5031 | WR90_Wean_Annual_Runon_incape | Polygon Showing The Crown Knight Diant | Cape Lat/Long | Wultibasinai | WK91 | tes | Not given |
| Existing infrastructure | 5032 | Crowns Knight Plant | Polygon Showing The Crown Knight Plant | Hartbeestnoek Lat/Long WGS 85 | Central Basin | BKS | NO | Not given |
| Required for Study's Options Analysis | 5033 | Proposed Pipline Routes | Lifies indicating the Pipeline Routes | Hartbeestnoek Lat/Long WGS 86 | Central Basin | BKS | NO | Not given |
| Required for Study's Options Analysis | 5034 | Other Sharts | Points with Shart Name | Hartbeestnoek Lat/Long WGS 87 | Eastern Basin | BKS | NO | Not given |
| Required for Study's Options Analysis | 5035 | Chafte and Diants | Lines indicating The Pipeline Routes | Hartbeestnoek Lat/Long WGS 88 | Eastern Basin | BKS | NO | Not given |
| Existing Infrastructure | 5036 | | | Hartbeestnoek Lat/Long WGS 89 | Eastern Basin | BKS | NO | Not given |
| Required for Study's Options Analysis | 5037 | Proposed Pipeline Routes | Lines indicating The Pipeline Routes | Hartbeestnoek Lat/Long WGS 90 | Western Basin | BKS | NO | Not given |
| Required for Study's Options Analysis | 5038 | Shafts and Decants | Points with Shaft Names | Hartbeesthoek Lat/Long WGS 91 | Western Basin | BKS | No | Not given |
| Mining Maps | S039 | Western Gold Mines | Polygons With Mine Names | Hartbeesthoek Lat/Long WGS 92 | Western Basin | BKS | No | Not given |
| Mining Maps | S040 | Mine boundaries | Polygons With Mine Names | Hartbeesthoek Lat/Long WGS 93 | Multibasinal | Shango Solutions | No | 2012 |
| Topography and related | S041 | 1500_Contour_ER_CR.dbf | Contour Data For The East Rand | GCS_WGS_1984 | Muiltibasinal | CGS | No | 2005 |
| Topography and related | S042 | 1520_Contour_ER_CR.dbf | Contour Data For The East Rand | GCS_WGS_1984 | Muiltibasinal | CGS | No | 2006 |
| Topography and related | S043 | 1540_Contour_ER_CR.dbf | Contour Data For The East Rand | GCS_WGS_1984 | Muiltibasinal | CGS | No | 2006 |
| Cadastral Data | S044 | 2627_AIR_TRANSPORT_AREA_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S045 | 2627_ARTIFICIAL_SURFACE_AREA_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Other | S046 | 2627_ARTIFICIAL_SURFACE_LINE_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S047 | 2627_BARRIER_LINE_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S048 | 2627_BOUNDARY_AREA_AREA_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S049 | 2627_BOUNDARY_LINE_LINE_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S050 | 2627_BUILDING_AREA_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S051 | 2627_BUILDING_POINT_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S052 | 2627_CONTROL_POINT_POINT_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S053 | 2627_DRAINAGE_LINE_LINE_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S054 | 2627_INLAND_WATER_AREA_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S055 | 2627_LAND_USE_AREA_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S056 | 2627_LAND_USE_LINE_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |

| Category | | | Brandattan | Projection | Pasin Source | 6 | Copyright | Date |
|-------------------------|-------|--------------------------------------|----------------|--------------|--------------|------------------|-----------|---------|
| Category | טו | File Name | Description | Projection | Basin | Source | issues | created |
| Cadastral Data | S057 | 2627 MAP INDEX AREA 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S058 | 2627 RAILWAY LINE 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S059 | 2627 RAILWAY POINT 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S060 | 2627 RELIEF LINE 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S061 | 2627 RELIEF POINT 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S062 | 2627 RELIEF10 LINE 2006 04 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Cadastral Data | S063 | 2627 RELIEF10 POINT 2006 07 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2008 |
| Cadastral Data | S064 | 2627 RIVER AREA 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S065 | 2627 RIVER LINE 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | \$066 | 2627 ROAD LINE 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S067 | 2627 STRUCTURE AREA 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S068 | 2627 STRUCTURE LINE 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | \$069 | 2627 STRUCTURE POINT 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | \$070 | 2627 TOPO AREA AREA 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S071 | 2627 TOPO LINE LINE 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | \$072 | 2627 TOPO POINT POINT 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | 5072 | 2627 VEGETATION AREA 2006 10 | Cadastral Data | GCS WGS 1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | 5075 | 2627 VEGETATION LINE 2006 10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | 5075 | 2627_VEGETATION_POINT_2006_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5075 | 2627_VEGETATION_FORM_2000_10 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5070 | 2628 AIR TRANSPORT AREA 2006 04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5078 | | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5079 | 2628 ARTIFICIAL SURFACE LINE 2006 04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5075 | 2628 BARRIER LINE 2006 04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5080 | 2628_BARMEN_LINE_2000_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5081 | 2628_BOUNDARY_AREA_AREA_2000_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5082 | | Cadastral Data | CCS_WCS_1984 | Regional | Shango Solutions | No | 2000 |
| Cadastral Data | 5085 | 2628_BUILDING_AREA_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5084 | 2628_BUILDING_POINT_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5085 | | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5080 | 2628_DRAINAGE_LINE_LINE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5087 | 2628_INLAND_WATER_AREA_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5080 | 2628_ISLAND_AREA_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5009 | 2628_LAND_USE_UNE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5090 | 2628_LAND_USE_LINE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5091 | 2628_MAP_INDEX_AREA_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5092 | 2628_RAILWAY_AREA_2000_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| | 5093 | 2628_RAILWAY_LINE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5094 | 2628_RAILWAY_POINT_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| | 5095 | 2628_RELIEF_LINE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5096 | 2628_RELIEF_POIN1_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | 5097 | 2628_RELIEF10_LINE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2009 |
| Cadastral Data | 5098 | 2628_RELIEF10_POIN1_2006_07 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2010 |
| Cadastral Data | 5099 | 2628_RIVER_AREA_2006_04 | | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | \$100 | 2628_RIVER_LINE_2006_04 | | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | \$101 | 2628_ROAD_LINE_2006_04 | | GCS_WGS_1984 | Regional | Shango Solutions | NO | 2006 |
| Cadastral Data | \$102 | 2628_STRUCTURE_AREA_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | \$103 | 2628_STRUCTURE_LINE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S104 | 2628_STRUCTURE_POINT_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S105 | 2628_TOPO_AREA_AREA_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S106 | 2628_TOPO_POINT_POINT_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S107 | 2628_VEGETATION_AREA_2006_04 | Ladastrai Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S108 | 2628_VEGETATION_LINE_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S109 | 2628_VEGETATION_POINT_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Cadastral Data | S110 | 2628_WATER_SOURCE_POINT_2006_04 | Cadastral Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2006 |
| Existing Infrastructure | S111 | Airports | Point Data | GCS_WGS_1984 | Regional | Shango Solutions | No | 2010 |
| Environmental | S112 | Biomes_NSBA_SA | Ploygon | GCS_WGS_1984 | Regional | Shango Solutions | No | 1999 |

| Catagony | ID | File Name | File Name Description Projection Basin Source | Source | Copyright | Date | | |
|-------------------------|-------|--|--|-------------------------|---------------|------------------|--------|---------|
| Category | | File Name | Description | Projection | Dasin | Source | issues | created |
| Existing Infrastructure | S113 | Bridges_PowerLines | Polyline | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Existing Infrastructure | S114 | Built Up Areas | Polygon | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Existing Infrastructure | S115 | Combined_Shafts_Rated | Point | GCS_WGS_1984 | Central Basin | Shango Solutions | No | 2011 |
| Environmental | S116 | Dams | Polygon | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Environmental | S117 | Dams_CR_ER.dbf | Polygon | GCS_WGS_1984 | Muiltibasinal | CGS | No | 2009 |
| General Study Area Maps | S118 | Degree_Grid.dbf | Polyline | GCS_WGS_1984 | Regional | CGS | No | 2001 |
| Environmental | S119 | DME_InLandWater_ER | Polygon | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Topography and related | S120 | DME_Relieflines | Polyline | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Topography and related | S121 | DME_Tiles_50 | Polyline | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Environmental | S122 | DME-Rivers_ER | Polyline | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Environmental | S123 | Drainage_lines | Polyline | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Geology | S124 | ER_Geology | Polygon | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Geology | S125 | ER_Geology_Lines | Polyline | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Other | S126 | ERPM_Discharge_Monitoring_Points | Point | GCS_WGS_1984 | Central Basin | Shango Solutions | No | 2005 |
| Mining Maps | S127 | ERPM_Mine_Boundary | Polyline | GCS_WGS_1984 | Central Basin | CGS | No | 2006 |
| Other | S128 | ERPM Overland Pipe | Polyline | GCS WGS 1984 | Central Basin | Shango Solutions | No | 2006 |
| Other | S129 | ERPM Surface Sampling Points | Point | GCS WGS 1984 | Central Basin | Shango Solutions | No | 2005 |
| Geology | S130 | Faults Wits Basin | Polyline | GCS WGS 1984 | Muiltibasinal | Shango Solutions | No | 2010 |
| Geology | S131 | Faults Witsgold | Polyline | GCS Hartebeesthoek 1999 | Eastern Basin | CGS | No | 2005 |
| Existing Infrastructure | S132 | FEW Compartment | Polygon | GCS WGS 1984 | Central Basin | Shango Solutions | No | 2006 |
| Existing Infrastructure | S133 | Gauteng north | Built Up Areas | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Existing Infrastructure | S134 | Gauteng south | Built Up Areas | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Cadastral Data | \$135 | Gauteng Farm Portions | Gauteng Farm Portion Boundaries | GCS WGS 1984 | Regional | Shango Solutions | No | 2012 |
| Cadastral Data | S136 | Gauteng Farm Portions Text | Gauteng Farm Portion Boundaries Names And Numbers | GCS WGS 1984 | Regional | Shango Solutions | No | 2012 |
| Cadastral Data | S137 | Gauteng Farm Text | Gauteng Farm Boundaries | GCS WGS 1984 | Regional | Shango Solutions | No | 2011 |
| Cadastral Data | S138 | Gauteng Farms | Gauteng Farm Boundaries Names And Numbers | GCS WGS 1984 | Regional | Shango Solutions | No | 2011 |
| Geology | \$139 | Geology SA.dbf | Polygon | GCS_WGS_1984 | Regional | CGS | No | 2001 |
| Existing Infrastructure | S140 | Highway ER CR.dbf | Polyline | GCS WGS 1984 | Muiltibasinal | CGS | No | 2005 |
| Mining Maps | S141 | Hurcules Compartment | Mine Voids In The Hercules Mine | GCS_WGS_1984 | Central Basin | Shango Solutions | No | 2006 |
| Existing Infrastructure | S142 | Industrial Land Use ERPM | Polygon | GCS_WGS_1984 | Central Basin | CGS | No | 2006 |
| Geology | S143 | Interpretted Structures SA | Geological Structures | GCS_WGS_1984 | Regional | Shango Solutions | No | 2008 |
| Hydrology | S144 | Knights deep Sample Points | Points | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Hydrology | \$145 | Knights sampling points | Points | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Other | S146 | KRB holes | Points | GCS WGS 1984 | Central Basin | Shango Solutions | No | 2006 |
| Existing Infrastructure | S147 | Land Use areas ER | Polygons | GCS Hartebeesthoek 1999 | Eastern Basin | CGS | No | 2005 |
| Mining Maps | S148 | Langlaagte shafts | Points | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Other | S149 | Lease Ownership | Polygons | GCS Hartebeesthoek 1999 | Eastern Basin | CGS | No | 2005 |
| Existing Infrastructure | S150 | Limpopo south | Built Up Areas. Polygons | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Existing Infrastructure | S151 | Main Roads | Polvline | GCS_WGS_1984 | Regional | Shango Solutions | No | 2011 |
| Existing Infrastructure | S152 | Main Reef Road.dbf | Polvline | GCS_WGS_1984 | Regional | CGS | No | 2005 |
| Environmental | \$153 | Major Dams | Polygon | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Geology | \$154 | Mapped Structures SA | Geological Structures | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Hydrology | \$155 | Mayfair Sample Points | Points | GCS_WGS_1984 | Central Basin | CGS | No | 2005 |
| Mining Maps | S156 | Mineral Occurances SA.dbf | Points | GCS_WGS_1984 | Regional | CGS | No | 2001 |
| Mining Maps | \$157 | Mining Mineral Regions SA Polygon.dbf | Polygon | GCS WGS 1984 | Regional | CGS | No | 2001 |
| Mining Maps | \$158 | Mining Mineral Regions SA Polyline.dbf | Polvline | GCS_WGS_1984 | Regional | CGS | No | 2001 |
| General Study Area Maps | \$159 | Minute Grid.dbf | Polyline, Grid Data | GCS_WGS_1984 | Regional | CGS | No | 2001 |
| Existing Infrastructure | \$160 | N1 | N1 Highway | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Existing Infrastructure | \$161 | National Roads | National Boads (Not Complete) | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Existing Infrastructure | \$162 | National Roads poster | Selected National Roads, N1, N3 And N4 In Gauteng Region | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Hydrology | S163 | Perennial Rivers | Perennial Rivers | GCS WGS 1984 | Regional | Shango Solutions | No | 2011 |
| Hydrology | S164 | Perennial rivers Polygons | Perennial Rivers Polygons | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Environmental | S165 | Proposed De Hoop Dam | Proposed De Hoop Dam | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Topography and related | \$166 | Provincial Boundaries | Provincial Boundaries | GCS_WGS_1984 | Regional | Shango Solutions | No | 2011 |
| General Study Area Mans | \$167 | Provincial Boundaries SA dbf | Provincial Boundaries | GCS_WGS_1984 | Regional | CGS | No | 2001 |
| Existing Infrastructure | \$168 | Railway | Railway | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| | 0100 | | | | | 12 | | 2007 |

| Catagony | 5 | File Nome | Description | Brainstian Basin Source | Course | Copyright | Date | |
|-------------------------|-------|--------------------------------------|---|-------------------------|-----------------|-------------------------|--------|---------|
| Category | U | File Name | Description | Projection | Basin | Source | issues | created |
| Existing Infrastructure | S169 | Railway_Lines | Railway Lines | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Environmental | S170 | Ramsar_Site | Ramsar Site, Polygon | GCS_WGS_1984 | Regional | Shango Solutions | No | 2008 |
| Mining Maps | S171 | Recommended_Shafts | Recommended Shafts, Point | GCS_WGS_1984 | Central Basin | Shango Solutions | No | 2011 |
| Topography and related | S172 | Relief_Points | Relief Points | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Other | S173 | Residential_Commercial_Land_Use_ERPM | Residential Commercial Land Use In ERPM | GCS_WGS_1984 | Central Basin | CGS | No | 2006 |
| Environmental | S174 | Rivers | Rivers | GCS_WGS_1984 | Regional | Shango Solutions | No | 2008 |
| Environmental | S175 | Rivers_ER_CR.dbf | Rivers In The East And Central Basin | GCS_WGS_1984 | Muiltibasinal | CGS | No | 2006 |
| Existing Infrastructure | S176 | Roads | Roads | GCS_Hartebeesthoek_1999 | Eastern Basin | CGS | No | 2005 |
| Existing Infrastructure | S177 | Roads | Roads | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Existing Infrastructure | S178 | Roads (arterial) | Roads (Arterial) | GCS WGS 1984 | Regional | Shango Solutions | No | 2010 |
| Existing Infrastructure | S179 | Roads ERPM | Roads In ERPM | GCS WGS 1984 | Central Basin | CGS | No | 2006 |
| Hydrology | S180 | RobinsonDeep Sample Point | Robinsondeep Sample Points | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Hydrology | S181 | RoseDeep Sample Point | Rosedeep Sample Point | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Hydrology | S182 | sample pts verified wgsdd.dbf | Sample Points | GCS WGS 1984 | Muiltibasinal | CGS | No | 2005 |
| Existing Infrastructure | S183 | Sewage Plant | Sewage Plant | GCS WGS 1984 | Central Basin | Shango Solutions | No | 2006 |
| Mining Maps | S184 | Shafts | Shafts, Points | GCS WGS 1984 | Eastern Basin | Shango Solutions | No | 2004 |
| Hydrology | S185 | SimmerJack Sample Point | Simmerjack Sample Points | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Existing Infrastructure | \$186 | Slime Dams ERPM | Slime Dams In ERPM | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Topography and related | S187 | South Africa Boundary | South Africa Boundary | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Topography and related | S188 | Southern Africa Boundaries | Southern Africa Boundaries | GCS WGS 1984 | Regional | Shango Solutions | No | 2007 |
| Hydrology | S189 | StanHope Sample Point | Stanhope Sample Points | GCS WGS 1984 | Central Basin | CGS | No | 2005 |
| Hydrology | \$190 | Structure Points | Geological Structure Points | GCS Hartebeesthoek 1999 | Fastern Basin | CGS | No | 2005 |
| Geology | \$191 | Structure SA dbf | Geological Structures In South Africa, Polyline | GCS WGS 1984 | Regional | CGS | No | 2003 |
| Geology | \$192 | Structures EB | Structures In The Fastern Basin | GCS Hartebeesthoek 1999 | Fastern Basin | CGS | No | 2005 |
| Cadastral Data | \$193 | Towns | Towns | GCS_WGS_1984 | Regional | Shango Solutions | No | 2005 |
| Cadastral Data | \$10/ | Towns | Towns | GCS_WGS_1984 | Regional | Shango Solutions | No | 2011 |
| Cadastral Data | S105 | Towns for Postor | Selected Towns | 6C5_WG5_1984 | Regional | Shango Solutions | No | 2010 |
| Cadastral Data | \$106 | Towns for Procentation | Selected Towns | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Environmental | \$107 | Vaaldam NatureReconve | Vaaldam Naturerecenve | GCS_WGS_1984 | Regional | Shango Solutions | No | 2007 |
| Environmental | \$109 | Variation SA | Vegetation SA Playgon | GCS_WGS_1984 | Regional | Shango Solutions | No | 2010 |
| Environmental | 5196 | Water Shafts | Water Shafte | GCS_WGS_1984 | Control Docin | Shango Solutions | No | 2002 |
| Mining Maps | 5199 | Water_Statts | Water sharts | GCS_WGS_1984 | Central Basin | | No | 2009 |
| | 5200 | | 1-E0.000 Tenegraphic Mans | GCS_WGS_1984 | Cellural Basili | Cus Channe Calutions | NO No | 2005 |
| Topography and related | 5201 | wgszsz/cc.tif | 1.50 000 Topographic Maps | GCS_WGS_1984 | Mulitibasinal | Shango Solutions | NO | 2006 |
| Topography and related | 5202 | WGS2527CD.TIF | 1:50 000 Topographic Maps | GCS_WGS_1984 | Mulitibasinal | Shango Solutions | NO | 2006 |
| Topography and related | \$203 | WGS2527DC.TIF | 1:50 000 Topographic Maps | GCS_WGS_1984 | Mulitibasinal | Shango Solutions | NO | 2006 |
| Topography and related | \$204 | WGS2527DD.11F | 1:50 000 Topographic Maps | GCS_WGS_1984 | Mulitibasinal | Shango Solutions | NO | 2006 |
| Topography and related | \$205 | wgs2528cc.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Mulitibasinal | Shango Solutions | NO | 2006 |
| lopography and related | \$206 | wgs2528cd.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Multibasinal | Shango Solutions | No | 2006 |
| lopography and related | \$207 | wgs2528dc.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Multibasinal | Shango Solutions | No | 2006 |
| Topography and related | S208 | wgs2627aa.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S209 | wgs2627ab.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S210 | wgs2627ac.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S211 | wgs2627ad.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S212 | wgs2627ba.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S213 | WGS2627BB.TIF | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S214 | wgs2627bc.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S215 | wgs2627bd.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S216 | WGS2627CA.TIF | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S217 | WGS2627CB.TIF | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S218 | WGS2627DA.TIF | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S219 | wgs2628aa.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S220 | wgs2628ab.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S221 | wgs2628ac.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S222 | wgs2628ad.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S223 | wgs2628ba.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |
| Topography and related | S224 | wgs2628bc.tif | 1:50 000 Topographic Maps | GCS_WGS_1984 | Muiltibasinal | Shango Solutions | No | 2006 |


Appendix C Media Articles

| Media Articles | |
|----------------|--|
| 1 | Beeld |
| 1a | |
| 10 | 29 February 2012 - Letter by Gerrit van Tonder: "Aarde sal bewe oor suur water uitpomp" |
| 1b | 9 March 2012: "Water wat brand" (Carolina AMD) |
| 1c | 10 March 2012: "Carolina: Minister se myne moet 'n plan kry" |
| 1d | 16 May 2012: "Myn van goud het SA baie gekos" |
| 1e | 18 May 2012: "25 van dorp in hot na geweld oor water" (Carolina AMD) |
| 1f | 19 May 2012: "Suur water: Polisie skiet op betogers" (Carolina AMD) |
| 1g | 29 June 2012: "Suur water: Verslag maan - Behandeling gaan omgewing verander" |
| 1h | 10 July 2012: "Opskud met waterplan, anders het Gauteng te min" |
| 1i | 21 July 2012: "Vaalrivier: Boere gewaarsku" |
| 1j | 31 August 2012: "Te min geld stop uitpomp van suur mynwater" |
| 1k | 9 October 2012: "Kuns beeld vuil myne uit" |
| 2 | Radio Sonder Grense - Radio interviews |
| 2a | 20110922_MON_SUURWATER.mp3 |
| 2b | 20120325_EKOFORUM_SUURMYNWATER.mp3 |
| 2c | 20121007_EKOFORUM_SUURWATER_UITSTALLING.mp3 |
| 2d | 20121016_RSG_KUNS_Insidious_waters.mp3 |
| 3 | News 24 |
| За | 22 March 2012 - Molewa: Solve acid mine water crisis |
| 3b | 1 April 2012 - Ecological mine disaster expected |
| 3c | 22 April 2012 - Companies mining plans to purify acid mine water |
| 3d | 5 October 2012 - Researcher finds new acid water threat |
| 3e | 14 October 2012 - Acid mine water: Premier must step in says DA |
| 3f | 24 October 2012 - Mines chamber blasted at parly hearings |
| 4 | Business Day |
| 4a | 24 April 2012 - Desalinating acid water has useful spin-offs |
| 4b | 24 January 2012 - Upgrade for AMD water plant imminent |
| 4c | 23 May 2012 - MPs shocked over slow progress to stop rise of acid mine water |
| 5 | Sunday Times |
| 5a | 20 September 2012 - Toxic tide threatens to flood heritage hot spot: Gold Reef City mine |
| _ 1 | museum at risk from rising acid water |
| 50 | 10 June 2012 - Mines face environment challenge (Business times) |
| 0 | Engineering News |
| ба | 22 March 2012 - TCTA again warns of funding shortial for acid water projects |
| 0D 7 | AMD ES - Cart Blanch Article |
| 8 | DBSA lune 2011 edigest newsletter - Water sector: Acid mine drainage issues |
| 0 | |
| 9 | Mail&Guardian, 16 March 2011 - Acid mine drainage: Urgent move on polluted water, |
| | desalination will be fast-tracked before sulphate levels reach dangerous levels. |
| | Water Sewage & Effluent Magazine, May 2012 edition - Promulgator & police? Is the approach |
| 10 | to acid mine drainage an indicator of a broader mindshift in the South African Department of |
| | Water Affairs? |
| 11 | Financial Mail, 20 May 2005 - Last man in hot water |
| 12 | Newspaper article - Funds for acid mine drainage insufficient |
| 13 | Timeslive, 22 May 2012 - DRDGold acid minewater 'blackmail' angers committee chair |
| 14 | Pretoria News,10 July 2012 - Mining houses shun acid water study |
| 15 | Saturday Star, 10 March 2012 - Plea for clean water to preserve people's dignity |
| 40 | Mining weekly, 4 - 10 March 2011 - 'Sound Advice': Cabinet approves acid mine drainage |
| 16 | report (Thurton's Oppinion) |