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EAP
Qualifications &
CV

Appendix A.1

Environmental Assessment Practitioner:

- Qualifications
- Registration



Universiteit van Pretoria

Die Raad en die Senaat verklaar hiermee dat die graad

Baccalaureus in Landskapargitektuur

met al die regte en voorregte daaraan verbonde by geleentheid van
'n kongregasie van die Universiteit toegeken is aan

JOHAN JACOBUS GOOSEN

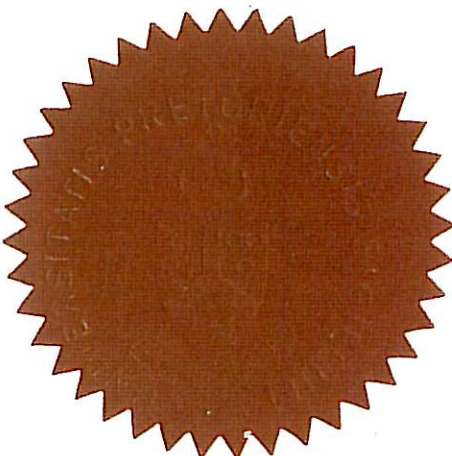
kragtens die Wet en Statuut van die Universiteit

Namens die Raad en die Senaat

Visekanselier en Rektor

Namens die Fakulteit
Natuurwetenskappe

Dekaan



Registrateur

1999-04-13



THIS IS TO CERTIFY THAT

Johan Jacobus Goosen

ID: 7510275115088

Reg. No. 20106

IS REGISTERED AS A
PROFESSIONAL LANDSCAPE ARCHITECT

WITH THE

**SOUTH AFRICAN COUNCIL
FOR THE LANDSCAPE ARCHITECTURAL
PROFESSION**

In terms of the regulations of Section 19 (2) (a) of the
Landscape Architectural Profession Act 45 of 2000

ISSUED ON 1 JULY 2015 AND VALID UNTIL 30 JUNE 2020

PRESIDENT

REGISTRAR

Appendix A.2

Environmental Assessment Practitioner

Curriculum Vitae

Curriculum vitae: Mr JJ GOOSEN

Name : **GOOSEN, JOHAN JACOBUS**
Date of Birth : 27 October 1975
Profession/Specialisation : Environmental Planner: landscape architecture and environmental planning
Years with Firm : 5
Nationality : South African
Years experience : 15

Key qualifications

Johan is employed as an environmental planner and landscape architect and at Aurecon. He has more than 15 years' experience in landscape architecture and environmental planning in a wide variety of sectors. His expertise includes urban open space planning and regional environmental planning frameworks, end land use planning for mining and waste facilities and brownfields site re-development. He has further been involved in numerous projects requiring environmental screening, impact assessment/permitting, construction monitoring and visual impact assessment (VIA) for linear infrastructure such as roads, rail, bulk water, urban and rural property developments and the mining and metals sector.

Johan holds a Bachelor in Landscape Architecture, which he obtained from the University of Pretoria (UP) in 1998, and completed a Graduate Diploma in Environmental Engineering from the Witwatersrand University (WITS) in 2014. He is a member of both the International Association of Impact Assessment (IAIA) and the Institute for Landscape Architecture in South Africa (ILASA). He is also a Registered Professional Landscape Architect with the South African Council for Landscape Architectural Professionals (SACLAP).

He has also been the co-writer and examiner of the environmental section of the SACLAP professional exam from 2009 to 2015, and regularly acts as external examiner for UP landscape architecture on environmental engineering aspects.

Employment record

07/2013 - Date	Aurecon, Associate, Landscape Architect and Environmental Planner
01/2012 - 06/2013	Aurecon, Landscape Architect and Environmental Planner
07/2010 - 12/2011	Golder Associates Africa, Landscape Architect, Environmental Planner and Group Leader: Land Development
2008 - 06/2010	Golder Associates Africa, Landscape Architect, Environmental Planner and Line Manager: Land Development Division
2003 - 2007	African EPA (Pty) Ltd, Landscape Architect, Environmental Planner and Divisional Manager: Landscape Architecture and Environmental Management
2000 - 2003	@Land Landscape Architects cc, Landscape Architect, Geographic Information System (GIS) Specialist and Member
1999 - 2000	Willem Van Riet Landscape Architects & Ecological Planners, Landscape Architect
1999	Wehrs Gartenbau - Walsrode, German, Landscape Installation/Construction

Management experience

2013 - Date	Associate for Environmental Services at Aurecon SA.
2010 - 2011	Division Leader of Land Development Division of Golder Associates. Reporting into the Business Unit Leader and management meeting. Responsible for managing and reviewing projects, and all required staff matters of the division as well as balanced scorecards and financial matters.
2008 - 2010	Line Manager of Land Development Division of Golder Associates, reporting into the Divisional Leader, responsible for managing projects and assisting with staff matters.
2003 - 2008	Divisional Manager of Landscape Architecture/Environmental Management Division of African EPA, responsible for managing projects and junior staff, as

2001 - 2003

well as monthly reporting to management meetings to the Board of Directors.
Member of @LAND Landscape Architects and Ecological Planners CC,
responsible for managing projects and junior staff.

Experience record

Environmental impact assessment (EIA) for Haakdoorndrift platinum open cast project (Limpopo Province, South Africa) 03/2016 - 12/2017. *Environmental Task Leader.* Aurecon was appointed to undertake the environmental impact assessment (EIA), waste and water licences for the Haakdoorndrift open cast project at their Amandelbult Complex as part of their open cast activities. Specialist studies include groundwater, soil and land capability, terrestrial and aquatic biodiversity, noise, blasting and vibration, heritage and palaeontology, social impact assessment (SIA) and floodline determination. Responsible for leading the integrated regulatory process, namely the EIA, and waste and WULA applications. Involved for 6 person-months. (Anglo American Platinum).

Dragline relocation pre-feasibility study at Landau Colliery (Mpumalanga Province, South Africa) 11/2015 - 09/2017. *Environmental Task Leader.* Aurecon was appointed to undertake a dragline relocation pre-feasibility study at Landau Colliery located in eMahlaheni. The scope of works extended to waste classification of discard material sources for Madini and Elandsfontein dumps. The works also included the compilation of a NEMA scoping/environmental impact assessment (EIA), waste Licence and IWULA for the proposed construction of a road, with the purpose of relocating the dragline from the Kromdraai Section to the Navigation Section of Landau Colliery. Responsible for leading the integrated regulatory process, namely the EIA and waste and WULA applications). Involved for 6 person-months. (Anglo Operations Pty Ltd).

Polokwane Neighbourhood Development Partnership Grant (NDPG) 2014 - 2016 (Limpopo Province, South Africa) 07/2014 - 12/2016. *Environmental and Landscape Design Task Leader.* Aurecon was appointed for a two-year period for the development of a precinct plan for the identified Seshego Hub, as part of the Neighbourhood Development Partnership Grant (NDPG) initiative; the management of required designs for current identified non-motorised transport (NMT) routes as well as the identification and design of future projects as identified in the P-Pan. Aurecon sub-contracted a portion of the work to Royal Haskoning (RH), but is supervising the implementation of the designs and performing all related future designs and its implementation. Responsible for environmental screening and landscape design inputs. Involved for 1 person-month. (Polokwane Local Municipality).

Waterberg feasibility (FEL 3) study for rail infrastructure (Limpopo and Mpumalanga Provinces, South Africa) 12/2014 - 12/2016. The project involved providing professional services for Stages 3, 4 and 5 of the Waterberg feasibility (FEL 3) study for coal rail infrastructure from Lephalale to Ermelo, including an incremental rail capacity development plan for expanding coal tonnage throughput up to 24 Mtpa. Aurecon was appointed to assist Transnet in attaining their business goal of establishing an incremental rail capacity development plan. Aurecon investigated and established the requirements in terms of upgrading the existing rail infrastructure in order to support the envisaged expansion, which includes infrastructure, rolling stock and other assets. Responsible for the environmental screening and report lead. Involved for 1.25 person-months. (Transnet SOC Johannesburg).

Waste management licence applications for Rooiberg landfill (Limpopo Province, South Africa) 01/2014 - 12/2016. *Environmental Task Leader.* The Department of Environmental Affairs (DEA) undertook a study, commissioned in 2007, which identified unlicensed municipal waste disposal facilities in South Africa. From the 581 sites that were identified, 341 were disposal facilities that needed to be licensed. Aurecon was appointed to conduct and manage the waste management licence applications on behalf of all affected municipalities. The scope involved solid waste management, transfer of skills to officials, legal compliance, environmental impact assessment (EIA) and environmental management. Responsible for the waste licence and leading the EIA. Involved for 2 person-months. (Department of Environmental Affairs (DEA)).

Engineering and project management services for the Project Raptor identification phase study (IPS) (Northern Cape Province, South Africa) 02/2015 - 12/2016. *Environmental Screening Task Leader.* Project Raptor was an identification phase study (IPS), initiated by BHP Billiton Hotazel Manganese Mines, to investigate all alternatives with regard to the establishment of new ore loading facilities for the Mamatwan and Wessels Mines. The aim was to produce a study document presenting a go-forward option and execution plan for the next phase. Aurecon followed a holistic approach to investigate options, scenarios and alternatives. Involved for 0.25 person-months. (Hotazel Manganese Mines (BHP)).

LNG-to-Power independent power producers (IPP) programme site selection project (Western Cape

Province, South Africa) 02/2016 - 11/2016. *Environmental Practitioner.* Aurecon was appointed by the South African Department of Energy's (DoE's) Independent Power Producer (IPP) Office to undertake the early phase project development work necessary to define a potential liquefied natural gas (LNG)-to-power project at Atlantis, Western Cape and at Coega, Eastern Cape. The scope of work entailed performing an initial site option investigation to assess the feasibility of establishing at least 1 000 MW and a maximum of 3 000 MW of gas-fired combined cycle gas turbine (CCGT) power generation technology. High-level studies on water requirements for potential desalination plants were also performed and potential third-party, non-power gas users, were also identified. Responsible for performing desktop environmental screening advice for the site selection study of Atlantis, Western Cape. Involved for 0.25 person-months. (Department of Energy (DoE)).

Integrated water and waste management plan (IWWMP) for Sonae Novobord (Mpumalanga Province, South Africa) 03/2015 - 06/2016. *Project Leader.* Aurecon was appointed to compile the integrated water and waste management plan (IWWMP) as part of the requirements of Sonae Novobord's existing integrated water use licence (IWULA) in order to demonstrate how it aims to manage the licence in day-to-day operations. Aurecon's services included operational water balance, a ground water study, a surface water assessment and management measures, consideration of waste streams and handling, and collation of these studies into the IWWMP document. Responsible as project leader. Involved for 2 person-months. (Sonae Novobord).

Economic viability study for the western corridor in Ghana: Phase 1 (Western and Ashanti Regions, Ghana) 05/2015 - 05/2016. *Environmental Lead.* The project entails the assessment of the economic viability of a proposed highway project along the western corridor of Ghana. The proposed project comprised 330 km of new highway construction and stretches from Elubo in the south to Sunyani in the north. The study assessed the viability of the proposed project from three perspectives, namely transport economic, macroeconomic and environmental and social. The route was visually assessed to obtain information regarding the materials, structures and drainage and geometric properties of the existing alignment. Responsible as environmental task leader. Involved for 1 person-month. (Mota-Engil Engenharia e Construc ao).

Environmental services for Klipplaats 400 kV line deviation (Mpumalanga Province, South Africa) 05/2014 - 05/2016. *Task Leader.* The project involved environmental studies, water use license application and preliminary design for the Klipplaats 400 kV line deviation at the Tweefontein Coal Mine, the registered land owner of the farm Klipplaat 14IS in Mpumalanga. Involved for 1.5 person-months. (Glencore Xstrata Coal South Africa (Glencore South Africa (Pty) Ltd)).

Design of a legal compliant hazardous waste facility (Limpopo Province, South Africa) 07/2013 - 01/2016. *Environmental Task Leader.* Grootegeluk Mine has two temporary hazardous waste storage areas for storing hazardous waste prior to it being removed from site for safe disposal at a licensed facility. These areas, however, were not compliant with environmental requirements and Aurecon consequently appointed to design a consolidated hazardous waste storage area. Particular attention was paid to safety standards, hazards, handling and storage. Responsible for the waste licence and leading the environmental impact assessment (EIA). Involved for 2 person-months. (Exxaro Coal Lephalalale).

Contamination assessment of selected Transnet Properties sites (Regional, South Africa) 03/2014 - 12/2015. *Project Leader.* Aurecon was appointed to undertake the initial assessment of various sites or precincts in order to identify any environmental contamination and to provide Transnet Properties with an initial assessment report as well as a financial model for the closure and rehabilitation of these sites. Sampling and lab testing was undertaken as part of the studies, and included a groundwater and soil study, soil profiling, an asbestos study and an ecological overview. Involved for 2 person-months. (Transnet SOC Ltd).

Development of a socio-economic framework and category for Green Star SA rating tool (South Africa) 06/2012 - 11/2015. *Project Leader.* The project entailed the development of a category framework for international use, a socio-economic category for the Green Star SA rating tool and five related socio-economic credits. Responsible for the overall project management and delivery and quality review of socio-economic specialist. Involved for 3 person-months. (Green Building Council of South Africa (GBCSA)).

Conceptual design and master planning for the WestPark industrial development (Western and Ashanti Regions, Ghana) 09/2015 - 11/2015. *Environmental Lead.* This project entailed the development of a master plan for the WestPark industrial park, including developing appropriate land-use zones, land infrastructure concept designs and off-grid electric power generation solutions. The concept designs included bulk earthworks, transport and roads, water supply, wastewater treatment, stormwater drainage, solid waste management, telecommunications, power generation and electrical transmission, distribution and reticulation networks. Responsible for the environmental screening task leader, including site visit and assessment. (Blackivy Ghana Ltd).

Environmental impact assessment (EIA) for the 140 MW Esيامa gas-fired generation plant (Western Region, Ghana) 04/2015 - 07/2015. *Project Leader.* The project involved the updating and completion of the environmental impact assessment (EIA) process for the 140 MW gas-fired generation plant in Esيامa, including specialist studies for air quality, noise, ecology and waste. An environmental permit was granted by the Ghana Environmental Protection Agency (EPA). Involved for 1.25 person-months. (Aggreko International Project).

Aganang strategic environmental assessment (SEA) (Limpopo Province, South Africa) 06/2014 - 04/2015. *Project Leader.* The project involved a strategic environmental assessment (SEA) of the Aganang Local Municipality to include environmental status quo and the desired state of environment and environmental management zones to guide future development against conservation targets. Involved for 1.25 person-months. (Capricorn District Municipality).

Study on the remediation of the Hammarsdale mercury sludge ponds (KwaZulu-Natal Province, South Africa) 10/2013 - 03/2015. *Report Task Leader.* During the 1970s and 1980s biocides containing mercury were used at the Hebox textile factory in Hammarsdale. The effluent generated by the facility was routed to the Hammarsdale wastewater treatment works (WWTW). The resultant sludge, containing mercury and other chemicals was later disposed of in the Hammarsdale mercury sludge ponds, owned by the Department of Public Works. Aurecon was appointed to perform a water quality management study on the remediation process and develop a remediation plan. Responsible for the rehabilitation landform design and fulfilling the role of report task leader. Involved for 0.25 person-months. (Department of Water and Sanitation (DWS)).

Development of reconciliation strategies for large bulk water supply systems: Orange River (ORECONS) (South Africa) 03/2012 - 02/2015. *Task Leader/Environmental Specialist.* The project entailed the formulation of a water reconciliation strategy for the Orange River System, based on the recent extensive studies in the area and a similar reconciliation strategy study on the Vaal River Catchment. Aurecon was appointed for the preliminary screening workshop; reviewing schemes and updating cost estimates, viewing/assessing social and environmental impacts, assembling information and formulating scenarios as well as the final screening workshop. A preliminary and a final water reconciliation strategy were the two main outputs of the study. Task leader responsible for the environmental screening undertaken to compare environmental and social impacts of the various proposed dam options in the Orange River catchment. Involved for 2 person-months. (WRP Consulting Engineers).

Environmental management framework (EMF) for the Nkomazi Local Municipality (Mpumalanga Province, South Africa) 01/2014 - 07/2014. *Project Leader.* This project entailed compiling an environmental management framework (EMF) for the Nkomazi Local Municipality, including environmental status quo, strengths, weaknesses, opportunities and threats (SWOT) analysis and EMF phases as well as delivering environmental management zones, each with a set of management guidelines. Involved for 0.5 person-months. (Nkomazi Local Municipality).

Basic assessment (BA) for the Pangaea/Kanga 88 kV powerlines (Mpumalanga Province, South Africa) 05/2013 - 06/2014. *Landscape Architect.* Eskom proposed the establishment of two 88 kV substations, Pangaea and Kanga, in conjunction with two 88 kV loop-in-loop-out lines from the existing 88 kV Erasmus-Arbor line in order to ensure electric supply for the upcoming Kusile Railway Line. The railway line will be constructed as a private siding, which is needed to transport limestone to the Kusile Power Station. Aurecon was appointed to conduct a basic assessment (BA) as well as a Level 1 wetland assessment to determine the extent of wetland or wet areas that are related to the proposed routes chosen for the construction of the Pangaea and Kanga 88 kV power lines. Involved for 1 person-month. (Eskom).

Feasibility study for the treatment of acid mine drainage (AMD) (Gauteng Province, South Africa) 12/2011 - 03/2014. *Environmental Specialist.* Aurecon was appointed to conduct a feasibility study to address the treatment of acid mine drainage (AMD) from Gauteng's underground mining basins, by removing salts and metals, to protect the receiving water resources and reduce the dilution releases from the Vaal Dam to the Vaal Barrage. The work included investigating future scenarios, analysing alternative infrastructure options and exploring alternatives for implementation. Responsible for advising the client on environmental impact assessment (EIA) process options, assisting with the writing of the "Options for Discharge of Water and Waste" report and the analysis of project options against the receiving environment. Involved for 1.5 person-months. (Department of Water and Sanitation (DWS)).

Full planning and engineering services for a new Sasko bakery in Woodmead (Western Cape Province, South Africa) 04/2007 - 02/2014. *Environmental Task Leader.* The project entailed the provision of full planning and engineering services for the development of Sasko's new bakery in Woodmead. Aurecon provided architectural, project management, civil, structural, electrical, mechanical, fire and wet services

engineering for the new bakery complex, including an ancillary administration block, a washbay and a workshop. Responsible as the environmental task leader. (Pioneer Food Group).

Technical advisory services for the Mauritius Light Rapid Transit (MLRT) system (Port Louis, Mauritius) 09/2012 - 01/2014. *Task Leader/Environmental Specialist.* Aurecon was appointed, as a partner to lead agency Singapore Cooperation Enterprise (SCE) and the Singapore Mass Transit Corporation (SMRT), to provide technical advisory services for the development of the Mauritius Light Rapid Transit (LRT) system. This included advisory services for transport and traffic planning, engineering and business case/financial planning. The Government of Mauritius is committed to build a LRT system to serve the established city areas running between the capital of Port Louis and Curepipe in order to relieve the main road arteries and to review its existing bus network in order to achieve an efficient multi-modal public transport network that can serve Mauritius over the long term. Task leader responsible for the environmental screening process undertaken as part of the reference design of the public-private partnership (PPP). Involved for 4 person-months. (Aurecon Singapore).

Rail feasibility study for the Beira-Chirodzi Corridor (Tete and Sofala Provinces, Mozambique) 03/2013 - 12/2013. *Environmental Lead.* Jindal Africa (JSPL) acquired concession rights for Chirodzi, a coal mine close to the town of Tete. To support the full export activity of the mine, a cost and operational effective rail export solution was required to transport up to 20 Mtpa of coal through to the Port of Beira. The first phase of the study involved the identification of routes using design parameters, environmental constraints and geotechnical data as inputs. From Phase 1 four corridors were selected for further detailing during Phase 2 of the study using InRail Alignment and Open Track railway simulation software. Involved for 0.5 person-months. (JSPL Mozambique Minerais Limitada).

Moreleta Spruit Adopt-a-River project (Gauteng Province, South Africa) 07/2011 - 12/2011. *Project Leader.* The project involved the compilation of a situation analysis, gap analysis and high-level action plan, as well as stakeholder engagement with relevant role players in the catchment in order to set up the Adopt-a-River forum. The situation analysis included historical context, land use and zoning, terrestrial and aquatic ecology, infrastructure and flood risk. A comprehensive geographic information system (GIS) database was also developed and made available for use via free software to relevant stakeholders. This was all deemed as Phase 1, with a view towards Phase 2 of the project, which entails the compilation of a state-of-the-rivers report as well as a master environmental management plan (EMP). Responsible for project management and environmental reporting. Involved for 4 person-months. (Department of Water and Sanitation (DWS)/IKAMVA Strategic Insights).

Zululand Anthracite Colliery (ZAC) environmental management plan (EMP) (KwaZulu-Natal Province, South Africa) 01/2011 - 10/2011. *Project Manager.* The project entailed the amendment of the existing environmental management programme report (EMPR) and a new National Environmental Management Act (NEMA) basic assessment application and process for a new open pit and ancillary activities. Responsible for the environmental impact assessment (EIA) project management and report writing, as well as the visual impact assessment (VIA) task as specialist. Involved for 3 person-months. (Zululand Anthracite Colliery (ZAC)).

End land use plans for mine closure (Mpumalanga & Northern Cape Provinces, South Africa) 06/2008 - 10/2011. *Specialist Landscaper.* The end land use is a critical part of the Anglo Closure Toolbox approach for mine closure. Such a land use plan should take into account the environmental risks determined for closure and the socio-economic context of the mine site; and should identify a number of post-closure land uses, which would also be spatially represented in line with the closure strategy for each part of the mine site. Various end land use plans have been developed for the Mpumalanga coal fields, as well as for Namaqua Mines (De Beers) in the Northern Cape. Responsible for project management, master planning and reporting of findings. Involved for 8 person-months. (Exxaro/De Beers).

Consolidation, update and amendment of the Lonmin environmental management programme report (EMPR) (North West Province, South Africa) 02/2011 - 08/2011. *Project Manager.* The project entailed the consolidation of all the approved environmental management programme reports (EMPRs) and amendments into two documents, one for each mineral rights area. This included updating activities according to more recent approvals in terms of other legislation and specialist studies, and the amendment of the environmental management plans (EMPs) for newly planned activities, all in terms of the Mineral and Petroleum Resources Development Act (MPRDA) and the National Environmental Management Act (NEMA) legislation. Responsible for project management, master planning and reporting of findings. Involved for 6 person-months. (Lonmin Plc).

Environmental impact assessment (EIA) for Blue Crane Country Estate (Gauteng Province, South

Africa) 2001 - 2011. Project Manager. The project entailed conducting an environmental impact assessment (EIA) for a proposed development for Blue Crane Country Estate. Responsible for conducting an EIA and compiling an environmental management plan (EMP). Involved for 24 person-months. (Private Property Developer).

Environmental impact assessment (EIA) for Provincial Road D419 (North West Province, South Africa) 2004 - 2011. Project Manager. The project entailed an environmental impact assessment (EIA) and environmental management plan (EMP) for a new 30 km section of road. Responsible for conducting an EIA and compiling an EMP. Involved for 5 person-months. (North West Provincial Government (NWPG)).

Environmental impact assessment (EIA) for Noordheuwel, Extension 20 (Gauteng Province, South Africa) 2007 - 2011. Project Manager. The project entailed an environmental impact assessment (EIA) for a proposed urban development in Noordheuwel, Extension 20. Responsible for conducting the EIA and compiling an environmental management plan (EMP). Involved for 2 person-months. (Private Property Developer).

Environmental impact assessment (EIA) for Secunda Corridor (light industrial) (Mpumalanga Province, South Africa) 2008 - 2011. Project Manager. The project entailed an environmental impact assessment (EIA) and environmental management plan (EMP) for an urban development in Secunda. Responsible for conducting an EIA and compiling the EMP. Involved for 4 person-months. (Private Property Developer).

Foskor Pyroxenite Expansion Project (PEP), Phase 2: visual impact assessment (VIA) (Mpumalanga Province, South Africa) 04/2010 - 09/2010. Task Leader. Golder conducted an environmental impact assessment (EIA) for the Foskor Pyroxenite Expansion Project (PEP), Phase 2. As part of the EIA, a visual impact assessment (VIA) was required, especially due to the close proximity of the project to the Kruger National Park and other tourism areas. The VIA included aspects such as site photo assessment with a global positioning system (GPS), geographic information system (GIS) Viewshed Analysis, adjacent land use analysis and mapping of human receptors. Responsible for the task management and VIA report. Involved for 2 person-months. (Foskor (Pty) Ltd).

Urban design framework (UDF) for Kimberley central business district (CBD) (Northern Cape Province, South Africa) 12/2008 - 08/2010. Project Leader. The project entailed the landscape design of six areas in the Kimberley central business district (CBD). This appointment developed into an urban design framework (UDF) for the Kimberley CBD on concept level, reporting into a municipal infrastructure grant (MIG) funding application in order to gain funding for the various projects. Responsible for project management, urban design, client liaison and drafting of the UDF. Involved for 8 person-months. (Sol Plaatje Local Municipality).

Waste site buffer zone feasibility studies (Gauteng and North West Provinces, South Africa) 06/2008 - 05/2010. Specialist Landscape Architect (buffer zone planning). Buffer zones required by legislation around general and hazardous waste sites cause the sterilisation of land. Feasibility studies for the alternative "some use" development options have been completed for Cape Gate in Vanderbijlpark (hazardous) and Mooiplaats private landfill site in Gauteng and Rustenburg Municipality (general waste), where health and safety perimeters per environmental media, and surrounding land use and social conditions are used to investigate and proposed feasible options for the use of such buffer zone land. Responsible for project management, master planning and reporting of findings. Involved for 6 person-months. (Cape Gate (Pty) Ltd/The Waste Group).

Zanzibar Urban Services Project (ZUSP) visual impact assessment (VIA) (Dar es Salaam and Zanzibar, Tanzania) 06/2009 - 02/2010. Task Leader. Golder conducted an environmental impact assessment (EIA) for the Zanzibar Urban Services Project (ZUSP). As part of the EIA, a visual impact assessment (VIA) was required, especially due to the World Heritage Status of Stonetown in Zanzibar, and the high tourism usage of the area. The VIA included aspects such as site photo assessment with a global positioning system (GPS), developing a unique street view assessment method, and analysis and mapping of culturally sensitive areas. Responsible for task management and VIA report. Involved for 4 person-months. (World Bank).

Environmental impact assessment (EIA) for River Falls Office Park (Gauteng Province, South Africa) 2006 - 2010. Project Manager. The project entailed an environmental impact assessment (EIA) and environmental management plan (EMP) for River Falls Office Park. Responsible for conducting the EIA and compiling the EMP. Involved for 8 person-months. (Private Property Developer).

Greenbelt master plan and business case for the Galeshewe Urban Renewal Programme (GURP) (Northern Cape Province, South Africa) 02/2009 - 09/2009. Project Leader of open space component. The Galeshewe Urban Renewal Programme (GURP) is a presidential project as part of a national urban renewal

strategy started in 2001. GURP was funded by the Neighbourhood Development Partnership Grant (NDPG) under the National Treasury. Galeshewe, a township adjacent to Kimberley, was one of the nominated areas of this project. The Green Belt Project entailed strategic open space planning, and the delineation of green corridors/belts, with the primary focus on urban design principles in combination with ecological design methodologies. Concept designs and a business case were submitted in order to gain funding for the greening of Galeshewe. Responsible for project management, master planning, landscape design and drafting of the business case. Involved for 4 person-months. (Sol Plaatje Local Municipality).

Pixley Ka Seme integrated environmental management programme (IEMP) (Northern Cape Province, South Africa) 02/2009 - 06/2009. *Project Leader.* The project entailed undertaking a process to draw up an integrated environmental management programme (IEMP) for the district. The work included existing and desired status quo environmental reporting; an assessment of all integrated development planning (IDP) and spatial development frameworks (SDFs) of local municipalities; stakeholder engagement to determine the environmental challenges and needs of each local council and the drafting of the IEMP. Responsible for project management and environmental reporting. Involved for 5 person-months. (Pixley Ka Seme Local Municipality).

Visual impact assessment (VIA) for the proposed Meteor Estate in the Vredefort Dome area (Free State Province, South Africa) 12/2008 - 04/2009. *Specialist Landscape Architect: visual impact assessment (VIA) task.* The project entailed visual assessment for a proposed residential estate on the boundaries of the Vredefort Dome World Heritage Site. This included site assessment, determination of visual baseline qualities, into modelling the changes the proposed development would have on the surrounding environment through geographic information systems (GIS) modelling and impact assessment. Responsible for project management, photo and impact assessment. Involved for 2 person-months. (Africa Geo-Environmental Engineering and Science (Pty) Ltd (AGES) Potchefstroom).

Visual impact assessment (VIA) for Benga mine and power plant (Tete Province, Mozambique) 08/2008 - 02/2009. *Specialist Landscape Architect.* Riversdale Mining, through their Mozambican arm Riversdale Mozambique Limitada (RML), appointed Golder for the full scope of feasibility and environmental assessment for the Benga Coal Resource adjacent to the Zambezi River. Part of the specialist studies included a visual impact assessment (VIA), complete with Viewshed analysis, digital terrain model, sections, artificial modelling of the mine process and infrastructure. Responsible for project management, site inspection and on-site photo assessments, report writing and impact assessment. Other duties included management of all geographic information systems (GIS) modelling. Involved for 5 person-months. (Riversdale Mozambique Limitada (RML)).

Environmental impact assessment (EIA) for The Hills Link Road (K40) (Gauteng Province, South Africa) 2008 - 2009. *Project Manager.* The project comprised an environmental impact assessment (EIA) and environmental management plan (EMP) for a new 5 km section of road. Responsible for conducting an EIA and compiling the EMP. Involved for 3 person-months. (Private Property Developer).

Environmental impact assessment (EIA) for Wapadrand, Extension 36 (Gauteng Province, South Africa) 2001 - 2009. *Project Manager.* The project entailed an environmental impact assessment (EIA) and environmental management plan (EMP) for an urban development bordering the Bronberg protected area. Responsible for conducting an EIA and compiling the EMP. Involved for 20 person-months. (Private Property Developer).

Mining end land use investigation for The Oaks Mine (Limpopo Province, South Africa) 06/2008 - 10/2008. *Project Leader.* The project entailed undertaking an investigation and public consultation process in order to identify alternative end land use options for their The Oaks Mine in Limpopo. This included advertisements in the prominent newspapers, and a detailed stakeholder engagement and tender process in order to determine suitable candidates/communities with which to partner for end land use. Responsible for project management, identification of land use alternatives, stakeholder consultation, tender adjudication and recommendations. Involved for 4 person-months. (De Beers).

Environmental impact assessment (EIA) for Randjesfontein, Extension 1 (Gauteng Province, South Africa) 2005 - 2008. *Project Manager.* The project consisted of an environmental impact assessment (EIA) for Randjesfontein Extension 1, a residential estate. Responsible for conducting the EIA and compiling an environmental management plan (EMP). Involved for 8 person-months. (Private Property Developer).

Regional coordination for the National Microbial Monitoring Programme (NMMP) for Crocodile West Marico and Vaal Water Management Areas (WMAs) on behalf of the Department of Water and Sanitation (DWS) (Various provinces, South Africa) 2007 - 2008. *Project Manager.* The National Microbial Monitoring

Programme (NMMP) provides information on the status and trends of the extent of faecal pollution, in terms of the microbial quality of surface water resources in priority areas; and provides information to help assess the potential health risk to humans associated with the possible use of faecally polluted water resources. Responsible for the regional coordination function between the Department of Water and Sanitation (DWS), local governments and other stakeholders regarding sample collection and distribution of the bi-monthly report for each water management area (WMA). Involved for 6 person-months. (Department of Water and Sanitation (DWS)).

Rehabilitation framework for the Pienaars River (Gauteng Province, South Africa) 06/2007 - 11/2007. *Project Leader.* The project was concerned with a rehabilitation framework for the Pienaars River in Mamelodi. This included site assessments with specialists, obtaining inputs from stakeholders from various communities and the City of Tshwane, status quo reporting, development of open space management, land-use and in-stream interventions and identification of pilot projects for further phases, and geographic information systems (GIS) mapping of all proposals. Responsible for project management and open space planet component. Involved for 4 person-months. (City of Tshwane Metropolitan Municipality (CTMM)).

Development initiative for Bloemhof Dam (North West Province, South Africa) 11/2006 - 05/2007. *Landscape Architect/Environmental Planner.* The project involved the development of a master plan and environmental impact assessment (EIA) plan for the Bloemhof Dam Nature Reserve. This included baseline studies, public participation, feasibility analysis, development of a master plan, architectural layouts for different use areas and the full EIA application process. Responsible for geographic information systems (GIS) mapping, project management and master planning. Involved for 3 person-months. (North West Provincial Government (NWPG)).

Environmental impact assessment (EIA) for the widening of Simon Vermooten Road (Gauteng Province, South Africa) 03/2006 - 02/2007. *Project Leader.* The project entailed the widening of Simon Vermooten Road in Pretoria East. A scoping process in terms of the Environment Conservation Act (ECA) was followed in order to widen this arterial road, which was eventually approved by the provincial authority. Subsequent work included the environmental authorisation for a main bulk water supply line adjacent to the road. An environmental management planning (EMP) was also drafted, and monitoring conducted during the construction process. Responsible for the environmental impact assessment (EIA) and EMP monitoring during construction. Involved for 7 person-months. (City of Tshwane Metropolitan Municipality (CTMM)).

Environmental impact assessment (EIA) for various wildlife estates in the Hoedspruit and Bela-Bela areas (Limpopo Province, South Africa) 2004 - 2007. *Project Manager.* The project entailed an environmental impact assessment (EIA) environmental management plan (EMP) for various wildlife estates in the Hoedspruit and Bela-Bela areas. Responsible for conducting the EIA and compiling the EMP. Involved for 24 person-months. (Private Property Developer).

Ga-Rankuwa Extension 21 (Gauteng Province, South Africa) 2004 - 2006. *Project Leader.* The project involved an environmental impact assessment (EIA), environmental management plan (EMP), open space master plan and EMP auditing during construction for underprivileged community in the North of Tshwane Metro. The entire life-cycle of the project was overseen. Responsible for conducting the EIA, compiling the EMP, master planning and landscape architecture. Involved for 12 person-months. (City of Tshwane Metropolitan Municipality (CTMM)).

Environmental impact assessment (EIA) for President Park Extension 44 (Gauteng Province, South Africa) 2006. *Project Manager.* The project involved an environmental impact assessment (EIA) for President Park, Extension 44, which is a medium-density housing development. Responsible for conducting the EIA and compiling an environmental management plan (EMP). Involved for 2 person-months. (Private Property Developer).

Frances Baard integrated environmental management programme (IEMP) (Northern Cape Province, South Africa) 02/2004 - 09/2004. *Geographic Information System (GIS) Specialist.* The project entailed the development of an integrated environmental management programme (IEMP) for the Frances Baard District Municipality (FBDM). The programme includes the status quo report, legal matrix of responsibilities, and an environmental issues and threats report for each local municipality. The end product was an interactive tool to officials with decision-making parameters and strategies for sustainable development. Responsible for project management and geographic information systems (GIS) mapping. Involved for 5 person-months. (Frances Baard District Municipality (FBDM)).

Galeshewe open space and landscape plan (Northern Cape Province, South Africa) 03/2004 - 08/2004. *Geographic Information System (GIS) Specialist.* The project entailed an open space assessment of

Galeshewe Township in Kimberley, including on-foot surveys of each open space, detailed planning proposals for improvement, newspaper articles and geographic information system (GIS) databases. Responsible for project management and GIS. Involved for 3 person-months. (Sol Plaatje Local Municipality).

Environmental geographic information system (GIS) for Dr Ruth Segomotsi Mompati District Municipality (North West Province, South Africa) 01/2004 - 03/2004. *Geographic Information System (GIS) Specialist.* The project involved a strategic environmental analysis (SEAN) and guidelines for the Dr Ruth Segomotsi Mompati District Municipality in North West Province, as a specialist environmental study feeding into the integrated development plan (IDP) for the area. Responsible for project management, geographic information systems (GIS) environmental analysis and strategic guideline document. Involved for 2 person-months. (VISI Africa Town Planners).

Geographic information systems (GIS) digital terrain model (DTM) for Tshwane (Gauteng Province, South Africa) 08/2003 - 12/2003. *Geographic Information System (GIS) Specialist.* The project involved electronic 3D model for the City of Tshwane Metropolitan Municipality (CTMM) to be used in the integrated development planning process, with specific reference to strategic spatial planning and analyses and decision making, as well as presentation purposes for the executive mayoral office. Responsible for project management, data gathering and analysis of current meta-database, presentation mapping and 3D analysis. Involved for 2 person-months. (City of Tshwane Metropolitan Municipality (CTMM)).

Gauteng Open Space Study (GOSS), Phase 1 (Gauteng Province, South Africa) 03/2001 - 07/2001. *Specialist Landscape Architect.* The first phase of the Gauteng Open Space Study (GOSS) was a geographic information system (GIS) based strategic open space planning project for the entire Gauteng Province. The project was completed for the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL). Responsible for information gathering and GIS database information input, including assigning land use categories for land parcels. Involved for 4 person-months. (Gauteng Provincial Government (GPG)).

Bushmans River Game Reserve: Phases 1 and 2 (KwaZulu-Natal Province, South Africa) 2001. *Geographic Information System (GIS) Specialist.* The project entailed the planning and development of a proposed big-five game reserve in the Kwazulu-Natal Midlands, with Roger Collision (Collision Consulting) and Darryl Lombard (Lorton Consulting). Responsible for environmental planning, geographic information system (GIS) related work, including the creation of digital terrain model (DTM) and subsequent slope and aspect analyses. Involved for 5 person-months. (Private).

Extension of Borakalalo National Park (North West Province, South Africa) 2001. *Geographic Information System (GIS) Specialist.* The project concerned the proposed extension of Borakalalo National Park. The work included conducting a physical infrastructure inventory and natural resource base and social inventory for the North West Parks and Tourism Board (NWP&TB) to facilitate the planning of the proposed extension of the national park. Responsible for environmental management and geographic information system (GIS). Involved for 1 person-month. (North West Parks and Tourism Board (NWP&TB)).

Dinokeng integrated environmental management plan (IEMP) (Gauteng Province, South Africa) 2001. *Geographic Information System (GIS) Specialist.* This project comprised the environmental planning component for the Dinokeng initiative, including conducting the environmental planning component for the North-eastern Gauteng Initiative (NEGI), a spatial planning initiative. This included the potential establishment of a big-five game reserve in the north-eastern part of Gauteng, with the Institute of Directors (IOD)/International Union for Conservation of Nature (IUCN) consortium. Responsible for environmental planning, all geographic information system (GIS) related work and map productions for the environmental team. Involved for 5 person-months. (International Union for Conservation of Nature (IUCN)/Gauteng Provincial Government (GPG)).

Bronberg strategic environmental assessment (SEA) (Gauteng Province, South Africa) 2001. *Geographic Information System (GIS) Specialist.* The project involved a strategic environmental assessment (SEA) of the Bronberg Ridge in Pretoria East. The work included assessing the state of the environment to set up land use and conservation management guidelines for the effective conservation of sensitive natural and cultural habitats and management of developable areas. Responsible for all geographic information system (GIS) related work, including habitat modelling for rare and endangered species and map productions. Involved for 6 person-months. (Gauteng Provincial Government (GPG)).

Museum Park initiative in Pretoria inner city (Gauteng Province, South Africa) 05/2000 - 08/2000. *Landscape Architect.* The project entailed urban design proposals and street furniture design for the Museum Park initiative in Pretoria inner city. Responsible for site analysis, urban design and graphic presentation drawings. Involved for 2 person-months. (City of Tshwane Metropolitan Municipality (CTMM)).

Tourism plan for the Maluleke area (Mpumalanga Province, South Africa) 05/2000 - 07/2000. *Landscape Architect.* The project involved developing a community-based tourism plan for the Makuleke tribe in conjunction with South African National Parks (SANParks) in the Pafuri area. Responsible for site suitability analysis, lodge site design and graphic presentation drawings. Involved for 2 person-months. (South African National Parks (SANParks)).

Visual impact assessment (VIA) for the Samancor chrome smelter in North West (North West Province, South Africa) 12/1999 - 03/2000. *Specialist Landscape Architect.* The project included specialist tourism, land use and visual impact assessment (VIA) of a proposed chrome smelter in Mooinooi as part of the Council for Scientific and Industrial Research (CSIR) consortium for Samancor. Responsible for the VIA and information gathering. Involved for 3 person-months. (Samancor).

Implementation of Spiegelhaus Garden (Magdeburg, Germany) 04/1999 - 05/1999. *Landscape Contractor Staff.* The project involved the implementation of the Spiegelhaus Garden - BUGA 2000 Landscape Expo, Magdeburg - a R750 million landscape project hosted every two years in a different city in Germany. Responsible for landscape installation. Involved for 1 person-month. (BUGA 2000 Landscape Expo, Germany).

Academic experience

Institute for International Research (IRR)

- Delivered a presentation named "Key Land Use Planning Considerations for Mine Closure" at the 5th Annual IIR Mine Closure and Rehabilitation Conference 2011, Johannesburg

Institute for Landscape Architects of South Africa (ILASA)

- Served on the adjudication panel of the two-yearly Institute for Landscape Architects of South Africa (ILASA) Merit Awards in 2011, which included assessing all Northern Province projects and providing feedback to the adjudication convener.
- Delivered a presentation named "Waste Site Buffer Zones: Alternative Land Uses" at the Institute for Landscape Architects of South Africa (ILASA) National Conference on 13, 14 May 2010.

International Federation of Landscape Architects (IFLA)

- Chaired session and discussion "Dealing with Mining Landscapes" at the 49th International Federation of Landscape Architects (IFLA) World Congress 2012 in Cape Town, South Africa.

South African Council for the Landscape Architecture Profession (SACLAP)

- Co-writer of the environmental section of the professional exam from 2009 to 2013, as well as co-examiner of this section of the exam for the same period.

University of Pretoria, South Africa

- External examiner for the 3rd year BSc (Landscape Architecture) students, First and Second Semester exams 2012.
- External examiner for the 3rd year BSc Landscape Architecture Students, 28-29 November, 2009

University of the Witwatersrand (Wits), South Africa

- Co-presenter of a lecture on "Food Gardens & Urban Agriculture" at the Wits Modernx Conference (2009) in celebration of the 50 year existence of the JB Moffat Building.

Education

2014 : Dip Environmental Engineering, University of the Witwatersrand (Wits), South Africa

1998 : Bachelors in Landscape Architecture, University of Pretoria, South Africa

Career enhancing courses

2014 : Level 2 SUSOP® Training Course, SUSOP (Pty) Ltd
2014 : Post-graduate short course in Environmental Management, University of the Witwatersrand (Wits), South Africa
2014 : Post-graduate short course in Mining and the Environment, University of the Witwatersrand (Wits), South Africa
2013 : Post-graduate short course in Coal and the Environment, University of the Witwatersrand (Wits), South Africa
2013 : Post-graduate short course in Wastewater Engineering, University of the Witwatersrand (Wits), South Africa
2013 : Level 1 SUSOP® Training Course, SUSOP (Pty) Ltd
2012 : Project Management Course (passed with distinction), Aurecon in-house training
2009 : 2-Day Technical Writing Course, Golder Associates Paste Engineering and Design, Canada
2009 : 2-Day Level 1: First Aid Course, National Occupational Safety and Health Consultancy (NOSHC)
2009 : 2-Day Grass Identification Course, Bushveld Eco Services - Frits van Oudshoorn
2008 : 3-Day Project Management Course, Golder Associates Paste Engineering and Design, Canada
2008 : 1-Day Health and Safety Representative Course, National Occupational Safety and Health Consultancy (NOSHC)
2001 : 1-week Introduction to GIS Course, Environmental Systems Research Institute (ESRI)

Professional affiliations

Member, International Association of Impact Assessment (IAIA)

Registered Professional Landscape Architect, South African Council for Landscape Architectural Professionals (SACLAP)

Member, Institute for Landscape Architecture in South Africa (ILASA)

Languages

	Reading	Writing	Speaking
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent
German	Poor	Poor	Fair

Publications

Bower J, 2010. "Technically Speaking". Contributor of an article on "Technically Speaking", the quarterly newsletter for Golder Associates worldwide - article on "Galeshewe Urban Renewal Project: Green Belt Project".

Referees

Company	Contact Person	Telephone nr.
Golder Associates	Nico Bezuidenhout	+27 12 364 4000/nbezuidenhout@golder.co.za

By my signature below I certify the correctness of the information above and my availability to undertake this assignment.

Signature of Staff Member

Date

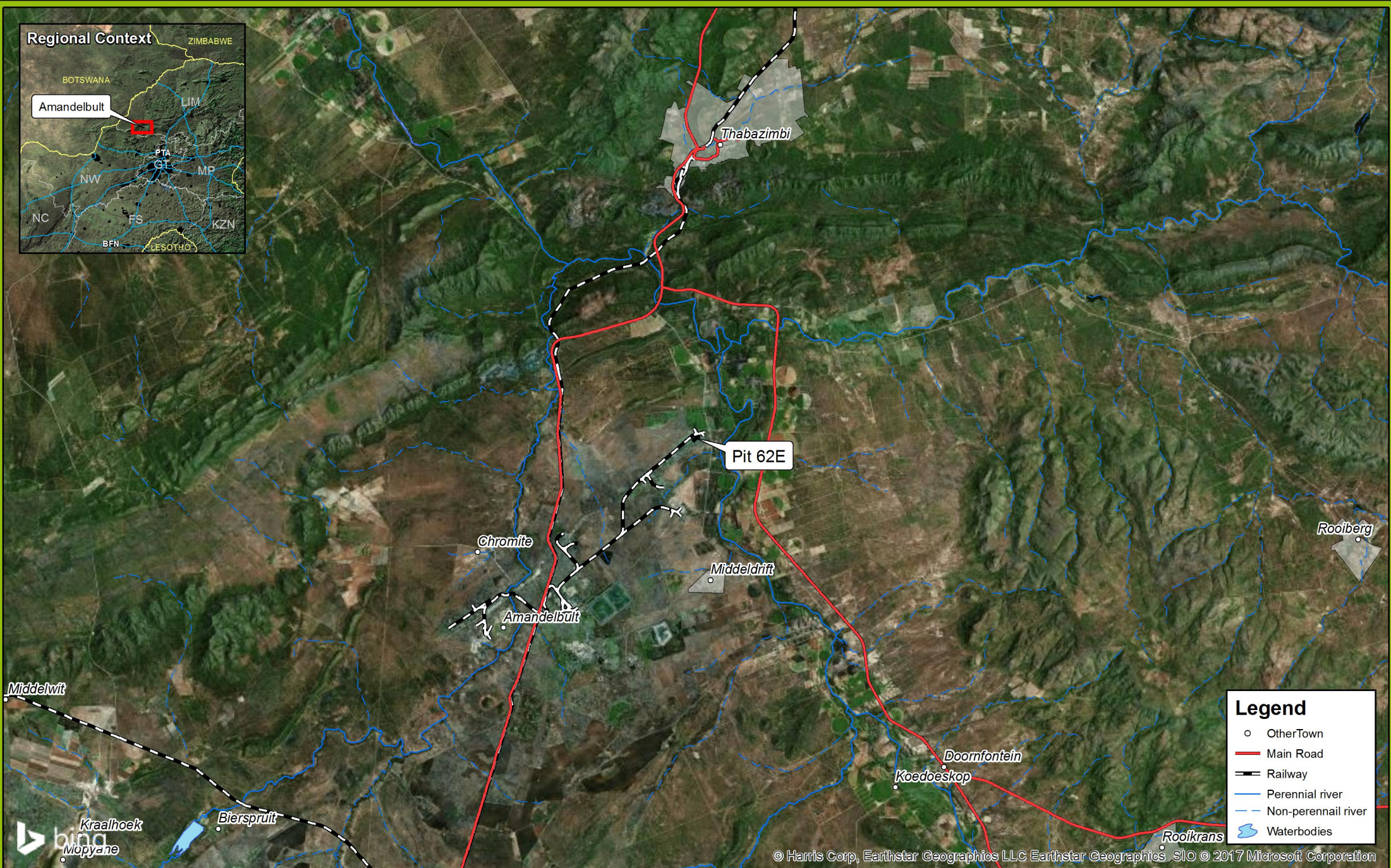
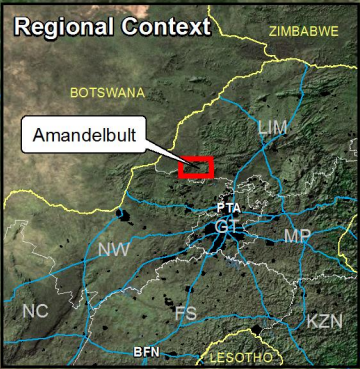
B

Maps



Appendix B.1

Locality Map



Legend

- OtherTown
- Main Road
- - - Railway
- Perennial river
- - - Non-perennial river
- Waterbodies

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AMANDELBULT
Pit 62E Locality Map



Scale as printed at A4 **1:250 000**



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Compiled by: Stephen Townshend
Compiled on: 2017/05/26






Appendix B.2

General Layout



Legend

-  Mining Right Boundary
-  Railway line
-  Haul road
-  Contractor's laydown area
-  Overburden stockpile
-  Pit 62E outline

AMANDELBULT

Pit 62E General Layout Map



Scale as printed at A4 **1:3 000**



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Compiled by: Stephen Townshend
Compiled on: 2017/05/25



Appendix B.3

Listed Activities



GNR 983 no. 56
(0.001 ha)

GNR 983 no. 21
(5 ha)

GNR 983 no. 9
(3.1 ha)

GNR 983 no. 27
(3.1 ha)

Overburden Stockpile 1
17921m²

Overburden Stockpile 2
17991m²

62E Dishaba
opencast
31453m²

HAAKDOORNDRIFT
4/374

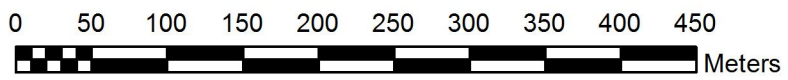
ELANDSKU
2/378

Legend

- Mining Right Boundary
- Railway line
- Haul road
- Contractor's laydown area
- Overburden stockpile
- Pit 62E outline

AMANDELBULT

Pit 62E Listed Activities Map



Scale as printed at A4 **1:5 000**



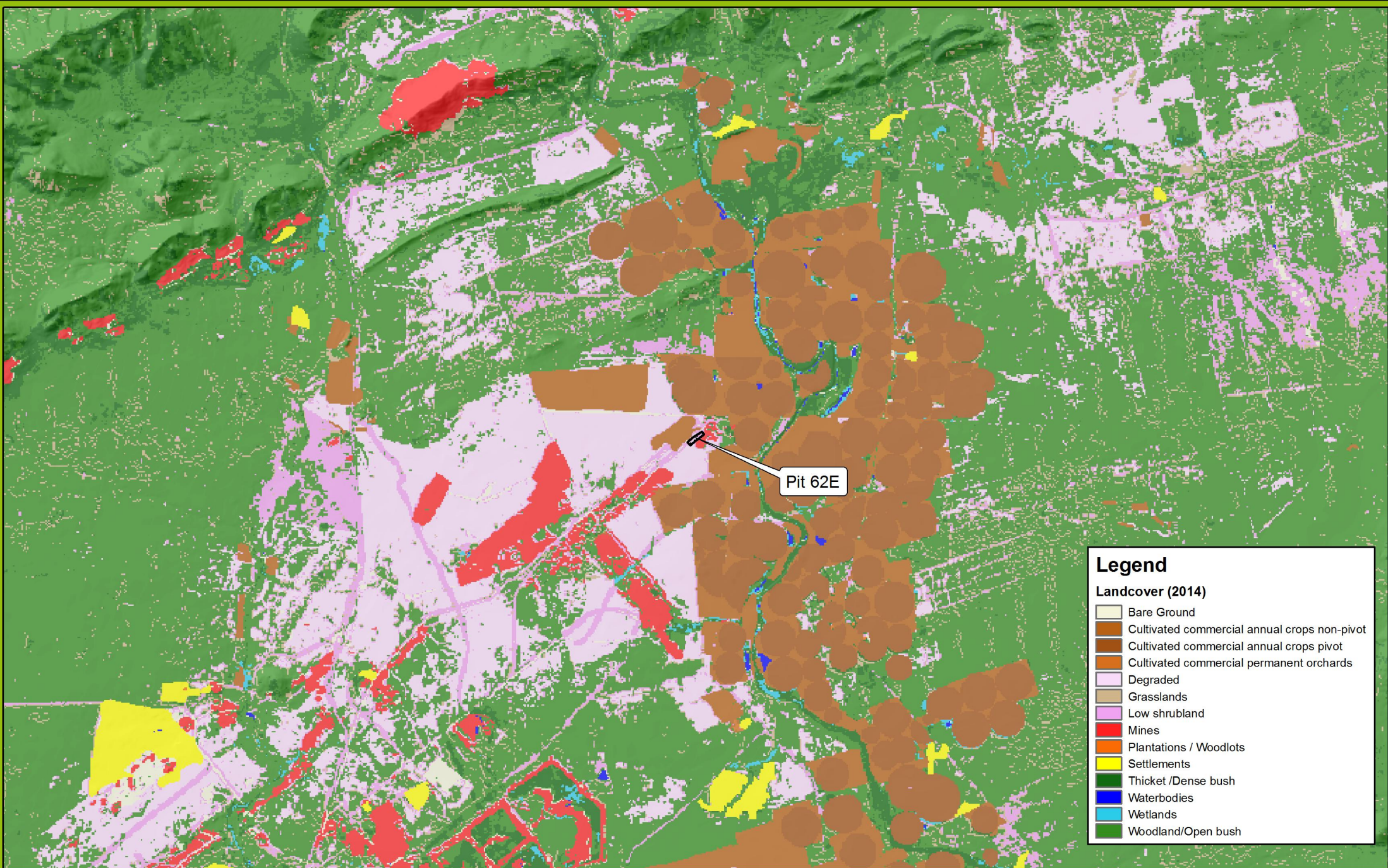
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Compiled by: Stephen Townshend
Compiled on: 2017/06/07



Appendix B.4

Landcover



Legend

Landcover (2014)

- Bare Ground
- Cultivated commercial annual crops non-pivot
- Cultivated commercial annual crops pivot
- Cultivated commercial permanent orchards
- Degraded
- Grasslands
- Low shrubland
- Mines
- Plantations / Woodlots
- Settlements
- Thicket /Dense bush
- Waterbodies
- Wetlands
- Woodland/Open bush

AMANDELBULT
Pit 62E Landcover Map



Scale as printed at A4 **1:100 000**



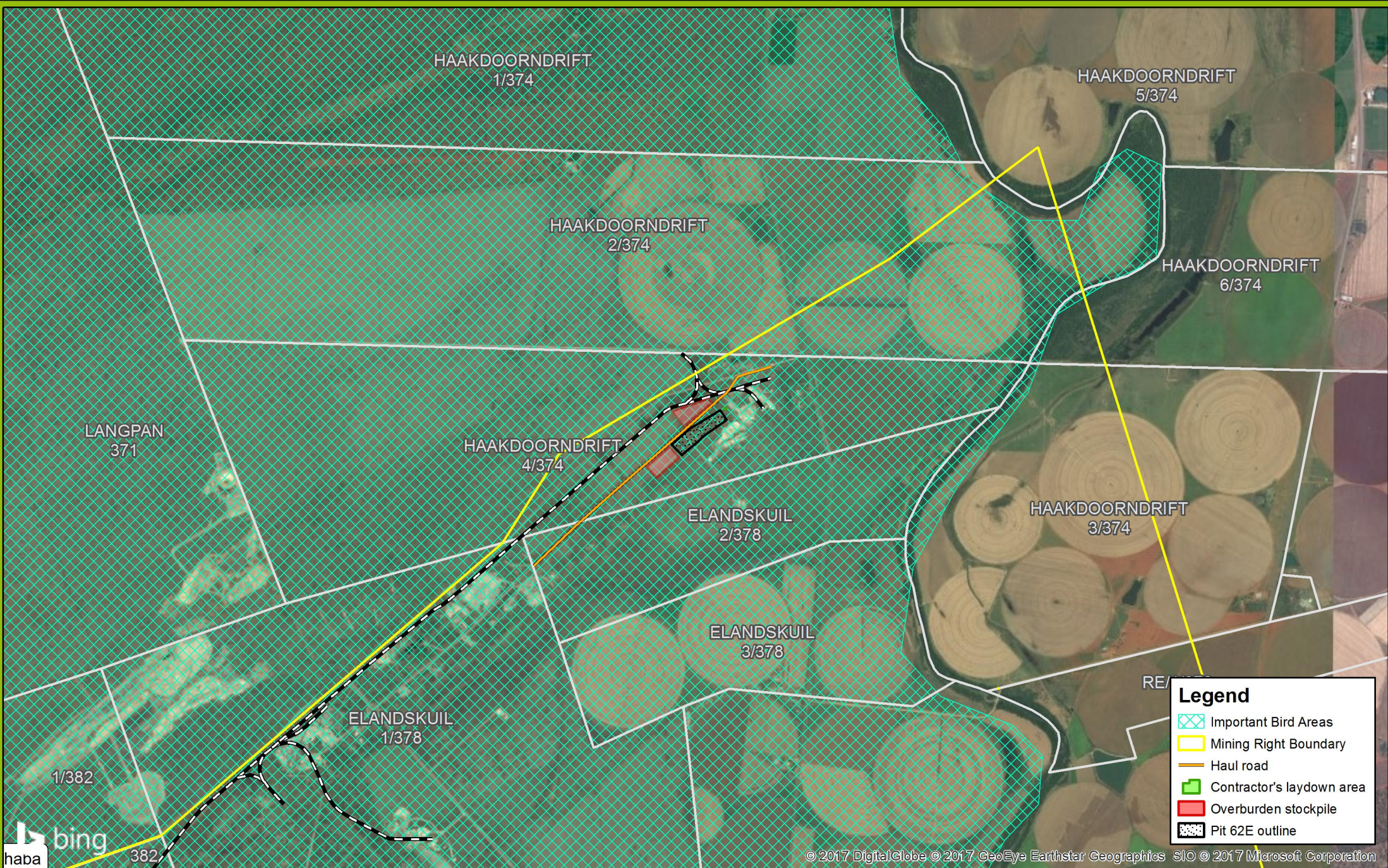
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Compiled by: Stephen Townshend
Compiled on: 2017/05/25



Appendix B.5

Important Bird Areas



Legend

- Important Bird Areas
- Mining Right Boundary
- Haul road
- Contractor's laydown area
- Overburden stockpile
- Pit 62E outline

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bing
haba

AMANDELBULT

Pit 62E Important Bird Areas (IBA's)



Scale as printed at A4 **1:30 000**



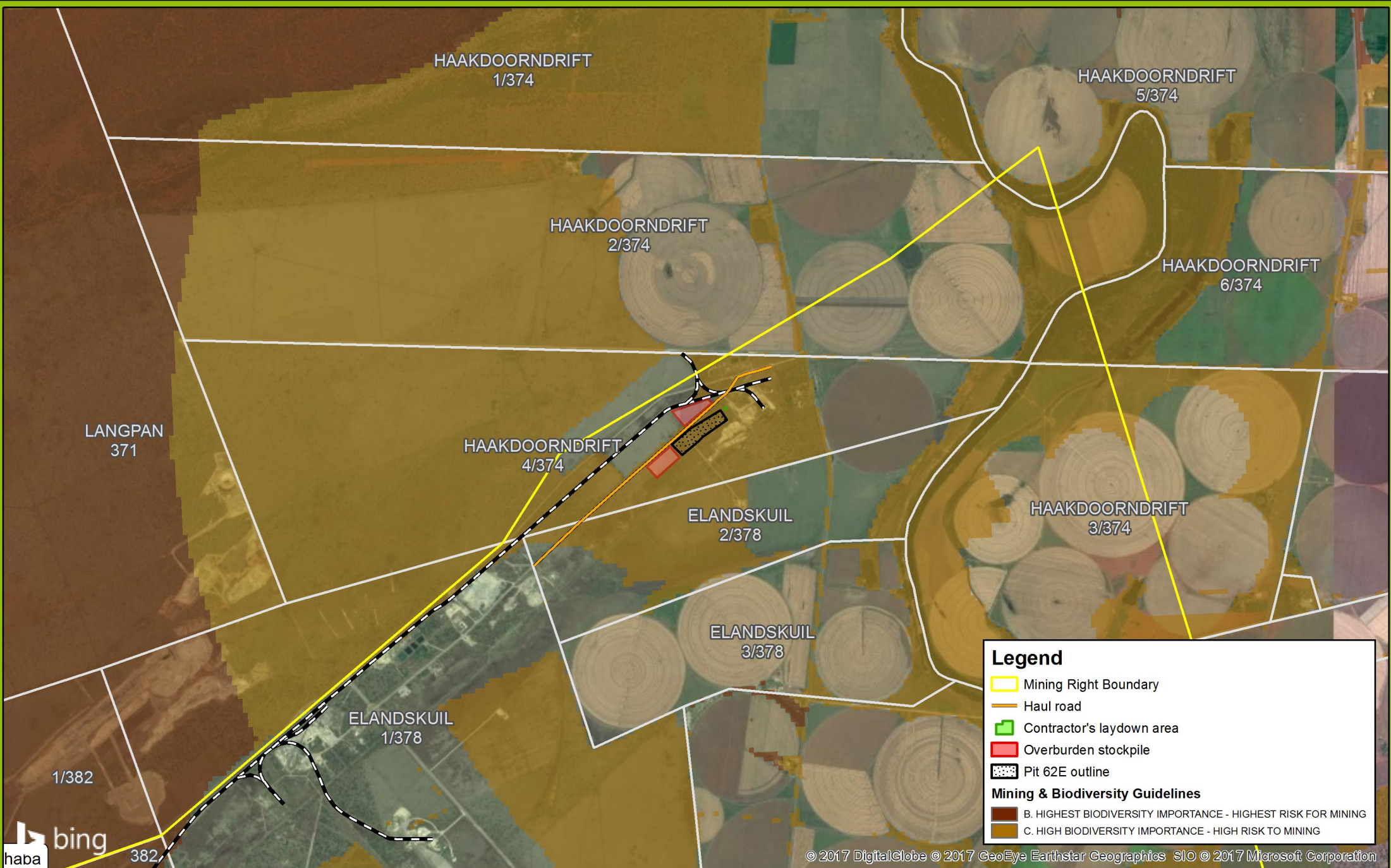
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Compiled by: Stephen Townshend
Compiled on: 2017/05/25



Appendix B.6

Mining & Biodiversity Guidelines



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Pit 62E Mining & Biodiversity Guidelines



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Compiled by: Stephen Townshend
Compiled on: 2017/05/25





C

Public
Participation
Records

Appendix C.1

I&AP Database

Affected Landowners

Portion / Erf nr	21 Digit Code	Maj Region	Municipality	Landowner / Organisation	Occupied / rented by	Contact person	Postal address	Postal code	Cell	Tel	Fax	Email
4	T0KQ0000000037400004	KQ	THABAZIMBI LOCAL MUNICIPALITY	RUSTENBURG PLATINUM MINES LTD		Anglo American Platinum						
RE	T0KQ0000000038600000	KQ	THABAZIMBI LOCAL MUNICIPALITY	RUSTENBURG PLATINUM MINES LTD		Anglo American Platinum						
1	T0KQ0000000037800002	KQ	THABAZIMBI LOCAL MUNICIPALITY	RUSTENBURG PLATINUM MINES LTD		Anglo American Platinum						
2	T0KQ0000000037800002	KQ	THABAZIMBI LOCAL MUNICIPALITY	RUSTENBURG PLATINUM MINES LTD		Anglo American Platinum						
2	T0KQ0000000037400002	KQ	THABAZIMBI LOCAL MUNICIPALITY	BUITENDAG BOERDERYE EIENDOMME PTY LTD	Sanet Buitendag & Louis Scheepers	Louis Scheepers			072 831 0446 [Louis] 0828259929 [Sanet]	0147721932		sanet3@telkomsa.net
3	T0KQ0000000037400003	KQ	THABAZIMBI LOCAL MUNICIPALITY	COETZEE MARIUS HUGO & COETZEE SHAUNEEN		Marius Coetzee	P O BOX 67, THABAZIMBI	0380	083 287 2977 [Marius] 083 379 7063 [Shauneen] 082 604 4225 [Rujuane]	0147722513		mhcoetzee1978@gmail.com; vtrujuane@gmail.com
0	T0KQ0000000037100000	KQ	THABAZIMBI LOCAL MUNICIPALITY	HUMAN ELSABE HENDRINA (deceased)	Piet Human	Piet Human	P O BOX 994, THABAZIMBI	0380	0834623015			langpan.human@gmail.com
RE	T0KQ0000000038900000	KQ	THABAZIMBI LOCAL MUNICIPALITY	UNKNOWN								
4	T0KQ0000000038800004	KQ	THABAZIMBI LOCAL MUNICIPALITY	RUUKKI SOUTH AFRICA (PTY) LTD (now Afarak South Africa (Pty) Ltd)			West Rand Consolidated Mines PO Box 658 Krugersdorp	1740		011 668 3800	011 668 3899	[Please obtain email address]
1	T0KQ0000000038800001	KQ	THABAZIMBI LOCAL MUNICIPALITY	CRONIMET CHROME PROP (PTY) LTD			PO Box 124284 Alberton	1454		011 908 1620	011 861 6604	info@cronimet.co.za
RE	T0KQ0000000038500000	KQ	THABAZIMBI LOCAL MUNICIPALITY	BAPHALANE BA MANTSERRE COMMUNITY DEVELOPMENT TRUST								[See "Municipal and Ward"]
RE	T0KQ0000000038600000	KQ	THABAZIMBI LOCAL MUNICIPALITY	RUSTENBURG PLATINUM MINES LTD								

Departments

Organisation	Unit	Contact person	Position	Postal address	Postal code	Tel	Fax	Email
Limpopo Department of Economic Development, Environment and Tourism (LEDET)	Integrated Pollution and Waste Management	Phuti Mabothe		Private Bag X9484 Polokwane	0700			mabothapj@ledet.gov.za
		Molutelwa Mahlako				082 755 7938		mahlokom@ledet.gov.za
	Environmental Impact Assessment	R Nelutshindwi	Control Environmental Officer: Grade B	20 Hans van Rensburg Street / 19 Biccard Street, Polokwane / Provate bag X 9484, Polokwane	0699 / 0700	015 290 7155 / 015 293 8300	015 295 5015	nelutshindwir@ledet.gov.za
		Mr Victor Mongwe		LEDET Building, Corner Suid and Dorp Streets, Polokwane				mongwev@ledet.gov.za
South African Heritage Resources Agency (SAHRA)		SAHRIS						

Municipal and Ward

Local Leadership Development Forum	Contact person	Position	Cell	Email
Bakgatla Ba Kgafela Traditional Authority	Mmadikemo Matlou	BBK Royal Council	060 495 9176	deboramatlou@gmail.com
	Thari Pilane	BBK Royal Council	071 100 7178	tharipilane@gmail.com
	Irvin Pheto		083 583 8359	irvin.pheto@bbkta.co.za
Mantserre Sub-Council	Saltiel Ramokoka	Mantserre Village Headman	083 529 9460 / 083 550 1809	saltielramokoka@gmail.com
Sebilong Community Property Association	Moabi Tisane		079 161 7538	tisani.moabi@gmail.com
Thabazimbi Local Municipality	Irene Nengwekhulu	Ward 6 Councillor	083 875 5393	nengwekhuluirene@gmail.com
Thabazimbi Local Municipality	Tshegofatso Ramoabi	Ward 8 Councillor	083 728 9509	tshegoramoabi89@gmail.com
Thabazimbi Local Municipality	Tshepo Makutu	Environmental		makututc@thabazimbi.gov.za

Appendix C.2

Background Information Document

Environmental Authorisation Process for Proposed Opencast Pits at Anglo American Platinum's Amandelbult Mine at Thabazimbi, Limpopo



INVITATION TO REGISTER AND COMMENT

Purpose of this document

The purpose of this Background Information Document (BID) is to brief interested and affected parties (I&APs) about the Basic Assessment (BA), Waste Management Licence (WML), and Environmental Management Programme (EMPr) addendum application processes that are being conducted for the proposed opencast activities at Anglo American's Amandelbult Mine in the Limpopo province.

In addition to supplying information about the proposed project, the BA, WML and EMPr processes, this BID also provides I&APs with the opportunity to:

- register as stakeholders in the public participation process; and
- comment on and make contributions to the proposed project.

The Competent Authority (in this case the Department of Mineral Resources [DMR]) will decide in accordance with the Mineral and Petroleum Resources Development Act (2004) (MPRDA), the National Environmental Management Act (1998) (NEMA) and its EIA Regulations (2014), and the National Environmental Management: Waste Act (2008) (NEM: WA) on whether to authorise the proposed activities.

Please register as an interested and affected party and submit your comments on the proposed project by 10 July 2017.

Either complete a response form, write a letter, call, or email the public participation office:

Attention: Ms. Amelia Visagie
 Aurecon South Africa (Pty) Ltd
 PO Box 74381, Lynnwood Ridge, 0040
 Tel: +27 12 427 3149
 Fax: +27 86 538 6115
 Email:
 amelia.visagie@aurecongroup.com
 www.aurecongroup.co.za

Background

Aurecon South Africa (Pty) Ltd was appointed by Anglo American Platinum (Pty) as the independent Environmental Assessment Practitioner (EAP) to provide environmental services for the proposed opencast mining of shallow reefs containing Platinum Group Metals (PGMs) through the proposed Pits 62E, 36W and 36E. These reefs form part of the Merensky and UG2 reefs in the Amandelbult Complex. The proposed pits and associated infrastructure will be located within the existing Amandelbult mining right boundary.

Certain environmental authorisations (EAs) are in place at the Complex. For instance, opencast mining on portion 0 of farm Elandsfontein 386 KQ (36W on the Tumela section) and portion 0 of the farm Middellaagte 382 KQ (36E on the Dishaba section) are in place under the mine's existing EMPr.

However, the mining of Pit 36W (Figure 1) as such is not authorised, and is being added to the existing EMPr under the "One Environmental Management System" put in place by the Environmental Impact Assessment Regulations, 2014 (Government Notices No. 982 to 985 of 2014). Therefore, an addendum to the EMPr will be submitted to the DMR.

As mentioned above, a mining right is in place for opencast mining at Pit 62E (Figure 2) on portion 4 of the farm Haakdoorndrift 374 KQ, but no EAs. Therefore, a BA is being conducted to obtain such an approval from the DMR.

Project description

The proposed Life of Mine (LoM) for each of the pits is approximately 3 to 6 months

due to their small extents (Table 1). The mineral resources extracted at the pits will be transported to the Amandelbult Concentrator Plant for processing. This application for authorisation includes the following main project components:

- opencast pits;
- overburden stockpile areas;
- contractor laydown areas; and
- haul roads along the pits and between the pits and overburden dump areas, if required.

Therefore, the application excludes processing of minerals, as this will take place at the existing Amandelbult Concentrator Plant.

New opencast mining projects at Anglo's Amandelbult Complex are motivated by a recent decline in commodity prices. This mining method (as opposed to underground mining) will enable Anglo to economically extract reef remnants of easily accessible PGM resources.

Mining method

Resources will be extracted through a truck and shovel method including the following steps (Figure 3):

1. Clear, grub, strip and stockpile topsoil.
2. The base cut of weathered material is taken to 2 m depth and the pit floor is prepared for blast-hole drilling.
3. The blast block is drilled out starting 10 m from the outcrop across to the high wall position.
4. Blast holes are drilled until contact is made with the top reef.

5. The overburden package is then blasted, and reef extraction proceeds down the dip and along the strike as mining deepens.
6. The block will be backfilled upon cessation of mining activities.

Who is doing the Environmental Impact Assessment and the Basic Assessment?

Anglo American Platinum (Pty) Ltd, in line with the EIA guidelines, appointed Aurecon South Africa (Pty) Ltd as independent consultant to conduct the EIA process. Aurecon is familiar with the project area, and is known for their proven independence in assessment of impacts and assisting stakeholders to contribute to the EIA process.

Legal requirements for EIA

Environmental Authorisation

In terms of the 2014 EIA Regulations (Government Notices No. R 982 to 985 of 2014, as amended), the opencast activities and its ancillary infrastructure will trigger listed activities requiring authorisation:

- The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second or more (Listing 1: 9);
- Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies (Listing 1: 21);

- The clearance of an area of 1 ha or more, but less than 20 ha of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity; or maintenance purposes undertaken in accordance with a maintenance management plan (Listing 1: 27);
- The widening of a road by more than 6 m, or the lengthening of a road by more than 1 km where the existing reserve is wider than 13.5 m; or where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas (Listing 1:56).

Waste Management Licence

In terms of the National Environmental Management: Waste Act, No. 59 of 2008, Government Notice 921 of 2013, and Government Notice 633 of 2015, the following waste management activities require licencing under the following section of Category B of the Act, from the DMR:

- Category B (11): The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

What is a BA?

A BA is a systematic process to identify positive and negative impacts on the environment (biophysical, socio-economic and cultural conditions) associated with a proposed activity and the evaluation of alternatives or management measures to minimise negative and optimise positive impacts, thereby preventing substantial detrimental impacts on the environment.

An BA is conducted in phases, namely:

- application phase;
- basic impact assessment phase;
- decision-making phase; and
- an overarching Public Participation Process (PPP) as outlined below.

Process to be followed for Public Participation

Public participation is the cornerstone of any EIA. It ensures that the process is fair, transparent, and inclusive. It also provides stakeholders with sufficient information and affords them ample opportunity to contribute. The contributions of stakeholders are valued.

The findings of the EIA will assist I&APs to understand the extent of the impacts. The PPP is designed to provide sufficient and accessible information to I&APs in an objective manner to assist them to:

- raise issues of concern and make suggestions for alternatives and enhanced benefits;
- contribute local knowledge;
- verify that their issues have been captured and considered by the technical investigations; and
- comment on the findings of the BA.

Stakeholder engagement

During this phase, it is customary to consult with:

- relevant authorities at various levels;
- relevant stakeholders;
- the applicant; and
- the public at large.

The PPP is designed to solicit a joint effort by stakeholders to produce better decisions than if they had acted independently. The primary aim of such a process is to facilitate better decision-making. The following activities will be utilised to achieve its objective:

- Advertising on-site, at various public locations, in a local newspaper; and
- Providing information to enable all affected parties an opportunity to register and comment on documents.

As part of the BA, specialist studies were conducted. The following specialist investigations have been undertaken:

- Heritage study;
- Palaeontological (fossil resources) study;
- Biodiversity study (terrestrial fauna, flora and soils).

Table 1 | Opencast pit sizes, locations, and authorisation status

Pit	Pit Size	Farm Name, number and portion	Application for EA / EMPr
36W	~4.1 ha	Elandsfontein 386 KQ, portion 0	To be added to existing EMPr
36E	~2.4 ha	Middellaagte 382 KQ, portion 0	Authorised under existing EMPr
62E	~3.1 ha	Haakdoordrift 374 KQ, portion 4	New EA required through BA

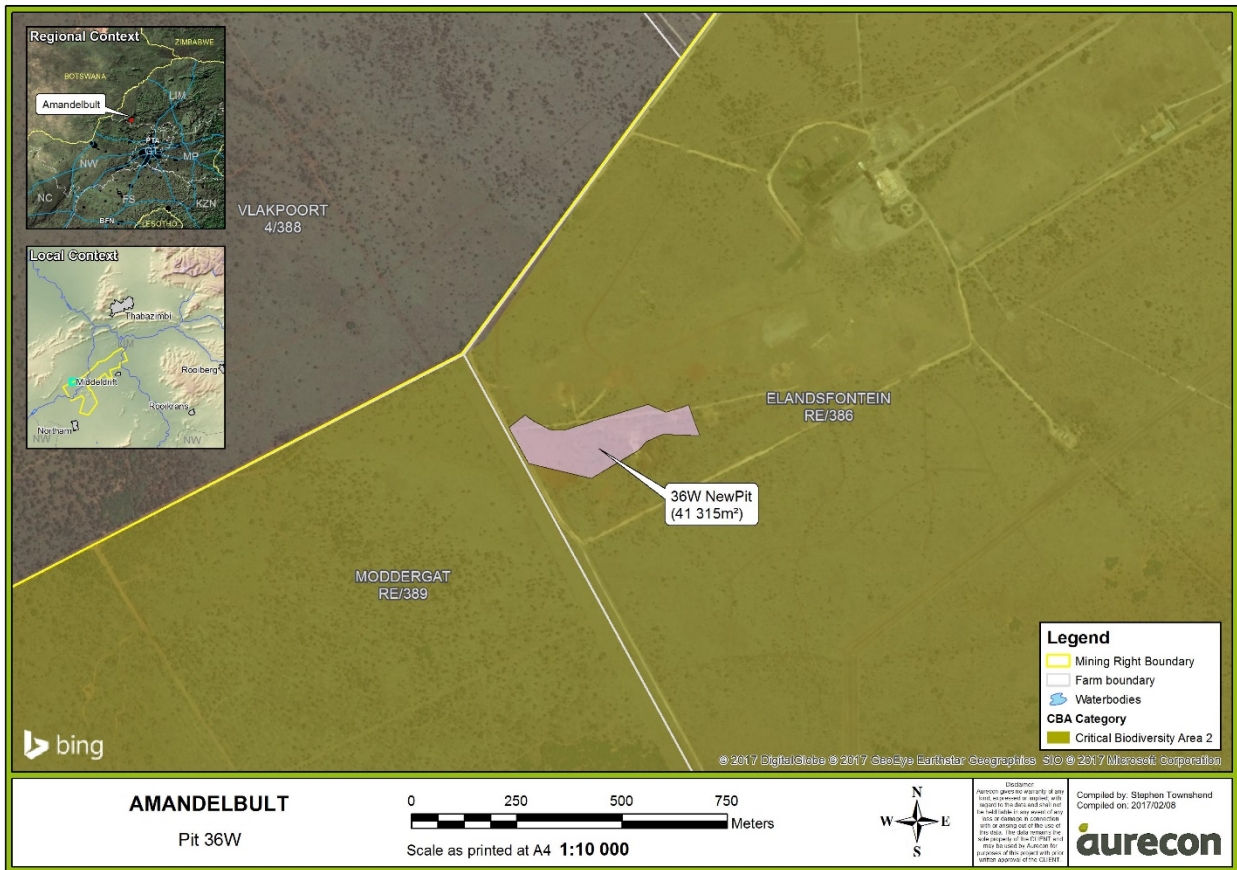


Figure 1 | Pit 36W requiring an addendum to the Amandelbult Complex Environmental Management Programme

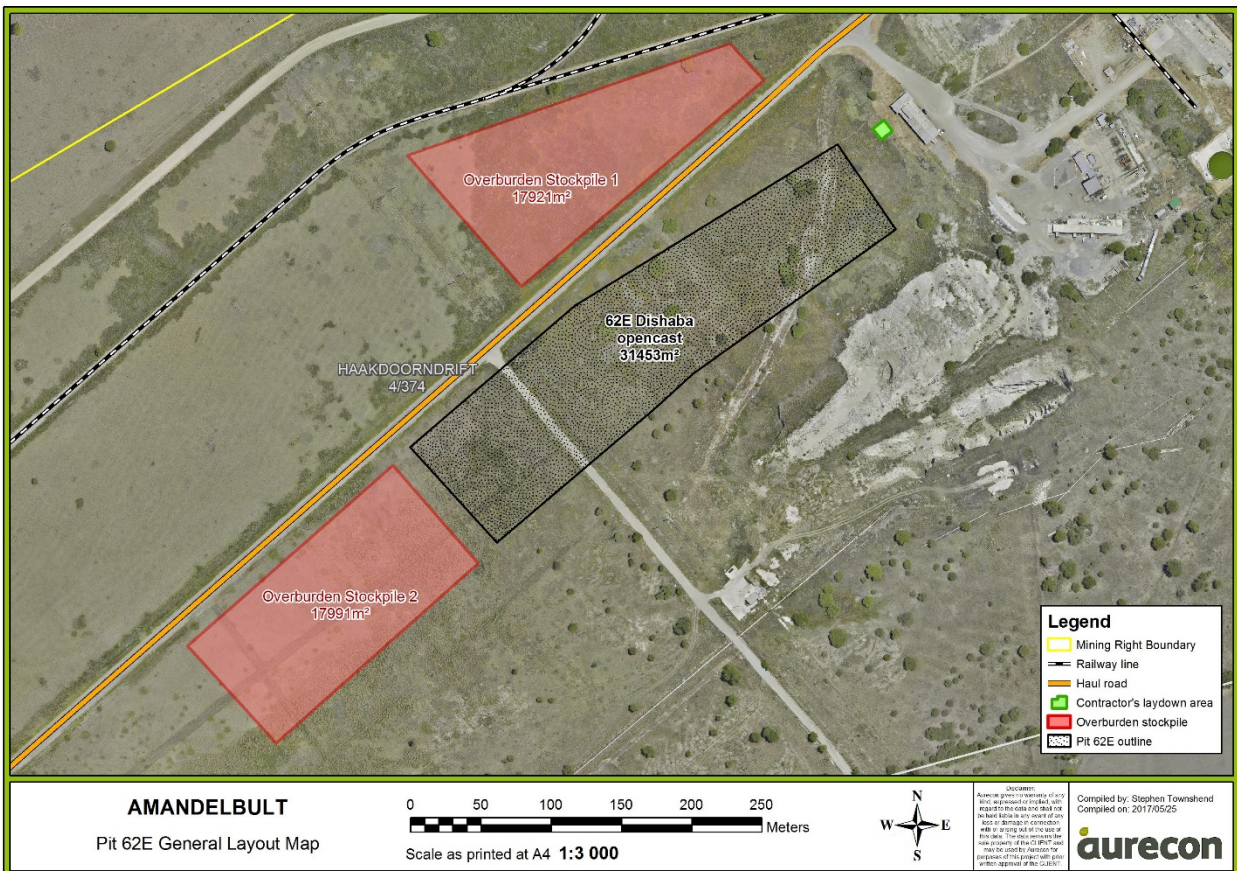


Figure 2 | Pit 62E requiring a Basic Assessment

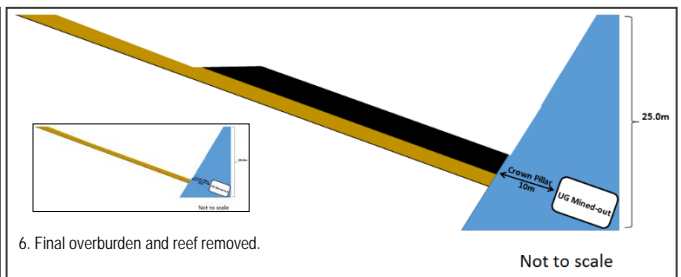
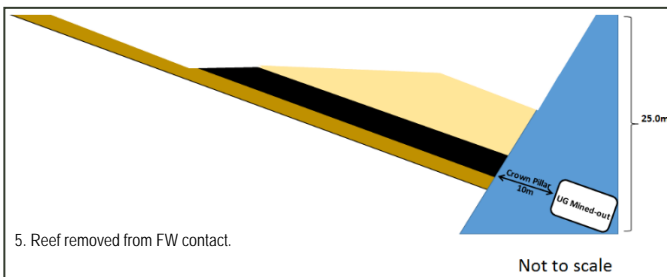
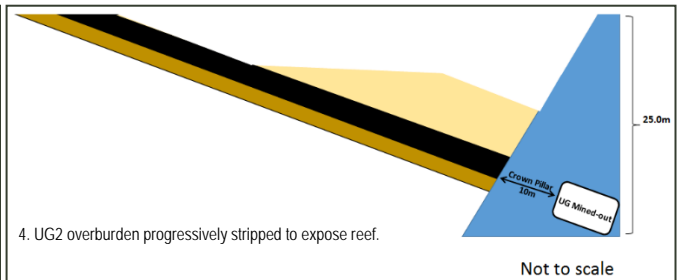
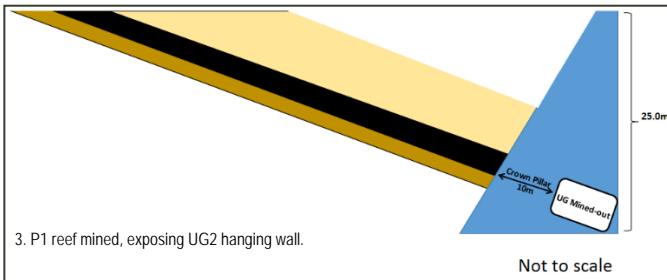
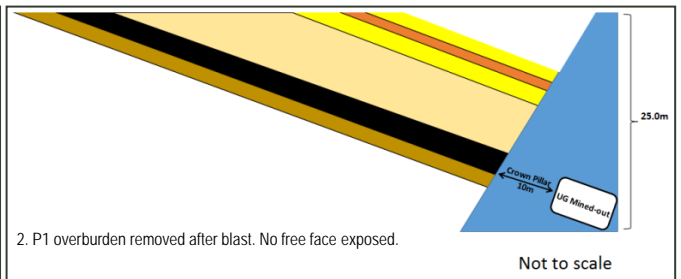
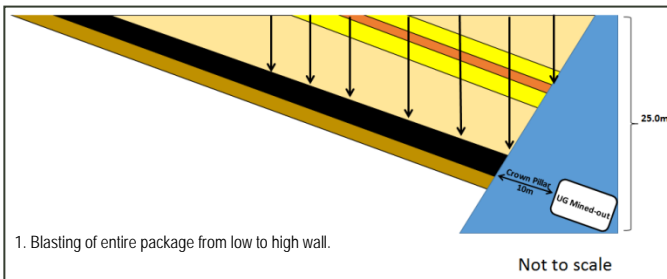
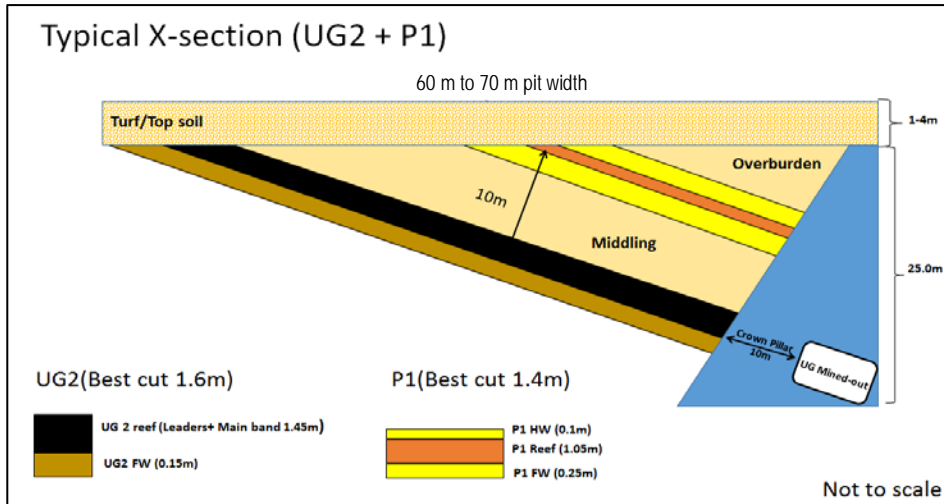


Figure 3 | Opencast mining method diagram.

Environmental Impact Assessment for the
**PROPOSED OPENCAST ACTIVITIES AT ANGLO AMERICAN PLATINUM'S AMANDELBULT MINE IN
 THABAZIMBI, LIMPOPO**
INVITATION TO REGISTER AND COMMENT BY 10 JULY 2017

Please complete and return to Aurecon to be included in the public participation process:

The Public Participation Office
 Aurecon South Africa (Pty) Ltd
 For attention: Amelia Visagie
 PO Box 74381
 Lynnwood Ridge
 0040

Tel: 012 427 3149
 Fax: 086 5386115
 Email: amelia.visagie@aurecongroup.com

Yes, I would like to participate in this Environmental Impact Assessment YES
 No, I am not interested NO

TITLE		FIRST NAME	
INITIALS		SURNAME	
ORGANISATION			
PROPERTY / FARM PORTION			
POSTAL ADDRESS		POSTAL CODE	
TEL NUMBER		FAX NUMBER	
CELL NUMBER			
EMAIL			

COMMENTS (please use separate sheets if you wish):

1. The following issues must be considered in the Environmental Impact Assessment Process:

.....

2. Please add the following colleagues / friends to the mailing list:

.....

Thank you for your participation.

Appendix C.3

Copy of Site Notice & Newspaper
Advertisement

NOTICE OF AN APPLICATION FOR AN ENVIRONMENTAL AUTHORISATION FOR TWO PROPOSED OPENCAST PITS AT ANGLO AMERICAN PLATINUM'S AMANDELBULT MINE

9 JUNE 2017

Project description: Anglo American Platinum (Pty) Ltd proposes the opencast mining of Platinum Group Metals of two pits (62E and 36W) at its Amandelbult Mine Complex. The pits are located on the Amandelbult mining right area near Thabazimbi in the Limpopo Province.

Listed activities: The following environmental processes will be undertaken in accordance with the relevant legislative requirements:

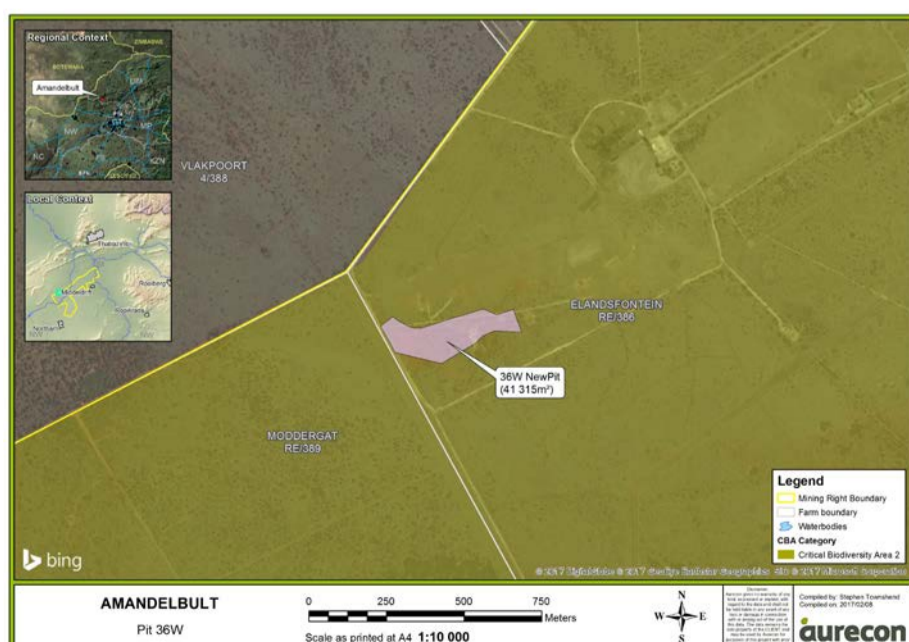
Legislation	Activities	Process / Competent Authority
National Environmental Management Act, (Act No. 107 of 1998)	Activity 9, 21, 27, and 56 of GNR 983 of 2014.	Integrated Environmental Authorisation Process / Department of Mineral Resources (DMR)
National Environmental Management: Waste Act (Act No. 59 of 2008)	Category B (11) of Waste Management Activities (GNR 921 of 2013)	
National Environmental Management Act, (Act No. 107 of 1998)	Addendum to valid Environmental Management Programme under "One Environmental Management System"	

Opportunity to participate: The Consultation Basic Assessment Report (CBAR) is available for public review at the following venues:

Public Place	Address	Contact Person	Tel. No.
Tumela Main Offices	24.8226° S, 27.2874° E	Ursula Marvey	014 784 2084 / 1087
Northam Post Office (Shoprite Centre)	Swartklip Rd.	Ms Nomsa Zozi	014 784 0121
Northam Platinum Mine Setaria Spar	24.794608° S, 27.412072° E	Charlotte Benton	014 785 0315

The proposed project will affect the following farm portions:

Farm	Portion	Pit	Process
Haakdoordrift 374 KQ	4	60E	Basic Assessment
Elandsfontein 386 KQ	0 (Remaining)	36W	EMPr addendum



CONSULTATION BASIC ASSESSMENT REPORT AVAILABLE FOR PUBLIC COMMENT FROM 9 JUNE TO 10 JULY 2017

For more information contact: Ms Lynette Herbst, Aurecon South Africa (Pty) Ltd, PO Box 74381, Lynnwood Ridge, 0040, Fax: 086 538 6115, Tel: 012 427 2627, Email: lynette.herbst@aurecongroup.com.

KITSISO YA KOPO YA TETLA YA TSA TIKOLOGO MALEBANA LE KATLANEGISO YA DIPETSE TSE PEDI TSE DI BULEGILENG KWA MOEPONG WA POLATENAMO WA ANGLO AMERICAN AMANDELBULT

9 SEETEBOSIGO 2017

Tihaloso ya porojeke: Anglo American Platinum (Pty) Ltd e atlanegisa gore go nne le moepo o o bulegileng wa Platinum Group Metals wa dipetse tse pedi (62E le 36W) kwa Amandelbult Mine Complex. Dipetse tseno di fitlhelwa kwa lefelong la tshwanelo ya moepo la Amandelbult gaufi le Thabazimbi kwa Porofenseng ya Limpopo.

Lethathama la dilo tse di tla dirwang: Ditirego tse di latelang tsa tikologo di tla dirwa tumalanong le dipatlafalo tse di tshwanelang tsa molao:

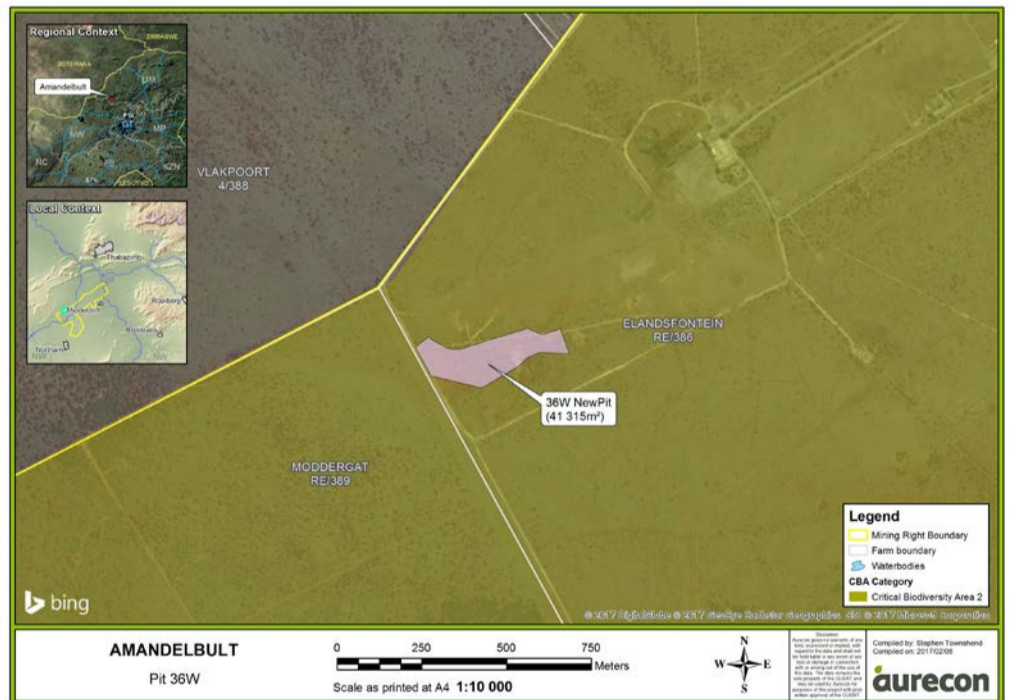
Molao	Ditiro	Tirego / Taolo e e Tshwanelegang
Molao wa Bosetšhaba wa Tsamaiso ya tsa Tikologo, (Act No. 107 ya 1998)	Tiro 9, 14, 21, 27, 51, le 56 tsa GNR 983 tsa 2014. Tiro 10 le 22 tsa GNR 985 tsa 2014.	Tirego ya Taolo ya tsa Tikologo e e Kopaneng / Lefapha la Ditsompelo tsa Diminerale (DMR)
Tsamaiso ya Bosetšhaba ya Tikologo: Molao wa Matlakala (Act No. 59 ya 2008)	Setlhophha B (11) sa Ditiro tsa Tsamaiso ya Matlakala (GNR 921 of 2013)	
Molao wa Bosetšhaba wa Tsamaiso ya tsa Tikologo, (Act No. 107 ya 1998)	Mametlelelo go Porojeramo ya Tsamaiso ya tsa Tikologo e e siameng kafa tlase ga "Thulaganyo e le Nngwe ya Tsamaiso ya tsa Tikologo"	

Tshono ya go tsaya karolo: Pego ya Motheo ya Tshekatsheko ya Ikgolaganyo (CBAR) e teng kwa mafelong a a latelang gore batho ba e sekaseke:

Lefelo la Botlhe	Aterese	Motho yo go ikgolagangwang nae	Nomore ya Mogala
Dikantoro-Kgolo tsa Tumela	24.8226° S, 27.2874° E	Ursula Marvey	014 784 2084 / 1087
Kantoro ya Poso ya Northam (Shoprite Centre)	Swartklip Rd.	Ms Nomsa Zozi	014 784 0121
Moepo wa Polatinamo wa Northam Setaria Spar	24.794608° S, 27.412072° E	Charlotte Benton	014 785 0315

Porojeke e e atlanegisitsweng e tla ama dikarolo tse di latelang tsa polasi:

Polasi	Karolo	Petse	Tirego
Haakdoorndrift 374 KQ	4	60E	Tshekatsheko ya Motheo
Elandsfontein 386 KQ	0 (Setseng)	36W	Mametlelelo ya EMPr



PEGO YA MOTHEO YA TSHEKATSHEKO YA IKGOLAGANYO E TENG GORE BATHO BA AKGELE GO TLOGA KA 9 SEETEBOSIGO GO YA GO 10 PHUKWI 2017

Go bona tshedimosetso ka botlalo, ikgolaganye le: Ms Lynette Herbst, Aurecon South Africa (Pty) Ltd, PO Box 74381, Lynnwood Ridge, 0040, Fakeese: 086 538 6115,
Mogala: 012 427 2627, lmeile: lynette.herbst@aurecongroup.com.

Invitation to Comment on The Basic Assessment Report of The Environmental Authorisation for Two Proposed Opencast Pits at The Anglo American Platinum (Pty) Ltd Amandelbult Mine Near Thabazimbi, Limpopo Province

Project description: Anglo American Platinum (Pty) Ltd proposes the opencast mining of Platinum Group Metals of two pits (62E and 36W) at its Amandelbult Mine Complex. The pits are located on the Amandelbult mining right area near Thabazimbi in the Limpopo Province.

A Basic Assessment Report (BAR) and Environmental Management Programme (EMPr) addendum will be undertaken in accordance with the relevant legislative requirements:

Legislation	Activities	Process / Competent Authority
National Environmental Management Act, (Act No. 107 of 1998)	• Activity 9, 21, 27, and 56 of GNR 983 of 2014.	Integrated Environmental Authorisation Process / Department of Mineral Resources (DMR)
National Environmental Management: Waste Act (Act No. 59 of 2008)	Category B (11) of Waste Management Activities (GNR 921 of 2013)	
National Environmental Management Act, (Act No. 107 of 1998)	Addendum to valid Environmental Management Programme under "One Environmental Management System"	

Hardcopies of the BAR and EMPr addendum will be available for download at <http://www.aurecongroup.com/en/public-participation.aspx> and at the following venues from Friday, 9 June 2017 to Monday, 10 July 2017: The reports may not be removed from the premises.

Public Place	Address	Contact Person	Tel. No.
Tumela Main Offices	24.8226° S, 27.2874° E	Ms. Ursula Marvey	014 784 2084 / 1087
Northam Post Office (Shoprite Centre)	Swartklip Rd.	Ms. Nomsa Zozi	014 784 0121
Northam Platinum Mine Setaria Spar	24.794608° S, 27.412072° E	Ms. Charlotte Benton	014 785 0315

HOW TO PARTICIPATE

Please submit your comments telephonically, by fax or e-mail to Lynette Herbst (see contact details below) on or before **Monday, 10 July 2017 to:**

The Public Participation Office | Aurecon South Africa (Pty) Ltd | Attention: Lynette Herbst | PO Box 74381 | Lynnwood Ridge | 0040 | Fax: +27 86 538 6115 | Tel: +27 12 427 2627 | Email: lynette.herbst@aurecongroup.com.

Taletso Ya Go Akgela Ka Pego Ya Tshekatsheko Ya Motheo Ya Tetla Ya Tikologo Ya Dipetse Tse Di Bulegileng Tse Pedi Tse Di Atlanegisilweng Kwa Moepong Wa Anglo American Platinum (Pty) Ltd Amandelbult, Gaufi Le Thabazimbi, Porofense Ya Limpopo

Tihaloso ya porojeke: Anglo American Platinum (Pty) Ltd e atlanegisa gore go nne le moepo o o bulegileng wa Platinum Group Metals wa dipetse tse pedi (62E le 36W) kwa Amandelbult Mine Complex. Dipetse tseno di fitlhelwa kwa lefelong la tshwanelo ya moepo la Amandelbult gaufi le Thabazimbi kwa Porofenseng ya Limpopo.

Lethathama la dilo tse di tla dirwang: Ditirego tse di latelang tsa tikologo di tla dirwa tumalanong le dipatlafalo tse di tshwanelang tsa molao:

Molao	Ditiro	Tirego / Taolo e e Tshwanel-egang
Molao wa Bosetšhaba wa Tsamaiso ya tsa Tikologo, (Act No. 107 ya 1998)	Tiro 9, 21, 27, le 56 tsa GNR 983 tsa 2014.	Tirego ya Taolo ya tsa Tikologo e e Kopaneng / Lefapha la Ditsompelo tsa Diminerale (DMR)
Tsamaiso ya Bosetšhaba ya Tikologo: Molao wa Matlakala (Act No. 59 ya 2008)	Setlhophu B (11) sa Ditiro tsa Tsamaiso ya Matlakala (GNR 921 of 2013)	
Molao wa Bosetšhaba wa Tsamaiso ya tsa Tikologo, (Act No. 107 ya 1998)	Mametlelelo go Porogeramo ya Tsamaiso ya tsa Tikologo e e siameng kafa tlase ga "Thulaganyo e le Nngwe ya Tsamaiso ya tsa Tikologo"	

Batho ba ba nang le kgatlhego le ba ba angwang ke projele, ba lalediwa go akgela ka mametlelelo ya Pego ya Tshekatsheko ya Motheo (BAR) le ya Porogeramo ya Tsamaiso ya tsa Tikologo (EMPr) tse di leng teng gore batho ba akgele ka tsone ka lobaka lwa malatsi a le masome a mararo (30 days) go tloga ka Lwabolthano, 9 Seetebosigo 2017 go ya go Mosupologo, 10 Phukwi 2017.

Dikhophi tsa pampiri tsa mametlelelo ya BAR le ya EMPr di tla bo di le teng ka nako e e supilweng ya go akgela kwa mafelong a a latelang. Dipego tseno ga di a tshwanela go tlosiwa mo mafelong ano.

Lefelo la Botlhe	Aterese	Motho yo go ikgolag-annwang nae	Nomoro ya Mogala
Dikantoro-Kgolo tsa Tumela	24.8226° S, 27.2874° E	Ms. Ursula Marvey	014 784 2084 / 1087
Kantoro ya Poso ya Northam (Shoprite Centre)	Swartklip Rd.	Ms. Nomsa Zozi	014 784 0121
Moepo wa Polatinamo wa Northam Setaria Spar	24.794608° S, 27.412072° E	Ms. Charlotte Benton	014 785 0315

Dikhophi tsa elektroniki tsa mametlelelo ya BAR le EMPr di teng gape go ka laisololwa go tswa go <http://www.aurecongroup.com/en/public-participation.aspx> ka nako e e supilweng ya go akgela.

KAFA O KA TSAYANG KAROLO KA TENG

Tsweetswee romela dikakgelo tsa gago ka go letsa mogala, ka fekese kgotsa ka go romela imeile go Lynette Herbst (bona dintlha tsa go ikgolaganya fa tlase) ka kgotsa pele ga Mosupologo, 10 Phukwi 2017 go: The Public Participation Office | Aurecon South Africa (Pty) Ltd | Attention: Lynette Herbst | PO Box 74381 | Lynnwood Ridge | 0040 | Fekese: +27 86 538 6115 | Mogala: +27 12 427 2627 | Imeile: lynette.herbst@aurecongroup.com.

Appendix C.4

Copy of Letters to I&APs and Authorities

Aurecon South Africa (Pty) Ltd
1977/003711/07
Aurecon Centre
Lynnwood Bridge Office Park
4 Daventry Street
Lynnwood Manor
0081
PO Box 74381
Lynnwood Ridge
0040
South Africa

T +27 12 427 2000
F +27 86 556 0521
E tshwane@aurecongroup.com
W aurecongroup.com



9 June 2017

Dear Interested and Affected Party

INVITATION TO COMMENT ON THE CONSULTATION BASIC ASSESSMENT REPORT AND EMPR ADDEDUM FOR THE PROPOSED OPENCAST PITS 62E AND 36W, AMANDELBULT MINE COMPLEX, LIMPOPO PROVINCE

Please be informed that the consultation Basic Assessment Report (BAR) and an addendum to the Environmental Management Programme (EMPr) to be authorised under the One Environmental Management System, compiled in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), the EIA Regulations of Government Notice (GN) No. 982 of 2014, as amended, is available for your review and comment. **Comment period: 9 June to 10 July 2017.**

Hardcopies of the consultation BAR and EMPr addendum will be available during the specified commenting period at the following venues (*the reports may not be removed from the premises*):

Public Place	Address	Contact Person	Tel. No.
Tumela Main Offices	24.8226° S, 27.2874° E	Ursula Marvey	014 784 2084 / 1087
Northam Post Office (Shoprite Centre)	Swartklip Rd.	Ms Nomsa Zozi	014 784 0121
Setaria Spar	24.794608° S, 27.412072° E	Charlotte Benton	014 785 0315

Electronic copies of the consultation BAR and EMPr addendum are also available for download from <http://www.aurecongroup.com/en/public-participation.aspx> during the specified comment.

Kindly submit any comments on the consultation BAR and EMPr addendum in writing on or before **Monday 10 July 2017** to:

The Public Participation Office
Aurecon South Africa (Pty) Ltd
Attention: Ms Lynette Herbst

PO Box 74381
Lynnwood Ridge
0040
South Africa

Fax: +27 86 538 6115
Tel: +27 12 427 2627
Email: lynette.herbst@aurecongroup.com

The comments will be recorded in the final submissions to the Competent Authority, the Department of Mineral Resources (DMR).

Thank you.
Yours sincerely,

Johan Goosen
EAP

Aurecon South Africa (Pty) Ltd

1977/003711/07

Aurecon Centre
Lynnwood Bridge Office Park
4 Daventry Street
Lynnwood Manor
0081

PO Box 74381
Lynnwood Ridge
0040

South Africa

T +27 12 427 2000

F +27 86 268 0200

E tshwane@aurecongroup.com

W aurecongroup.com

The Aurecon logo consists of a small green square above the word 'aurecon' in a bold, lowercase, sans-serif font.

9 June 2017

The Deputy Director
Department of Mineral Resources
Limpopo Region
Broll Building
101 Dorp Street
Polokwane
0699
by hand:

For Attention: Ms Mashudu Mudau

Dear Madam,

INVITATION TO COMMENT ON THE CONSULTATION BASIC ASSESSMENT REPORT AND EMPR ADDEDUM FOR THE PROPOSED OPENCAST PITS 60E AND 36W, AMANDELBULT MINE COMPLEX, LIMPOPO PROVINCE

Included herewith is a copy of the consultation Basic Assessment Report (BAR) and an addendum to the Environmental Management Programme (EMPr) to be authorised under the One Environmental Management System, compiled in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), the EIA Regulations of Government Notice (GN) No. 982 of 2014, as amended, for your review and comment. Should you require soft copies, please let us know.

The Reports will be available to Interested and Affected Parties for review from 9 June to 10 July 2017.

Kindly submit any comments on the consultation BAR and EMPr addendum in writing, on or before Monday 10 July 2017 to:

The Public Participation Office
Aurecon South Africa (Pty) Ltd
Attention: Ms Lynette Herbst
PO Box 74381
Lynnwood Ridge
0040
Fax: +27 (0) 83 538 6115
Tel: +27 (0) 12 427 2627
Email: lynette.herbst@aurecongroup.com

The comments will be recorded in the Final BAR for submission.

Note that we have provided each of the commenting authorities (LEDET and SAHRA) with a copy of the consultation BAR as well for comment.

Thank you.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Johan Goosen', written over a horizontal line.

Johan Goosen

Environmental Assessment Practitioner

Aurecon South Africa (Pty) Ltd
1977/003711/07
Aurecon Centre
Lynnwood Bridge Office Park
4 Daventry Street
Lynnwood Manor
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E tshwane@arecongroup.com
W aurecongroup.com

The Aurecon logo consists of a small green square above the word 'aurecon' in a bold, lowercase, sans-serif font.

9 June 2017

Limpopo Department of Economic Development, Environment and Tourism
Private Bag X9484
Polokwane
0700

Attention: Mr Victor Mongwe

Dear Sir,

INVITATION TO COMMENT ON THE CONSULTATION BASIC ASSESSMENT REPORT AND EMPR ADDEDUM FOR THE PROPOSED OPENCAST PITS 60E AND 36W, AMANDELBULT MINE COMPLEX, LIMPOPO PROVINCE

Included herewith is a copy of the consultation Basic Assessment Report (BAR) and an addendum to the Environmental Management Programme (EMPr) to be authorised under the One Environmental Management System, compiled in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), the EIA Regulations of Government Notice (GN) No. 982 of 2014, as amended, for your review and comment. Should you require soft copies, please let us know.

The Reports will be available to Interested and Affected Parties for review from 9 June to 10 July 2017.

Kindly submit any comments on the consultation BAR and EMPr addendum in writing, on or before Monday 10 July 2017 to:

The Public Participation Office
Aurecon South Africa (Pty) Ltd
Attention: Ms Lynette Herbst
PO Box 74381
Lynnwood Ridge
0040
South Africa
Fax: +27 (0) 83 538 6115
Tel: +27 (0) 12 427 2627
Email: lynette.herbst@arecongroup.com

The comments will be recorded in the Final BAR for submission to the Competent Authority, the Department of Mineral Resources (DMR).

Thank you.

Yours sincerely,

A handwritten signature in grey ink, appearing to read 'Johan Goosen', is written over a horizontal line.

Johan Goosen
Environmental Assessment Practitioner



D

**Impact
Assessments**

Appendix D: Impact Assessments

Construction (site establishment, vegetation clearing, topsoil stripping & stockpiling)

Code	Impact	Pre-mitigation:						Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
1	Loss of topsoil due to negligent stripping and stockpiling procedures at open pit and due to use of topsoil for construction purposes.	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
2	Deterioration of topsoil quality due to contamination with underlying subsoil layers or rock formations	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
3	Decline in topsoil fertility due to mixing of soil's A and B horizons (upper and lower horizons) and due to possible mixing of different soil types	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
4	Compaction and decline in topsoil structure during stockpiling	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
5	Topsoil contamination with hydrocarbons and chemical compounds from mechanical equipment	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low
6	Loss of topsoil through erosion at stockpiles	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
7	Cease in current land use at pit, stockpiles and infrastructure footprints during mine construction and operation	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low
8	Loss of floral & faunal habitat	Short-term	Site-specific	Moderate - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Site-specific	Low - negative	Negligible	Very likely	Very low
9	Loss of floral & faunal SCC	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low
10	Sensory disturbances to fauna	Short-term	Local	Moderate - negative	Slightly detrimental	Fairly likely	Low - negative	Short-term	Local	Moderate - negative	Slightly detrimental	Unlikely	Very low
11	Direct faunal mortality	Medium-term	Local	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative	Medium-term	Site-specific	Moderate - negative	Slightly detrimental	Unlikely	Very low
12	Natural resource harvesting	Short-term	Site-specific	Negligible	Negligible	Unlikely	Very low	Short-term	Site-specific	Negligible	Negligible	Very unlikely	Very low
13	Alien and invasive species	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
14	Water quality deterioration due to pollutant discharge or dirty water runoff	Short-term	Local	Negligible	Negligible	Unlikely	Very low	Short-term	Local	Negligible	Negligible	Unlikely	Very low
15	Dust deposition due to soil clearing	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Site-specific	Low - negative	Negligible	Very likely	Very low
16	Dust deposition due to vehicle movement	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Local	Negligible	Negligible	Very likely	Very low
17	PM ₁₀ emissions due to vehicle & equipment (e.g. generators) operation	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Local	Negligible	Negligible	Very likely	Very low
18	Daytime noise caused by vehicle & equipment operation	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low
19	Night-time noise caused by vehicle & equipment operation	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Local	Low - negative	Slightly detrimental	Unlikely	Very low
20	Chance heritage finds	Short-term	Site-specific	Low - negative	Negligible	Very unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Very unlikely	Very low
21	Chance fossil finds	Short-term	Site-specific	Low - negative	Negligible	Very unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Very unlikely	Very low
22	Visual impact from night-time lighting	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
23	Visual impact from dust	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
24	Safety & security impacts	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low

Operation (OB blasting, removal & ore extraction)

Code	Impact	Pre-mitigation:						Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
1	Deterioration of topsoil quality due to contamination with underlying subsoil layers or rock formations	Medium-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low	Medium-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
2	Compaction and decline in topsoil structure during stockpiling	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low

Code	Impact	Pre-mitigation:						Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
3	Topsoil contamination with hydrocarbons and chemical compounds from mechanical equipment	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
4	Loss of topsoil through erosion at stockpiles & pit edges	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
5	Cease in current land use at pit, dumps, stockpiles and infrastructure footprints	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low
6	Sensory disturbances to fauna	Short-term	Local	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Short-term	Local	Low - negative	Slightly detrimental	Unlikely	Very low
7	Direct faunal mortality	Medium-term	Local	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative	Medium-term	Local	Moderate - negative	Moderately detrimental	Unlikely	Low - negative
8	Water quality deterioration due to pollutant discharge or dirty water runoff	Short-term	Local	Low - negative	Slightly detrimental	Unlikely	Very low	Short-term	Local	Low - negative	Slightly detrimental	Unlikely	Very low
9	Dust deposition due to loading and hauling	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Local	Low - negative	Slightly detrimental	Fairly likely	Low - negative
10	Dust deposition emissions due to vehicle movement	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Local	Low - negative	Slightly detrimental	Unlikely	Very low
11	PM ₁₀ emissions due to vehicle & equipment (e.g. generators) operation	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Local	Negligible	Negligible	Very likely	Very low
12	Daytime noise caused by vehicle & equipment operation	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low
13	Night-time noise caused by vehicle & equipment operation	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative
14	Ground vibration caused by blasting	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
15	Air blast caused by blasting	Short-term	Local	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
16	Fly rock caused by blasting	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
17	Chance heritage finds	Short-term	Site-specific	Low - negative	Negligible	Very unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Very unlikely	Very low
18	Chance fossil finds	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low
19	Visual impact from night-time lighting	Short-term	Site-specific	Low - negative	Negligible	Very likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Very likely	Very low
20	Visual impact from dust	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low	Short-term	Site-specific	Negligible	Negligible	Very likely	Very low
21	Contribution to employment retention at mine	Short-term	Local	Moderate - positive	Slightly beneficial	Very likely	Low - positive	Short-term	Local	Moderate - positive	Slightly beneficial	Very likely	Low - positive
22	Contribution to PGM-resources at mine	Short-term	Local	Moderate - positive	Slightly beneficial	Certain	Moderate - positive	Short-term	Local	Moderate - positive	Slightly beneficial	Certain	Moderate - positive

Decommissioning (material & topsoil replacement, grading, revegetation)

Code	Impact	Pre-mitigation:						Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
1	Loss of topsoil due to negligent stripping and stockpiling procedures at open pit and due to use of topsoil for construction purposes.	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
2	Decline in topsoil fertility due to mixing of soil's A and B horizons (upper and lower horizons) and due to possible mixing of different soil types	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
3	Compaction and decline in topsoil structure during topsoil replacement	Medium-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Medium-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
4	Topsoil contamination with hydrocarbons and chemical compounds from mechanical equipment	Medium-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Medium-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
5	Loss of topsoil through erosion at stockpiles, pit edges and rehabilitated areas	Medium-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative	Medium-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
6	Reconstructed topography	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Very likely	Low - negative
7	Replacement of floral & faunal habitat	Long-term	Local	Moderate - positive	Moderately beneficial	Very likely	Moderate - positive	Long-term	Local	Moderate - positive	Moderately beneficial	Very likely	Moderate - positive
8	Alien and invasive species	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Fairly likely	Very low
9	Dust deposition emissions due to topsoil handling	Short-term	Site-specific	Low - positive	Negligible	Very likely	Very low	Short-term	Site-specific	Low - positive	Negligible	Unlikely	Very low
10	Dust deposition emissions due to vehicle movement	Short-term	Site-specific	Low - positive	Negligible	Very likely	Very low	Short-term	Site-specific	Low - positive	Negligible	Unlikely	Very low
11	PM ₁₀ emissions due to vehicle & equipment (e.g. generators) operation	Short-term	Site-specific	Low - negative	Negligible	Very likely	Very low	Short-term	Site-specific	Low - negative	Negligible	Very likely	Very low

Code	Impact	Pre-mitigation:						Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
12	Daytime noise caused by vehicle & equipment operation	Short-term	Site-specific	Negligible	Negligible	Fairly likely	Very low	Short-term	Site-specific	Negligible	Negligible	Fairly likely	Very low
13	Night-time noise caused by vehicle & equipment operation	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low
14	Chance heritage finds	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low
15	Chance fossil finds	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low
16	Visual impact from night-time lighting	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low
17	Visual impact from dust	Short-term	Site-specific	Negligible	Negligible	Unlikely	Very low	Short-term	Site-specific	Negligible	Negligible	Unlikely	Very low



E

Specialist Reports

Appendix E.1

Ecological Baseline Survey

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ECOLOGICAL ASSESSMENT OF ANGLO PLATINUM AMANDELBULT MINE PROPOSED OPEN PITS 62 EAST AND 36 WEST, NEAR NORTHAM IN LIMPOPO PROVINCE

This memo serves as a formal report on the current ecological status of the areas planned for the proposed expansion of opencast mining activities, relating to the proposed open pits 62 East and 36 West. A single site visit to the sites of both proposed pits was undertaken in May 2017. The objectives of this document are to:

1. Determine the proximity of the sites to aquatic habitats;
2. Evaluate the ecological state of the sites by evaluating the vegetation at each site in relation to the species components of the primary vegetation type;
3. Estimate the potential of the sites to support floral and faunal species of conservation importance; and
4. Evaluate the ecological stability of each site.

The Proposed Development

The development consists of the addition of two open-cast pits, with their associated spoil stockpiles. In total the mining footprint is approximately 7.2ha in size.

Background Ecology

The Anglo Platinum Amandelbult Mine is situated in the Dwaalboom Thornveld (SVcb1) (Mucina and Rutherford, 2006). The topography consists of an expansive flat area ringed by several low, rocky, hill ranges. The climate is characterised by highly seasonal rainfall of approximately 550mm MAP (Mean Annual Precipitation), with very dry winters, hot summers and high mean annual evaporation. The underlying geology is dominated by Norite, which, in conjunction with the climate has given rise to a landscape where the flat areas are dominated by dark, heavy vertisols with marked shrink-swell properties.

The vegetation is typically open savanna. The tree component is dominated by *Acacia* species, which are strongly related to the clay content of the upper soil horizons. In areas where the clay content exceeds 55%, the shrink-swell nature of the turf soils excludes the growth of trees. Otherwise the dominant tree species are *Acacia nilotica*, *Acacia tortillis* and *Zizyphus mucronata*. Dominant grass species are *Aristida bipartita*, *Digitaria eriantha*, *Bothriochloa insculpta*, and *Panicum maximum*.

The ecostatus of the Dwaalboom Thornveld is considered to be ***Least Threatened***. The conservation target is 19%, and to date approximately 6% of this has been achieved. However, approximately 86% of the vegetation type remains intact under a dominant land-use of cattle grazing. The remainder has been transformed mainly by crop cultivation and to a lesser extent mining. The areas degraded by erosion, and the prevailing erosion risk, is low to very low due to the flat topography. Little evidence of direct soil erosion was observed during the site visit, although areas of localised soil borrowing are evident. The vegetation type tends to be low in species diversity and endemic species (Mucina and Rutherford, 2006).

Areas of Ecological Concern

The mine is in the centre of one of Birdlife South Africa's Important Bird Areas (IBA), the Northern Turfveld IBA. This IBA is 56,090 ha in size, and incorporates the area west of the Crocodile River between Northam and the range of hills south of Thabazimbi. The main trigger species are Secretary Bird, Kori Bustard, Lanner Falcon, Black-winged Pratincole and Yellow-throated Sandgrouse. It should be noted that Secretary Bird and Kori Bustard are wide ranging species that are not necessarily restricted to the IBA for any particular reason. The Lanner Falcon may be dependent on the koppies and hill ranges for nesting sites (which will not be affected by mining activities), but is otherwise able to hunt over a range of habitats, including disturbed ones.

The Black-winged Pratincole is a globally threatened species. It is, however, migratory, ranging across the landscape and not necessarily confined to the IBA. In fact, the core area of its South African distribution is in southern Gauteng and eastern and central Free State. It is uncommon within this IBA. It feeds on insects, and is hence most likely to be tied to open rangelands, croplands and rivers and their floodplains. The spatial and temporal disturbance of the proposed mining activities on these habitats within the IBA is likely to be limited. The suspected reason behind the global threat to this species is extensive habitat destruction in its Eurasian breeding grounds (Hockey *et al.*, 2005).

The primary reason the area has been classified as an IBA is that it *supports the majority of the South African population of Yellow-throated Sandgrouse*. This population falls outside of formally protected areas. In contrast to the Yellow-throated Sandgrouse population in Botswana, which seasonally receives migrant birds from further north in Africa, the South African population has been found to be sedentary. It hence forms a meta-population, and the genetic diversity associated with this increases its biodiversity value. The species habitat requirements are open grassland, fallow fields and recently burned areas, especially on black clay soils and usually near water. The Amandelbult mine encompasses all of these habitats (Blane and Tarboton, 1990).

Yellow-throated Sandgrouse feed on seeds of legumes such as *Indigofera*, *Crotalaria* and *Cassia*, as well as ruderal species such as *Bidens* and *Sesbania*. They have adapted to foraging in fallow croplands, feeding on remnants of oats, sorghum, wheat, soya-bean and barley crops. They scrape nests in the ground, usually beneath or adjacent to a large tufted grass or shrub (Hockey *et al.*, 2005). They have managed to adapt to the removal of their natural habitat and its replacement by cultivated lands.

Pit 62 East

The proposed pit is approximately 3.5 ha in extent, and situated west and adjacent to existing mining activities. The new pit is bordered by recently closed and rehabilitated mine workings to the south; current mining to the east; and an area that has been used for mine stockpiles (and is hence completely transformed) to the north and west. Although there is porous connectivity to intact blocks of primary vegetation, in practice the area has been separated (albeit temporarily) by severe and ongoing disturbance from both mining and commercial crop agricultural activities.

- *Topography*: Flat, typical of the plains between hill ranges and kopjes in this landscape (**Figure 1**).



Figure 1: Views of the site of Pit 62 East, showing dark soils; severe disturbance; proximity to mining activities; and encroachment of activities

- *Soils*: Dark, heavy, vertic clay soils with marked shrink-swell properties. Typical of soils overlying Andesite in an environment characterised by a hot dry climate and strongly seasonal rainfall.
- *Local Disturbance Regime*: Severe. Although the site contains vestiges of the primary vegetation, the disturbance sustained is high. Infrastructure and mining activities have encroached extensively into the site.
- *Proximity to Aquatic Habitats*: None identified on site. The nearest riparian system is the Crocodile River, approximately 1.3km to the east.
- *Vegetation*: Vestiges of the natural vegetation remain, indicated by mature *Acacia tortillis* and *Acacia nilotica* trees. The sward beneath the trees is dominated by *Acacia mellifera* shrubs, *Digitaria eriantha* and *Panicum maximum*, and *Bothriochloa insculpta* with *Aristida bipartita*, *Dichanthium annulatum* and *Urochloa panicoides* prominent. There has been substantial encroachment by ruderal grass species such as *Sorghum halipense* and *Cenchrus ciliaris*. Encroachment by alien plants is low. A species list is provided in **Appendix A**.
- *Potential for the Site to Support Flora and Fauna of Conservation Significance*: Low. The ongoing disturbance surrounding the site is likely to preclude this. There are substantial blocks of intact vegetation, particularly to the west, which would provide eminently more suitable habitat for biota associated with this vegetation type, and would likely act as a sink to biota dislodged by mining activities. No indications were found of plants of conservation importance, although the site visit was a once-off, and occurred towards the end of the growing season. It is considered unlikely that the site would contain species that are not represented in the larger intact blocks remaining in the local landscape.

- *Ecological Context of the Site:* **Figure 2** places the development site in ecological context. The site is surrounded by disturbance, which limits ecological connection with intact blocks of vegetation. To the east, north and south connectivity to undisturbed vegetation has been lost due to commercial agriculture. There is a small block of intact vegetation to the east, but this is also isolated. To the west the vegetation grades into a large intact block of vegetation. To the west, connectivity is porous at present because, although the site is disturbed, it consists of secondary grassland, which allows animals to traverse it. However, this area is planned for the support of further stockpiles from elsewhere on the mine, which will further sever the site from the surrounding landscape.

The implications of this ecological isolation relate to the disruption to the ecological processes that maintain ecological functioning, such as:

- The grass cover in this area is considered to be sweetveld, which allows grazing at all scales by herbivores throughout the year. Large herbivores remove forage biomass (reducing the fire fuel load, and hence frequency and intensity of fires); recycle nutrients; and break up crusted soil surfaces, allowing rainfall infiltration and seed germination;
- The disruption to animal movement patterns also affects seed dispersal, particularly for the tree species;
- Fire frequency and intensity is affected, and altered from natural conditions.



Figure 2: Map of Pit 62 East, showing its position in a substantially transformed landscape

Pit 36 West

This development site is also superimposed on an extensive disturbance footprint. It is outside the IBA area (and is hence unlikely to include prime Yellowthroated Sandgrouse habitat), but is situated inside a Critical Biodiversity Area (CBA) 2, based on the most recent Systematic Conservation Plan (SCP) for Limpopo Province (2013). CBAs are areas that have been selected to meet biodiversity pattern and or ecological process targets. However, it is acknowledged that there may be alternative sites available to meet the targets and there is some flexibility in motivating for a change or intensification in land-use.

- *Topography*: Flat. Any change in micro-topography is associated with human disturbance.
- *Soils*: The site is situated at the interface between dark vertic soils and deep, red strongly structured pedocutanic soils. Even though the soils are red-brown, there are vertic characteristics such as deep cracks (indicating shrink-swell properties) evident, and slumping or self-sloping (**Figure 3**). The soils are deep, strongly structured, well-drained and clay-rich. The topography is stable, and soil erosion and export from the site is not a consideration.
- *Local Disturbance Regime*: Substantial, although intermittent. The disturbance associated with quarrying or soil removal has been high. Other sources of disturbance are pond excavation; the construction of a shooting range (**Figure 3, D**); and infrastructure development (roads and powerlines).
- *Proximity to Aquatic Habitats*: None identified on site, nor within 500m of the site.
- *Vegetation*: While there are vestiges of natural vegetation remaining, most of the natural vegetation within the site has been removed, and then recolonised by secondary vegetation communities. It should be noted that this ecosystem is accustomed to widespread vegetation dieback due to drought and elephant activity, and the vegetation is resilient. There is little difference in species composition and richness between primary and secondary communities. The disturbances have generally avoided the trees, although most of the herbaceous growth is secondary (based on the shape of the terrain). Many of the earthworks have been colonised by *Acacia mellifera* and *A. tortillis* trees. These are mature, providing an indication of the period since the disturbance occurred. The dominant trees within the site are *Acacia tortillis*; *Acacia nilotica*; *Acacia mellifera* and *Zizyphus mucronata*. The shrub component is dominated by *Grewia flavescens*; *Euclea undulata* and *Diospyros lycoides*. The grasses that make up the bulk of the herbaceous cover are *Digitaria eriantha*; *Panicum maximum*; *Dichanthium annulatum*; *Cymbopogon pospischilii*; *Andropogon chinensis* and *Setaria incrassata*. Encroachment by alien plants is low, although *Lantana camara* was recorded. A species list is provided in **Appendix A**.
- *Potential for the Site to Support Flora and Fauna of Conservation Significance*: Low to Moderate. The site is isolated, with a low prevailing disturbance regime. This is conducive to animals moving into and through the site, before being flushed by intermittent events such as shooting practice on the firing range. The degree of disturbance sustained and the modification to the micro-topography of the site renders it unlikely to support plant and animal species that are not found in the large blocks of undisturbed and intact vegetation to the west, north and south of the site (**Figure 4**). These areas would support biota dislodged by future mining activities. No indications were found

of plants of conservation importance, although the site visit was a once-off, and occurred towards the end of the growing season.



Figure 3: The characteristics of the site for Pit 36W showing: vertic soil properties such as cracks (A) and slumping (E); recolonization of earthworks (B, C); red soils; extensive earthworks (B, C, D, E); exclusion of trees from the earthworks (E); dumping of rock (F); recolonization of area by secondary grasses (C, F).



Figure 4: Map of Pit 36 West, showing the high degree of disturbance sustained relative to the surrounding landscape

- *Ecological Context of the Site:* **Figure 4** places the development site in ecological context. The site has been disturbed substantially, and it is surrounded by large tracts of intact vegetation. The mine is unlikely to affect the ecological processes in these areas.

Mining is ostensibly an incompatible land-use with achieving the strategic conservation objectives for the Critical Biodiversity Area (Class 2) as recognised by the Limpopo (SCP). However, this should be viewed in the following context:

1. The CBA 2 classification acknowledges that these are of lower priority than CBA1 areas, and that there may be other areas that provide the same biodiversity value and will achieve the same goals; and allows for the identification of alternatives;
2. The CBA classification is undertaken at a landscape scale, and considers large areas of intact vegetation. Small transformed areas within the larger intact matrix require site-specific considerations in terms of their overall impact on the attainment of conservation goals;
3. The small size of the development (4.1ha) in relation to the large contiguous blocks of this vegetation type that remain intact;
4. The proximity of the development on the periphery of permanently transformed land to the east;

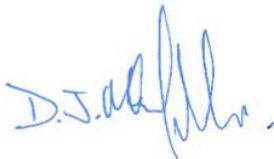
5. The development is superimposed on historical disturbance, and will not involve the transformation, and subsequent fragmentation; of intact vegetation;
6. The CBA2 is situated directly adjacent to a large block of land classified as 'other natural area' in the SCP. There is no reason why this cannot contribute to the functioning of the CBA;
7. The development is not permanent, and any infrastructure may be considered temporary;
8. The environmental conditions within the site are expected to lend themselves to a high potential for effective rehabilitation in the short- to medium-term. The topsoils tend to be deep, relatively homogenous and base-rich. The low, strongly seasonal and highly variable rainfall regime has influenced the life history strategies of the dominant herbaceous plant species. In order to persist, plants have invested more resources into the production of large quantities of viable seed at the expense of biomass production and the ability to resprout following defoliation. This allows them to bridge drought periods by having viable seeds lying dormant long after the adult plants have perished. The ecological consequence of this is that the vegetation is resilient (has a low ecological sensitivity), and ecologically equipped to recover following dieback. It is able to be restored following disturbance. It is uncertain whether in practice this applies to the extensive pedo-turbation associated with opencast mining, but the ecology of the dominant terrestrial system suggests that the potential is higher than in more mesic ecosystems.

Conclusions

- It should be noted that the platinum seam is relatively confined across the Anglo Platinum property, and the proposed new pits and their stockpiles have a small footprint (less than 10 ha) relative to the size of the IBA (56,090 ha), the CBA2 and the adjacent natural area. According to Hockey *et al.* (2005), the persistence of the Yellow-throated Sandgrouse population is dependent on the continuation of the current crop farming regime, rather than the extent of natural habitat. The proposed open pits will not affect this land-use.
- The proposed open pits are unlikely to affect local aquatic resources at either site.
- Pit 62E is partially intact vegetation surrounded by transformed land, with poor connectivity to adjacent blocks of undisturbed vegetation.
- Pit 36W is a disturbed patch within a matrix of intact vegetation, and is unlikely to affect the ecological status or processes associated with this ecosystem.
- The disturbance is not permanent.
- The potential for rehabilitation and the restoration of ecological processes to the mined areas is considered high.
- The developments are unlikely to adversely affect the conservation objectives of the Limpopo SCP.
- The proposed open pits are confined to areas that:

- Have already sustained a degree of disturbance;
- Contain vegetation with a low ecological sensitivity;
- Have low species richness and poor levels of endemism;
- Occur in vegetation that is classed as Least Threatened, and is hence of low conservation priority. The development is unlikely to compromise local biodiversity.

Yours faithfully



DOUG MCCULLOCH

Ecologist: Environment & Advisory Services

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Appendix A: Species List

Pit 62 East			
Species	Growth Form	Functional Group	Abundance
<i>Acacia tortillis</i>	Tree/ Shrub		
<i>Acacia mellifera subs. detinens</i>	Shrub		
<i>Sorghum halipense</i>	Grass	Exotic	Patches
<i>Bothriochloa insculpta</i>	Grass	Increaser 2	
<i>Chloris virgata</i>	Grass	Increaser 2	
<i>Cenchrus ciliaris</i>	Grass	Decreaser	Locally dominant
<i>Bidens pillosa</i>	Forb	Ruderal	
<i>Aristida bipartita</i>	Grass	Increaser 2	Dominant
<i>Sorghum versicolor</i>	Grass	Increaser 2	Patches
<i>Panicum maximum</i>	Grass	Decreaser	
<i>Aristida canescens</i>	Grass	Increaser 2	
<i>Setaria nigrirostris</i>	Grass	Decreaser	Patches
<i>Urochloa panicoides</i>	Grass	Increaser 2	Patches
<i>Acacia karoo</i>	Tree		
<i>Cynodon nemfluensis</i>	Grass	Exotic	Patches
<i>Sesbania bispinosa</i>	Shrub	Alien	
<i>Dichanthium annulatum</i>	Grass	Decreaser	
<i>Zinnia peruviana</i>	Forb	Alien Ruderal	
<i>Hibiscus trionum</i>	Forb	Alien Ruderal	
<i>Sporobolus africanus</i>	Grass	Increaser 2	
Pit 36 West			
Species	Growth Form	Functional Group	Abundance
<i>Acacia tortillis</i>	Tree		Common
<i>Acacia mellifera subs. detinens</i>	Shrub and Tree		Dominant
<i>Acacia karoo</i>	Tree		Common
<i>Zizyphus mucronata</i>	Shrub		Common
<i>Acacia nilotica</i>	Tree		Common
<i>Digitaria eriantha</i>	Grass	Decreaser	Dominant
<i>Setaria incompressa</i>	Grass	Decreaser	Dominant
<i>Aristida adscencionis</i>	Grass	Increaser 2	Common
<i>Aristida congesta</i>	Grass	Increaser 2	
<i>Enneapogon cenchroides</i>	Grass	Increaser 2	
<i>Grewia flavescens</i>	Shrub		Dominant
<i>Bothriochloa insculpta</i>	Grass	Increaser 2	Dominant
<i>Dichanthium annulatum</i>	Grass	Decreaser	Dominant
<i>Solanum elaeagnifolium</i>	Forb		
<i>Hyparrhenia hirta</i>	Grass	Increaser 1	
<i>Andropogon chinensis</i>	Grass	Increaser 1	

<i>Acacia gerrardii</i>	Shrub		
<i>Asparagus larycinus</i>	Shrub		
<i>Dichrostachys cineria</i>	Shrub		
<i>Aristida bipartita</i>	Grass	Increaser 2	
<i>Panicum maximum</i>	Grass	Decreaser	Dominant
<i>Heteropogon contortus</i>	Grass	Decreaser	
<i>Themeda triandra</i>	Grass	Decreaser	
<i>Solanum delagoense</i>	Forb		
<i>Searsia lancea</i>	Tree		
<i>Euclea undulata</i>	Shrub		
<i>Diospyros lycoides subs. lycoides</i>	Shrub		Dominant
<i>Aptosimum elongatum</i>	Forb		
<i>Cymbopogon pospischilii</i>	Grass	Increaser 3	Dominant
<i>Eragrostis curvula</i>	Grass	Increaser 2	
<i>Fingerhuthia africana</i>	Grass	Decreaser	
<i>Zinnia peruviana</i>	Forb	Alien Ruderal	
<i>Gymnosporia buxifolia</i>	Shrub		
<i>Cenchrus ciliaris</i>	Grass	Decreaser	
<i>Lantana camara</i>	Shrub	Alien	

Appendix E.2

Heritage Impact Assessment



HERITAGE IMPACT ASSESSMENT

THE PROPOSED DEVELOPMENT OF TWO OPEN MINING PITS 62E/60E (DISHABA) AND 36W (TUMELA) AT THE AMANDELBULT MINING COMPLEX LOCATED NORTH OF NORTHAM, THABAZIMBI LOCAL MUNICIPALITY, WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

Date: 1 May 2017

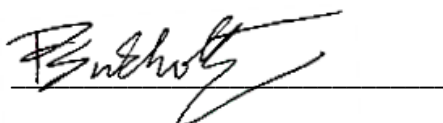
Declaration of Independence

The report has been compiled by PGS Heritage (Pty) Ltd, an appointed Heritage Specialist for Aurecon South Africa (Pty) Ltd. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment.

HERITAGE CONSULTANT: PGS Heritage (Pty) Ltd

CONTACT PERSON: Polke Birkholtz
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Email: polke@pgsheritage.co.za



SIGNATURE:

A handwritten signature in black ink, appearing to read 'Birkholtz', is written over a horizontal line.

DETAILS OF CLIENT:

CLIENT: Aurecon South Africa (Pty) Ltd

CONTACT PERSON: Lynette Herbst
Tel: +27 (0) 12 427 2627
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Report Title	Heritage Impact Assessment for the Proposed Development of two Open Mining Pits 62E/60E (Dishaba) And 36W (Tumela) at the Amandelbult Mining Complex, located north of Northam, Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province.		
Control	Name	Signature	Designation
Author	Polke Birkholtz		Project Manager / Heritage Specialist & Archaeologist
Co-Author	Heidi James-Birkholtz		Archaeologist

Input by Specialists:

- **Ms Elize Butler** was commissioned as Palaeontologist to carry out a Palaeontological Desktop Study. This report is attached under **Appendix C**.

As indicated in the table below, this Heritage Impact Assessment report was compiled in accordance with the NEMA Appendix 6 requirements for specialist reports.

NEMA REGS (2014) - APPENDIX 6	RELEVANT PAGES AND SECTIONS
Details of the specialist who prepared the report.	Pages i, ii, iii, 1 & 2. Also Appendix B
The expertise of that person to compile a specialist report including a curriculum vitae.	Pages i, ii, iii, 1 & 2. Also Appendix B
A declaration that the person is independent in a form as may be specified by the competent authority.	Page ii
An indication of the scope of, and the purpose for which, the report was prepared.	Page 1 (Section 1.1)
The date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Page 14 (Section 3.1)
A description of the methodology adopted in preparing the report or carrying out the specialised process.	Page 14 (Section 3.1)
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure.	Sections 5 to 8 & Appendix C
An identification of any areas to be avoided, including buffers.	Sections 5 to 8 & Appendix C
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.	Appendix C
A description of any assumptions made and any uncertainties or gaps in knowledge.	Page 2 (Section 1.3)
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment.	Executive Summary and Section 9. Please note that no development alternatives were assessed.
Any mitigation measures for inclusion in the EMPr.	See Section 8 & Appendix C
Any conditions for inclusion in the environmental authorization.	See Section 8 & Appendix C
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	See Section 8 & Appendix C
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and	Executive Summary and Section 9
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	
A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. It is not known whether a public participation was undertaken as part of the environmental process.
A summary and copies if any comments that were received during any consultation process	Not applicable. See previous item.
Any other information requested by the competent authority.	Not applicable.

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd was appointed by Aurecon South Africa (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the environmental process for the proposed development of two opencast mining pits 62E/60E (Dishaba) and 36W (Tumela) at the Amandelbult Mining Complex, located north of Northam, in Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province.

An archival and historical desktop study was undertaken to provide a historic framework for the project area and surrounding landscape. This was augmented by a study of available historical and archival maps and an assessment of previous archaeological and heritage studies completed for the area. The desktop study revealed that the surroundings of the study area is characterised by a long and significant history, whereas previous archaeological and heritage studies from this area have revealed a number of archaeological and heritage sites, which for the most part comprise Late Iron Age stonewalled settlements. These previous reports also revealed very few sites located in the turf thornveld east of the R510 between Thabazimbi and Northam, with more sites (primarily Late Iron Age stonewalled settlements) located west of this main artery. The sites from the surroundings of the study area have primarily been identified at rock outcrops, as well as in close proximity to the Bierspruit. With the proposed open pit at 62E/60E located on the turf thornveld east of the R510 and the proposed 36W open pit located west of the R510 but some distance from the Bier Spruit and any rocky outcrops, the primary finding from the desktop study was that the heritage fieldwork undertaken for these sites is unlikely to reveal any heritage sites of significance.

The heritage fieldwork was undertaken by a team comprising two archaeologists. Despite an intensive walkthrough of the two pit areas by the fieldwork team, no archaeological or heritage sites were identified.

Ms. Elize Butler of Banzai Environmental (Pty) Ltd was commissioned to undertake a desktop Palaeontological Impact Assessment. Her report and findings are attached in full in **Appendix C**. Ms. Butler found that the study area is completely underlain by the Rustenburg Layered Suite of the Bushveld Igneous Complex and Quaternary sediments overlying the igneous bedrock. These intrusive igneous rocks of the **Rustenburg Layered Suite** are completely **unfossiliferous**. This layer thus has **NO significance** in terms of local palaeontological heritage. The **Quaternary superficial deposits** have been relatively neglected in palaeontological terms. They may sometimes contain important fossil biotas,

e.g. bones, teeth and horn cores of mammals and reptile remains. Non-marine molluscs, ostrich egg shells, trace fossils and plant remains in organic-rich alluvial horizons are also preserved. Siliceous diatoms in pan sediments have been found. These fossil assemblages in the Quaternary are rare, low in diversity, and occur over a wide geographic area, and thus the **palaeontological sensitivity** of the Quaternary deposits within the study region is rated as **low**. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single fossil can have a huge scientific importance as many fossil taxa are known from a single fossil.

The impact assessment undertaken in terms of palaeontology, concluded that:

- The Intensity of impact on palaeontological heritage is low negative.
- The duration of the impact will be long term (6-15 years).
- The duration of the extent will be site-specific.
- The probability of the impact occurring is unlikely.
- The development will only be slightly detrimental to the environment.
- The significance of the impact is low negative and the latter can all be said with a medium confidence.

The following mitigation measures are required for palaeontology:

- Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.
- The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet SAHRA's minimum standards for palaeontological impact studies.

The palaeontological desktop study included a Protocol of Finds that must be adhered to.

On the condition that the recommendations regarding palaeontology are adhered to, and that the open pit areas do not change, no heritage reasons can be given for the development not to continue.

CONTENTS	PAGE
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2 TECHNICAL DETAILS OF THE PROJECT	9
3 ASSESSMENT METHODOLOGY.....	14
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List of Appendices

- A Legislative Requirements – Terminology and Assessment Criteria
- B Curriculum Vitae
- C Desktop-Based Palaeontological Impact Assessment

1 INTRODUCTION

PGS Heritage (Pty) Ltd was appointed by Aurecon South Africa (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the environmental process for the proposed development of two open mining pits 62E/60E (Dishaba) and 36W (Tumela) at the Amandelbult Mining Complex, located north of Northam, in Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area and to assess the impact of the proposed development on these identified heritage sites. The HIA aims to inform the environmental assessments in the development of a comprehensive EMP to manage the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

This HIA was compiled by PGS Heritage (Pty) Ltd.

The staff at PGS Heritage (Pty) Ltd. has a combined experience of nearly 70 years in the heritage consulting industry and have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where the staff has the relevant expertise and experience to undertake that work competently.

Polke Birkholtz, the project manager and author, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited with the CRM Section of ASAPA. He has 18 years of experience in the heritage assessment and management field and holds a B.A. (cum laude) from the University of Pretoria specialising in Archaeology, Anthropology and History as well as a B.A. (Hons.) in Archaeology (cum laude) from the same institution.

Heidi James-Birkholtz, the co-author, holds a B.A. (cum laude) from the University of Pretoria,

specialising in Archaeology and Psychology. Her postgraduate studies comprised a B.A. (Hons.) in Archaeology (cum laude) as well as a Masters Degree in Archaeology, both from the University of Pretoria.

Ms. Elize Butler, the appointed palaeontologist for this project, holds a B.Sc from the University of the Orange Free State specialising in Botany and Zoology, a B.Sc (Hons.) in Zoology from the same institution as well as an M.Sc (cum laude) in Zoology from the University of the Free State. She has nearly 25 years experience as a palaeontologist.

1.3 Assumptions and Limitations

The following assumptions and limitations to this study exist:

- Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites, as well as the density of vegetation cover found in some areas. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.
- Such observed or located heritage features and/or objects may not be disturbed or removed in any way, until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- i. National Environmental Management Act (NEMA) Act 107 of 1998
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
- iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- iv. Development Facilitation Act (DFA) Act 67 of 1995

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- i. GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998
 - a. Basic Assessment Report (BAR) – Regulations 19 and 23
 - b. Environmental Scoping Report (ESR) – Regulation 21
 - c. Environmental Impacts Assessment (EIA) – Regulation 23
 - d. Environmental Management Programme (EMPr) – Regulations 19 and 23
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
 - a. Protection of Heritage Resources – Sections 34 to 36; and
 - b. Heritage Resources Management – Section 38
- iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
 - a. Section 39(3)
- iv. Development Facilitation Act (DFA) Act 67 of 1995
 - a. The GN R.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that “*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...*”. The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) “*...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*”. In accordance with legislative requirements and EIA rating criteria, the regulations of SAHRA and ASAPA have also been incorporated to ensure that a comprehensive and legally compatible HIA report is compiled.

1.5 Terminology and Abbreviations

Archaeological resources

This includes:

- i. material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- ii. rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- iii. wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- iv. features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- i. construction, alteration, demolition, removal or change in use of a place or a

- structure at a place;
- ii. carrying out any works on or over or under a place;
- iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- iv. constructing or putting up for display signs or boards;
- v. any change to the natural or existing condition or topography of land; and
- vi. any removal or destruction of trees, or removal of vegetation or topsoil

Early Stone Age

The archaeology of the Stone Age, dating to between roughly 700 000 and 2 500 000 years ago.

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, and fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources

This means any place or object of cultural significance

Holocene

The most recent geological time period, which commenced 10 000 years ago.

Later Stone Age

The archaeology of the last 20 000 years, associated with fully modern people.

Late Iron Age

The archaeology of the last 1000 years up to the 1800s, associated with ironworking and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age, dating to between 20 000-300 000 years ago, associated with early modern humans.

Palaeontology

The study of fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and of any site which contains such fossilised remains or trace.

Study Area

For the purposes of this report, the term study area refers to the area that is defined in Section 2.1 of this report. This portion of land forms the area that was assessed for the purposes of this report.

Table 1- Abbreviations

<i>ABBREVIATION</i>	<i>DESCRIPTION</i>
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resources Management
DEA	Department of Environmental Affairs
DWS	Department: Water and Sanitation
DMR	Department of Mineral Resources
EAP	Environmental Assessment Practitioner

<i>ABBREVIATION</i>	<i>DESCRIPTION</i>
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment / Early Iron Age
EMPr	Environmental Management Programme Report
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HIR	Heritage Impact Report
HSR	Heritage Scoping Report
I&AP	Interested & Affected Party
LSA	Later Stone Age
LIA	Late Iron Age
MIA	Middle Iron Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PIA	Palaeontological Impact Assessment
PSSA	Palaeontological Society of South Africa
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

Refer to **Appendix B** for further discussion on heritage management and legislative matters.

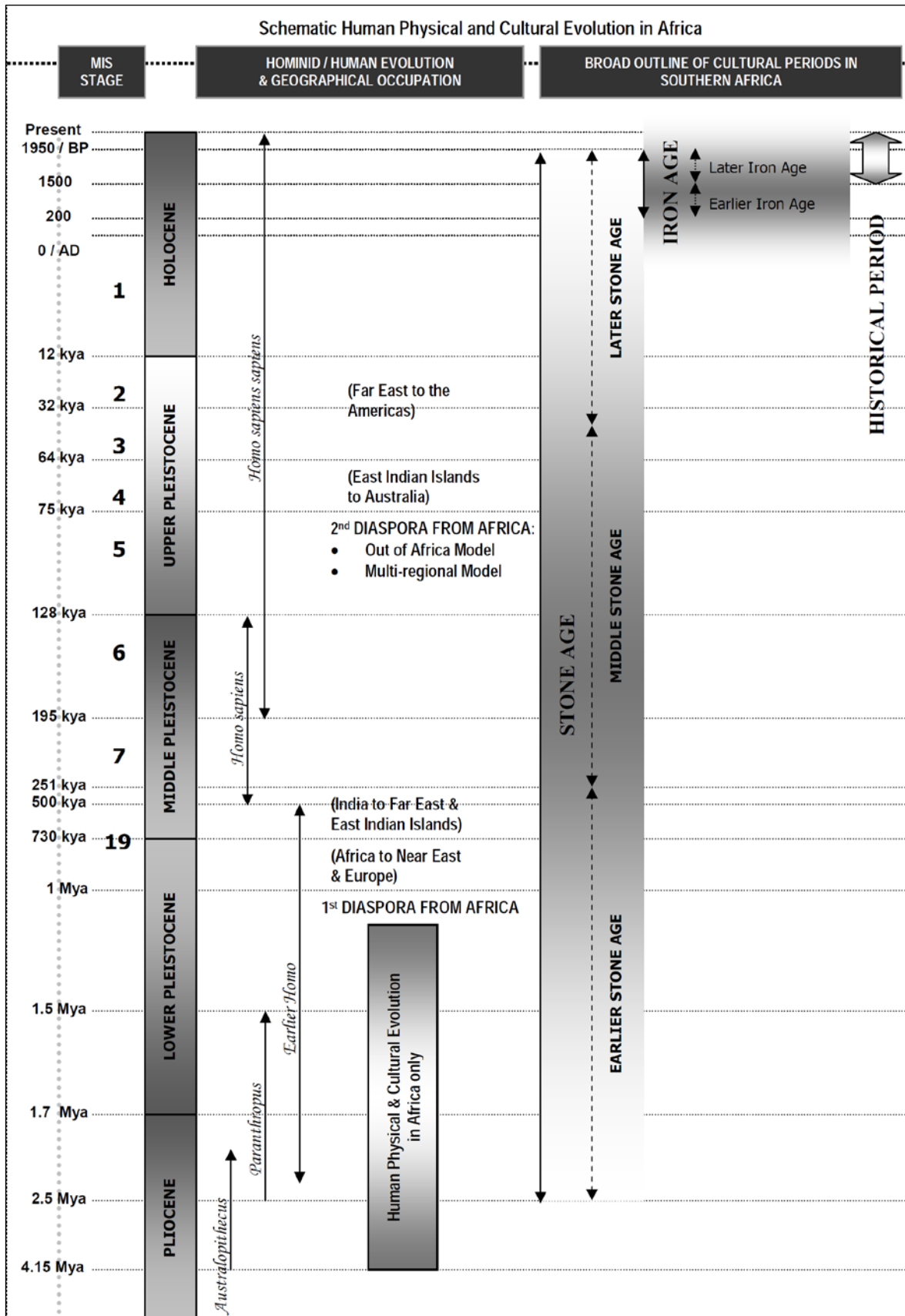


Figure 1–Human and Cultural Time line in Africa (Morris, 2008).

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

2.1.1 62E/60E (Dishaba) Open Pit

Coordinates	<p>Northernmost Point: S 24° 43' 39.71" E 27° 23' 55.76"</p> <p>Southernmost Point: S 24° 43' 48.91" E 27° 23' 47.20"</p>	<p>Easternmost Point: S 24° 43' 41.66" E 27° 23' 57.27"</p> <p>Westernmost Point: S 24° 43' 46.74" E 27° 23' 44.98"</p>
Location	<p>The project is situated between Northam and Thabazimbi, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province. The study area forms part of the Amandelbult Mining Complex.</p> <p>The study area is located 28.5 km north-east of Northam and 15 km south south-west of Thabazimbi.</p>	
Property	Portion 4 of the farm Haakdoorndrift 374 KQ	
Topographic Map	2427CB Thabazimbi	
Study Area Extent	The study area is approximately 3.15 hectares in extent.	
Description	<p>The proposed development area for the 62E/60E (Dishaba) Open Pit is located in the Dishaba Section of the Amandelbult Mining Complex.</p> <p>Mining activities and infrastructure define the immediate surroundings of the study area, with a gravel haul road located on its northern boundary, a rehabilitated open pit mine to its west, the 62E Decline Shaft to its east and further mining features to its south.</p> <p>The study area is situated on a reasonably level portion of turf thornveld, with evidence of disturbance throughout. This disturbance is primarily in the form of grading activities which had disturbed sections of the study area as well as an area on the eastern end of the site where heaps of disturbed soil had been packed. A gravel road and associated Eskom line also cut through the western half of the study area.</p> <p>Only semi-natural vegetation remains present within the study area. These comprise small pockets of grassland and thorn trees.</p>	

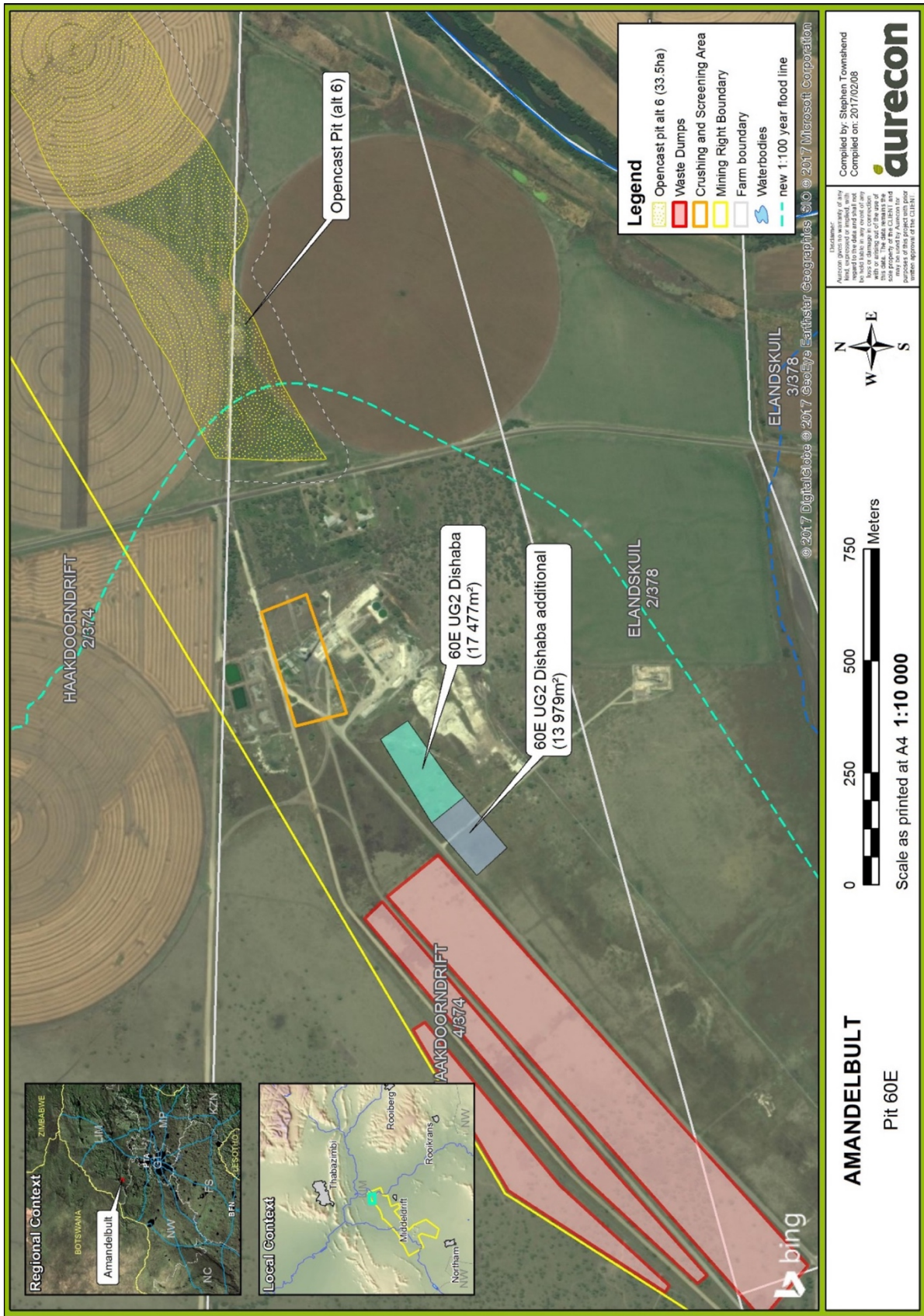


Figure 2 – Locality plan depicting the position of the 62E/60E (Dishaba) Open Mining Pit. This plan was obtained from Aurecon.

2.1.2 36W (Tumela) Open Pit

Coordinates	<p>Northernmost Point: S 24° 49' 23.27" E 27° 15' 56.59"</p> <p>Southernmost Point: S 24° 49' 28.99" E 27° 15' 51.78"</p>	<p>Easternmost Point: S 24° 49' 25.71" E 27° 16' 0.96"</p> <p>Westernmost Point: S 24° 49' 25.10" E 27° 15' 44.78"</p>
Location	<p>The project is situated between Northam and Thabazimbi, within the Thabazimbi Local Municipality of the Waterberg District Municipality, Limpopo Province. The study area forms part of the Amandelbult Mining Complex.</p> <p>The study area is located 14.5 km north of Northam and 29.5 km south-west of Thabazimbi.</p>	
Property	<p>Portion 0 of the farm Elandsfontein 386 KQ</p>	
Topographic Map	<p>2427CD Northam</p>	
Study Area Extent	<p>The study area is approximately 4.12 hectares in extent.</p>	
Description	<p>The proposed development area for the 36W (Tumela) Open Pit is located within the Critical Biodiversity Area 2, as defined in Version 2 of the Limpopo Conservation Plan. It is located in the Tumela Section of the Amandelbult Mining Complex. The study area is situated on the northern boundary of the Madeleine Robinson Nature Reserve, with a small section of its eastern end located within this nature reserve.</p> <p>The study area is disturbed and undulating, and is characterised by three quarries, one of which had been converted into a drinking hole for animals. As will be seen in the desktop study below, this area had been used as a quarry since the 1980s. By the mid 2000s, the study area was significantly disturbed by three large quarries.</p> <p>A secondary gravel road cuts along the northern end of the study area. Another gravel road defines the western boundary of the study area. A shooting range was built by Anglo American on the far eastern end of the study area. This range is enclosed in a security fence.</p> <p>Small undisturbed sections of the study area comprise grassland and thorn trees.</p>	

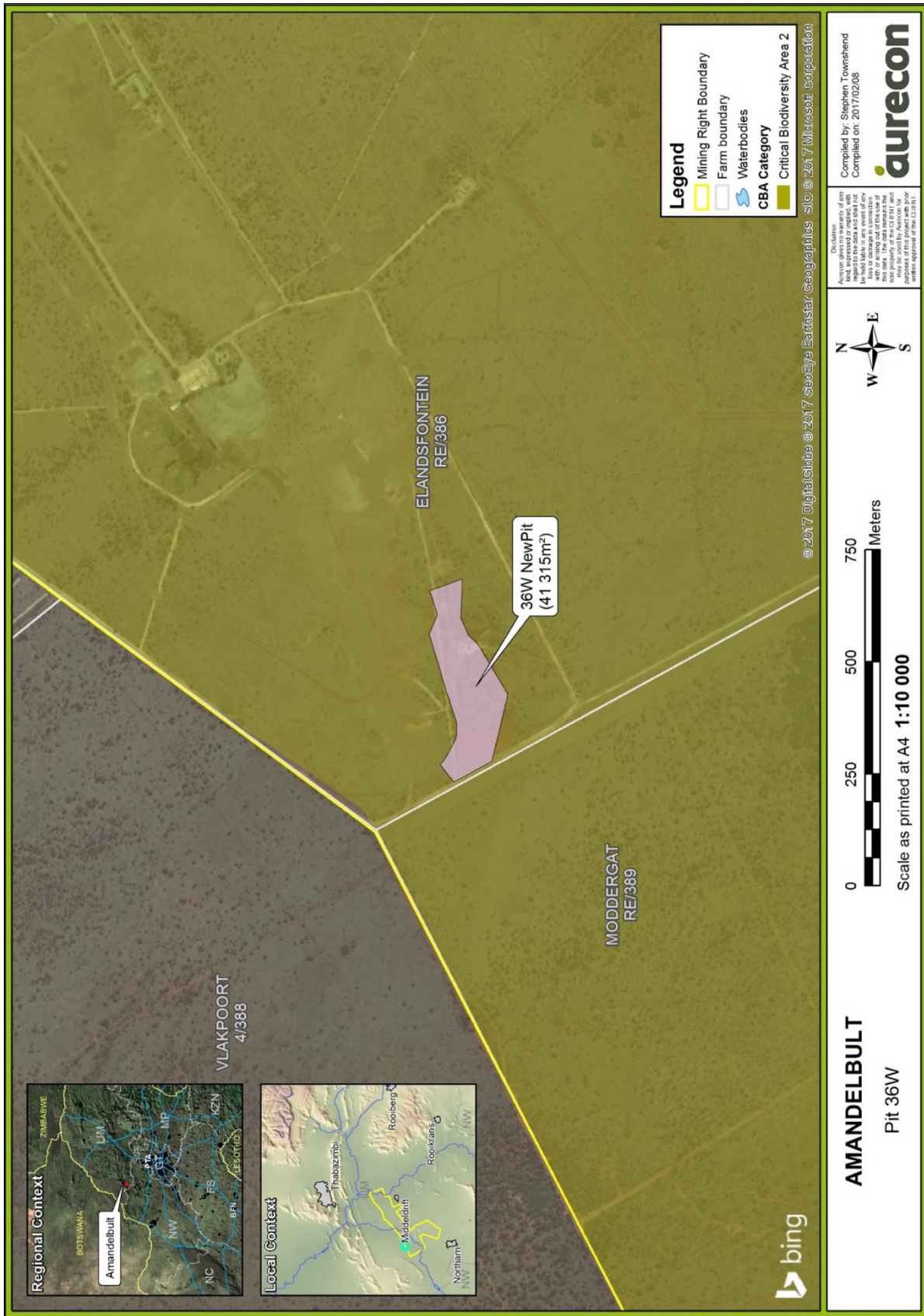


Figure 3 – Locality plan depicting the position of the 36W (Tumela) Open Mining Pit. This plan was obtained from Aurecon.

2.2 Technical Project Description

The content of this chapter was obtained from the Environmental Screening Report compiled by Aurecon in February 2017 (Aurecon, 2017).

2.2.1 Project Overview

Anglo American (Amandelbult Opencast Operations) operates a large Platinum Group Metals (PGM) mining operation at Amandelbult, approximately 15km north of Northam and 20km south of Thabazimbi in Limpopo Province. This mining complex has existing mining authorisations, initially granted in 1997 under the then Minerals Act, 1991 (Act No. 50 of 1991). This Act was replaced by the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

The mine is proposing the development of two open pits. These comprise the 62E/60E (Dishaba) pit on Portion 4 of the farm Haakdoorndrift 374 KQ and the 36W (Tumela) pit on Portion 0 of the farm Elandsfontein 386 KQ. In order to proceed with the proposed mining, a 11kV distribution line and an 8m gravel road, which traverse proposed pit 62E/60E in a north-south direction, will need to be relocated.

3 ASSESSMENT METHODOLOGY

3.1 Methodology for Assessing Heritage Site Significance

The HIA process consisted of three steps:

Step I – Desktop Study: An archaeological and historical background study was undertaken using available literature and sources. This was augmented by an assessment of available archival and historic maps, which allowed for the historic layering of the study area. Previous archaeological and heritage studies from the study area and surroundings were also accessed using the South African Heritage Resources Information System (SAHRIS) of the South African Heritage Resources Agency (SAHRA). As part of the desktop study process, Ms. Elize Butler was commissioned to undertake a desktop Palaeontological Impact Assessment. Her report and findings are attached in full in **Appendix C**.

Step II – Physical Survey: Intensive walkthroughs of the two proposed open mining pit areas were undertaken by a fieldwork team comprising two archaeologists. The fieldwork was undertaken on Monday, 24 April 2017 and was aimed at locating and documenting sites falling within the proposed project areas.

Step III – The final step involved the recording and documentation of relevant heritage resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and recommendations.

The significance of heritage sites was based on five main criteria:

- site integrity (i.e. primary vs. secondary context),
- amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
 - Low - <10/50m²
 - Medium - 10-50/50m²
 - High - >50/50m²
- uniqueness and
- the potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

- A - No further action necessary;
- B - Mapping of the site and controlled sampling required;
- C - No-go or relocate development position
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site

Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report (see **Table 2**).

Table 2: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	-	High/Medium	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium	Recording before destruction
Generally Protected C (GP.C)	-	Low	Destruction

3.2 Methodology for Impact Assessment

The methodology for impact assessment outlined here, was provided by Aurecon.

The assessment of the significance of impacts for a proposed development is by its nature, a matter of judgement. To deal with the uncertainty associated with judgement and ensure repeatable results, Aurecon rates impacts using a standardised and internationally recognised methodology adhering to ISO 14001 and World Bank/IFC requirements.

For each predicted impact, criteria are applied to establish the **significance** of the impact based on likelihood and consequence, both without mitigation being applied and with the most effective mitigation measure(s) in place.

The criteria that contribute to the **consequence** of the impact are **intensity** (the degree to which pre-development conditions are changed); the **duration** (length of time that the impact will continue); and the **extent** (spatial scale) of the impact. The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence by appropriately adjusting the thresholds or scales of the intensity, duration and extent criteria, based on expert knowledge. For each impact, the specialist applies professional judgement to ascribe a numerical rating for each criterion according to the examples provided in Table 3, Table 4 and Table 5 below. The consequence is then established using the formula:

Consequence = intensity x (+ duration + extent)

Depending on the numerical result, the impact's consequence would be defined as either extremely, highly, moderately or slightly detrimental; or neutral; or slightly, moderately, highly or extremely beneficial. These categories are provided in Table 7.

To determine the significance of an impact, the **probability** (or likelihood) of that impact occurring is also taken into account. In assigning probability, the specialist takes into account the likelihood of occurrence but also takes cognisance of uncertainty and detectability of the impact. The most suitable numerical rating for probability is selected from Table 6 below and applied with the consequence according to the following equation:

Significance = consequence x probability

When assigning **probability** to an impact, it is vitally important to distinguish this from the concepts of **frequency** and **confidence**, with which it is sometimes confused.

- **Probability** refers to the likelihood that an impact will occur.
- **Frequency** refers to the regularity with which an impact occurs. To illustrate the difference between frequency and probability, it must be considered that something that happens infrequently may still be a certainty (i.e. have a high probability). For instance, Halley's Comet only comes close to the sun every 75 to 76 years (i.e. it has a very low frequency), but it is still a certainty. Table 16) refers to the degree of certainty of a prediction. Confidence may be related to any of the impact assessment criteria (extent, intensity, duration or probability) and is not necessarily only related to probability. Confidence may be influenced by any factors that introduce uncertainty into a prediction.

Depending on the numerical result of this calculation, the impact would fall into a significance category of negligible, minor, moderate or major, and the type would be either positive or negative. Examples of these categories are provided in Table 8.

Once the significance of an impact occurring without mitigation has been established, the specialist must apply his/her professional judgement to assign ratings for the same impact after the proposed mitigation has been implemented.

The tables on the following pages show the scales used to classify the above variables, and define each of the rating categories.

Table 3: Definition of Intensity Ratings

Rating	Criteria	
	Negative impacts (-)	Positive impacts (+)
Very high (-/+ 4)	Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very long periods of time (more than a typical human life time).	Great improvement to ecosystem or social processes and services or resources.
High (-/+ 3)	High degree damage to natural or social system components, species or resources.	Intense positive benefits for natural or social systems or resources.
Moderate (-/+ 2)	Moderate damage to natural or social system components, species or resources.	Average, on-going positive benefits for natural or social systems or resources.
Low (-/+ 1)	Minor damage to natural or social system components, species or resources. Likely to recover over time. Ecosystems and valuable social processes not affected.	Low positive impacts on natural or social systems or resources.
Negligible (0)	Negligible damage to individual components of natural or social systems or resources, such that it is hardly noticeable.	Limited low-level benefits to natural or social systems or resources.

Table 4: Definition of Duration Ratings

Rating	Criteria
2	Long-term: The impact will continue for 6-15 years.
1	Medium-term: The impact will continue for 2-5 years.
0	Short-term: The impact will continue for between 1 month and 2 years.

Table 5: Definition of Extent Ratings

Rating	Criteria
2	Regional: The impact will affect the entire region.
1	Local: The impact will extend across the site and to nearby properties.
0	Site specific: The impact will be limited to the site or immediate area.

Table 6: Definition of Probability Ratings

Rating	Criteria
4	Certain/ Definite: There are sound scientific reasons to expect that the impact will definitely occur.
3	Very likely: It is most likely that the impact will occur.
2	Fairly likely: This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably occur.
1	Unlikely: This impact has not happened yet but could happen.
0	Very unlikely: The impact is expected never to happen or has a very low chance of occurring.

Table 7: Application of Consequence Ratings

Rating	Consequence rating
-8	Extremely detrimental
-7 to -6	Highly detrimental
-5 to -4	Moderately detrimental
-3 to -2	Slightly detrimental
-1 to 1	Negligible
2 to 3	Slightly beneficial
4 to 5	Moderately beneficial
6 to 7	Highly beneficial
8	Extremely beneficial

Table 8: Application of Significance Ratings

Rating	Significance rating
-4	Very high - negative
-3	High - negative
-2	Moderate - negative
-1	Low - negative
0	Very low
1	Low - positive
2	Moderate - positive
3	High - positive
4	Very high - positive

Despite attempts at ensuring objectivity and impartiality, environmental assessment remains an act of judgement and can never escape the subjectivity inherent in attempting to define significance. The determination of the significance of an impact depends on context (spatial and duration) and intensity of that impact. Since the rationalisation of context and intensity will ultimately be prejudiced by the observer, there can be no wholly objective measure by which to judge the components of significance, let alone how they are integrated into a single comparable measure.

This notwithstanding, in order to facilitate informed decision-making, environmental assessments must endeavour to come to terms with the significance of the environmental impacts. Recognising this, Aurecon has attempted to address potential subjectivity in the current ESIA process as follows:

- Being explicit about the difficulty of being completely objective in the determination of significance, as outlined above;
- Developing an explicit methodology for assigning significance to impacts and outlining this methodology in detail. Having an explicit methodology not only forces the specialist to come to terms with the various facets that contribute to significance (thereby avoiding arbitrary assessment), but also provides the reader with a clear summary of how the specialist derived the significance;

- Wherever possible, differentiating between the significance of potential environmental impacts as experienced by the various affected parties; and
- Utilising a team approach and internal review of the assessment to facilitate a rigorous and defensible system.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts.

The specialists appointed to contribute to this impact assessment have empirical knowledge of their respective fields and are thus able to comment on the confidence they have in their findings based on the availability of data and the certainty of their findings (Example provided in Table 9).

Table 9: Definition of Confidence Ratings

Rating	Criteria
Low	Judgement is based on intuition and there some major assumptions used in assessing the impact may prove to be untrue.
Medium	Determination is based on common sense and general knowledge. The assumptions made, whilst having a degree of uncertainty, are fairly robust.
High	Substantive supportive data or evidence exists to verify the assessment.

4 CURRENT STATUS QUO

4.1 Site Description

The two components of the study area, located in different parts of the Amandelbult Mining Complex, will be individually discussed below. Each section is illustrated with photographs taken during the fieldwork.

4.1.1 Open Mining Pit 62E/60E (Dishaba)

Mining activities and infrastructure define the immediate surroundings of the study area, with a gravel haul road located on its northern boundary, a rehabilitated open pit mine to its west, the 62E Decline Shaft to its east and further mining features to its south.

The study area is situated on a reasonably level portion of turf thornveld, with evidence of disturbance throughout. This disturbance is primarily in the form of grading activities, which had disturbed sections of the study area (see Figures 4 & 5 below) and an area on the eastern end of the site where heaps of disturbed soil had been packed (see Figure 6).

A gravel road and associated Eskom line also cuts through the western half of the study area.

Only semi-natural vegetation remains present within the study area. These comprise small pockets of grassland and thorn trees.



Figure 4 - General view of a section of disturbed land at Pit 62E/60E (Dishaba). The turf found in this component of the study area can clearly be seen.



Figure 5 – More evidence of disturbance in the form of grading activities at Pit 62E/60E (Dishaba). Note the grassland and thorn trees characterising undisturbed sections in the back.



Figure 6 – These heaps of soil and stone were observed on the eastern end of Pit 62E/60E (Dishaba).

4.1.2 Open Pit 36W (Tumela)

The study area is disturbed and undulating, and is characterised by three quarries, one of which had been converted into a drinking hole for animals (refer Figures 7 & 9). As will be seen in the desktop study below, this area had been used as a quarry since the 1980s. By the mid 2000s, the study area was significantly disturbed by three large quarries.

A secondary gravel road cuts along the northern end of the study area. Furthermore, another gravel road defines the western boundary of the study area. A shooting range was built by Anglo American on the far eastern end of the study area. This range is enclosed in a security fence (see Figure 10).



Figure 7 – General view of Pit 36W (Tumela). One of the quarries characterising this site can be seen.



Figure 8 – Another general view of Pit 36W (Tumela).



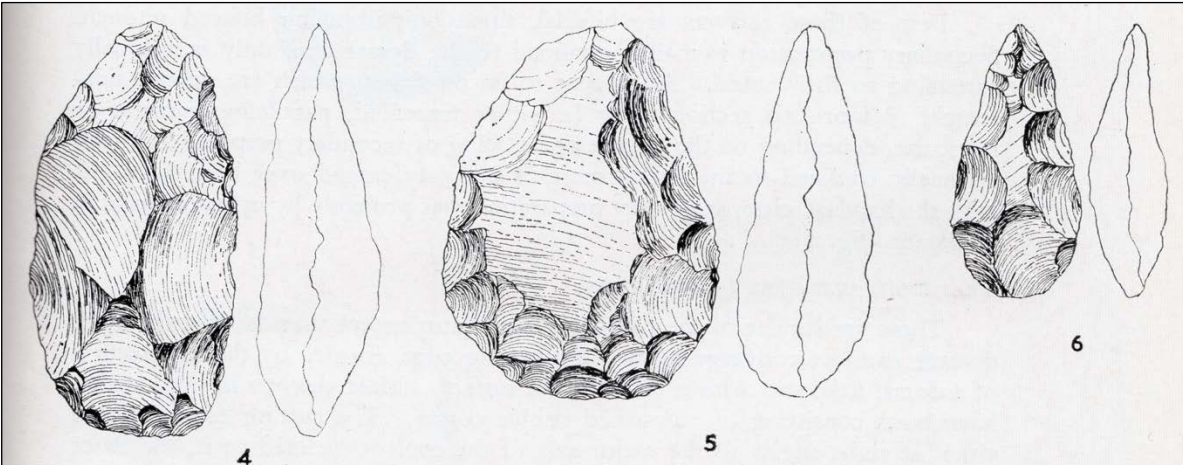
Figure 9 – View of one of the quarry areas, which had been converted into a watering hole for animals.



Figure 10 – Shooting range located on the eastern end of Open Pit 36W (Tumela).

5 DESKTOP STUDY FINDINGS

5.1 Archaeological and Historical Overview of the Study Area and Surroundings

DATE	DESCRIPTION
The Study Area and Surroundings during the Stone Age	
<p>The South African Stone Age is the longest archaeologically-identified phase identified in human history and lasted for millions of years. Very little is known about the Stone Age archaeology of the study area and its immediate surroundings.</p>	
<p>2.5 million to 250 000 years ago</p>	<p>The Earlier Stone Age is the first and oldest phase identified in South Africa’s archaeological history and comprises two technological phases. The earliest of these technological phases is known as Oldowan which is associated with crude flakes and hammer stones and dates to approximately 2 million years ago. The second technological phase in the Earlier Stone Age of Southern Africa is known as the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial handaxe. The Acheulian phase dates back to approximately 1.5 million years ago.</p> <p>During an archaeological survey of the Amandelbult Mining Lease Area in 1994, no ESA archaeological sites were identified (Van Schalkwyk et.al., 1994). This dearth in archaeological sites associated with the Early Stone Age was also observed during an intensive archaeological and heritage survey undertaken within the Marakele National Park (roughly 25km north-east of the present study area) by a team that included the author (Birkholtz & Steyn, 2002). The nearest known researched and published Early Stone Age site, is an open site named Blaaubank, which is located in a gravel donga near Rooiberg (some 40km east by southeast of the present study area). Lithics associated with both the Early and Middle Stone Ages were identified at this site (Wadley et.al., 2016).</p>
 <p>The figure displays three handaxes, labeled 4, 5, and 6. Each handaxe is shown in a perspective view on the left and a corresponding profile view on the right. Handaxe 4 is a large, ovate, bifacially flaked tool with a wide base and a pointed tip. Handaxe 5 is a smaller, more elongated, ovate bifacial tool. Handaxe 6 is a small, elongated, bifacial tool with a pointed tip. The perspective views show the characteristic flaking patterns and the bifacial nature of these tools.</p>	
<p><i>Figure 11 – Example of Early Stone Age Later Acheulian handaxes identified at Blaaubank near Rooiberg. Cropped section of an illustration published in Mason (1962:199).</i></p>	

<p>250 000 to 40 000 years ago</p>	<p>The Middle Stone Age (MSA) dates to between 250 000 to 40 000 years BP. MSA dates of around 250 000 BP originate from sites such as Leopards Kopje in Zambia, while the late Pleistocene (125 000 BP) yields a number of important dated sites associated with modern humans (Deacon & Deacon, 1999). The MSA is characterised by flake and blade industries, the first use of grindstones, wood and bone artefacts, personal ornaments, use of red ochre, circular hearths and a hunting and gathering lifestyle.</p> <p>A number of Middle Stone Age occurrences and findspots were identified during the archaeological and heritage survey of the Amandelbult Mining Lease Area in 1994 (Van Schalkwyk et.al., 1994). These occurrences were all identified to the west of the R510 tar road between Rustenburg and Thabazimbi.</p>
<p>40 000 years ago to the historic past</p>	<p>The Later Stone Age (LSA) is the third phase identified in South Africa's Stone Age history. This phase in human history is associated with an abundance of very small stone artefacts known as microliths.</p> <p>A number of Later Stone Age occurrences and findspots were identified during the archaeological survey of the Amandelbult Mining Lease Area in 1994. These occurrences were primarily identified in proximity to large rocky outcrops (Van Schalkwyk et.al., 1994).</p> <p>Interestingly, research on the Later Stone Age in the Waterberg Plateau suggests a discontinuity between Middle Stone Age and Later Stone Age settlement of several thousand years, with settlement of the area by Later Stone Age hunter gatherers occurring in the 11th and 12th Centuries and coinciding with settlement by Iron Age peoples (Van der Ryst 1998). While the relationship between Stone Age people and Iron Age settlers was initially characterised by peaceful interaction and trade, the relationship seems to have degraded into one of subjugation of the former, a process that was exacerbated by an influx of increasing numbers of white settlers into the area as well. The farm Vaalpenspan 90 KQ, located some distance to the north of the study area, is a reminder of the marginalised remnants of the hunter gatherers, 'Vaalpense' being the name given to people of mixed agropastoralist and hunter gatherer descent (Van der Ryst 1998; Birkholtz & Steyn 2002).</p> <p>In Southern Africa, the Later Stone Age is characterised by the appearance of rock art in the form of paintings and engravings. As far as is presently known, the nearest Later Stone Age rock art site to the study area is located roughly 10km north-west of the study area, where a cave containing the remnants of Later Stone Age rock art was identified during an archaeological survey of the farms Buffelsfontein 353 KQ and Tygerskloof 354 KQ (Huffman, 2004). Another known Later Stone Age rock art site is located near the confluence of the Crocodile and Pienaars Rivers, some 43km to the south-east (Bergh, 1999). Furthermore, the Waterberg located north of the study area, is known for its many rock art sites, including those containing shaded paintings such as at Haakdoorndraai (Pager, 1973) and the depiction of a fat tailed sheep at Dwaalhoek 185 KQ (Van der Ryst 1998). These two farms are located roughly 80km north-east of the present study area.</p>

The Study Area and Surroundings during the Iron Age

The arrival of early farming communities during the first millennium, heralded in the start of the Iron Age for South Africa. The Iron Age is that period in South Africa's archaeological history associated with pre-colonial farming communities who practiced cultivation and pastoralist farming activities, metal working, cultural customs such as lobola and whose settlement layouts show the tangible representation of the significance of cattle (known as the Central Cattle Pattern) (Huffman, 2007).

The tangible remains of the Iron Age are frequently identified in the general surroundings of the study area, and these may include potshers, stonewalled settlements, grinding stones and metal smelting and forging sites.

AD 350 – AD 650	The Bambata facies of the Benfica Sub-Branch of the Kalundu Ceramic Tradition represents the earliest known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by “... <i>fine decoration, multiple bands and cross-hatching on long rim, alternating blocks of stamped and incised lines in neck.</i> ” (Huffman, 2007:215).
AD 750 – AD 1000	The Diamant facies of the Kalundu Ceramic Tradition represents the second known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by “... <i>tapered rims with broadly incised herringbone.</i> ” (Huffman, 2007:225).
AD 1000 – AD 1300	The Eiland facies of the Kalundu Ceramic Tradition represents the second known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by “... <i>fine herringbone with stamping.</i> ” (Huffman, 2007:221).
AD 1350 – AD 1750	<p>Ongoing research in KwaZulu-Natal has focused on the second phase of the Blackburn sequence, known as Moor Park. During the fourteenth century, the Moor Park farmers were the first to colonize the higher altitude grasslands of South Africa's interior. In doing so, they opened up possibilities for greater economic specialization and interdependence, not least because of the impossibility of smelting iron where suitable fuel was lacking. The same lack of timber also encouraged the adoption of stone as a building material (Mitchell and Whitelaw, 2005).</p> <p>The Moor Park facies of the Blackburn Branch of the Urewe Tradition is associated with pottery characterised by punctates, rim notching and appliqué (Huffman, 2007).</p>
1500 AD – 1700 AD	<p>The Madikwe facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the next phase in the Iron Age of the study area and surroundings. This facies can likely be dated to between AD 1500 and AD 1700. The decoration on the ceramics associated with this facies is characterised by multiple bands of cord impressions, incisions, stabs and punctates separated by colour (Huffman, 2007).</p> <p>As indicated above, the Madikwe facies represents one of three parallel Iron Age facies, which had developed from the original Moloko facies known as</p>

	<p>Icon. As such, the Madikwe facies was the contemporary of the Olifantspoort and Letsibogo facies, and developed into the Buispoort facies (AD 1700 – AD 1850) (Huffman, 2007).</p>
1650 AD – 1820 AD	<p>The Uitkomst facies of the Blackburn Branch of the Urewe Ceramic Tradition represents another Iron Age period identified for the surroundings of the study area. This facies can likely be dated to between AD 1650 and AD 1820. The decoration on the ceramics associated with this facies is characterised by stamped arcades, appliqué of parallel incisions, stamping and cord impressions and is described as a mixture of the characteristics of both Ntsuanatsatsi (Nguni) and Olifantspoort (Sotho) (Huffman, 2007).</p> <p>The type-site is Uitkomst Cave, which is situated approximately 130km south by south-east of the study area. The site was excavated by Professor R.J. Mason of the University of the Witwatersrand as part of a project to excavate five cave sites in the Witwatersrand-Magaliesberg area. These five sites are Glenferness, Hennops River, Pietkloof, Zwartkops and Uitkomst. Uitkomst was chosen as the type site for the particular Iron Age material excavated at these sites as the Uitkomst deposit was found to be well stratified and the site “...illustrates the combination of a certain kind of pottery with evidence for metal and food production and stone wall building found at the open sites...” (Mason, 1962:385).</p> <p>The Uitkomst pottery is viewed as a combination of Ntsuanatsatsi and Olifantspoort, and with the Makgwareng facies is seen as the successors to the Ntsuanatsatsi facies. The Ntsuanatsatsi facies is closely related to the oral histories of the Early Fokeng people and represents the earliest known movement of Nguni people out of Kwazulu-Natal into the inland areas of South Africa. Regarding this theory, the Bafokeng settled at Ntsuanatsatsi Hill in the present-day Free State Province. Subsequently, the BaKwena lineage had broken away from the Bahurutshe cluster and crossed southward over the Vaal River to come in contact with the Bafokeng. As a result of this contact a Bafokeng-Bakwena cluster was formed, which moved northward and became further ‘Sotho-ised’ by coming into increasing contact with other Sotho-Tswana groups. According to this theory, this eventually resulted in the appearance of Uitkomst facies type pottery which contained elements of both Nguni and Sotho-Tswana speakers (Huffman, 2007). Huffman states that that the Uitkomst facies is directly associated with the Bafokeng (Huffman, 2007). However, it worth noting that not all researchers agree with this preposition of the Bafokeng origins. In their book on the history of the Bafokeng, Bernard Mbenga and Andrew Mason indicate that the research of Prof. R.J. Mason and Dr. J.C.C. Pistorius “...would indicate that the Bafokeng originated from the Bahurutshe-Bakwena-Bakgatla lineage cluster. Tom Huffman holds a different view...” (Mbenga & Mason, 2010).</p>
1700 AD – 1840 AD	<p>The Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition is the next phase to be identified within the study area’s surroundings. It is most likely dated to between AD 1700 and AD 1840. The key features on the decorated ceramics include rim notching, broadly incised chevrons and</p>

	<p>white bands, all with red ochre (Huffman, 2007).</p> <p>It is believed that the Madikwe facies developed into the Buispoort facies. The Buispoort facies is associated with sites such as Boschhoek, Buffelshoek, Kaditshwene, Molokwane and Olifantspoort (Huffman, 2007).</p>
Late 1700s – c. 1828	<p>The Bakgatla-ba-ga-Kgafela represents one of the Late Iron Age groups that can be associated with the close to immediate surroundings of the present study area. According to available oral history, the Bakgatla-ba-ga-Kgafela frequently moved around within the general area located between the Waterberg to the north-east and Pilanesberg to the south-west. During the period between the late 1600s and 1869, the Bakgatla-ba-ga-Kgafela had relocated 20 times. This said, the north-eastern Pilanesberg near present-day Moruleng was frequently settled during this period.</p> <p>Two of the Bakgatla-ba-ga-Kgafela settlements were located in closer proximity to the present study area. The first of these was Sefikile hill, on the farm Spitskop 410 KQ, and which is located roughly 20km south-west of the present study area. The oral history tells us that during the end of the eighteenth century Kgosi Pheto, the chief of the Bakgatla-ba-ga-Kgafela, settled at Sefikile hill. They remained here until the death of Pheto in c. 1805 (Hall et.al., 2008).</p> <p>During a heritage survey, Dr. J.C.C. Pistorius identified the occurrence of damaged stone walled sites and a graveyard along the base of Sefikile hill at Sefikile village (Pistorius 2012). It can be assumed that the damaged stone walled sites can be associated with the settlement of the Bakgatla-ba-ga-Kgafela at this hill.</p> <p>The second settlement of the Bakgatla-ba-ga-Kgafela in proximity to the study area occurred during the early 1820s, when Kgosi Pilane moved his people to the farm Schilpadnest 385 KQ. They named their settlement here Mmamodimokwana (Hall et.al., 2008). The farm Schilpadnest is located only 1.25km north-east of the proposed pit at 36W. It was here, at Schilpadnest, that the Bakgatla-ba-ga-Kgafela were attacked by Mzilikazi's Khumalo Ndebele (Matabele) in c. 1828.</p>
c. 1820	<p>According to Breutz (1953), the Kwena baPhalane moved to the western bank of the Crocodile (Odi) River where it is joined by the Sand (Thokwe) River. This author suggested that the settlement of the Kwena baPhalane on the western bank of the Crocodile River, may either have been on the farms Buffelshoek 351 KQ or Haakdoordrift 373 KQ. This latter farm is located 2.8km north of the present study area.</p>
The Study Area and Surroundings during the Mfecane	
<p>The Mfecane (Difaqane) is a period of upheaval during the end of the Iron Age and the start of the Historical Period. These years of unrest originated primarily in the migration of three Nguni groups from present day Kwazulu-Natal into the present day Free State as a result of the conquests of the Zulu under King Shaka. The three Nguni groups were the Hlubi of Mpangazitha, the Ngwane of Matiwane and the Khumalo Ndebele (Matabele) of Mzilikazi.</p> <p>There is quite some evidence, in the form of defensive hilltop settlement and aggregation, that the</p>	

Late Iron Age in the region was a time of upheaval and conflict, initially as a result of the influx of the Ndebele and later by European settlers (Hall 1985). The Difaqane period in the study area and surroundings saw Mzilikazi first establishing himself along the Magaliesberg Mountains between 1827 and 1832, before relocating to the Marico River valley in 1832. Their settlement and movement during this period unsettled many Sotho and Tswana groups who fled east to seek refuge (Huffman 1990). In fact, the Kransberg, located north-east of the present-day town of Thabazimbi, was vernacularly known as 'Marakeli' or 'place of refuge' (Coetzee, n.d. undated). Other groups fled south, such as the Bakgatla-ba-ga-Kgafela under kgosi Kgamanyane who settled at Saulspoort south-west of the study area.

1820s	<p>In c. 1821 the Hlubi migrated across the Drakensberg Mountains in a westerly direction (Maggs, 1976) and attacked the Tlokwa of MaNthatisi along the banks of the Wilge River. This river has its source near Harrismith and flows into the Vaal River where the Vaal Dam is located today. While it is not exactly certain where MaNthatisi's settlements would have been located (in all likelihood further south), the Tlokwa fled westward as a result of the Hlubi attack and in turn attacked other groups located in its path. This started a period of unrest and warfare, which rippled across the Highveld on both sides of the Vaal River (Legassick, 2010) (Lye and Murray, 1980).</p> <p>The Ngwane followed closely on the Hlubi and further augmented the unrest and warfare along the southern Highveld (Legassick, 2010).</p> <p>Although the effects of the migrations of the Hlubi and Ngwane would certainly have had a profound impact on the northern Free State as well, this was also the case in terms of the Khumalo Ndebele who would have played a significant role in the surroundings of the study area during this time.</p>
1823 - 1832	<p>The Khumalo Ndebele (also known as the Matabele) were forced to leave Kwazulu-Natal and between 1823 and 1827 settled along the central Vaal River (Bergh, 1999).</p> <p>In c. 1827 the Khumalo Ndebele of Mzilikazi moved away from the central Vaal River and established themselves along the Magaliesberg Mountains (Bergh, 1999). With this mountain range located roughly 110km south-east of the present study area, it is evident that this movement brought the study area much closer to the sphere of influence of Mzilikazi and his Khumalo Ndebele. It is therefore no surprise that in c. 1828, one year after their migration to the Magaliesberg Mountains, that the Khumalo Ndebele attacked the Bakgatla-ba-ga-Kgafela of Kgosi Pilane at their settlement on the farm Schilpadnest 385 KQ. This attack caused the Bakgatla-ba-ga-Kgafela to abandon their settlement, only to return years later. After returning to their settlement at Schilpadnest, the Bakgatla-ba-ga-Kgafela abandoned it again in 1837 due to pressure from the Khumalo Ndebele (Breutz 1953; Van Schalkwyk 2007).</p> <p>In c. 1832 the Khumalo Ndebele moved to the Marico River where Mzilikazi established his capital at Motsenyateng (Bergh, 1999).</p> <p>Two different settlement types have been associated with the Khumalo Ndebele. The first of these is known as Type B walling and was found at Nqabeni in the Babanango area of Kwazulu-Natal. These walls stood in the</p>

open without any military or defensive considerations and comprised an inner circle of linked cattle enclosures (Huffman, 2007). The second settlement type is known as Doornspruit, and comprises a layout which from the air has the appearance of a 'beaded necklace'. This layout comprises long scalloped walls (which mark the back of the residential area) which closely surround a complex core which in turn comprises a number of stone circles. The structures from the centre of the settlement can be interpreted as kitchen areas and enclosures for keeping small stock.

It is important to note that the Doornspruit settlement type is associated with the later settlements of the Khumalo Ndebele in areas such as the Magaliesberg Mountains and Marico and represent a settlement under the influence of the Sotho with whom the Khumalo Ndebele intermarried. The Type B settlement is associated with the early Khumalo Ndebele settlements and conforms more to the typical Zulu form of settlement.

In the surroundings of the present study area, it can be expected that the settlements of the Khumalo Ndebele would have conformed more to the Doornspruit than the Type B type of settlement. It must be stressed, however, that no published information could be found which indicates the presence of Doornspruit sites in the general vicinity of the study area.

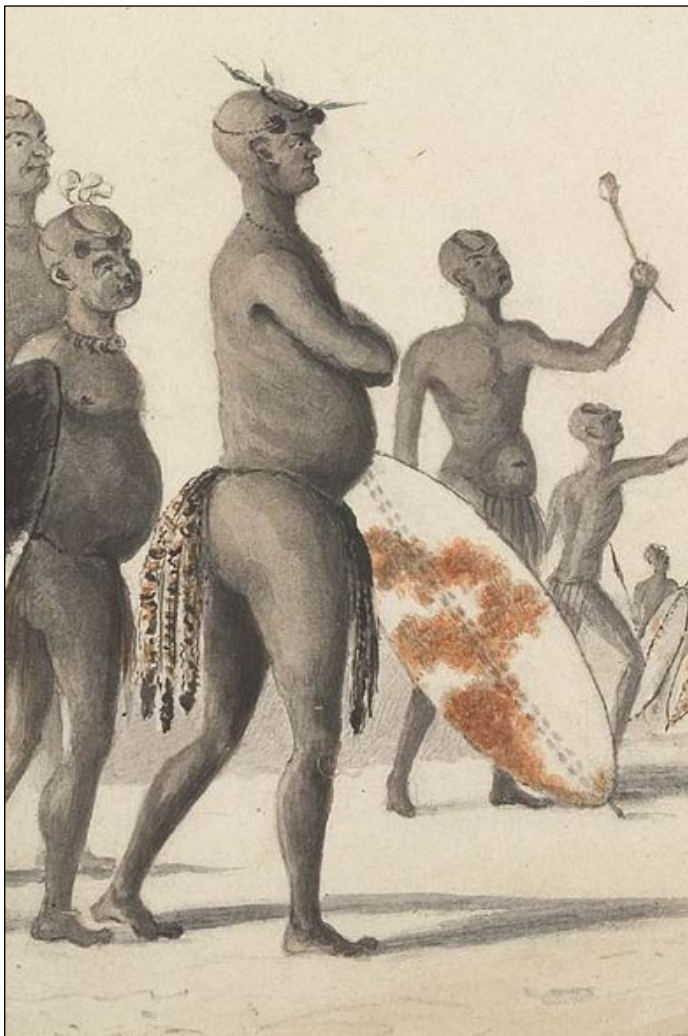


Figure 12

King Mzilikazi of the Matabele. This depiction was made by Captain Cornwallis Harris in c. 1838 (www.sahistory.org.za),

The Study Area and Surroundings during the Early Historical Period

The early Historical Period within the study area and surroundings was characterised by the arrival of newcomers to this area. The first arrivals would almost certainly have been travellers, traders, missionaries, hunters and fortune seekers. However, with time, this initial trickle was replaced by a mass flood of white immigrants during the 1830s, when a mass migration of roughly 2 540 Afrikaner families (comprising approximately 12 000 individuals) from the frontier zone of the Cape Colony to the interior of Southern Africa took place. The people who took part in this Great Trek were later to be known as Voortrekkers (Visagie, 2011).

1836	The first Voortrekker parties crossed over the Vaal River (Bergh, 1999).
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Late 1830s – Early 1840s	<p>These years saw the early establishment of farms by the Voortrekkers in the general vicinity of the study area (Bergh, 1999). During this period the first contacts between white people and the black people residing in the Rustenburg district, which included the general surroundings of the present study area took place.. According to Bergh (2005), these early contacts resulted in the setting aside of land by the Voortrekker leadership for some of the black groups such as the Bafokeng. Mbenga (1997) also indicates that the relationship between the Voortrekkers and the Bakgatla were initially similarly amicable.</p> <p>However, within a short period the relationship between the Voortrekkers and the black groups living in the area around Rustenburg became increasingly strained. For example, Bergh (2005) states that the Bafokeng were eventually dispossessed of their farms. The system of unpaid labour enforced by the Voortrekkers on the local black groups would certainly have deteriorated the relationship further. See for example Morton (1992).</p>
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c. 1840	The Kwena baPhalane abandoned their settlement near the confluence of the Crocodile and Sand Rivers (Breutz, 1953).
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1851	Both the district and town of Rustenburg was established in this year. At the time, the study area fell within the Rustenburg district. It would remain within this district until 1977, when it was allocated within the newly established district of Thabazimbi (Bergh, 1999).
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1840s - 1860s	<p>Although the first white farmers from Potchefstroom arrived and settled in the general surroundings of the study area as early as 1839 and 1840 (Changuion & Bergh, 1999), for the most part the permanent settlement of the first white farmers within the study area and its immediate surroundings occurred during the 1860s.</p> <p>During this period the first more permanent contacts between the black people residing in the surrounding area at the time and white people took place. Closer to Rustenburg, these early contacts resulted in the setting aside of land by the Voortrekker leadership for the Bafokeng people (Bergh, 2005). Mbenga (1997) indicates that the relationship between the Voortrekkers and the Bakgatla were initially also amicable. However, within a short period the relationship between the Voortrekkers and the black groups living in the areas around Rustenburg became increasingly strained and numerous black</p>
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	<p>groups living on farms near Rustenburg were eventually dispossessed of their land. The system of unpaid labour enforced by the Voortrekkers on these groups would certainly have deteriorated the relationship further. See for example Morton (1992).</p>
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<p>1860s</p>	<p>The permanent settlement of white farmers in the area, resulted in the proclamation of individual farms and the establishment of permanent farmsteads. Not all these early pioneers commenced with farming activities, with a number of them providing for themselves primarily through hunting. The hunting of elephants and hippo was especially favoured (Pont, 1965).</p> <p>Although farming activities eventually developed in the area, diseases such as tsetse and malaria also hindered these developments, and it took some time before farming was undertaken in earnest (Pont, 1965). The first farming activities undertaken in the area centred around cattle farming, and it was only later that agriculture was also practised (Naudé, 1998). According to Coetzee (n.d.), the farmers of Koedoeskop were the first white farmers from this entire region to start with agriculture by establishing small irrigated agricultural lands along the Crocodile River. The power needed to undertake irrigation work was initially supplied by steam engines, with diesel and paraffin engines utilised much later. It is not known when these first agricultural activities by white farmers at Koedoeskop commenced.</p>
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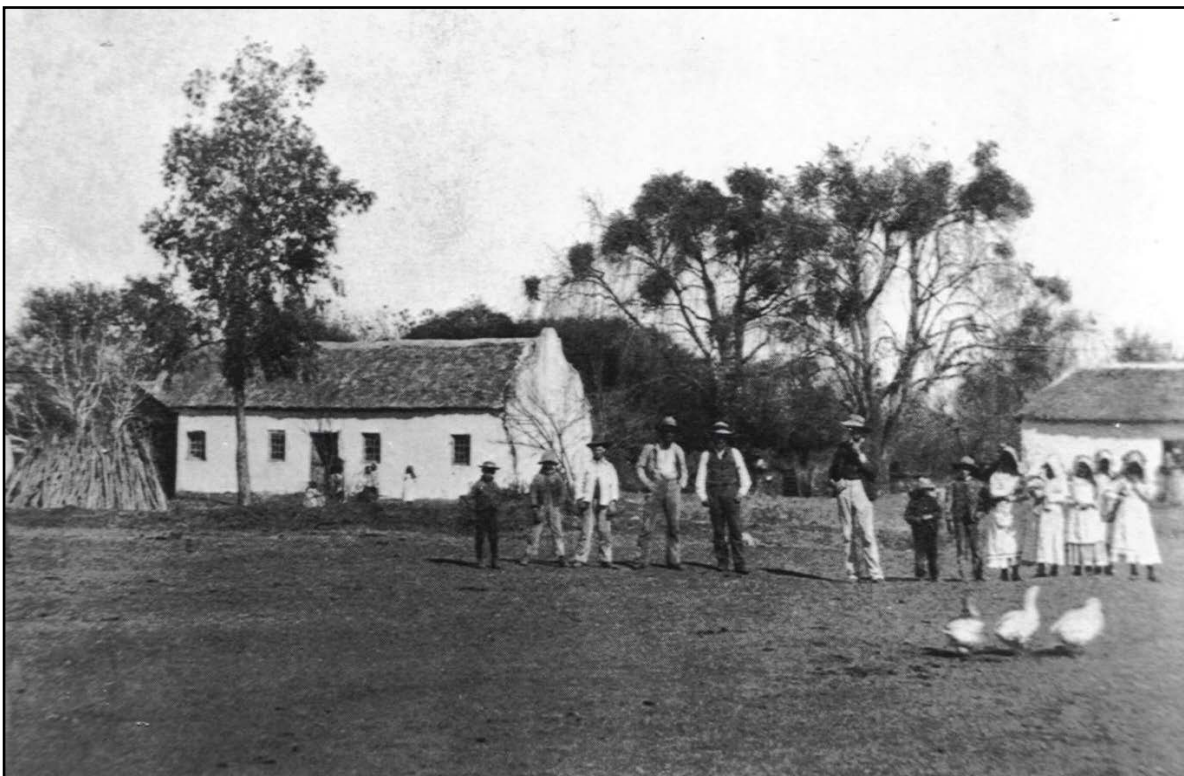


Figure 13 – A typical farmstead in the Waterberg during the late nineteenth century.

<p>1870</p>	<p>The Kwena baPhalane moved to the farm Schilpadnest 385 KQ in 1870 and the farm was still in their possession when P.L. Breutz published his <i>The Tribes of Rustenburg and Pilanesberg Districts</i> in 1953 (Breutz, 1953).</p>
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1880-1881	<p>The First Boer War (also known as the First War of Independence) between the Zuid-Afrikaansche Republiek and Great Britain took place during this time. The closest event associated with this war to the study area and surroundings would have been the besiegement of a company of 2nd Battalion Royal Scots Fusiliers by Boer forces at Rustenburg. The siege lasted for 93 days (Wulfsohn, 1992). The locality where the earthwork fort was located is situated some 90 km south of the present study area</p>
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The Study Area and Surroundings during the Twentieth Century

The general surroundings of the study area underwent significant changes and development during the twentieth century, including extensive development in the form of iron and platinum mining, railway and transportation development as well as the establishment of nearby towns such as Thabazimbi and Northam. This said, the twentieth century also started with the South African War, which would have had an impact on this landscape as well as its people.

1899 - 1902	<p>On 11 October 1899 war broke out between Britain and the two Boer republics of the Orange Free State and Transvaal (Zuid-Afrikaansche Republiek). The present study area and surroundings were never part of the main theatre of war, and no skirmishes or battles associated with the war are known from within the study area or its immediate surroundings.</p> <p>During the war years the Bakgatla from Saulspoort and Bechuanaland under Kgosi Linchwe I (the son of Kgamanyane Pilane) actively resisted and fought the Boer Commandos and also raided Boer farms across the present-day North West and Gauteng Provinces as far as south of Rustenburg, with some sources even indicating that the Kgatla regiments raided farms in the Pretoria District as well. While no clear victors in the fight for the land north of the Elands River emerged, the Bakgatla succeeded in harassing and attacking the Boer forces to the extent that the far north-western areas of the Transvaal Republic were largely left unmanned and unoccupied by Boer forces during much of the war, and especially so as the war progressed. While numerous skirmishes would have taken place around the general surroundings of the present study area as a result of the tug of war between the Boers and Bakgatla, two pitched battles did occur in this general area namely at Janskop and Draaiberg (Morton, 1992). These battlefields are located on the northern and north-western ends of the Pilanesberg, and are located some 40km south-west of the present study area. This said, these two battles between the Boers and Bakgatla may have been the nearest battles of the war to the present study area.</p> <p>As part of the so-called ‘scorched earth’ policy initiated by Lord Kitchener, many Boer farmhouses were destroyed. This would certainly also have been true for the surroundings of the study area as well. Another aspect characteristic of the ‘scorched earth’ policy was the system of concentration camps (also referred to as refugee camps) in which Boer as well as Black women and children were held. The closest of any of these camps to the present study area, was the one at Modimolle and which was in existence from May 1901 to March 1902. This camp was established by the British authorities and used for the keeping of Boer women and children, resulted</p>
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	<p>in the death of 525 persons, 429 of whom were under the age of 15 years (www.angloboerwar.com).</p> <p>The Anglo-Boer War came to an end with the signing of the Peace Treaty of Vereeniging in May 1902.</p>
1914	<p>At the end of the South African War (1899 – 1902), the Transvaal and Orange Free State republics lost their independence to the British Empire. In 1910, the Union of South Africa was established consisting of the Cape Colony, Natal, the Transvaal Colony and the Orange River Colony. General Louis Botha was appointed the Union's first prime minister and believed that South Africa's future would be best served as part of the British Commonwealth. In 1914, the South African government under General Louis Botha decided to assist Great Britain in its war with Germany. A number of Boer leaders were not happy about this turn of events, and when General Koos de la Rey was killed at a roadblock in Johannesburg, emotions reached a boiling point and rebellion broke out across the former Boer republics.</p> <p>While the Boer Rebellion would also have played its part in the general surroundings of the study area, no battles or skirmishes are known in proximity to the present study area. One of the nearest events of the rebellion to the present study area would have taken place on 6 and 7 November 1914, when a force of 18 rebels attacked the Pilanesberg Police Station, which at the time was held by a single policeman, Constable Petrus Paulus Jacobus (Piet) Botha. The attack did not succeed (Wulfsohn, 1989). While the exact location of this police station is not known, it is believed to have been near Sun City, some 60km south-west of the present study area.</p>
1919	<p>Although iron had been mined and processed from the surroundings of the study area during the Iron Age, the first white person to pay any attention to the iron ore in proximity to present-day Thabazimbi, was a prospector by the name of J.H. Williams. While on a hunting trip in 1919, he pitched his tent at the spot where the Crocodile River runs out of the gorge known as Vlieëpoort. While hunting around this area, Williams soon realised that the mountains here were rich in iron ore. As a result he obtained discoverer's rights to extensive sections of these iron ore deposits (Coetzee, n.d.). Vlieëpoort is located 13km north-west of the present study area.</p>
1924	<p>In this year the famous geologist Hans Merensky was shown a sample of platinum ore that a Mr. Andries Lombard had found near Lydenburg. Merensky managed to trace a platinum reef all along the outer edge of the Bushveld Complex from Lydenburg to Rustenburg. This reef was to be known as Merensky Reef (Carruthers, 2007). The discovery of the Bushveld Complex was of extensive economic significance for South Africa. As indicated by Wikipedia, the Bushveld Igneous Complex "<i>...contains the world's largest reserves of platinum-group-metals (PGMs) – platinum, palladium, osmium, iridium, rhodium, and ruthenium – along with vast quantities of iron, tin, chromium, titanium and vanadium.</i>"</p> <p>The complex was traced along two zones or belts, known as the Western and Eastern Belt. The Western Belt is of significance for the present study.</p>

The relevant government survey reports of the time indicated that the Western Belt “...extends for about 100 miles as follows: from Brits towards Rustenburg and then northwards, skirting the Pilanesberg on its western side and continuing almost as far as the Crocodile River.” See for example The Official Year Book of the Union (1938:862).



Figure 14

Dr. Hans Merensky, the geologist who discovered the platinum reef at Lydenburg and Rustenburg (Machens, 2009).

1925 - 1929

The platinum discovery made by Hans Merensky led to a platinum boom in the South Africa. This saw the floating of more than 50 mining companies in the Rustenburg and Lydenburg districts. Some of the smaller concerns closed down reasonably quickly (Wagner, 1973).

Similarly, the identification of the Bushveld Complex meant that the surroundings of the study area were increasingly prospected and mined. One of the most significant mining companies from this area was Potgietersrust Platinums Limited. Registered on 27 August 1925, the company was established with capital to the value of £1, 962,500 in 7.85 million shares valued at 5 shillings each. The company was originally established to work the platinum deposits near Mokopane, but between 1926 and 1929 also acquired the Rustenburg properties of the Premier Rustenburg Platinum Limited, Steelpoort Platinum Syndicate Limited and Eerstegeluk Platinum Mines Limited. The closest property of Potgietersrust Platinums Limited to the present study area, was the farm Schilpadnest 385 KQ (South African Mining Yearbook, 1942) (Wagner, 1973), located only 1.25km north-east of the proposed Open Pit 36W.

Another early mining company from the surroundings of the study area was Elandsfontein Platinum Limited, which appears to have been established during the late 1920s. Established with issued capital of £100,501 15s, and a

	<p>subsidiary of the African and European Investment Company, Elandsfontein Platinum was established to mine the platinum located on the farm Elandsfontein 386 KQ (old farm number 850) (South African Mining Yearbook, 1942) (Wagner, 1973). With the proposed Open Pit 36W located on the same farm, it is clear that this mine also represents one of the earliest platinum mines in proximity to the present study area.</p>
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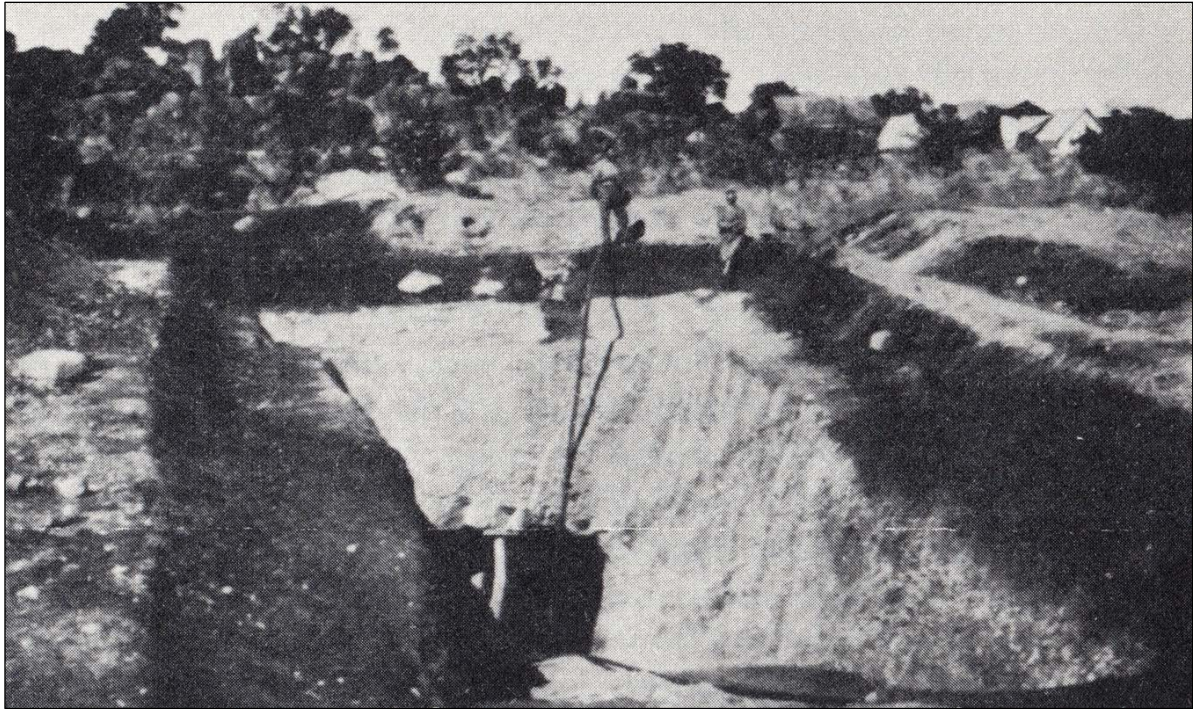


Figure 15 – Historic photograph taken during the late 1920s, depicting the opening of No. 2 Incline Shaft on the Merensky Horizon on the farm Schilpadnest 385 KQ (Wagner, 1973:128).

<p>12 August 1929</p>	<p>The railway line from Boschoek, over Northam and on to Middelwit was completed on this day (www.wikipedia.org). This would have stimulated mining exploration and development in areas surrounding the study area.</p>
<p>Early 1930s</p>	<p>In 1930 Iscor decided to mine the iron ore discovered by Williams just over a decade before. Iscor obtained the discoverer rights from Dunswart Iron and Steelworks Limited, which acquired the discoverer rights from a Mr. Delfos, who in turn bought them from the discoverer, J.H. Williams (Coetzee, n.d.).</p> <p>C.J.N. Jourdan of the Department of Mines was delegated to join Iscor and manage the commencement of the first iron ore mining activities in this area. Accompanied by a Messrs. Sheller and Sacht, who were respectively appointed as mine manager and mine secretary, Jourdan arrived at the proposed mine on 30 November 1930 (Coetzee, n.d.).</p> <p>Prospecting activities commenced in March 1931. Initially, the mine workers established themselves in tents on the northern slope of the mountain. However, the tents were eventually replaced by shacks and with time houses were also built on this same end of the mountain. It was here, on the same northern slope of the mountain, that the present-day town of</p>

Thabazimbi was eventually formally established (Coetzee, n.d.).

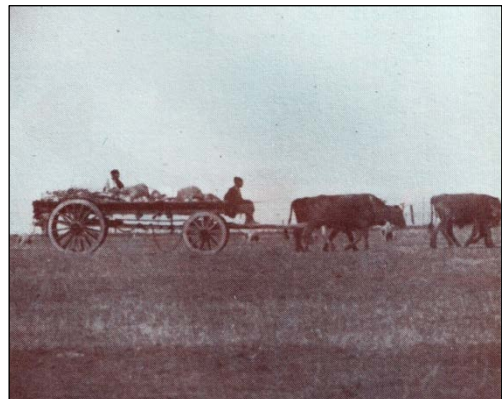
As the nearest railway station was at Northam, the mine had to bring everything needed for the new mining development by ox wagon all the way from Northam. In turn, the mined iron ore from the mine had to be transported back to Northam with ox wagons. Such a return journey between Northam and the mine took three days to accomplish. To assist with these very difficult transport arrangements, Jourdan invited local farmers to become part-time transport riders. Two of the local farmers who became transport riders, were Tommie van Deventer and Jan Steenkamp. Incidentally, their oxwagons were also modified and extended to allow for the transportation of cocopan rails (Coetzee, n.d.).

The biggest difficulty faced by the transport riders was the lack of a drift over the Crocodile River. As a result, a number of the wagons got stuck in the river. To assist the transport riders and avoid unnecessary delays, Jourdan requested the assistance of local farmers to build a concrete slab in the river. Work on this slab was completed in two days, and the crossing was renamed the Helpmekaar Drift (Coetzee, n.d.). While the exact position of the road used by the transport riders between Northam and the mine is presently not known, one can assume that this road would have passed the general surroundings of the present study area. The position of Helpmekaar Drift is known to be located roughly 7.5km north of the study area where the concrete slab built during the 1930s can still be seen.



Figure 17 - This portrait was taken in 1938 and depicts the Van Deventer couple. Mr. Kosie van Deventer was one of the farmers who became transport riders between Northam and the mine at Thabazimbi during the early 1930s (Coetzee, n.d.:26).

Figure 16 – The image below depicts Mr. Van Deventer’s oxwagon (Coetzee, n.d.:17).



1934	The railway line from Northam to Thabazimbi was completed on 26 February 1934 (Bergh, 1999) (www.wikipedia.org). This would have accelerated mining exploration and development in the study area and surroundings.
1946	Northam was laid out by E.H.J. Fulls on the farm Leeukoppie and the town was formally proclaimed in 1946. This farm and a number of surrounding ones were at the time owned by one man, H. Herd. He had purchased these farms from British soldiers, who had originally received the farms at the end of the South African War. As owner of the farm where the new town was to be established, Herd was allowed to name the newly established town and decided on the name Northam in Devonshire, England (Erasmus, 2004). Northam is located 15km south of the present study area.
4 May 1953	Although mining houses had been built from the early 1930s onwards at the northern foot of the mountain, the town of Thabazimbi was only officially proclaimed on 4 May 1953. The town's name is derived from the isiZulu word for 'iron mountain' (Erasmus, 2004). Thabazimbi is located 14.5km north of the present study area.

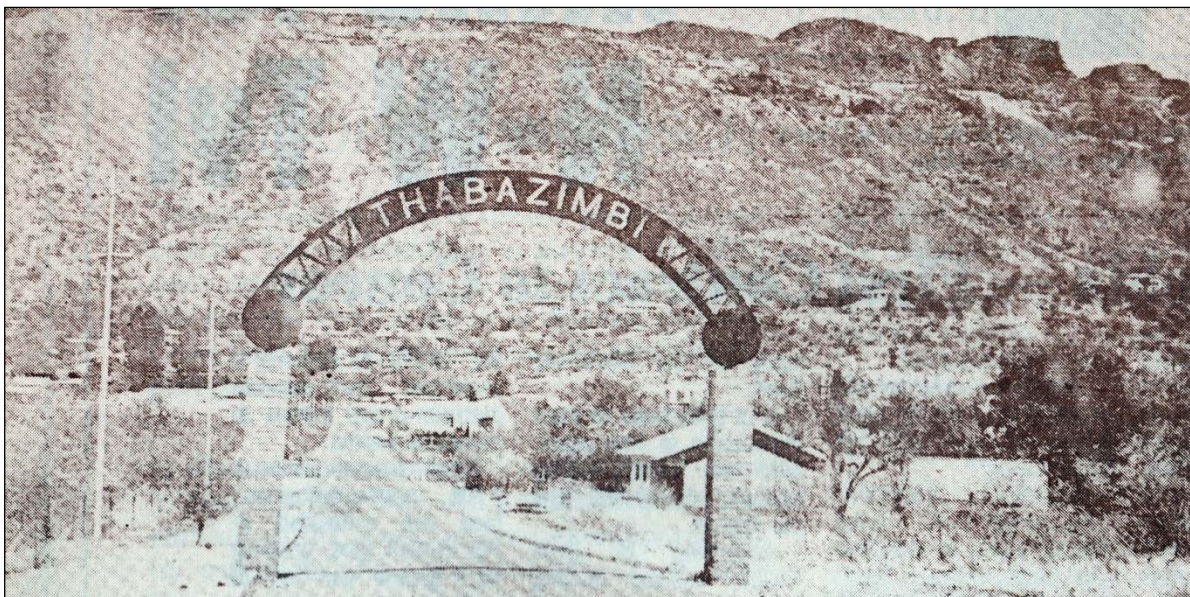
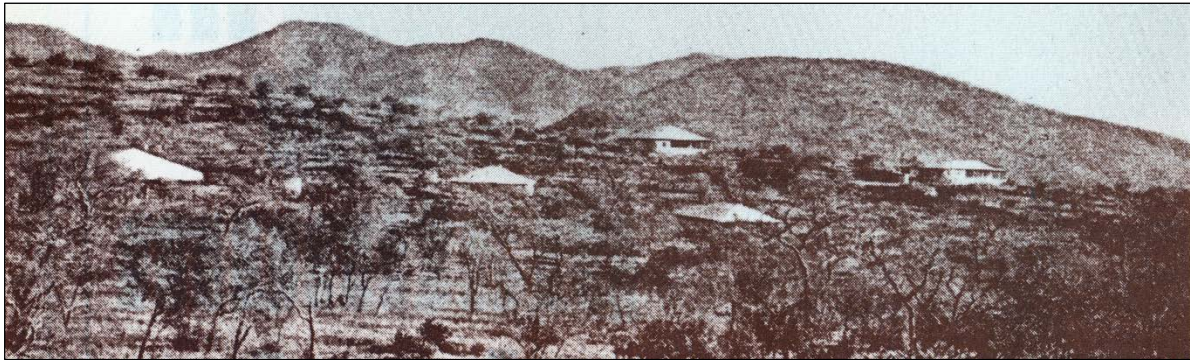


Figure 18 – Two early photographs of Thabazimbi. The top image depicts the five first houses built here, whereas the bottom image depicts the town's old northern entrance (Coetzee, n.d.:44).

5.2 Archival and Historical Maps

An assessment of available archival and historical maps was undertaken as a way to establish a historic layering for the study area. These archival and historical maps are also very valuable in identifying heritage sites and features.

5.2.1 2427CB Topographical Sheet

Of the two proposed opencast pits, only the 62E/60E (Dishaba) pit is located on the 2427CB Topographical Sheet. The first, second and third editions of this topographic map sheet will be discussed in more detail below.

5.2.1.1 First Edition of the 2427CB Topographical Sheet

The two figures below depict sections of the First Edition of the 2427CB Topographical Sheet. This edition of the sheet was based on aerial photography undertaken in 1963. This map sheet was surveyed in 1967 and printed in 1968 by the Trigonometrical Survey Office.

The following observations can be made from the map:

- No heritage sites are depicted within the study area.
- The nearest depicted heritage feature to the study area appears to be a farm building located on the northern boundary of the farm Elandskuil. This farm building is depicted roughly 388m south-east of the present study area and if it still exists today, will not be impacted upon by the proposed development.
- At the time, the study area was located within a landscape characterised by agricultural activities.
- No evidence for mining activities can be seen within the study area or its immediate surroundings.

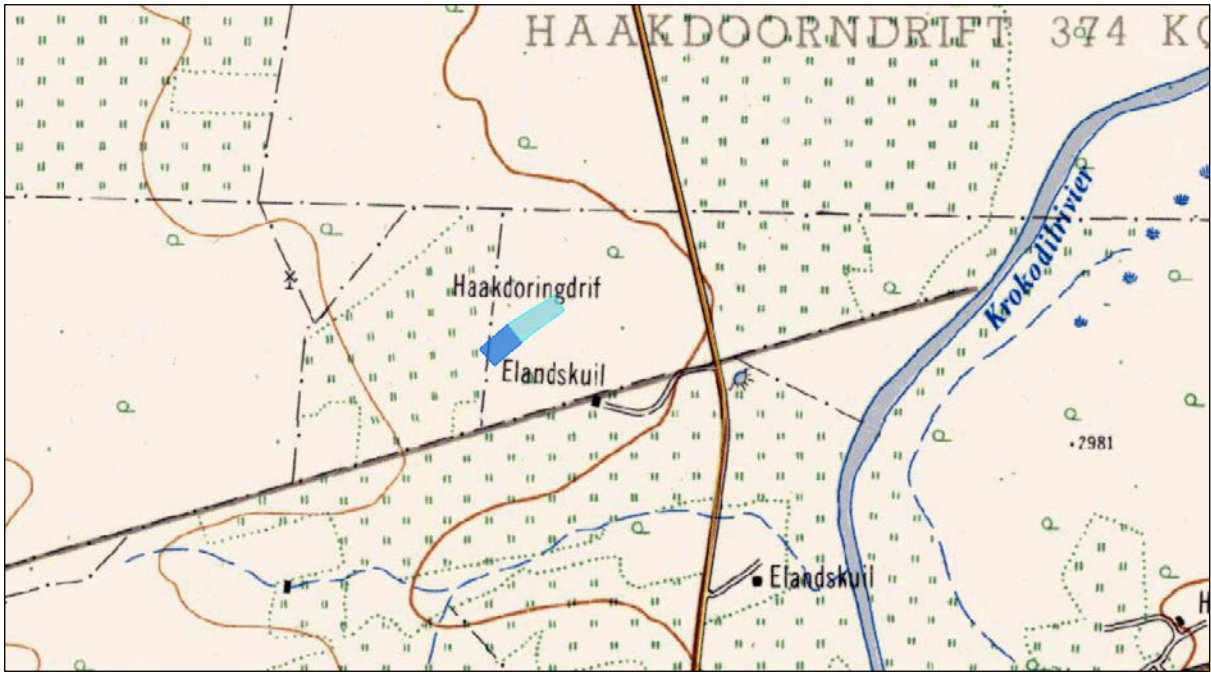


Figure 19 – Detail view of a section of the First Edition of the 2427CB Topographical Sheet that was surveyed in 1967. The component of the study area that is depicted on this topographic sheet, namely the proposed Open Pit 62E/60E (Dishaba), is depicted in dark and light blue.



Figure 20 – Closer view of a section of the First Edition of the 2427CB Topographical Sheet that was surveyed in 1967. The component of the study area that is depicted on this topographic sheet, namely the proposed Open Pit 62E/60E (Dishaba), is depicted in dark and light blue. The position of the farm building on the farm Elandskuil, can clearly be seen. This farm building represents the nearest heritage feature to the study area that is depicted on this map.

5.2.1.2 Second Edition of the 2427CB Topographical Sheet

The figure below depicts a section of the Second Edition of the 2427CB Topographical Sheet. This edition of the sheet was surveyed in 1980 and published by the Chief Directorate: Surveys and Land Information in 1985.

The following observations can be made from the map:

- No heritage sites are depicted within the study area.
- Heritage features from the immediate surroundings of the study area include the same farm building located on the northern boundary of the farm Elandskuil, as well as four buildings shown for the first time to the east of the study area.
- At the time, the study area was located entirely within an agricultural field.
- The earliest evidence for mining activities are depicted in the surroundings of the study area. These comprise a row of shafts located south-west of the study area.

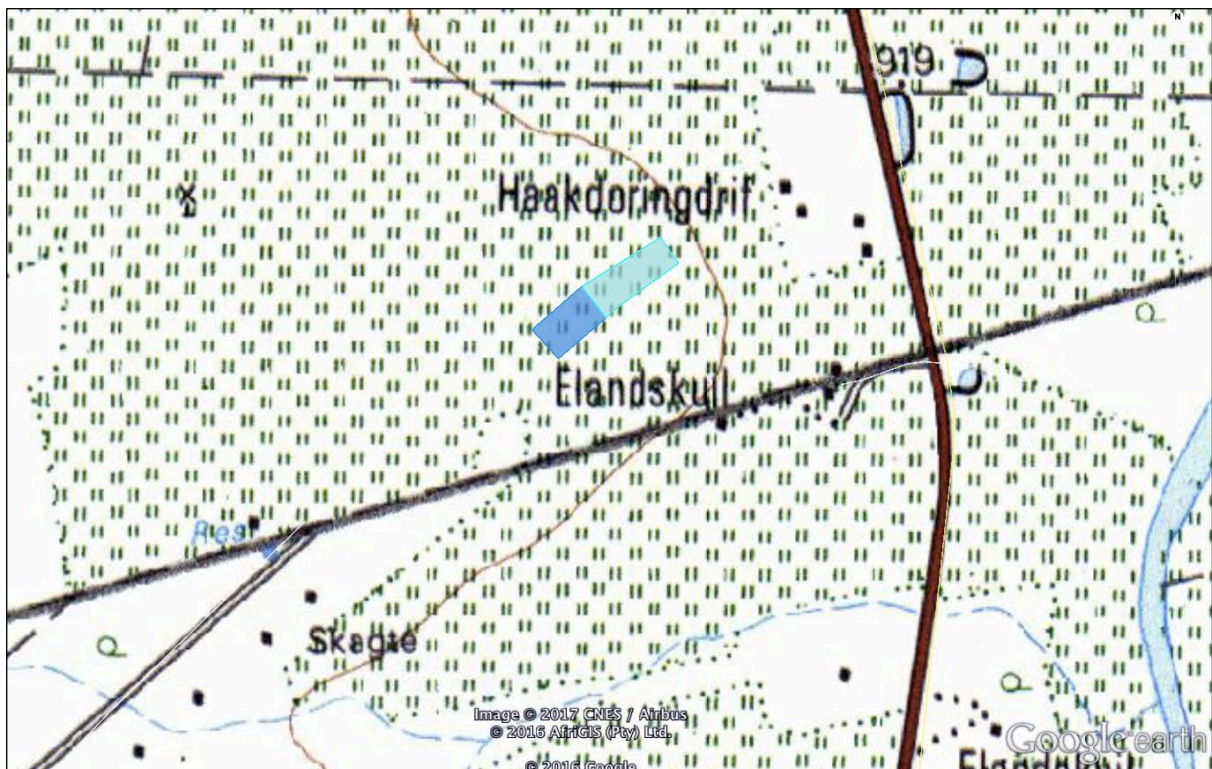


Figure 21 – Detail view of a section of the Second Edition of the 2427CB Topographical Sheet that was surveyed in 1980. The component of the study area that is depicted on this topographic sheet, namely the proposed opencast pit known as 62E/60E (Dishaba), is depicted in dark and light blue.

5.2.1.3 Third Edition of the 2427CB Topographical Sheet

The figure below depicts a section of the Third Edition of the 2427CB Topographical Sheet. This edition of the sheet was surveyed in 2005 and published by the Chief Directorate: National Geospatial Information in 2009.

The following observations can be made from the map:

- No heritage sites are depicted within the study area.
- It is clear from this 2005 depiction of the study area and surroundings that considerable mining development has taken place in the immediate surroundings of the component of the study area depicted on this sheet. This mining development include a railway line, buildings, reservoirs, pipelines and roads. Of these development aspects, only a section of a secondary road built between 1980 and 2005 is shown within the component of the study area depicted on this sheet.



Figure 22 – Detail view of a section of the Third Edition of the 2427CB Topographical Sheet that was surveyed in 2005. The component of the study area that is depicted on this topographic sheet, namely the proposed opencast pit known as 62E/60E (Dishaba), is depicted in dark and light blue.

5.2.2 2427CD Topographical Sheet

Of the two proposed opencast pits, only Open Pit 36W pit is located on the 2427CD Topographical Sheet. The first, second and third editions of this map sheet will be discussed in more detail below.

5.2.2.1 First Edition of the 2427CD Topographical Sheet

The figure below depicts a section of the First Edition of the 2427CD Topographical Sheet. This edition of the sheet was based on aerial photography undertaken in 1963. This map sheet was surveyed in 1967 and printed in 1968 by the Trigonometrical Survey Office. The following observations can be made from the map:

- No heritage sites are depicted within the study area or its surrounding landscape. A track is depicted roughly 740m east of the proposed Open Pit 36W.
- At the time, the study area was located within a landscape which for the most part appears to have comprised undisturbed veld.
- No evidence for mining activities can be seen within the study area or its surroundings.

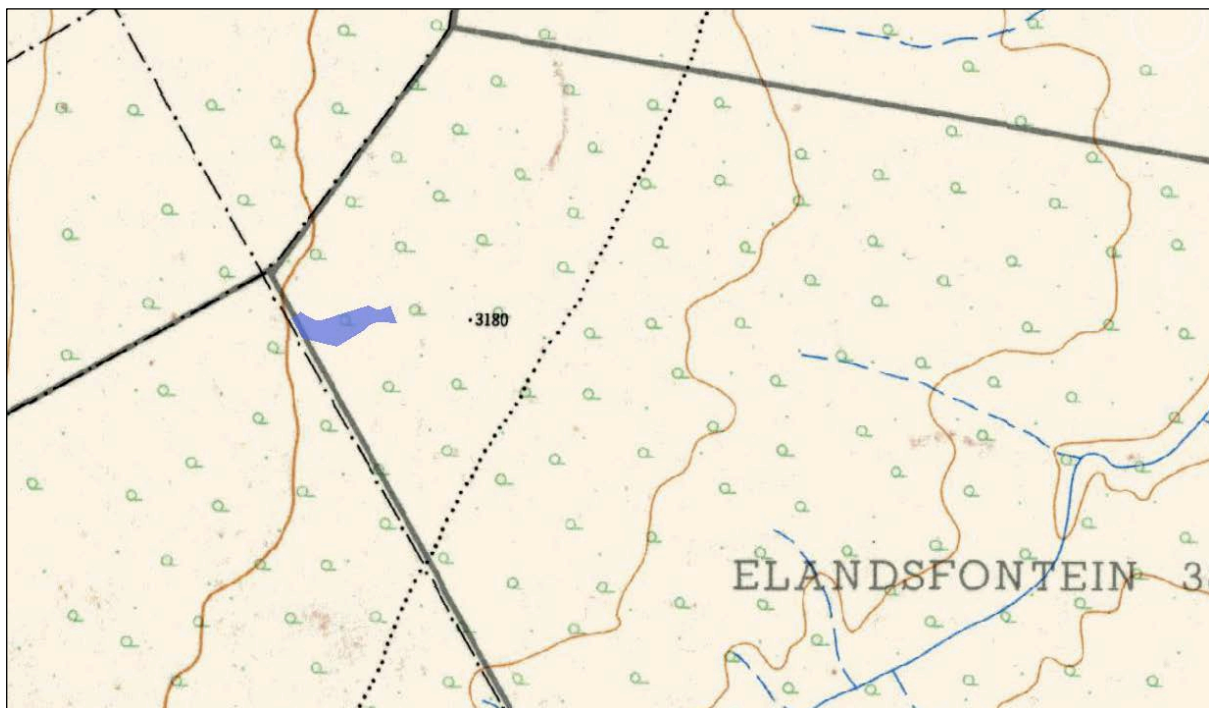


Figure 23 – Detail view of a section of the First Edition of the 2427CD Topographical Sheet that was surveyed in 1967. The component of the study area that is depicted on this topographic sheet, namely the proposed Open Pit 36W, is shown as a purple polygon.

5.2.2.2 Second Edition of the 2427CD Topographical Sheet

The figure below depicts a section of the Second Edition of the 2427CD Topographical Sheet. This edition of the sheet was surveyed in 1980 and published by the Chief Directorate: Surveys and Land Information in 1985. The following observations can be made from the map:

- No heritage sites are depicted within the study area component depicted here.
- A road is shown for the first time cutting across the northern end of this component of the study area.
- A quarry is shown immediately south of the proposed 36W opencast area. A track is also shown linking the above-mentioned road to the quarry.
- The period between 1968 (when the previous map sheet was surveyed) and 1980 has evidently seen extensive mining development on the farm Elandsfontein 386 KQ. Apart from the features mentioned above, none of the mining development depicted on this map is located within the study area or its immediate surroundings.



Figure 24 – Detail view of a section of the Second Edition of the 2427CD Topographical Sheet that was surveyed in 1980. The component of the study area that is depicted on this topographic sheet, namely the proposed Open Pit 36W, is shown as a purple polygon.

5.2.1.3 Third Edition of the 2427CD Topographical Sheet

The figure below depicts a section of the Third Edition of the 2427CD Topographical Sheet. This edition of the sheet was surveyed in 2005 and published by the Chief Directorate: National Geospatial Information in 2009. The following observations can be made from the map:

- No heritage sites are depicted within the study area.
- Three quarries are shown within the study area.
- A small section on the eastern end of the proposed 36W opencast pit area is depicted within the boundaries of the Madeleine Robinson Nature Reserve. The depiction of this nature reserve on the 2005 edition of the topographical sheet, suggests that this nature reserve was established between 1980 and 2005.
- Mining development continued during the period between 1980 and 2005. In the general surroundings of the study area, this mining development includes roads, a conveyor belt, reservoirs and buildings. None of these are located within the 36W Open Pit area.



Figure 25 – Detail view of a section of the Third Edition of the 2427CD Topographical Sheet that was surveyed in 2005. The component of the study area that is depicted on this topographic sheet, namely the proposed Open Pit 36W, is shown as a purple polygon.

5.3 Previous Heritage Impact Assessment (HIA) Reports from the Study Area and Surroundings

An assessment of SAHRIS has revealed that at least two previous reports had study areas which included the present study area as well. However, no archaeological or heritage sites were identified within the present study area at the time.

Furthermore, a number of previous heritage and archaeological studies were also undertaken in the immediate surroundings of the present study area. Only reports that covered areas located within 5 km from the present study area boundaries will be included in this discussion.

All previous studies located on the SAHRIS system, will be briefly discussed in ascending order below. The discussion of the identified previous studies will also be separated between studies which assessed areas located within the present study area and studies located within the immediate surroundings of the present study area.

5.3.1 Previous Reports within the Study Area

Van Schalkwyk, J.A. 1994. A Survey of Archaeological and Cultural Historical Resources in the Amandelbult Mining Lease Area. An unpublished report by the National Cultural History Museum on file at SAHRA as: 1994-SAHRA-0024. SAHRIS MAP ID_02340.

The National Cultural History Museum was commissioned by Rustenburg Platinum Mines Limited to undertake a survey of archaeological and cultural historical resources in the Amandelbult Mining Lease Area. The area assessed during this study comprised the farms Zwartkop 369 KQ, Haakdoorndrift 374 KQ, Elandskuil 378 KQ, Middellaagte 382 KQ, Amandelbult 383 KQ, Schilpadnest 385 KQ and Elandsfontein 386 KQ. With the present study area located on portions of the farms Haakdoringdrift 374 KQ and Elandsfontein 386 KQ, it is clear that this 1994 survey included the present study area as well.

The 1994 survey resulted in the identification of 50 archaeological and heritages sites, including Early Iron Age sites, Late Iron Age stonewalled settlements and occurrences, Stone Age sites and occurrences, historic homesteads and settlements and cemeteries. None of these sites were identified within or in proximity to the present study area. In fact, as far as can be established, the nearest of the 50 sites to the present study area is Site 38, which comprises a small stone enclosure

(roughly 1.5m in diameter) associated with an elongated pile of stones. This site is located 1.34km north-east of the footprint area for the proposed Open Pit 36W.

It is worthwhile to note that one of the conclusions made by Van Schalkwyk (1994:7) is that no archaeological or heritage sites were identified east of the R510 between Thabazimbi and Northam “...due to the fact that people avoided the turf thornveld in prehistoric times. Settlement occurred almost exclusively close to the Bierspruit, which also served as watersource for the area.” From this it is evident that all the sites were identified west of the tar road, with the largest majority of these located in proximity to the Bierspruit.

Van Schalkwyk, J.A., Teichert, F., & Pelsler, A.J. 2003. A Survey of Archaeological Sites for the Amandelbult Platinum Mine Seismic Exploration Program. An unpublished report by the National Cultural History Museum on file at SAHRA as: 2003-SAHRA-0086. SAHRIS MAPID_00779.

The National Cultural History Museum was contracted by General de Geophysique to undertake an archaeological survey of an area earmarked for seismographic surveys. The area assessed during this study comprised the farms Elandsfontein 386 KQ, Moddergat 389 KQ, Kaalvlakte 416 KQ and Goverments Plaats 417KQ.

Although the findings of the fieldwork are not presented in the copy of the report available on SAHRIS, a map on page 6 of the report depicts all the Iron Age sites identified during the fieldwork. None of these sites are shown to be anywhere near the component of the present study area located on the farm Elandsfontein 386 KQ (i.e. the proposed Open Pit 36W).

5.3.2 Previous Reports from the Immediate Surroundings of the Study Area

Huffman, T.N. 2004. Archaeological Assessment for the Rhino Andalusite Mine. Unpublished report by ARM. SAHRIS MAPID_00627.

Archaeological Resources Management was contracted by Rhino Andalusite Mine to undertake an archaeological assessment of the exploration activities proposed by the mine for portions of the farms Buffelsfontein 353 KQ and Tygerskloof 354 KQ. This study area is located 9.2 km south-west of the nearest component of the present study area, namely the proposed Open Pit 36W.

The archaeological assessment resulted in the identification of four archaeological sites, comprising

one pre-colonial mining site (Site 1), one cave with remnants of rock art (Site 2), and two Late Iron Age sites (Sites 3 & 4) consisting inter alia of pottery, upper and lower grinding stones and mud and burnt daga hut remnants. One small piece of slag, signifying metal working, was also observed at Site 4.

Van Schalkwyk, J.A. 2006. Heritage Impact Assessment: Portion 6 of the Farm Aapieskraal. Unpublished letter by the National Cultural History Museum. SAHRIS MAPID_00894.

The National Cultural History Museum was contracted by Mr D. Nel to undertake a heritage impact assessment of Portion 6 of the farm Aapieskraal 377 KQ. This property is located immediately east of the Crocodile River, and roughly 8.3 km south-east of the nearest component of the present study area, namely the proposed Open Pit 62E.

The study area was found to be located within the floodplain of the Crocodile River, without the presence of rocky outcrops. As a result, no archaeological or heritage sites were identified.

Van Schalkwyk, J.A. 2007. Survey of Heritage Resources in the location of the proposed Merensky Mining Project, Amandelbult Section, Rustenburg Platinum Mine, Limpopo Province. Unpublished report by the National Cultural History Museum. SAHRIS MAPID_01017.

The National Cultural History Museum was contracted by WSP Environmental to undertake a survey of the proposed Shaft 3, Shaft 4 and Concentrator Plant areas located on the farms Middellaagte 382 KQ, Amandelbult 383 KQ and Elandsfontein 386 KQ. The proposed Shaft 3 area is located 4.4 km south-east of the component of the present study area located on the farm Elandsfontein 386 KQ (i.e. the proposed Open Pit 36W), whereas the proposed Shaft 4 area is located 8.4 km south-west of the component of the present study area located on the farm Haakdongdrift 374 KQ.

The report mentions the presence of Stone Age and Late Iron Age sites in proximity to the proposed Shaft 3 development (these sites had been fenced off during a previous assessment), with a possible Iron Age settlement at the proposed Shaft 4 development area. No heritage sites were identified at the proposed Concentrator Plant area.

The findings of the fieldwork are not presented in the copy of the report available on SAHRIS. This being said, none of the sites referred to in the report are located in close proximity to the present

study area. An interesting observation made by the author is although the turf thornveld areas to the east of R510 between Thabazimbi and Northam were avoided for settlement purposes during prehistoric times, the Iron Age site identified at the Shaft 4 development is located east of the tar road within the turf thornveld. However, as mentioned by the author, it is important to note that this site was located at a rocky outcrop within the turf thornveld.

Van der Walt, J. 2016. Archaeological Impact Assessment for the Proposed Additional Underground and Opencast Mining as well as Associated Infrastructure and Processing Facilities at Thaba Chronimet Chrome Mine, Limpopo Province. Unpublished report by HCAC. SAHRIS Case Number 10011.

HCAC was contracted by Worley Parsons Resources and Energy to undertake an archaeological impact assessment on portions of the farms Roodedam 368 KQ, Zwartkop 369 KQ, Elandskuil 378 KQ and Middellaagte 382 KQ. The area assessed as part of this study is located roughly 1.2 km south-west of the proposed Open Pit 60E/62E (Dishaba) on the farm Haakdoorndrift 374 KQ and the same distance north-east of the proposed Open Pit 36W on the farm Elandsfontein 386 KQ.

The archaeological impact assessment resulted in the identification of six heritage sites, comprising one Late Iron Age stonewalled site (Site 1), one multicomponent site consisting of a Late Iron Age stonewalled settlement in proximity to a cluster of Middle Stone Age lithics (Site 2), historic adits at a hill known as Mooskop (Site 3), the remains of Chromedale Railway Station (Site 4), the remains of a historic farmhouse and outbuilding (Site 5) and a stone cairn (Site 6). Of these sites, the nearest one to the present development is the historic farmhouse and outbuilding at Site 5, which is located 5.7 km south-west of the proposed Open Pit 36W on the farm Elandsfontein 386 KQ.

Gaigher, S. 2016. Heritage Impact Assessment Report for the Proposed Haakdoorndrift Opencast Activities at the Anglo American Platinum's Amandelbult Mine at Thabazimbi, Limpopo Province. Unpublished report by the G&A Heritage.

G&A Heritage was contracted by Aurecon to undertake a heritage impact assessment of opencast operations proposed for Portions 2 and 4 of the farm Haakdoorndrift 374 KQ and Portion 2 of the farm Elandskuil 378 KQ. The area assessed as part of this 2016 study is located roughly 570 m east of the nearest component of the present study area, namely the proposed Open Pit 62E on the farm Haakdoorndrift 374 KQ. No heritage sites were identified.

5.3.3 Conclusions that to be drawn from the Previous Heritage Studies

The following conclusions can be drawn from the previous archaeological and heritage studies:

- Many of the heritage studies from the surroundings of the present study area have revealed the presence of heritage sites, with Late Iron Age stonewalled settlements predominantly identified here.
- No archaeological or heritage sites had been identified in proximity to the proposed Open Pit 62E on the farm Haakdoorn drift 374 KQ. The reason for this appears to be the observation made in some of the previous reports (Van Schalkwyk, 1994) (Van Schalkwyk, 2007) that the turf thornveld in the area to the east of the R510 between Thabazimi and Northam was not used for settlement purposes during precolonial times.
- No archaeological or heritage sites had been identified in proximity to the proposed Open Pit 36W on the farm Elandsfontein 386 KQ. This said, previous heritage studies did identify a large number of Late Iron Age stonewalled sites west of the R510 between Thabazimbi and Northam. However, these were identified primarily near rocky outcrops and in proximity to the Bierspruit.

6 FIELDWORK FINDINGS

Intensive walkthroughs of both proposed open mining pits were undertaken by the PGS Heritage fieldwork team. The findings of the intensive field-based assessment are provided below:

- Open Pit 60E/62E (Disbaba)

This component of the study area had been disturbed by grading activities, with one section of the site also used for the storing of soil and rock. The immediate surroundings of the site are characterised by mining and mining infrastructure. The proposed open pit is located within turf thornveld some 1.5km west of the Crocodile River. As indicated before, a number of previous heritage studies had observed that the turf thornveld found in this landscape would have been avoided during prehistoric settlement.

No archaeological or heritage sites were identified within the proposed Open Pit 60E/62E (Disbaba).

- Open Pit 36W (Tumela)

The proposed 36W (Tumela) pit is located within the general landscape where a number of archaeological sites, and especially LIA stonewalled settlements, had been identified. However, these sites were primarily found near rocky outcrops and in proximity to the Bierspruit. The current fieldwork revealed that the site is not located anywhere near any rocky outcrops, and is some distance from the Bierspruit. The fieldwork also found that the site had been extensively utilised for quarrying activities, with one depression from a quarry also turned into a watering hole for animals. These fieldwork observations confirmed the findings of the desktop study, which revealed that since the 1980s, this property had been used for quarrying activities and by 2005 at least three extensive quarries were located here. On the eastern end of the site a shooting range, enclosed by security fencing, is located.

No archaeological or heritage sites were identified within the proposed Open Pit 36W (Tumela).



Figure 26 – Google Earth image of the proposed Open Pit 60E/62E, depicting the recorded track logs in red and the study area in blue.

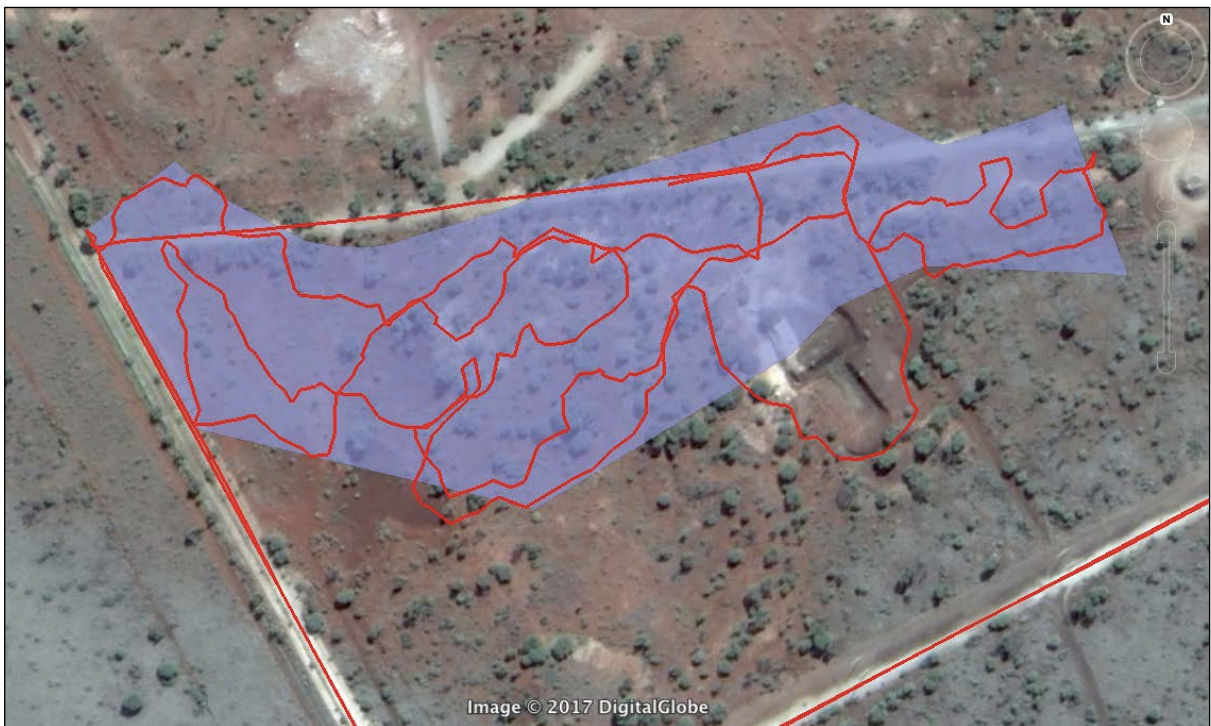


Figure 27 – Google Earth image of the proposed Open Pit 36W, depicting the recorded track logs in red and the study area in violet.

7 IMPACT OF PROPOSED DEVELOPMENT ON HERITAGE RESOURCES

7.1 Assessment of Impact of Proposed Development on Non-Palaeontological Heritage Sites

Despite intensive field surveys of the two proposed open mining pit areas, no archaeological or heritage sites were identified. This is in line with previous heritage studies, which showed that the turf thornveld (within which Open Pit 60E/62E is located) was avoided in prehistoric times, whereas most of the archaeological sites identified in the landscape surrounding the proposed Open Pit 36W (Tumela), are located at rocky outcrops or in proximity to the Bierspruit. This latter open mining pit is located some distance from any rocky outcrops or the Bierspruit.

From this, it is clear that no impact on archaeological or other non-palaeontological heritage sites is expected.

7.2 Assessment of Impact of Proposed Development on Palaeontology

Ms Elize Butler of Banzai Environmental (Pty) Ltd was appointed to undertake a palaeontological desktop study for the proposed development. Her impact assessment and findings are presented below.

Ms. Butler found that the study area is completely underlain by the Rustenburg Layered Suite of the Bushveld Igneous Complex and Quaternary sediments overlying the igneous bedrock.

These intrusive igneous rocks of the **Rustenburg Layered Suite** are completely **unfossiliferous**. This layer thus has **NO significance** in terms of local palaeontological heritage.

The **Quaternary superficial deposits** have been relatively neglected in palaeontological terms. They may sometimes contain important fossil biotas, e.g. bones, teeth and horn cores of mammals and reptile remains. Non-marine molluscs, ostrich egg shells, trace fossils and plant remains in organic-rich alluvial horizons are also preserved. Siliceous diatoms in pan sediments have been found. These fossil assemblages in the Quaternary are rare, low in diversity, and occur over a wide geographic area, and thus the **palaeontological sensitivity** of the Quaternary deposits within the study region is rated as **low**. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single

fossil can have a huge scientific importance as many fossil taxa are known from a single fossil.

Table 10: Definition of Intensity ratings

Rating	Criteria	
	Negative impacts (-)	Positive impacts (+)
Very high (-/+ 4)	Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very long periods of time (more than a typical human life time).	Great improvement to ecosystem or social processes and services or resources.
High (-/+ 3)	High degree damage to natural or social system components, species or resources.	Intense positive benefits for natural or social systems or resources.
Moderate (-/+ 2)	Moderate damage to natural or social system components, species or resources.	Average, on-going positive benefits for natural or social systems or resources.
Low (-/+ 1)	Minor damage to natural or social system components, species or resources. Likely to recover over time. Ecosystems and valuable social processes not affected.	Low positive impacts on natural or social systems or resources.
Negligible (0)	Negligible damage to individual components of natural or social systems or resources, such that it is hardly noticeable.	Limited low-level benefits to natural or social systems or resources.

Table 11: Definition of Duration ratings

Rating	Criteria
2	Long-term: The impact will continue for 6-15 years.
1	Medium-term: The impact will continue for 2-5 years.
0	Short-term: The impact will continue for between 1 month and 2 years.

Table 12: Definition of Extent ratings

Rating	Criteria
2	Regional: The impact will affect the entire region
1	Local: The impact will extend across the site and to nearby properties.
0	Site specific: The impact will be limited to the site or immediate area.

Table 13: Definition of Probability ratings

Rating	Criteria
4	Certain/ Definite: There are sound scientific reasons to expect that the impact will definitely occur.
3	Very likely: It is most likely that the impact will occur.
2	Fairly likely: This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably occur.
1	Unlikely: This impact has not happened yet but could happen.
0	Very unlikely: The impact is expected never to happen or has a very low chance of occurring.

Table 14: Application of Consequence ratings

Rating	Consequence rating
-8	Extremely detrimental
-7 to -6	Highly detrimental
-5 to -4	Moderately detrimental
-3 to -2	Slightly detrimental
-1 to 1	Negligible
2 to 3	Slightly beneficial
4 to 5	Moderately beneficial
6 to 7	Highly beneficial
8	Extremely beneficial

Table 15: Application of significance ratings

Rating	Significance rating
-4	Very high - negative
-3	High - negative
-2	Moderate - negative
-1	Low - negative
0	Very low
1	Low - positive
2	Moderate - positive
3	High - positive
4	Very high - positive

Table 16: Definition of Confidence ratings

Rating	Criteria
Low	Judgement is based on intuition and there some major assumptions used in assessing the impact may prove to be untrue.
Medium	Determination is based on common sense and general knowledge. The assumptions made, whilst having a degree of uncertainty, are fairly robust.
High	Substantive supportive data or evidence exists to verify the assessment.

Impact Assessment Summary:

- The Intensity of impact on palaeontological heritage is low negative.
- The duration of the Impact will be long term (6-15 years).
- The duration of the extent will be site-specific.
- The probability of the impact occurring is unlikely.
- The development will only be slightly detrimental to the environment.
- The significance of the impact is low negative and the latter can all be said with a medium confidence.

8 MITIGATION MEASURES

8.1 Mitigation Required for Non-Palaeontological Heritage Sites

From the previous section it is clear that no non-palaeontological heritage resources, including archaeological sites, were identified within the two proposed open pit areas. On the condition that the open mining pit areas as proposed do not change, no mitigation measures are required to mitigate the impact of the proposed development on non-palaeontological heritage.

8.2 Mitigation Required for Palaeontology

Ms Elize Butler of Banzai Environmental (Pty) Ltd was appointed to undertake a palaeontological desktop study for the proposed development.

The mitigation measures recommended by Ms. Butler are as follows:

- Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.
- The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

Please note that the palaeontological desktop study of Ms Elize Butler of Banzai Environmental (Pty) Ltd includes a Protocol for Finds that must be adhered to.

9 CONCLUSIONS AND RECOMMENDATIONS

PGS Heritage (Pty) Ltd was appointed by Aurecon South Africa (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the environmental process for the proposed development of two opencast mining pits 62E/60E (Dishaba) and 36W (Tumela) at the Amandelbult Mining Complex, located north of Northam, in Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province.

An archival and historical desktop study was undertaken to provide a historic framework for the project area and surrounding landscape. This was augmented by a study of available historical and archival maps and an assessment of previous archaeological and heritage studies completed for the area. The desktop study revealed that the surroundings of the study area is characterised by a long and significant history, whereas previous archaeological and heritage studies from this area have revealed a number of archaeological and heritage sites, which for the most part comprise Late Iron Age stonewalled settlements. These previous reports also revealed very few sites located in the turf thornveld east of the R510 between Thabazimbi and Northam, with more sites (primarily Late Iron Age stonewalled settlements) located west of this main artery. The sites from the surroundings of the study area have primarily been identified at rock outcrops, as well as in close proximity to the Bierspruit. With the proposed open pit at 62E/60E located on the turf thornveld east of the R510 and the proposed 36W open pit located west of the R510 but some distance from the Bier Spruit and any rocky outcrops, the primary finding from the desktop study was that the heritage fieldwork undertaken for these sites is unlikely to reveal any heritage sites of significance.

The heritage fieldwork was undertaken by a team comprising two archaeologists. Despite an intensive walkthrough of the two pit areas, no archaeological or heritage sites were identified.

Ms. Elize Butler of Banzai Environmental (Pty) Ltd was commissioned to undertake a desktop Palaeontological Impact Assessment. Her report and findings are attached in full in **Appendix C**. Ms. Butler found that the study area is completely underlain by the Rustenburg Layered Suite of the Bushveld Igneous Complex and Quaternary sediments overlying the igneous bedrock. These intrusive igneous rocks of the **Rustenburg Layered Suite** are completely **unfossiliferous**. This layer thus has **NO significance** in terms of local palaeontological heritage. The **Quaternary superficial deposits** have been relatively neglected in palaeontological terms. They may sometimes contain

important fossil biotas, e.g. bones, teeth and horn cores of mammals and reptile remains. Non-marine molluscs, ostrich egg shells, trace fossils and plant remains in organic-rich alluvial horizons are also preserved. Siliceous diatoms in pan sediments have been found. These fossil assemblages are rare, low in diversity, and occur over a wide geographic area, and thus the **palaeontological sensitivity** of the deposits within the study region is rated as **low**. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single fossil can have a huge scientific importance as many fossil taxa are known from a single fossil.

The impact assessment undertaken in terms of palaeontology, concluded that:

- The Intensity of impact on palaeontological heritage is low negative.
- The duration of the Impact will be long term (6-15 years).
- The duration of the extent will be site-specific.
- The probability of the impact occurring is unlikely.
- The development will only be slightly detrimental to the environment.
- The significance of the impact is low negative and can be said with a medium confidence.

The following mitigation measures are required for palaeontology:

- Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.
- The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

The palaeontological desktop study includes a Protocol for Finds that must be adhered to.

On the condition that the recommendations regarding palaeontology are adhered to, and that the open pit areas do not change, no heritage reasons can be given for the development not to continue.

10 PREPARERS

This Heritage Impact Assessment was written by the following preparers:

- Polke Birkholtz– Project Manager / Author
- Heidi James-Birkholtz – Archaeologist / Co-Author

Ms Elize Butler compiled a Palaeontological Desktop Study for this project. Her report can be seen in **Appendix C.**

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Historic Topographic Maps

All the historic topographic maps used in this report were obtained from the Directorate: National

Geo-spatial Information of the Department of Rural Development and Land Reform in Cape Town.

Google Earth

All the aerial depictions used in this report are from Google Earth.

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Appendix A

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In terms of the heritage legislation, permits are required to damage, destroy, alter, or disturb them. Furthermore, individuals who already possess heritage material, are required to register it. The management of heritage resources is integrated with environmental resources and this means that, before development takes place, heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves which are older than 60 years and are not located in a cemetery (such as ancestral graves in rural areas), are protected. The legislation also protects the interests of communities that have an interest in the graves: they should be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle are to be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resources authority and, if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the construction company's cost. Thus, the construction company will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;

- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection to, all historic and prehistoric cultural remains, including graves and human remains.

Graves and cemeteries

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the South African Heritage Resources Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years, over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

Appendix B
CURRICULUM VITAE

**PROFESSIONAL CURRICULUM
FOR POLKE DOUSSY BIRKHOLTZ**

Name: Polke Doussy Birkholtz

Date & Place of Birth: 9 February 1975 – Klerksdorp, North West Province, South Africa

Place of Tertiary Education & Dates Associated:

Institution: University of Pretoria

Qualification: BA (Cum Laude) - Bachelor of Arts Specializing in Archaeology, History & Anthropology

Date: 1996

Institution: University of Pretoria

Qualification: BA Hons (Cum Laude) - Bachelor of Arts with Honours Degree Specializing in Archaeology

Date: 1997

Qualifications:

BA - Degree specialising in Archaeology, History and Anthropology

BA Hons - Professional Archaeologist

Memberships:

Association of Southern African Professional Archaeologists (ASAPA)

Professional Member of the CRM Section of ASAPA

Overview of Post Graduate Experience:

1997 – 2000 – Member/Archaeologist – Archaeo-Info

2001 – 2003 – Archaeologist/Heritage Specialist – Helio Alliance

2000 – 2008 – Member/Archaeologist/Heritage Specialist – Archaeology Africa

2003 - Present – Director / Archaeologist / Heritage Specialist – PGS Heritage

Languages: English: Speak, Read & Write & Afrikaans: Speak, Read & Write

Total Years' Experience: 17 Years

Experience Related to the Scope of Work:

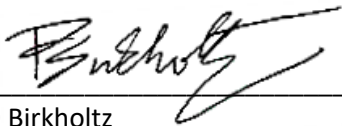
- Polke has worked as a **HERITAGE SPECIALIST / ARCHAEOLOGIST / HISTORIAN** on more than 275 projects, and acted as **PROJECT MANAGER** on almost all of these projects. His experience include the following:
 - Development of New Sedimentation and Flocculation Tanks at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Greenline*.

- EThekweni Northern Aqueduct Project, Durban, KwaZulu-Natal. Heritage Impact Assessment for *Strategic Environmental Focus*.
- Johannesburg Union Observatory, Johannesburg, Gauteng Province. Heritage Inventory for *Holm Jordaan*.
- Development at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Aurecon*.
- Comet Ext. 8 Development, Boksburg, Gauteng Province. Phase 2 Heritage Impact Assessment for *Urban Dynamics*.
- Randjesfontein Homestead, Midrand, Gauteng Province. Baseline Heritage Assessment with Nkosinathi Tomose for Johannesburg City Parks.
- Rand Leases Ext. 13 Development, Roodepoort, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Proposed Relocation of the Hillendale Heavy Minerals Plant (HHMP) from Hillendale to Fairbreeze, KwaZulu-Natal. Heritage Impact Assessment for *Goslar Environmental*.
- Portion 80 of the farm Eikenhof 323 IQ, Johannesburg, Gauteng Province. Heritage Inventory for *Khare Incorporated*.
- Comet Ext. 14 Development, Boksburg, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Rand Steam Laundries, Johannesburg, Gauteng Province. Archival and Historical Study for *Impendulo and Imperial Properties*.
- Mine Waste Solutions, near Klerksdorp, North West Province. Heritage Inventory for *AngloGold Ashanti*.
- Consolidated EIA and EMP for the Kroondal and Marikana Mining Right Areas, North West Province. Heritage Impact Assessment for *Aquarius Platinum*.
- Wilkoppies Shopping Mall, Klerksdorp, North West Province. Heritage Impact Assessment for *Centre for Environmental Management*.
- Proposed Vosloorus Ext. 24, Vosloorus Ext. 41 and Vosloorus Ext. 43 Developments, Ekurhuleni District Municipality, Gauteng Province. Heritage Impact Assessment for *Enkanyini Projects*.
- Proposed Development of Portions 3, 6, 7 and 9 of the farm Olievenhoutbosch 389 JR, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Proposed Development of Lotus Gardens Ext. 18 to 27, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Pierre Joubert*.
- Proposed Development of the site of the old Vereeniging Hospital, Vereeniging, Gauteng Province. Heritage Scoping Assessment for *Lekwa*.
- Proposed Demolition of an Old Building, Kroonstad, Free State Province. Phase 2 Heritage Impact Assessment for *De Beers Consolidated Mines*.
- Proposed Development at Westdene Dam, Johannesburg, Gauteng Province. Heritage Impact Assessment for *Newtown*.
- West End, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.
- Kathu Supplier Park, Kathu, Northern Cape Province. Heritage Impact Assessment for *Synergistics*.

- Matlosana 132 kV Line and Substation, Stilfontein, North West Province. Heritage Impact Assessment for *Anglo Saxon Group* and *Eskom*.
 - Marakele National Park, Thabazimbi, Limpopo Province. Cultural Resources Management Plan for *SANParks*.
 - Cullinan Diamond Mine, Cullinan, Gauteng Province. Heritage Inventory for *Petra Diamonds*.
 - Highveld Mushrooms Project, Pretoria, Gauteng Province. Heritage Impact Assessment for *Mills & Otten*.
 - Development at the Reserve Bank Governor's Residence, Pretoria, Gauteng Province. Archaeological Excavations and Mitigation for the *South African Reserve Bank*.
 - Proposed Stones & Stones Recycling Plant, Johannesburg, Gauteng Province. Heritage Scoping Report for *KV3*.
 - South East Vertical Shaft Section of ERPM, Boksburg, Gauteng Province. Heritage Scoping Report for *East Rand Proprietary Mines*.
 - Proposed Development of the Top Star Mine Dump, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
 - Soshanguve Bulk Water Replacement Project, Soshanguve, Gauteng Province. Heritage Impact Assessment for *KWP*.
 - Biodiversity, Conservation and Participatory Development Project, Swaziland. Archaeological Component for *Africon*.
 - Camdeboo National Park, Graaff-Reinet, Eastern Cape Province. Cultural Resources Management Plan for *SANParks*.
 - Main Place, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.
 - Modderfontein Mine, Springs, Gauteng Province. Detailed Archival and Historical Study for *Consolidated Modderfontein Mines*.
 - Proposed New Head Office for the Department of Foreign Affairs, Pretoria, Gauteng Province. Heritage Impact Assessment for *Holm Jordaan Group*.
 - Proposed Modification of the Lukasrand Tower, Pretoria, Gauteng Province. Heritage Assessment for *IEPM*.
 - Proposed Road between the Noupoort CBD and Kwazamukolo, Northern Cape Province. Heritage Impact Assessment for *Gill & Associates*.
 - Proposed Development at the Johannesburg Zoological Gardens, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
- Polke's **KEY QUALIFICATIONS:**
 - Project Management
 - Archaeological and Heritage Management
 - Archaeological and Heritage Impact Assessment
 - Archaeological and Heritage Fieldwork
 - Archival and Historical Research
 - Report Writing
- Polke's **INFORMATION TECHNOLOGY EXPERIENCE:**

- *MS Office – Word, Excel, & Powerpoint*
- *Google Earth*
- *Garmin Mapsource*
- *Adobe Photoshop*
- *Corel Draw*

I, Polke Doussy Birkholtz, hereby confirm that the above information contained in my CV is true and correct.



PD Birkholtz

5 January 2016

Date

Appendix C

DESKTOP-BASED PALAEOLOGICAL IMPACT ASSESSMENT

Appendix E.3

Palaeontological Desktop Study

PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED DEVELOPMENT OF OPEN PIT MINING AT PIT 36W (New Pit) AND 62E (Dishaba) AMANDELBULT MINE COMPLEX, THABAZIMBI, LIMPOPO PROVINCE.

Prepared for:

PGS HERITAGE (PTY) LTD

DATE: 25 April 2017

By

BANZAI ENVIRONMENTAL (PTY) LTD

P.O. BOX 11023

UNIVERSITAS

BLOEMFONTEIN

9323

EXECUTIVE SUMMARY

Banzai Environmental Pty (Ltd) was appointed by PGS Heritage to undertake a Palaeontological desktop assessment assessing the potential palaeontological impact of the planned mining activities on the farm Haakdoordrift 374 KQ, portion 4 (Pit 62E and 60E, Dishaba) and Elandsfontein 386 KQ, portion 0 (Pit 36W, New Pit), Thabazimbi, Limpopo Province. This report forms part of the Basic Environmental Impact Assessment and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. According to the latter Act, a palaeontological impact assessment is required to detect the presence of fossil material within the proposed development footprint and to assess the impact of the construction and operation of the project on the palaeontological resources.

The proposed Study Area is entirely underlain by sedimentary rocks of the **Bushveld Igneous Complex and Quaternary sediments overlying the igneous bedrock**. These intrusive igneous rocks of the Rustenburg Layered Suite are completely unfossiliferous. Igneous rocks thus have **no significance** in terms of local palaeontological heritage. The Quaternary superficial deposits have been relatively neglected in palaeontological terms but they may sometimes contain important fossil biotas. These fossil assemblages in the Quaternary are mostly sparse, low in diversity, and occur over a wide geographic area, and thus the **palaeontological sensitivity** of the Quaternary deposits within the study region is rated as **low**. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single fossil can have a huge scientific importance as many fossil taxa are known from a single fossil.

Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

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1 INTRODUCTION

Aurecon South Africa (Pty) Ltd has been appointed by Anglo American Platinum Amandelbult Mine to assist with a Basic Assessment process for two open cast pits namely Pit 62E and an EMP-amendment for Pit 36W, Thabazimbi, Limpopo Province, South Africa.

Banzai Environmental Pty Ltd has been appointed by PGS Heritage in assessing the palaeontological impact in the proposed mining activities on Haakdoorndrift 374 KQ, portion 4 (Pit 62E and 60E, Dishaba) and Elandsfontein 386 KQ, portion 0 (Pit 36W, New Pit) Thabazimbi, Limpopo Province (Fig.1-2).

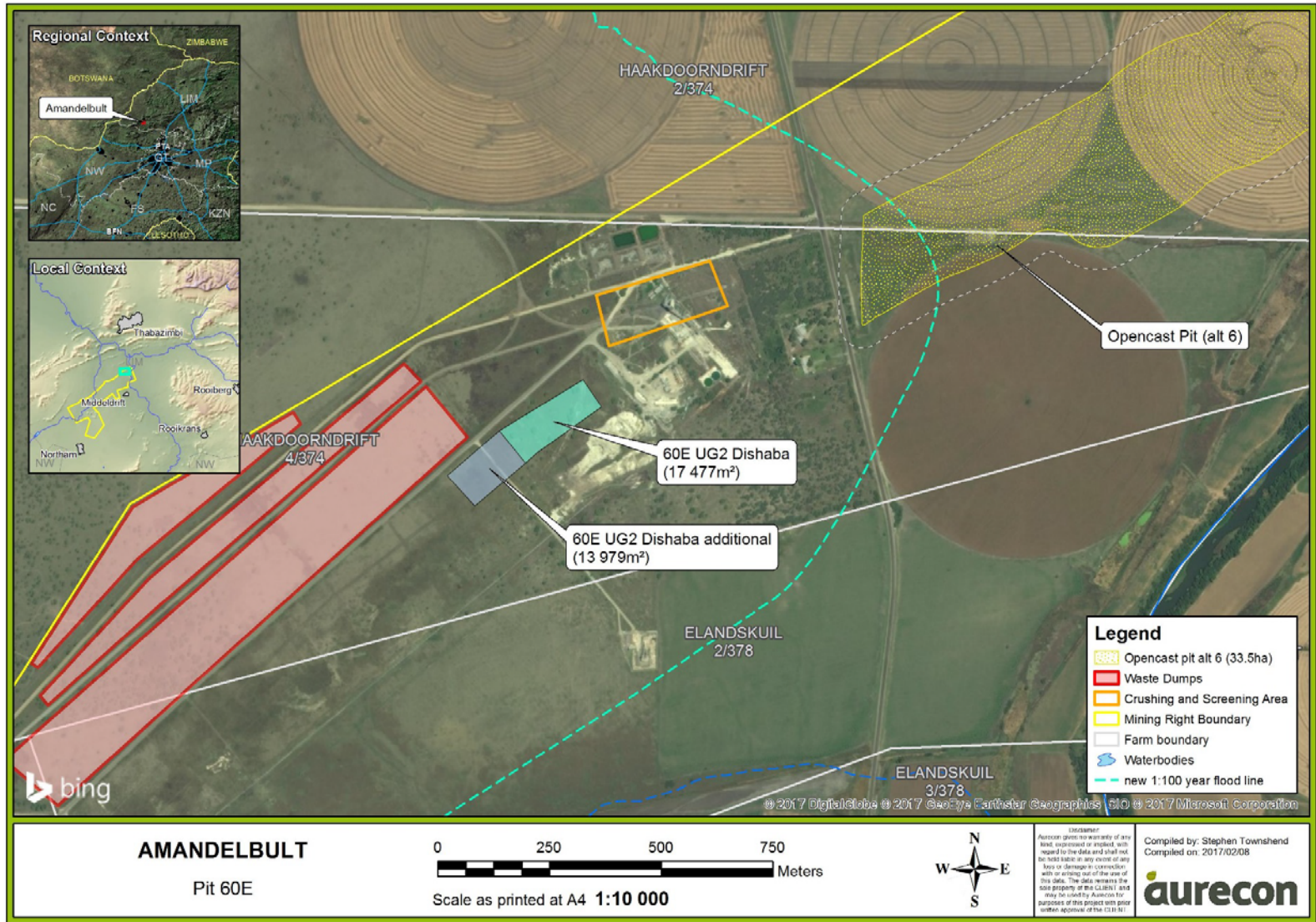


Figure 1 Locality map of Pit 62E, made up of the two 60E portions shown as blue and green polygons.

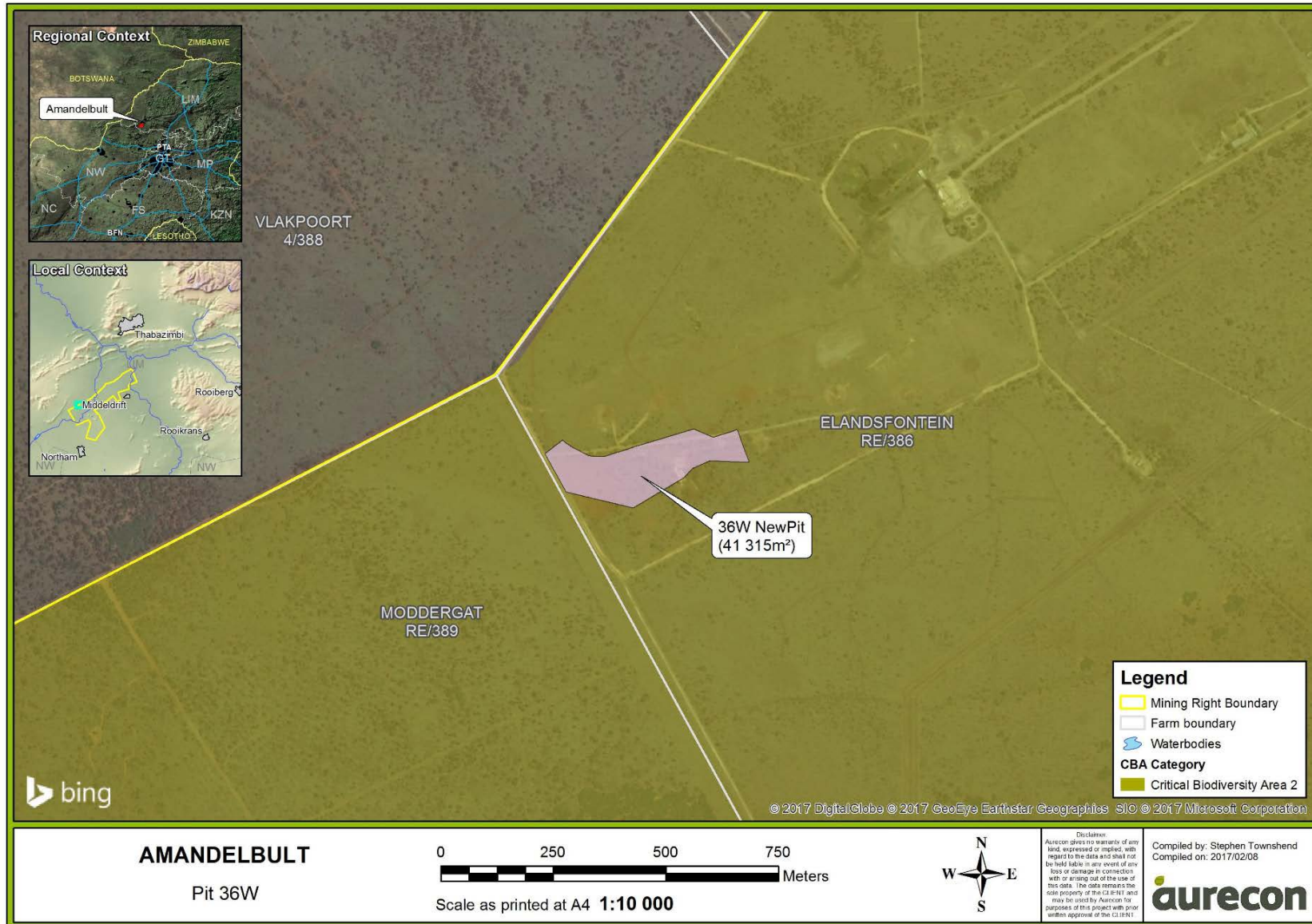


Figure 2. Locality map of Pit 36W, showing its location within a Critical Biodiversity Area as per the Limpopo Conservation Plan.

2 SCOPE

According to the South African Heritage Resources Agency (SAHRA) Archaeology, Palaeontology and Meteorites (APM) Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports, the aims of the palaeontological impact assessment are:

- To identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- To assess the level of palaeontological significance of these formations;
- To comment on the impact of the development on these exposed and/or potential fossil resources; and
- To make recommendations as to how the developer should conserve or mitigate damage to these resources.

The objective is therefore to conduct a Palaeontological Impact Assessment, which forms of part of the Heritage Impact Assessment (HIA) and the EIA Report, to determine the impact of the development on potential palaeontological material at the site.

When a palaeontological desktop/scoping study is conducted, the potentially fossiliferous rocks (i.e. groups, formations, members, etc.) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is collected from published scientific literature; fossil sensitivity maps; consultations with professional colleagues, previous palaeontological impact studies in the same region and the databases of various institutions may be consulted. This data is then used to assess the palaeontological sensitivity of each rock unit of the study area on a desktop level. The likely impact of the proposed development on local fossil heritage is subsequently established on the basis of the palaeontological sensitivity of the rocks and the nature and scale of the development itself (extent of new bedrock excavated).

If rocks of moderate to high palaeontological sensitivity are present within the study area, a Phase 1 field-based assessment by a professional palaeontologist is necessary. Generally, damaging impacts on palaeontological heritage occur during the construction phase. These excavations will modify the existing topography and may disturb, damage, destroy or permanently seal-in fossils at or below the ground surface that are then no longer available for scientific study.

When specialist palaeontological mitigation is suggested, it may take place prior to construction or, even more successfully, during the construction phase when new, potentially fossiliferous bedrock is

still exposed and available for study. Mitigation usually involves the careful sampling, collection and recording of fossils, as well as relevant data concerning the surrounding sedimentary matrix. Excavation of the fossil heritage will require a permit from SAHRA and the material must be housed in a permitted institution. With appropriate mitigation, many developments involving bedrock excavation will have a *positive* impact on our understanding of local palaeontological heritage.

2.1 ASSUMPTIONS AND LIMITATIONS

The accuracy and reliability of desktop Palaeontological Impact Assessments as components of heritage impact assessments are normally limited by the following restrictions:

- Old fossil databases that have not been kept up-to-date or are not computerised. These databases do not always include relevant locality or geological information. South Africa has a limited number of professional palaeontologists that carry out fieldwork and most development study areas have never been surveyed by a palaeontologist.
- The accuracy of geological maps where information may be based solely on aerial photographs and small areas of significant geology have been ignored. The sheet explanations for geological maps are inadequate and little to no attention is paid to palaeontological material.
- Impact studies and other reports (*e.g.* of commercial mining companies) - is not readily available for desktop studies.

Large areas of South Africa have not been studied palaeontologically. Fossil data collected from different areas but in similar Assemblage Zones might however provide insight on the possible occurrence of fossils in an unexplored area. Desktop studies therefore usually assume the presence of unexposed fossil heritage within study areas of similar geological formations. Where considerable exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a Palaeontological Impact Assessment may be significantly improved through field-survey by a professional palaeontologist.

2.2 LEGISLATION

Cultural Heritage in South Africa is governed by the National Heritage Resources Act (Act 25 of 1999). This Palaeontological Environmental Impact Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the above mentioned Act. In accordance with Section 38, an HIA is required to assess any potential impacts to palaeontological heritage within the site.

SECTION 35 OF THE NATIONAL HERITAGE RESOURCES ACT 25 OF 1999

In Section 3 of The National Heritage Resources Act, various categories of heritage resources are recognized as part of the National Estate. This include among others:

- geological sites of scientific or cultural importance
- palaeontological sites
- palaeontological objects and material, meteorites and rare geological specimens

- The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.
- All archaeological objects, palaeontological material and meteorites are the property of the State.
- Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
- No person may, without a permit issued by the responsible heritage resources authority—
 - Destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
 - Destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
 - Trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
 - Bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
- When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—
 - Serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order; and/or

- Carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary.

3 GEOGRAPHICAL LOCATION OF THE SITE

The proposed open cast pits of Pit 62E and 60E (Dishaba), and Pit 36W (New Pit) is located approximately 15km north of Northam and 20km south of Thabazimbi in the Limpopo Province, South Africa (Fig.1-2).

4 GEOLOGICAL AND PALAEOLOGICAL HISTORY

The proposed study site is completely underlain by the **Rustenburg Layered Suite of the Bushveld Igneous Complex** and **Quaternary sediments** overlying the igneous bedrock.

4.1 GEOLOGY

4.1.1 Bushveld Igneous Complex

The Rustenburg Layered Suite is Vaalian in age (2,100 – 1,920 Million years old) and consists of an igneous intrusion with anorthosite, hybrid gabbro, gabbro, diabase, epidiorite, pyroxenite, and norite rocks.

4.1.2 Quaternary sediments

Quaternary superficial deposits of Late Caenozoic (Miocene to Pliocene to Recent) age occur throughout the Karoo Basin (Partridge et al. 2006). They include pedocretes (for example calcretes), colluvial slope deposits, down wasted surface gravels, river alluvium, wind-blown sands and spring and pan sediments. Hill slopes are frequently mantled with a layer of colluvium or slope deposits (e.g. sandstone and dolerite scree).

4.2 PALAEOLOGICAL HERITAGE

4.2.1 Bushveld Igneous Complex

These intrusive igneous rocks of the Rustenburg Layered Suite are completely unfossiliferous. This layer in the proposed development site is thus of NO significance in terms of local palaeontological heritage.

4.2.2 Quaternary sediments

In palaeontological terms the Quaternary superficial deposits have been relatively neglected. They may sometimes contain important fossil biotas, e.g. bones, teeth and horn cores of mammals as well as remains of reptiles like tortoises. Non-marine molluscs (bivalves, gastropods), ostrich egg shells, trace fossils (*e.g.* calcretised termitaria, coprolites), and plant remains such as peats or palynomorphs (pollens, spores) in organic-rich alluvial horizons. Siliceous diatoms in pan sediments have also been found. These fossil assemblages are rare, low in diversity, and occur over a wide geographic area, and thus the palaeontological sensitivity of the Quaternary deposits in the study region is rated as low.

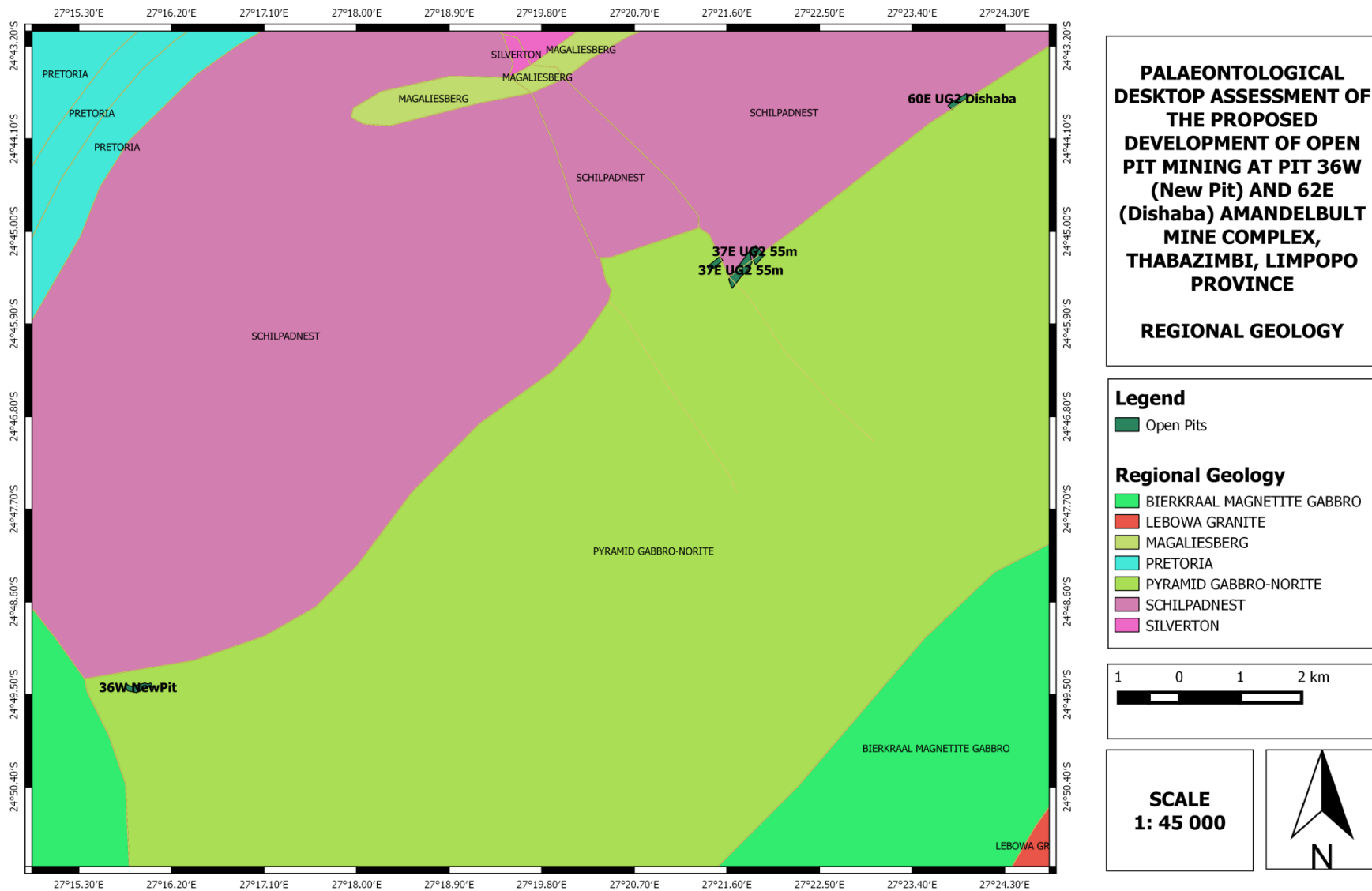


Figure 3: The surface geology of the proposed new mining operations (indicated in dark green) on the farm Haakdoorndrift 374 KQ, portion 4 (Pit 62E and 60E, Dishaba) and Elandsfontein 386 KQ, portion 0 (Pit 36W, New Pit), Thabazimbi, Limpopo Province. The open pit mining site is completely underlain by the Rustenburg Layered Suite of the Bushveld Igneous Complex and Quaternary sediments overlying the igneous bedrock.

5 IMPACT ASSESSMENT

These intrusive igneous rocks of the **Rustenburg Layered Suite** are completely **unfossiliferous**. **This layer** thus has NO significance in terms of local palaeontological heritage.

The **Quaternary superficial deposits** have been relatively neglected in palaeontological terms. They may sometimes contain important fossil biotas, e.g. bones, teeth and horn cores of mammals and reptile remains. Non-marine molluscs, ostrich egg shells, trace fossils and plant remains in organic-rich alluvial horizons are also preserved. Siliceous diatoms in pan sediments have been found. These fossil assemblages in the Quaternary are rare, low in diversity, and occur over a wide geographic area, and thus the **palaeontological sensitivity** of the Quaternary deposits within the study region is rated as **low**. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single fossil can have a huge scientific importance as many fossil taxa are known from a single fossil.

The Impact ratings relevant to the proposed open cast pits of Pit 62E and 60E (Dishaba), and Pit 36W (New Pit), Thabazimbi are indicated in yellow.

Table 1: Definition of Intensity ratings

Rating	Criteria	
	Negative impacts (-)	Positive impacts (+)
Very high (-/+ 4)	Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very	Great improvement to ecosystem or social processes and services or resources.
High (-/+ 3)	High degree damage to natural or social system components, species or	Intense positive benefits for natural or social systems or resources.
Moderate (-/+ 2)	Moderate damage to natural or social system components, species or	Average, on-going positive benefits for natural or social systems or resources.
Low (-/+ 1)	Minor damage to natural or social system components, species or resources. Likely to recover over time. Ecosystems and valuable social	Low positive impacts on natural or social systems or resources.
Negligible (0)	Negligible damage to individual components of natural or social systems or resources, such that it is	Limited low-level benefits to natural or social systems or resources.

Table 2: Definition of Duration ratings

Rating	Criteria
2	Long-term: The impact will continue for 6-15 years.
1	Medium-term: The impact will continue for 2-5 years.
0	Short-term: The impact will continue for between 1 month and 2 years.

Table 3: Definition of Extent ratings

Rating	Criteria
2	Regional: The impact will affect the entire region
1	Local: The impact will extend across the site and to nearby properties.
0	Site specific: The impact will be limited to the site or immediate area.

Table 4: Definition of Probability ratings

Rating	Criteria
4	Certain/ Definite: There are sound scientific reasons to expect that the impact will
3	Very likely: It is most likely that the impact will occur.
2	Fairly likely: This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably
1	Unlikely: This impact has not happened yet but could happen.
0	Very unlikely: The impact is expected never to happen or has a very low chance of

Table 5: Application of Consequence ratings

Rating	Consequence rating
-8	Extremely detrimental
-7 to -6	Highly detrimental
-5 to -4	Moderately detrimental
-3 to -2	Slightly detrimental
-1 to 1	Negligible
2 to 3	Slightly beneficial
4 to 5	Moderately beneficial
6 to 7	Highly beneficial
8	Extremely beneficial

Table 6: Application of significance ratings

Rating	Significance rating
-4	Very high - negative
-3	High - negative
-2	Moderate - negative
-1	Low - negative
0	Very low
1	Low - positive
2	Moderate - positive

3	High - positive
4	Very high - positive

Table 7: Definition of Confidence ratings

Rating	Criteria
Low	Judgement is based on intuition and there some major assumptions used in
Medium	Determination is based on common sense and general knowledge. The assumptions made, whilst having a degree of uncertainty, are fairly robust.
High	Substantive supportive data or evidence exists to verify the assessment.

Table Summary

- The Intensity of the development on the Palaeontological Heritage is Low negative.
- The Duration of the Impact will be long term (6-15 years).
- The duration of the extent will be site specific.
- The probability is unlikely that the impact will occur.
- The development will only be slightly detrimental to the environment.
- The significance of the impact is low negative and the latter can all be said with a medium confidence.

Mitigation Measures

It is therefore recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required for the commencement of this development, **pending** the discovery or exposure of any fossil remains during the construction phase.

Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

6 FINDINGS AND RECOMMENDATIONS

The proposed development site of the new open cast mining operations on planned mining activities on the farm Haakdoorndrift 374 KQ, portion 4 (Pit 62E and 60E, Dishaba) and Elandsfontein 386 KQ, portion 0 (Pit 36W, New Pit), Thabazimbi, Limpopo Province is completely underlain by the Rustenburg Layered Suite of the Bushveld Igneous Complex and Quaternary sediments overlying the igneous bedrock.

These intrusive igneous rocks of the **Rustenburg Layered Suite** are completely **unfossiliferous**. **This layer** thus has **NO significance** in terms of local palaeontological heritage.

The **Quaternary superficial deposits** have been relatively neglected in palaeontological terms. They may sometimes contain important fossil biotas, e.g. bones, teeth and horn cores of mammals and reptile remains. Non-marine molluscs, ostrich egg shells, trace fossils and plant remains in organic-rich alluvial horizons are also preserved. Siliceous diatoms in pan sediments have been found. These fossil assemblages **in the Quaternary** are rare, low in diversity, and occur over a wide geographic area, and thus the **palaeontological sensitivity** of the **Quaternary** deposits within the study region is rated as **low**. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single fossil can have a huge scientific importance as many fossil taxa are known from a single fossil.

Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

7 PROTOCOL FOR FINDS

Determine the geology of the development area

- The Environment Control Officer (ECO) (Environmental Manager) in collaboration with the project geologist must determine the geological background of areas where development will expose bedrock.
- The SAHRIS Fossil Heritage Layer (available from the SAHRA web page) needs to be consulted to determine whether the geology is considered sensitive. If the geology is found to be insignificant development may proceed without hindrance. When the SAHRIS Fossil Heritage indicates a low significance or higher a palaeontologist with the necessary expertise must be identified.

Palaeontological field assessment

- The ECO must obtain the services of a qualified palaeontologist.
- The palaeontologist will conduct a field assessment to identify and assess any possible fossils that may occur in the rocks. Generally, damaging impacts on palaeontological heritage occur during the construction phase. These excavations will modify the existing topography and may disturb, damage, destroy or permanently seal-in fossils at or below the ground surface that are then no longer available for scientific study.
- If fossils are found on the development site the palaeontologist involved would require a collection permit from SAHRA.
- Mitigation may take place prior to construction or, even more successfully, during the construction phase when new, potentially fossiliferous bedrock is still exposed and available for study. Mitigation entails careful sampling, collection and recording of fossils, as well as relevant data concerning the surrounding sedimentary matrix.
- Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

Ongoing fossil collection in the Mining Industry

- The ECO must confirm that the mine geologist regularly inspect the potential fossil bearing rock before being discarded.
- The ECO must collect any identified fossiliferous material.
- The relevant qualified palaeontologist must carry out inspections of the discard dumps on a regular basis (timeframe agreed with Mine).

- The palaeontologist will remove fossils from the mine that is considered to be of good quality or scientific value and catalogue them for curation.

Chance find Procedure

- If a chance find is made the person responsible for the find must immediately stop all work near the find.
- The site must be secured to protect it from any further damage
- The person who made the find must immediately report the find to his/her direct supervisor, according to reporting protocols instituted by the Mine. The supervisor must report the find to his/her manager and the ECO. The ECO must report the find to the relevant Authorities and a relevant palaeontologist.
- The ECO must make sure that a relevant palaeontologist is engaged to investigate the chance find and site and assess its context, age and possibility of the find representing a more extensive site.
- Both ECO and palaeontological specialist must ensure that accurate records and documentation are kept. (Documentation must start with the initial find report, and include records of all actions taken, persons involved and contacted, comments received and findings).
- Documentation and records will be essential to request authorizations and permits from the relevant Authorities to continue work on site
- The palaeontologist will submit a report, which will include all records kept by the ECO to SAHRA.
- The report will include recommendations for additional specialist work that may be necessary, or request approval to continue with the development.
- Once the necessary approvals have been issued, the Mine may carry on with the development.
- The ECO will be in charge to close off the chance find procedure and could require implementing or integrating any requirements issued by any Authority into operational management plans

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9 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty three years. She has been conducting Palaeontological Impact Assessments since 2014.

10 DECLARATION OF INDEPENDENCE

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;

- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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