Appendix D

COPIES OF LETTERS OF INVITATION, BID AND I&AP REGISTRATION FORM

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ENVIRONMENTAL IMPACT ASSESSMENT DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT	
BACKGROUND INFORMATION DOCUMENT DISTRIBUTED TO REGISTERED I&Aps	
NAME	**COMPANY / ORGANISATION**
Mr MH Allen	
Mr Frank Claesere	
Mr NB De Wet	
Mr Desmond	
Mr A. Henning	
Mev Anel Schultze	
Mr J. Visser	
Mr Jaco Kleynhans	Africa EPA
Mr Eugene Pienaar	Alzu Ondernemings
Mnr Leon du Toit	ALZU Voere
Mr Sydney Sesenyamotse	AMD - Supplier
Mr TA Ramuya	Anglo Coal: Goedehoop
Ms Daphney Tshehla	Anglo Coal: Goedehoop
Anvin Beleggings	Anvin Beleggings
Mr C. Haupt	Arnot Power Station
Ms Tessa Cousins	Association for Water & Rural Development (AWARD)
Mnr Pieter Grobler	Aurecon
Mr Nelson Campbell	Bank Collieries
Ms Sharon Clark	BHP Billiton
Ms Jacky Broadhurst	BHP Billiton Energy Coal SA
Mrs Wendy Mey	BHP Billiton Energy Coal SA
Mr P. Msiza	BHP Billiton Energy Coal SA
Mr Dan Ferreira	Blackwattle
Mr AC Streicher	Boschmanspoort
Mr Benjamin Walton	Cape Nature
Mr C. Schoeman	Christo Schoeman Boerdery
Mr Reuben Brussow	Columbus Stainless
Mr Dawie Schalk Wessels	Columbus Stainless
Mr Venty Mahlangu	Dept of Agric Conservation & Environment- Region
Ms S. Sybil	Dept of Provincial Local Govt. & Housing
Madala Masuku	Dept of Public Works, Roads, & Transport
Mr Themba Nicodimus	Dept of Public Works, Roads, & Transport
Mr Solomon Baloyi	Dept of Agriculture
D. Kleyn	Dept of Agriculture
Mr TL Shilubane	Dept of Agriculture and Land Administration
Mr Jan Venter	Dept of Agriculture and Land Administration
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Mr Phillemon Mathebula	Dept of Agriculture, Conservation, Environment and Land Administration
Mr Dinah Pule	Dept of Agriculture, Conservation, Environment and Land Administration
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Mr Roy Mandlazi	Dept of Economic Development, Environment and Tourism
Mr Bheki Mhlanga	Dept of Economic Development, Environment and Tourism
Mr Peter Lukey	Dept of Environmental Affairs
Mr Coenrad Agenbach	Dept of Environmental Affairs and Tourism
Mr William Lubisi	Dept of Health
Mr A. Venter	Dept of Health
Dr ETC Moloko	Dept of Health and Social Services
Mr Nkosinathu Mabutyana	Dept of Labour
Mr Thabo Magemba	Dept of Labour
Mr Peter Molapo	Dept of Labour
Mr Lucas Potgieter	Dept of Labour
Ms Portia Leshilo	Dept of Land Affairs
Mr FS Mahlangu	Dept of Land Affairs
Siphiwe Mahlangu	Dept of Land Affairs
Ms Charity Mthimunye	Dept of Land Affairs
Mr N. Nqana	Dept of Land Affairs
Ms Tumi Seboka	Dept of Land Affairs
Mr Mike Combrink	Dept of Land-Use
Ms Candith Mashego-Dlamini	Dept of Local Government and Housing
Mr Louis Bezuidenhout	Dept of Mineral Resources
Ms Thandiwe Biyela	Dept of Mineral Resources
Ms Sonia Chipu	Dept of Mineral Resources
Mr Andre Cronje	Dept of Mineral Resources
Mr Gugulethu Cutshwa	Dept of Mineral Resources
Mr Lebeau Labuschagne	Dept of Mineral Resources
Muhadi Mafagane	Dept of Mineral Resources
Ms Suzan Malebe	Dept of Mineral Resources
Mr David Msiza	Dept of Mineral Resources
Nhlanhla Phakathi	Dept of Mineral Resources
Mr Jimmy Sekgale	Dept of Mineral Resources
Mr MJ Senyane	Dept of Mineral Resources
Ms Elize Swart	Dept of Mineral Resources
Ms Priscilla Nkwinika	Dept of Public Works
Mr David Mabuza	Dept of Roads and Transport
Ms M. Mhlabane	Dept of Transport
Mrs Lerato Bapela	Dept of Water Affairs
Ms Goodness Bopape	Dept of Water Affairs
Nokuthula Cebekulu	Dept of Water Affairs
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Mr Donald Mabada	Dept of Water Affairs
Mr Nasreen Mansoor	Dept of Water Affairs
Thapelo Mashaba	Dept of Water Affairs
Ms Thembani Mashamba	Dept of Water Affairs
Mr Mogale Matseba	Dept of Water Affairs
Ms Kama Meso	Dept of Water Affairs
Mr Benjamin Mokino	Dept of Water Affairs
Mr Dumisani Mthembu	Dept of Water Affairs
Miss Felicia Nemathaga	Dept of Water Affairs
Mr George Oosthuizen	Dept of Water Affairs
Mr Marcus Selepe	Dept of Water Affairs
Mr Tefo Tshabidi	Dept of Water Affairs
Mr Johan van Aswegen	Dept of Water Affairs
Mr Niel Van Wyk	Dept of Water Affairs
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Mnr Johann Schoonbee	Eskom
Ms Daphne Mabogoane	Eskom Generation
Ms Tovhowani Tshikomba	Eskom Generation
Mr Heine Hoffman	Eskom Holdings
Mr Jan Mitchell	Eskom Transmission
Ms Anneline Pretorius	Eskom Transmission
Mr Piet Swanepoel	Eskom: Arnot Krag Stasie
Mr Joppie Faureman	Farm: Surprise Klipbank
Mr J. Sauerman	Farm: Surprise Klipbank
Mnr Gawie Roux	GD Roux Boerdey
Mnr Willem Roux	GD Roux Boerdey
Mr Philip Owen	Geasphere
Mr G. Gerrits	Gerrie Gerrits Boerdery
Mr Rodney Meyer	Highveld Steel and Vanadium Corporation
Mr SPD Skosana	Highveld Water and Sanitation Association
Mr Abram Zwane	Highveld Water and Sanitation Association
Mr Terry Baker	Iliso Consulting
Mr T. Visagie	Jeffares&Green
Mr Ian Mey	Jonati Environmental Services
Ms Jacqui Hex	Jones & Wagener
Mnr Nicholas van Eeden	Josephine Landbou cc
Mr JH Steenkamp	JPS Farming
Mr Lood Büchner	Kanhym
Mr G. Strydom	Kanhym Estates
Dr T. Prinsloo	Kanhym Landgoed
Mr Jonathan Julyan	Key Plan

NAME	COMPANY / ORGANISATION
Mr Pieter du Toit	Kumba Resources
Mr Cyril Dlamini	Local Government and Housing
Dr Garth Batchelor	MDEDET
Dr Garth Brachelor	MDEDET
Mr Selby Hlatshwayo	MDEDET
Mr Fikile Theledi	MDEDET
Mr Dineo Tswai	MDEDET
Mrs Anna Marth Ott	Middelburg Chamber of Commerce
Mr Coen Bester	MiddelBurg Chamberof Commerce
Mr Piet Voges	Middelburg Co-op
Mr Steven Bloy	Middelburg Colliery
Mr Petros Mnisi	Middelburg Employment People's Structures
Mr Brian Gibson	Middelburg Ferrochrome
Mr Jannie Cronje	Middelburg Mine Services
Mr Tobie van den Berg	Middelburg Observer/ Daller
Mrs Shirley Xulu	Middelburg Public Library
Miss T. Mlabatheki	Mine Workers Union
Miss linah Moswathupa	Mine Workers Union
Mr Andre Hofmann	Mpumalanga Parks Board
Mr Anton Lindstrom	Mpumalanga Parks Board
Mr Roelf Smit	Mpumalanga Parks Board
Mr Lebona Mosia	Mpumalanga Provincial Government
Mr Dinah Pule	Mpumalanga Provincial Government
Mr Mokope Taiwe	Mpumalanga Provincial Government
Mr Martin Joubert	Muhanga Mine
Mr Mpho Nku	National Energy Regulator of SA
Mr T. Pather	National Nuclear Regulater
Mr SJ Mosenyane	National Nuclear Regulator
Mr Paris Mashego	National Union of Mine Workers
Mr Themba Mavuso	National Union of Mine Workers
Mr Stephen Nhlapo	National Union of Mine Workers
Ms Thabisile Dlamini	Nkangala District Municipality
Mr Vusi Mahlangu	Nkangala District Municipality
Mr T C Makola	Nkangala District Municipality
Mr Temba Phintshane	Nkangala District Municipality
Mr Nlteke Risimate	Nkangala District Municipality
Cllr SPD Skhosana	Nkangala District Municipality
Mr Peter Gunther	Oanglo Coal
Mr De La Hunt	Ogies Local Town Council
Mr Vik Cogho	Olifants River Forum
Ms Marianna Nieuwoudt	Olifants River Forum
Mr BF Viviers	Olifants River Lodge

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Mr Chris Botha	Optimum Colliery
Ms Ilse Bruwer	Optimum Colliery
Ms Mbali Mbhele	Optimum Colliery
Mr K. Dippenaar	Polmaise Colliery
Mr JC Aucamp	Polyce
Mr Benjamin Moduka	Provincial Heritage Resources Authority
Mr Kleinbooi Mabaso	Provincial Roads Administration
Mr Ben Viljoen	Provincial Roads Administration
Mr Matthews Hlabane	SA Green Revolutionary Council
Ms Jennifer Kitto	SAHRA: Gauteng
Mrs Portia Ramalamola	SAHRA: Gauteng
Mrs Vhonani Ramalamula	SAHRA: Gauteng
Mrs Nonofho Ndobochani	SAHRA: Head Office
Mr Francois Erasmus	SAHRA: Mpumalanga
Mr Neo January	SAHRA: Mpumalanga
Mrs Nkosazana Machete	SAHRA: Mpumalanga
Mr Godfrey Tshivhalavhala	SAHRA: Mpumalanga
Mr Aubrey Nhlabathi	Samancor Chrome
Mrs Heather Booysen	Samancor Middelburg Ferrochrome
Mr I. Essa	SANRAL
Mr Daniel Venter	SANRAL
Mr Mike Yorke-Hart	SANRAL
Mr HA Geldenhys	Schoonoord
Mr JJ Geldenhys	Schoonoord
Mr Moses Sibiya	Shanduka Coal
Ms GG W. Langa	South African Local Government Association
Mr C Badenhorst	Steve Tshwete Local Municipality
Mr Rudolph Bouwer	Steve Tshwete Local Municipality
Mr W D Fouche	Steve Tshwete Local Municipality
Mr Willie Fouche	Steve Tshwete Local Municipality
Mr Andrew Kgomo	Steve Tshwete Local Municipality
Ms T R Mabanola	Steve Tshwete Local Municipality
Mr Aubrey Madamalala	Steve Tshwete Local Municipality
Mr Delight Mahlangu	Steve Tshwete Local Municipality
Cllr I M Mahlangu	Steve Tshwete Local Municipality
Ms Ida Mahlangu	Steve Tshwete Local Municipality
Ms. L Mahlangu	Steve Tshwete Local Municipality
Ms Martha Mahlangu	Steve Tshwete Local Municipality
Ms Mmanthakeng Mahlangu	Steve Tshwete Local Municipality
Mr Thabo Mahlangu	Steve Tshwete Local Municipality
Cllr Johnson Marotobolo	Steve Tshwete Local Municipality
Mr Elias Masango	Steve Tshwete Local Municipality

Mr Mashiane	Steve Tshwete Local Municipality
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Mr Andrei Mashiloane	Steve Tshwete Local Municipality
Mr AT Mashiloane	Steve Tshwete Local Municipality
Mr Elphus Mathebula	Steve Tshwete Local Municipality
Ms Pamela S Mile	Steve Tshwete Local Municipality
Mrs Muka Mnguni	Steve Tshwete Local Municipality
Mr S. Mthethwa	Steve Tshwete Local Municipality
Mr Thulani Nkosi	Steve Tshwete Local Municipality
Ms R. Pilodia	Steve Tshwete Local Municipality
Ms G G Radise	Steve Tshwete Local Municipality
Mr Erick Ratshibvumo	Steve Tshwete Local Municipality
Mr S. Shaik	Steve Tshwete Local Municipality
KM Skosana	Steve Tshwete Local Municipality
Mr Gert Stoltz	Steve Tshwete Local Municipality
Mr Gert Stoltz	Steve Tshwete Local Municipality
Mr K. Swart	Steve Tshwete Local Municipality
Mr Kobus Swart	Steve Tshwete Local Municipality
Mr Jan Stander	Telkom SA
Dr Anthony Turton	Water Institute of South Africa (WISA)
Ms Thapelo Machaba	Water Quality Management
Mr Garth Barnes	WESSA: Northern Region
Mr E. Kleynhans	Woestalleen Colliery
Mev Christa Cass	Womens Agricultural Union
Mr Elmien Webb	Xstrata Coal
Mr V Shaw	Xstrata Coal South Africa
Mr Nico Dooge	Xstrata Coal South Africa
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SiVEST
Established in 1952

Your reference: 9529 MWRP
Our reference: B479 MWRP EIA
Date: 4 February 2011

Dear Interested and/or Affected Party

INVITATION TO PARTICIPATE: ENVIRONMENTAL IMPACT ASSESSMENT FOR THE DOUGLAS TAVISTOCK JOINT VENTURE'S (DTJV) PROPOSED MIDDELBURG WATER RECLAMATION PROJECT (MDEDET Ref No: 17/2/3/N28 and DEA Ref No.: 12/9/11/L492/)

Jones & Wagener Consulting Civil Engineers (J&W) has been appointed by the Douglas Tavistock Joint Venture (DTJV), a joint venture between of BHP Billiton Energy Coal South Africa (BECSA) (Pty) Limited and Tavistock Collieries (Pty) Limited to conduct an Environmental Impact Assessment (EIA) in terms of Government Notices GNR 543, 544 and 545 of the National Environmental Management Act, Act No. 107 of 1998, (NEMA) and GN 718 of 3 July 2009 of the National Environmental Management: Waste Act, Act 59 of 2008 (NEM:WA). The proposed Middelburg Water Reclamation Project (MWRP) is registered with the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) under reference number MDEDET 17/2/3/N28 and the National Department of Environment (DEA) under reference number DEA 12/9/11/L492/6.

The DTJV is conducting a feasibility study for constructing and operating the MWRP to be located on Middelburg Mines North Section (now known as Middelburg Colliery) near Middelburg in the Mpumalanga Province. Part of the study entails obtaining all the required authorisations and licences. The proposed MWRP will include infrastructure, such as mine water pump facilities and pipelines, mine water balancing dam, water treatment plant, gypsum waste disposal facility and supporting infrastructure. The appended Background Information Document (BID) contains more information on the proposed MWRP – see attached.

The DTJV must obtain an environmental authorisation and required licences before commencing with the proposed project as required in terms of the provisions of the NEMA, NEM:WA and other legislation, such as the National Water Act. In order to obtain the authorisation and licences an Environmental Impact Assessment (EIA) needs to be undertaken. The EIA will include a scoping process, expected completion by the first quarter 2011, followed by the Impact Assessment, expected completion by the third quarter 2011. The public participation process will be conducted by SiVEST Environmental.

SiVEST Environmental would like to invite you, as an interested and/or affected party (I&AP), to become part of the EIA and public participation (PP) processes for the proposed project. The aim of this process is to ensure that the environmental impacts associated with the project are taken into consideration and mitigated, to ensure public input in decision making and to provide decision-makers with sufficient information to make an informed decision on the proposed activities associated with the project.

YOUR COMMENT IS IMPORTANT

You are invited to formally register as an interested and/or affected party (I&AP) and to participate in the EIA process by completing the registration and comment form enclosed with the BID. You are welcome to comment on the BID in any of the following ways:

- Submitting your completed registration and comment form to us on or before **Friday 11 March 2011**
- Writing a letter to be received by us on or before **Friday 11 March 2011**, or
- By e-mail, fax or phoning the public participation office.

Please note that we propose holding a Public Meeting in March 2011. This meeting will be advertised in various local newspapers and a personal invitation will be send to all registered I&APs on the project's PP database.

You are requested to use the registration and comment form to indicate your preferred method of notification and any direct business or other interest you may have in the environmental authorisation process. Several opportunities will be provided to your disposal to make contributions during the EIA process within set timeframes, and you will receive advance notification of these once you have registered.

We would like to thank you, in advance, for becoming part of the EIA and public participation processes and are looking forward to receiving your comments relating to the proposed project.

Yours sincerely

NICOLENE VENTER
Snr Public Participation Practitioner

Documents included: Background Information Document (BID)
Registration and Comment Form

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SiVEST
Gestig in 1952

U verwysing:

Ons verwysing: 9529 MWRP

Datum: 11 Februarie 2011

Geagte Belangstellende en/of Geaffekteerde Party

UITNODIGING OM DEELNAME: OMGEWINGSIMPAKSTUDIE VIR DIE DOUGLAS TAVISTOCK GESAMENTLIKE ONDERNEMING (DTJV) SE VOORGESTELDE MIDDELBURG WATERHERWINNINGSPROJEK (MDEDET Verwysingsnommer 17/2/3/N28 en DEA Verwysingsnommer 12/9/11/L492/6)

Jones & Wagener Raadgewende Siviele Ingenieurs (J&W) is deur die Douglas Tavistock Gesamentlike Onderneming (DTJV), 'n gesamentlike onderneming tussen BHP Billiton Energy Coal South Africa (BECSA) (Edms.) Bpk. en Tavistock Collieries (Edms.) Bpk. aangestel om 'n Omgewingsimpakstudie (EIA) te onderneem ingevolge Staatskennisgewing R543, R544 en R545 van die Nasionale Wet op Omgewingsbestuur, Wet 107 van 1998 (NEMA) en Staatskennisgewing 718 van 3 Julie 2009 van die Nasionale Wet op Omgewingsbestuur: Afval, Wet 59 van 2008 (NEM:WA). Die voorgestelde Middelburg Waterherwinnigsprojek (MWRP) is by die Mpumalanga Departement Ekonomiese Ontwikkeling, Omgewing en Toerisme (MDEDET) geregistreer onder verwysingsnommer MDEDET 17/2/3/N28 en die Nasionale Departement van Omgewingsake (DEA) onder verwysingsnommer DEA 12/9/11/L492/6.

Die DTJV onderneem tans 'n definisiefase studie vir die oprigting en bedryf van die MWRP wat op Middelburg Myn Noord-seksie (nou bekend as Middelburg Steenkoolmyn) naby Middelburg in die Mpumalagaprovinsie geleë sal wees. Deel van die studie behels die verkryging van al die nodige magtigings en lisensies. Die voorgestelde MWRP sluit infrastruktuur soos 'n mynwaterpompe en -pyplyne, 'n mynwaterbalanseerdam, waterbehandelingsaanleg, afvalwegdoeningfasiliteit en ondersteunende infrastruktuur in. Die aangehegte Agtergrondinligtingsdokument (BID) bevat meer inligting oor die voorgestelde MWRP – sien aangeheg.

Die DTJV moet 'n omgewingsmagtiging en die nodige lisensies bekom alvorens die voorgestelde projek 'n aanvang kan neem, soos verlang ingevolge die bepalings van die NEMA, NEM:WA en ander wetgewing, soos die Nasionale Waterwet. Ten einde die magtiging en lisensies te bekom moet 'n EIA onderneem word. Die EIA sal 'n bestekopnameproses insluit, wat na verwagting teen die eerste kwartaal van 2011 voltooi sal wees, gevolg deur die Impakevaluering, wat na verwagting teen die derde kwartaal van 2011 voltooi sal wees. SiVEST Environmental sal die openbare deelnameproses (PP) onderneem.

SiVEST Environmental wil u, as 'n belangstellende en/of geaffekteerde party (I&AP), nooi om deel te word van die EIA en openbare deelnameproses vir die voorgestelde projek. Die oogmerk van hierdie proses is om toe te sien dat die omgewingsimpakte wat met die projek gepaardgaan in ag geneem en versag word, om openbare insette in die besluitnemingsproses te verseker en om aan besluitnemers genoegsame inligting te verskaf om 'n ingeligte besluit te neem oor die voorgestelde aktiwiteite wat met die projek gepaardgaan.

U KOMMENTAAR IS BELANGRIK

U word uitgenooi om formeel as 'n I&AP te registreer en om aan die EIA-proses deel te neem deur die registrasie- en kommentaarvorm wat by die BID ingesluit is, in te vul. U is welkom om kommentaar op die BID te lewer deur:

- u voltooide registrasie- en kommentaarvorm voor of op **Vrydag, 11 Maart 2011** by ons in te dien;
- 'n brief te skryf wat ons voor of op **Vrydag, 11 Maart 2011** moet bereik; of
- per e-pos, faks of telefonies met die openbare deelnamekantoor in verbinding te tree.

Let asseblief daarop dat ons van voorneme is om in Maart 2011 'n Openbare Vergadering te hou. Hierdie vergadering sal in verskeie plaaslike koerante geadverteer word en 'n persoonlike uitnodiging sal aan alle geregistreerde I&APs op die projek se PP-databasis gestuur word.

U word versoek om van die registrasie- en kommentaarvorm gebruik te maak om die kennisgewingsmetode wat u verkies aan te dui, asook enige regstreekse sake- of ander belang wat u in die omgewingsmagtigingsproses mag hê. Tydens die EIA-proses sal u verskeie geleenthede hê om binne vasgestelde tydsraamwerke bydraes te lewer, en u sal vooraf hiervan in kennis gestel word wanneer u geregistreer het.

Ons wil u graag by voorbaat bedank vir u deelname aan die EIA- en openbare deelnameproses en ons sien uit daarna om u kommentaar betreffende die voorgestelde projek te ontvang.

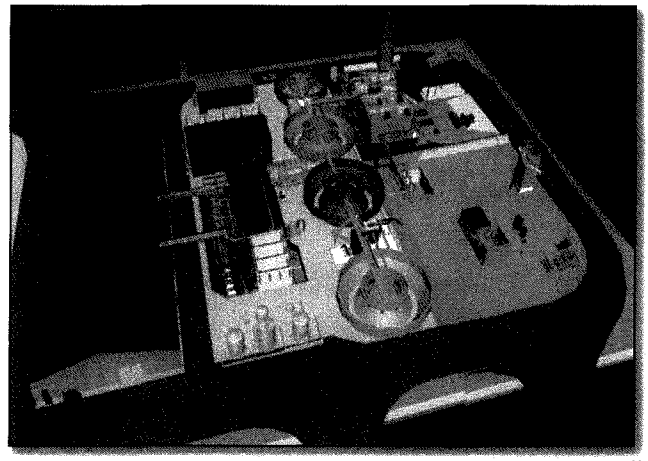
Die uwe

NICOLENE VENTER
Senior Openbare Deelnamepraktisyn

Ingeslote dokumentasie: Agtergrondinligtingsdokument (BID)
Registrasie- en Kommentaarvorm

Die geaffekteerde mynwater sal in die bestaande geimpakteerde water bestuursinfrastruktuur opgevang word en deur 'n netwerk van pompe, pyplyne, sinkputte en kanale na die waterbehandelingsaanleg herlei word. Die water versamelings- en vervoerstelsels sal op myneiendom opgerig word en sal, sover prakties moontlik, bestaande dienslewerings deurgange soos vervoerbande, karweipaaie en serwitute volg.

Die voorgestelde waterbehandelingsproses is gegrond op die HiPRO® ontwerp wat deur Keyplan, 'n afdeling van die Aveng Group ontwikkel is. Die HiPRO® proses maak van membrane gebruik om soute uit die reedsbehandelde toevoerwater te verwyder, wat deur herhaalde presipitering- en waterherwinning-stappe opgevolg word. Gegewe die chemiese samestelling van die MWRP toevoerwater, word twee behandelde waterprodukstrome deur die proses geproduseer; een wat aan die vereistes vir die opvangsgebied voldoen en die tweede wat aan die gehalte voldoen vir proseswater vir hergebruik in die myn se steenkoolverwerkingsaanlegte.



Figuur 2: Driedimensionele aansig van 'n tipiese HiPRO® waterbehandelingsaanleg

Figuur 2 is 'n driedimensionele illustrasie van 'n tipiese HiPRO® waterbehandelingsaanleg.

Die MWRP behandelingsproses produseer twee afvalstrome, naamlik 'n metaalryke gipsafval en 'n ±95% suiwer gipskoek. Albei gips afvalprodukte het potensiële kommersiële waarde en die DTJV poog om geleenthede te ondersoek rondom die toekomstige verskaffing hiervan aan die gipsmark.

Tot tyd en wyl 'n mark vir die hergebruik gevind word sal daar met die metaalryke gipsafval en die 95% gipskoek weggedoen word in aparte spesifiek ontwerpte en gelisensieerde afvalfasiliteite wat naasliggend aan die MWRP geleë sal wees.

Die behandelde water wat aan die gehaltedoelwitte van die korttermyn opvangsgebied-waterhulpbron standaarde sal voldoen, sal in die Spookspruit, 'n sytak van die Olifantsrivier in die Bo-Olifantsrivieropvangsgebied gestort word. Die Bo-Olifantsrivier voed die Loskopdam. Voor storting sal die water natuurlik belug word en 'n water vloeispoed-verminderingstruktuur sal opgerig word om erosie van die rivierwalle en -bodem te voorkom. Die tweede water produkstroom van proseswatergehalte, sal na die steenkoolverwerkingsaanleg versprei word vir hergebruik.

Ander infrastruktuur wat vir die projek verlang sal word sluit kantore, ablusiegeboue, laboratorium, rioolwerke en ander dienste, soos berging- en werkswinkelfasiliteite, sekuriteit en toegangsbeheer, heinings en beligting, tuine, paaie en parkering, stormwaterbestuurstelsel, kommunikasie en inligtingstegnologiesteun, asook die instrumentasie en beheer van die waterherwinningskema in.

Die aanleg sal in twee fases ontwikkel word. Die eerste fase sal 15 ML/dag (15 000 kubieke meter per dag) mynwater behandel. Sodra die tweede fase bykom, sal die kapasiteit verdubbel tot 30 ML/dag. Die elektrisiteitsvoorsiening aan die MWRP sal uit Middelburg Myn se huidige netwerk verkry word. Die MWRP se geïnstalleerde krag sal ongeveer 3.5 megawatt wees.

Ligging van die Voorgestelde Projek

Twee opsies vir die ligging van die aanleg word as deel van die ondersoekproses oorweeg, naamlik:

- **Opsie 1:** Op die plaas Hartebeesfontein 315 IS, wat langs die R575 geleë is; en
- **Opsie 2:** Op die plaas Goedehoop 315 IS wat oor die Goedehoopdam uitkyk.

Figuur 3 dui ook die voorgestelde pyplynroetes aan, wat op Middelburg Myn eiendom is.

Daar word in die vooruitsig gestel dat die voorgestelde MWRP 'n aanvanklike area van ongeveer vyftig (50) hektaar in beslag sal neem, wat met die Fase 2 uitbreidings tot ongeveer 'n honderd (100) hektaar sal vergroot.

Motivering vir die Voorgestelde Projek

Die hoofdoel van die MWRP is om oortollige besoedelde mynwater, wat tans nie geskik is om in die omgewing te stort nie, te behandel tot 'n standaard wat geskik is vir storting. Die MWRP sal hierdie water namens Middelburg Myn se Noord- en Klipfontein Gedeeltes behandel (sien Figuur 3). Die MWRP sal 'n aparte entiteit wees wat deur die DTJV besit word.

Sekondêr tot die hoofdoel, sal die projek ook vanuit 'n ekonomiese, maatskaplike en institusionele en omgewingsperspektief volhoubaar wees soos volg:

- Die herwinning van mynwater tot aanvaarbare opvanggebied standaarde verbeter die gehalte en hoeveelheid van die water vir verskeie gebruike in die Bo-Olifantsrivieropvangsgebied wat tans onder 'n waterskaarste gebuk gaan;
- Die storting van die behandelde water in die opvangsgebied sal die plaaslike akwatiese-ekostelsel steun en 'n minimum basisvloei van goeie gehalte water in plaaslike strome in stand hou; en
- Dit kan tydelike werksgeleenthede skep tydens konstruksie.

Doel van Dokument

Die doel van hierdie Agtergrondinligtingsdokument (BID) is om Belangstellende en/of Geaffekteerde partye (I&APs) van inligting te voorsien oor die voorgestelde Middelburg Waterherwinningsprojek (MWRP). Die MWRP is 'n gesamentlike onderneming tussen BHP Billiton Energy Coal South Africa (Edms) Bpk. (BECSA) en Tavistock Collieries (Edms) Bpk., wat as die Douglas Tavistock Gesamentlike Onderneming (DTJV) bekend staan.

'n Gedeelte van die projek behels om vas te stel wat die omgewingsimpakte is wat met die MWRP gepaardgaan ten einde maatreëls te ontwikkel om die potensiële negatiewe impakte te minimaliseer en om die positiewe impakte te versterk. Dit sal behels om 'n gedetailleerde Omgewingsimpakstudie (EIA) uit te voer en 'n projekspesifieke Omgewingsbestuursprogram (EMPr) vir die projek te ontwikkel. Daarbenewens word 'n Geïntegreerde Watergebruiklisensie (IWUL) vir die projek verlang, wat deur 'n Geïntegreerde Water- en Afvalbestuursplan (IWWMP) gesteun moet word. Voorts, soos vervat in die Minerale en Petroleum Hulpbron Ontwikkelingsweg (MPRDA) is dit 'n vereiste dat die Omgewingsbestuursprogram Verslag (EMPR) gewysig moet word.

Die doel van die omgewingstudies is om spesifieke fundamentele doelwitte te vervul, wat belanghebbende en openbare menings insluit wat by wyse van 'n Openbare Deelnameproses ingewin sal word. Die doelwitte van die Openbare Deelnameproses is om:

- inligting tussen die proponent (DTJV) en I&APs uit te ruil sodat die proponent tersaaklike aspekte kan ondersoek en ingeligte besluite hieroor kan neem;
- kwessies en knelpunte saam te vat om besluitneming deur die tersaaklike owerhede moontlik te maak; en
- I&APs 'n geleentheid te bied om kommentaar te lewer oor die bevindinge van die spesialis-omgewingstudies.

Die DTJV het Jones & Wagener Raadgewende Siviele Ingenieurs aangestel om die EIA uit te voer en al die nodige magtigings en lisensies vir die MWRP te bekom. Spesialiste sal aangestel word om, waar dit vereis word, die spesialis ondersoeke uit te voer, ten einde die EIA en ander magtigingsprosesse toe te lig.

Ten einde aan die openbare deelnameproses deel te neem, word van u verlang om as 'n I&AP te registreer deur die Registrasievorm wat by hierdie dokument aangeheg is in te vul.

I&Aps word uitgenooi om hierdie dokument te bestudeer en enige kommentaar, vraagstukke, knelpunte en/of voorstelle vir verbeterde besluitneming aan die Openbare Deelnamekantoor (kontakbesonderhede op die laaste bladsy) te stuur.
Alle kommentaar sal in die omgewingstudies vervat en aangeteken word as deel van 'n Vraag- en Antwoordverslag wat deel van die EIA-dokumentasie sal vorm.

Agtergrond tot die Voorgestelde Middelburg Waterherwinningsprojek

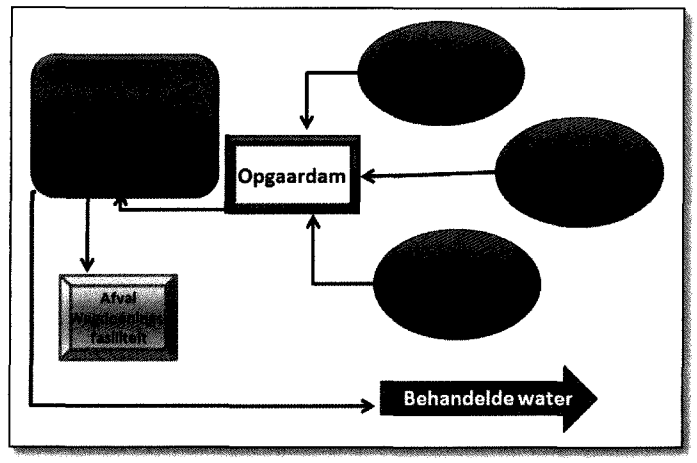
Middelburg Myn (nou bekend as Middelburg Steenkoolmyn), wat uit die Noord- en Klipfonteinseksies bestaan, is geleë binne die munisipale gebied van die Steve Tshwete Plaaslike Munisipaliteit naby Middelburg in die Mpumalanga Provinsie. Middelburg val binne die Nkangala Distriksmunisipaliteit. Die gebied vorm ook deel van die Bo-Olifantsrivier Waterbestuursgebied (WMA), wat op sy beurt deel vorm van die veel groter Olifantsrivier-opvangsgebied; een van Suid-Afrika en Mosambiek se groot watervoorsieningstelsels.

Middelburg Myn genereer 'n oormaat geimpakteerde mynwater en die oogmerk van die Middelburg Waterherwinningsprojek (MWRP) is om die oortollige besoedelde mynwater van die Hartebeesfontein, Goedehoop en Klipfontein-seksies te behandel tot 'n geskikte standaard om in die Spookspruit, 'n sytak van die Bo-Olifantsrivieropvanggebied, te laat invloei. Die projek is 'n gesamentlike onderneming tussen BHP Billiton Energy Coal South Africa (Edms) Bpk en Tavistock Collieries (Edms.) Bpk, en staan as die Douglas Tavistock Gesamentlike Onderneming (DTJV) bekend.

Die DTJV het 'n voorlopige uitvoerbaarheidstudie onderneem om die lewensvatbaarheid vir die konstruksie en bedryf van 'n waterbehandelingsaanleg te Middelburg Myn se Noordelike gedeelte vas te stel. Die projek is tans in 'n definisiefase om die uiteindelike uitvoerbaarheid daarvan te bepaal. Die definisiefase sluit die omgewingsmagtigingsprosesse, soos die vereiste EIA, in.

Die omvang van hierdie voorgestelde projek is om 'n mynwaterherwinningskema op te rig en te bedryf (sien Figuur 1). Die voorgestelde aanleg sal bestaan uit:

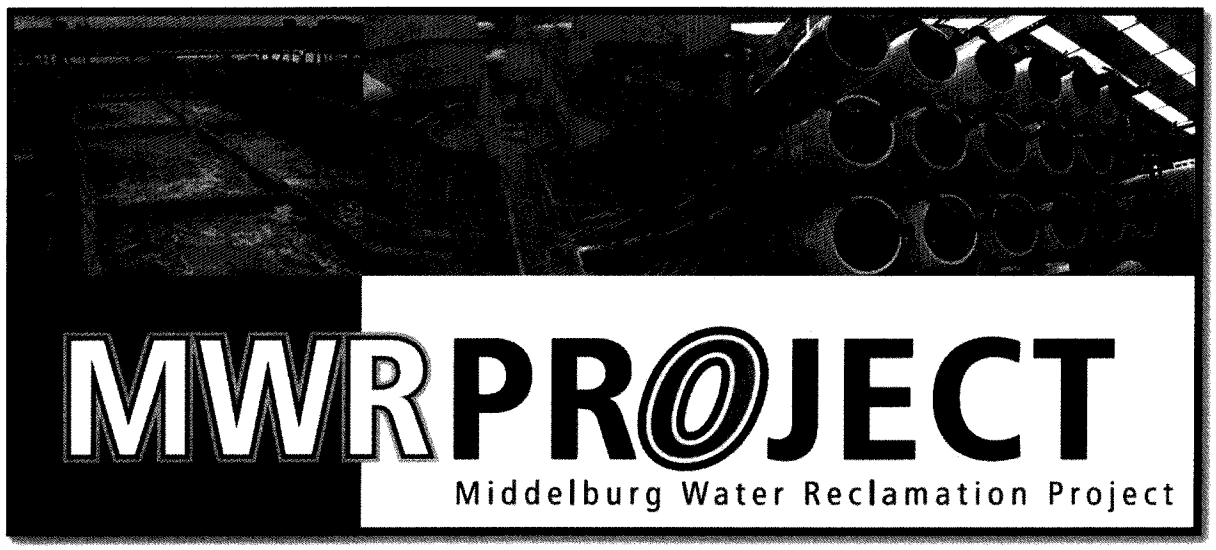
- infrastruktuur om die geimpakteerde mynwater van verskeie bronne na die waterbehandelingsaanleg se toevoer-waterdamme te pomp;
- 'n mynwaterbehandelingsaanleg wat op die Hoë Herwinning Presipiterende Omgekeerde-osmose (HiPRO©) proses gebaseer is;
- afvalwegdoenings fasiliteite om die gipsafval-produkte wat uit die behandelingsproses voortspruit te akkomodeer; en
- infrastruktuur om die behandelde water te versprei met pyplyne vir vrylating in die opvangsgebied en/of hergebruik elders by die myn.



Figuur 1: Kompotente van die mynwater-herwinningskema

BACKGROUND INFORMATION DOCUMENT

Environmental Impact Assessment for the Douglas Tavistock Joint Venture's Proposed Middelburg Water Reclamation Project
(MDEDET Ref No 17/2/3/N28 & DEA Ref No 12/9/11/L492/6)
February 2011



Public Participation Office

Nicolene Venter or Andrea Gibb
SiVEST Environmental
PO Box 2921, Rivonia, 2128
Tel: (011) 798 0600; Fax: (011) 803 772
E-mail: andreag@sivest.co.za
Website: www.sivest.co.za

SiVEST
Established in 1952

Technical Enquiries about the EIA

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Sien keersy vir Afrikaans.

Abbreviations

BECSA	BHP Billiton Energy Coal South Africa
BID	Background Information Document
DEA	Department of Environmental Affairs
DTJV	Douglas Tavistock Joint Venture
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme (NEMA)
EMPR	Environmental Management Programme Report (MPRDA)
HiPRO®	High Recovery Precipitating Reverse Osmosis
I&AP	Interested and Affected Party
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
MDEDET	Mpumalanga Department of Economic Development, Environment and Tourism
MPRDA	Minerals and Petroleum Resource Development Act
MWRP	Middelburg Water Reclamation Plant
NEMA	National Environmental Management Act
NWA	National Water Act
PPP	Public Participation Process
WMA	Water Management Area

Purpose of Document

The purpose of this Background Information Document (BID) is to provide interested and/or affected parties (IAPs) with information about the proposed Middelburg Water Reclamation Project (MWRP), a joint venture between BHP Billiton Energy Coal South Africa (BECSA) (Pty) Limited and Tavistock Collieries (Pty) Limited, called the Douglas Tavistock Joint Venture (DTJV).

Part of the project entails determining the potential environmental impacts associated with the MWRP in order to develop measures to minimise the potential negative impacts and enhance the positive ones. This will entail doing a detailed Environmental Impact Assessment (EIA) and developing a project specific Environmental Management Programme (EMPr) for the project. In addition an Integrated Water Use License (IWUL) is required for the project, which is to be supported by an Integrated Water and Waste Management Plan (IWWMP). Furthermore as per the Minerals and Petroleum Resources Development Act (MPRDA) an Environmental Management Programme Report (EMPR) amendment is required.

The environmental studies intend to fulfil specific fundamental objectives that include stakeholders' and public opinion, which is obtained through a Public Participation Process. The objectives of the Public Participation Process are to:

- exchange information between the proponent (DTJV) and Interested and Affected Parties (IAPs) in order for the proponent to investigate relevant aspects and make informed decisions regarding these;
- collate I&APs' issues and concerns to enable and enrich decision making by the relevant authorities;
- provide I&APs with an opportunity to comment on the findings of the specialist environmental studies.

The Douglas Tavistock Joint Venture (DTJV) appointed Jones & Wagener Consulting Civil Engineers to conduct the EIA and obtain all the required authorisations and licences for the MWRP. Specialists will be appointed to conduct the specialist studies, where required, in order to inform the EIA and other authorisation processes.

In order to participate in the public participation process, you are required to register as an I&AP. Refer to Registration Form attached to this document.

I&APs are invited to study this document and to provide the Public Participation Office (contact details on the last page) with any comments, issues, concerns and/or suggestions for enhanced benefits. All comments will be integrated into the environmental studies and recorded as part of an Issues and Response Report that will form part of the EIA documentation.

Background to the Proposed Middelburg Water Reclamation Project

Middelburg Mines (now known as Middelburg Colliery), comprising of the North and Klipfontein Sections, is located within the municipal area of Steve Tshwete Local Municipality, near the Town of Middelburg in the Mpumalanga Province. Middelburg falls within the Nkangala District Municipality. The area also forms part of the Upper Olifants River Water Management Area (WMA), which again forms part of the much larger Olifants River catchment, one of the major water supply systems of South Africa and Mozambique.

Middelburg Mines generates excess impacted mine water and the objective of the Middelburg Water Reclamation Project (MWRP) is to treat excess impacted mine water from the Hartebeesfontein, Goedehoop and Klipfontein sections to a suitable standard for release into the Spookspruit, a tributary of the Upper Olifants River catchment. The project is a joint venture between BHP Billiton Energy Coal South Africa (BECSA) (Pty) Limited and Tavistock Collieries (Pty) Limited, called the Douglas Tavistock Joint Venture (DTJV).

The DTJV has conducted a pre-feasibility study to determine the viability of constructing and operating a water treatment plant located on Middelburg Mines' North Section. The project is now at a definition phase study to determine its ultimate feasibility. The definition phase study includes the environmental authorisation processes, such as the required Environmental Impact Assessment.

The scope of this proposed project is to construct and operate a mine water reclamation scheme (see Figure 1). The proposed facility will comprise of:

- Mine water collection infrastructure to convey the mine affected water from various sources to the water treatment plant feed water dam;
- A mine water treatment plant based on the High Recovery Precipitating Reverse Osmosis (HiPRO®) process;
- Waste disposal facilities to manage the gypsum wastes produced by the treatment process; and
- Distribution infrastructure to convey the treated water fit for release into the catchment and/or re-use elsewhere at the mine.

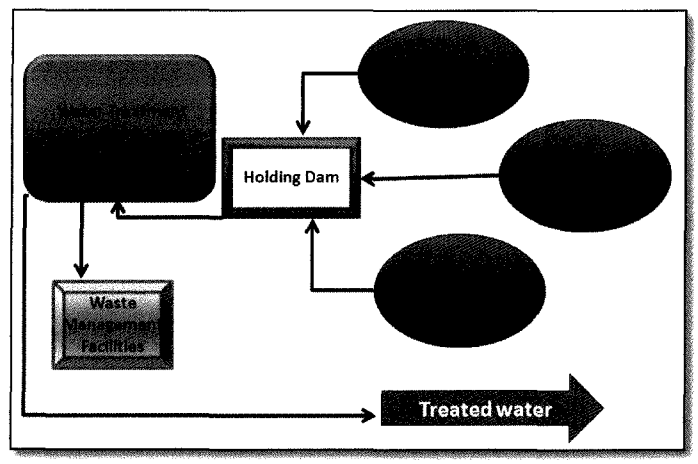

Figure 1: Components of a Mine Water Reclamation Scheme

The mine affected water will be collected from the existing impacted mine water management infrastructure and transferred via a network of pumps, pipelines, sumps and canals to the water treatment plant. The collection infrastructure will be constructed on mine property and will follow, as far as practically possible, existing service corridors such as conveyors, haul roads and servitudes.

The proposed water treatment process is based on the HiPRO® design developed by Keyplan, a division of the Aveng Group. The HiPRO® process uses membranes to remove salts from the pre-treated feed water followed by repeated precipitation and water extraction steps. Given the chemistry of the MWRP feed water, the process produces two treated water product streams, one meeting the catchment discharge requirements and the second meeting the quality for process water for re-use in coal processing facilities.

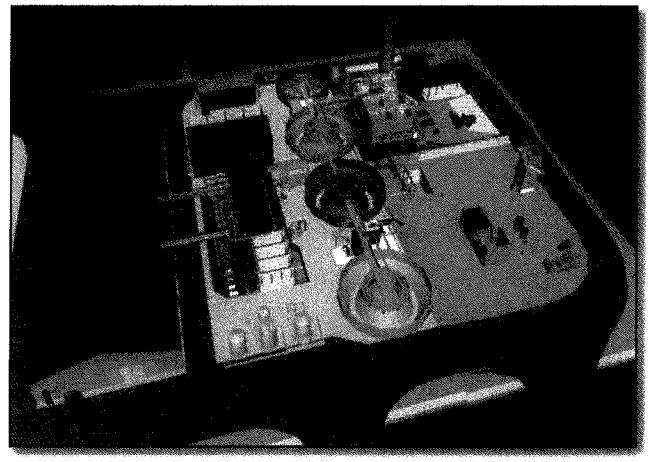

Figure 2: Three dimensional view of typical HiPRO® water treatment plant

Figure 2 provides a three dimension illustration of a typical HiPRO® water treatment plant.

The MWRP treatment process produces two waste streams, namely a metal-rich gypsum waste and a ±95% pure gypsum cake. Both gypsum streams potentially have commercial value and the DTJV aims to explore opportunities around the supply of these to the gypsum market in future.

In the interim, the metal-rich gypsum waste and the 95% gypsum cake will be disposed of in separate dedicated, specially engineered and licensed waste management facilities adjacent to the water treatment plant.

The treated water, meeting the interim catchment water resource quality objectives, will be discharged into the Spookspruit, a tributary of the Olifants River in the Upper Olifants River catchment, which feeds into the Loskop Dam. Prior to discharge, the water will be naturally aerated and a dissipation structure will be constructed to prevent significant erosion of the river bed. The second product water stream, of process water quality, will be transferred to the coal processing plant for re-use.

Other infrastructure that will be required for the project includes site offices, change houses, laboratory, sewerage works and other services, such as store and workshop facilities, security and access control, fencing and lighting, landscaping, roads and parking, storm water management, communications and information technology support, and the instrumentation and control of the mine water reclamation scheme.

The facility will be developed in two phases. The first phase will treat 15 ML/day (15 000 cubic metres per day) of mine water. Once the second phase is added, the capacity will be doubled to 30 ML/day. The electricity supply to the MWRP will be fed from Middelburg Mines' current network. The MWRP's installed power will be approximately 3.5 MW.

Location of the Proposed Project

Two options for the location of the plant are being considered as part of the investigatory process, namely:

- **Option 1:** On the farm Hartebeesfontein 315 IS, which is adjacent to the R575, and
- **Option 2:** On the farm Goedehoop 315 IS overlooking the Goedehoop Dam.

Figure 3 also indicates the proposed pipeline routes, which will be located on land belonging to Middelburg Mines.

It is envisaged that the proposed MWRP will have an initial footprint of approximately fifty (50) hectares and will expand, with the phase 2 additions, to approximately hundred (100) hectares.

Motivation for the Proposed Project

The main objective of the MWRP is to treat excess impacted mine water, currently not suitable for discharge to the environment, to a standard that is suitable for discharge. The MWRP will treat this water on behalf of the Middelburg Mines North and Klipfontein Sections (see Figure 3). The MWRP will be a separate entity owned by the Douglas Tavistock Joint Venture (DTJV).

Secondary to the main objective, the project will also be sustainable from an economic, social and institutional and environmental perspective, as follows:

- Reclamation of mine water to acceptable catchment standards improves the quality and quantity of water in the currently water stressed, Upper Olifants River Catchment for various uses;
- The discharge of the treated water into the catchment will support the local aquatic ecosystem and maintain a minimum base flow of good quality water in local streams;
- It may create temporary job opportunities during construction.

Relevant Environmental Authorisations

The DTJV needs to obtain all the required environmental authorisations before the MWRP can be constructed and commence operation. These authorisations are required to ensure that the project will not cause any negative impacts on the environment and ensure that it is operated within the intended specifications. The following is required:

- An authorisation in terms of the National Environmental Management Act's new EIA regulations, as promulgated on 18 June 2010 and effective as from 2nd of August 2010;
- An integrated water use license (IWUL) as required in terms of the provisions of the National Water Act (Act 36 of 1998) (NWA) for the MWRP and amendments of existing NWA licenses for the mines involved;
- License for the treatment of water and disposal of waste in terms of the provisions of the National Environmental Management: Waste Act (Act 59 of 2008) (NEM:WA);
- Heritage Impact Assessment in terms of the provisions of the National Heritage Resources Act (Act 25 of 1999);
- An EMPR amendment in terms of the Minerals and Petroleum Resource Development Act (Act 49 of 2008) (MPRDA).

Environmental Impact Assessment & Public Participation Process

What is an Environmental Impact Assessment?

Environmental Impact Assessments (EIAs) are used by developers (e.g. mining companies) and authorities to obtain an objective view of the potential environmental and social impacts that could arise during the construction, operation and closure of a proposed development, such as the development and operation of the proposed MWRP. This information must provide a sound basis for decision-making by the decision-making authority.

The end product of an EIA is an *Environmental Impact Report (EIR)*, which must:

- identify the potential impacts of the proposed development;
- record the issues, comments and/or concerns and suggestions raised by I&APs; and
- outline the measures that must be taken to avoid or reduce any negative impacts, and enhance positive impacts. The concerns and issues raised by the I&APs must also be addressed.

The steps of a typical EIA are outlined in Figure 4 below.

The Environmental Management Programme (EMPr) sets out measures to manage impacts identified during the EIA process for the construction and operational phases of the project.

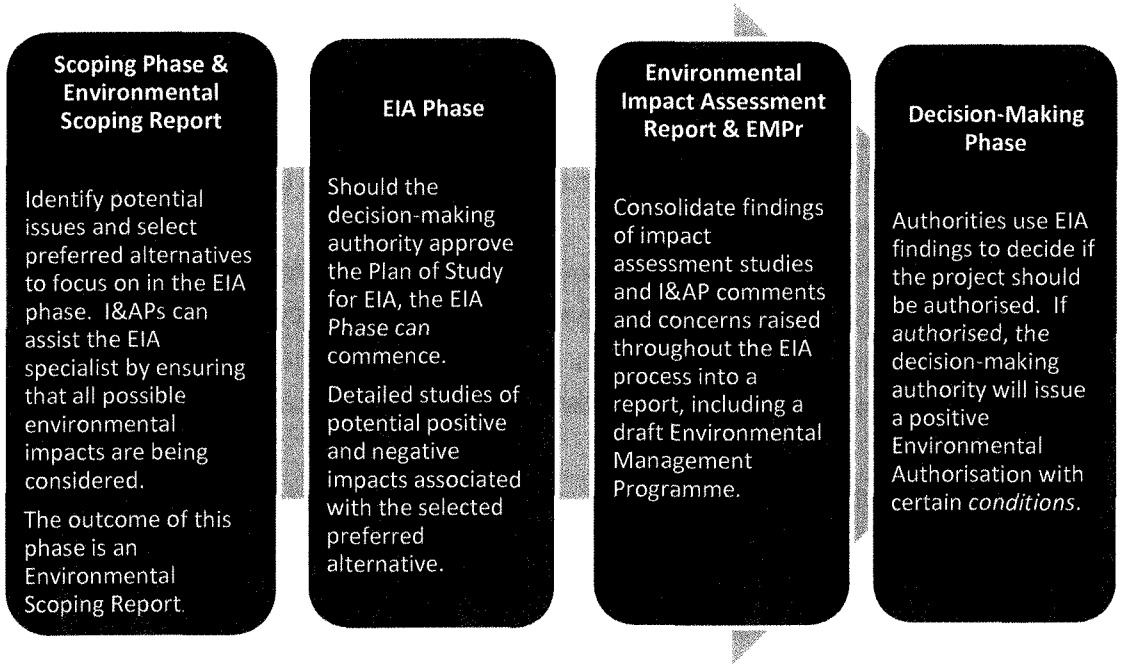

Figure 4: Environment Impact Assessment Process

Environmental Specialist Studies to be Undertaken

In order to identify how and where a project may impact on the environment, specialist studies are required to inform the EIA process, which includes the Public Participation Process. The following specialist studies have thus far been identified for the proposed MWRP:

- Heritage and cultural resources assessment;
- Biodiversity survey and assessment, including aquatics, wetlands, and fauna and flora;
- Ground water assessment (geohydrological assessment);
- Hydraulic impact assessment of the Spookspruit to the confluence with the Olifants River;
- Surface water quality impact assessment of the Spookspruit and the Loskop Dam;
- Reserve Determination
- Noise impact assessment;
- Air quality impact assessment;
- Geotechnical assessment;
- Socio-economic impact assessment;
- Traffic assessment.

The findings and recommendations made in the specialist studies will assist the technical team to propose measures to mitigate the negative impacts and enhance the positive ones. In addition, it will be used to develop the Environmental Management Programme (EMPr), which is required to ensure that all mitigatory and other environmental management measures are implemented and adhered to in order to protect the environment during the construction and operation of the MWRP.

Public Participation Process (PPP)

As part of the engagement process during the EIA, public meetings will be held. SiVEST has been appointed to manage the public participation process (PPP). Public participation is the cornerstone of any EIA, as it will be for this proposed project. The principles of NEMA govern many aspects of EIAs, including public participation.

The steps of a typical PPP is outlined in Figure 5 below

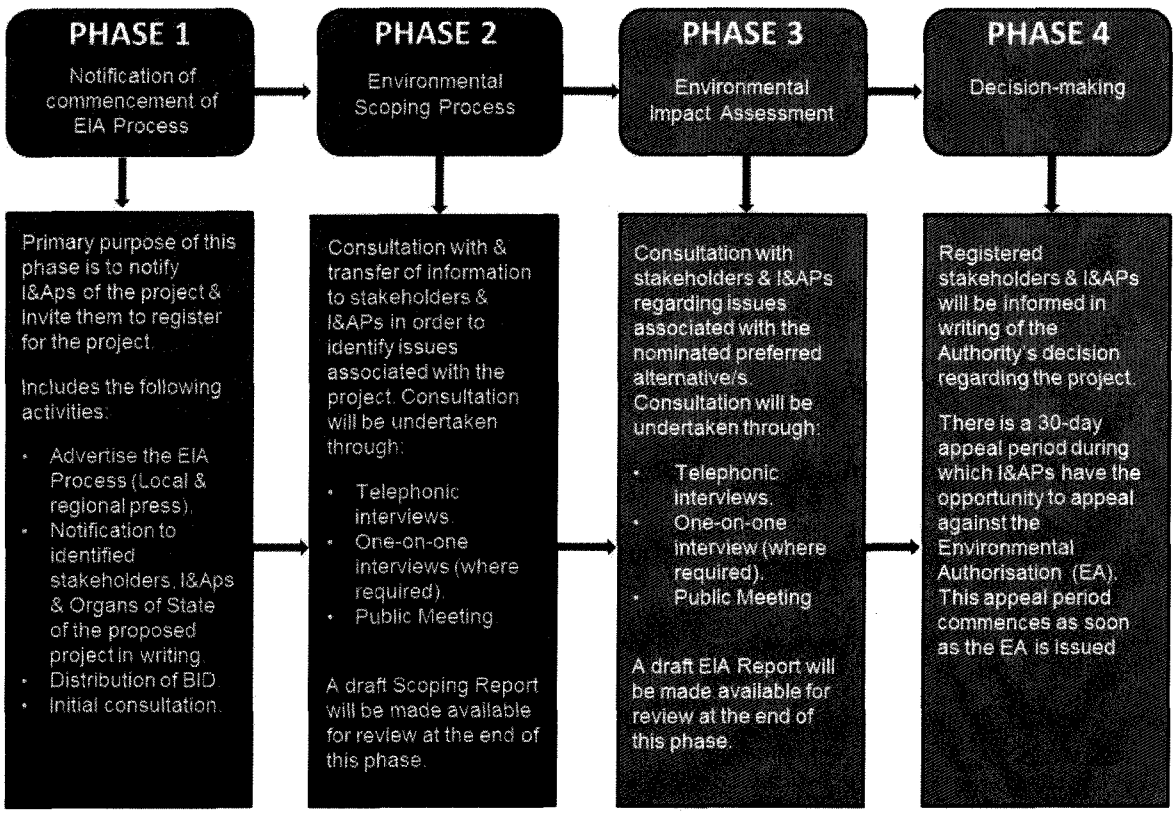

Figure 5: Steps that will be followed for the public participation process forming part of the EIA for the proposed MWRP

The key objective of public participation during this EIA will be to provide I&APs with sufficient and transparent information on an on-going basis to ensure effective participation throughout the process. As part of this public participation process I&APs will also be provided with the opportunity to comment on the findings of the Scoping and Impact Assessment Reports as well as the EMPr, which will be made available for public review during the process.

How to Participate in the PPP Process

Stakeholders are invited and urged to contact the EIA team about any concerns regarding the project by:

- Responding (by phone, fax or e-mail) to the invitation to participate in the PPP, as advertised in the printed media;
- Completing and forwarding (SA postal mail, fax or e-mail) the attached Registration and Comment Form to SiVEST;
- Attending the Public Meetings to be held during the course of the project;
- Contacting the PP Team telephonically regarding a query, comment or request for further project information;
- Reviewing the draft Reports within the 40-day review periods that will be stipulated in the advertisement as well as in personalised letters.

Your Responsibilities

You, as an I&AP, have a right to participate in this process by requesting further information or by informing the consultant of your concerns regarding the environment and the proposed Middelburg Water Reclamation Project. In terms of the EIA Regulations, your attention is drawn to your responsibilities as an I&AP:

- In order to participate in this EIA process, you **must** register yourself on the project database.
- Inform any other parties (neighbours, friends, colleagues, etc) who may be interested and/or affected by the proposed project about the EIA process and encourage them to become involved.
- Ensure that any comments regarding the proposed project are submitted within the timeframes that have been approved or set by the authorities, such as MDEDET, or within any extension of a timeframe agreed to by authjorities and the applicant (i.e. DTJV).
- Disclose any direct business, financial, personal or other interest which you may have in the approval or refusal of the application for the proposed Middelburg Water Reclamation Project.

Our responsibilities as independent consultants

In terms of the EIA Regulations, our responsibilities in the public consultation process include:

- We must ensure that sufficient information regarding this proposed project is made available to you, either through the BID or providing information as and when requested.
- We must ensure that you have an understanding of the proposed project to be able to comment informatively and to enable you to submit any concern in an informed manner.
- We must ensure that the following actions are taken upon receiving any comments/queries/issues:
- The contact details provided by you are entered into the project database and that you are sent all further information releases
- If you send us queries or comments, we respond in writing
- If you call us, your details and queries / comments are recorded. Should we not be able to answer your question immediately, your call will be returned as soon as possible with a response.

Who and How to Contact Us

SiVEST

Environmental Division
51 Wessels Road, Rivonia, 2128
P O Box 2921, Rivonia. 2128

Contact persons: Nicolene Venter or Andrea Gibb

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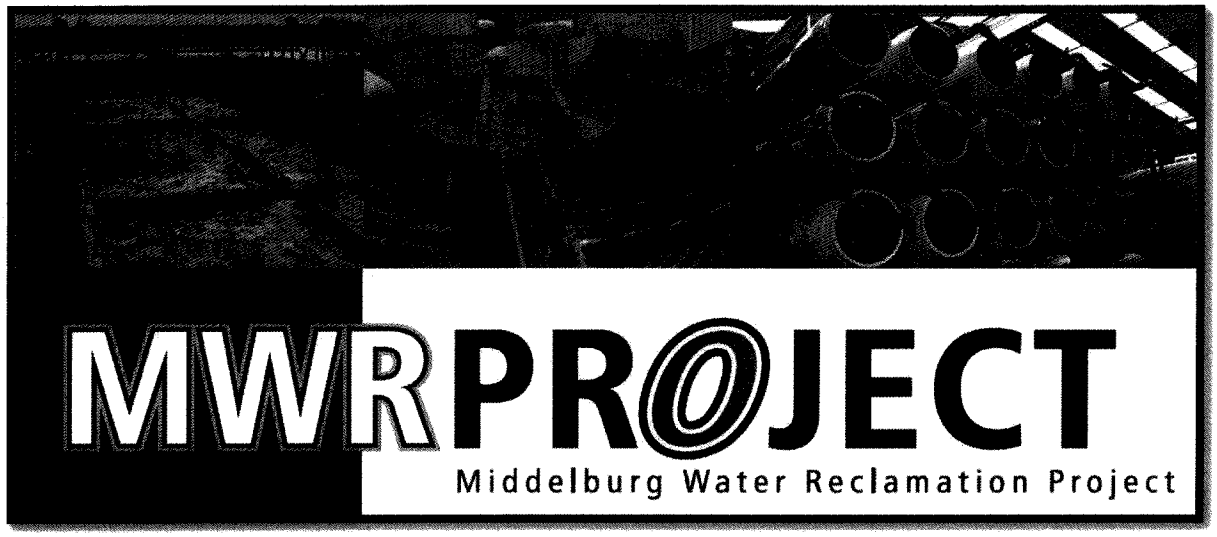
Fax: + 27 11 803 7272
E- mail: andreag@sivest.co.za
Website : www.sivest.co.za

AGTERGROND-INLIGTINGSDOKUMENT

Omgewingsimpakstudie vir die
Douglas Tavistock Gesamentlike Onderneming se
Voorgestelde Middelburg Waterherwinningsprojek
(MDEDET Verw no 17/2/3/N28 en DEA Verw no 12/9/11/L492/6)
Februarie 2011



Openbare Deelnamekantoor

Nicolene Venter of **Andrea Gibb**
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SiVEST
Established in 1952

Tegniese navrae oor die EIA

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Jones & Wagener Raadgewende Siviele Ingenieurs
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Tel: 011 519 0200; Faks: 011 519 0201
E-pos: vanzyl@jaws.co.za

See reverse side for English.

Afkortings

AID (BID)*	Agtergrondinligtingsdokument
B&GP (I&AP)*	Belangstellende en Geaffekteerde Party
BECSA	BHP Billiton Energy Coal South Africa (Edms) Bpk
DTJV	DouglasTavistock Gesamentlike Onderneming
DEA	Departement van Omgewingsake
NOBW (NEMA)*	Nasionale Omgewingsbestuurswet
GWGL (IWUL)*	Geïntegreerde Watergebruiklisensie
GWABP (IWWMP)*	Geïntegreerde Water- en Afvalbestuursplan
HiPRO®	Hoë Herwinning Presipiterende Omgekeerde-osmose (High Recovery Presipitating Reverse Osmosis)
MDEDET	Mpumalanga Departement Ekonomiese Ontwikkeling, Omgewing en Toerisme
MPHOW (MPRDA)*	Minerale en Petroleum Hulpbron Ontwikkelingswet
MWHP (MWRP)*	Middelburg Waterherwinningsprojek
NWW (NWA)*	Nasionale Waterwet
OBPr (EMPr)*	Omgewingsbestuurprogram
OBPV (EMPR)*	Omgewingsbestuurprogram Verslag (MPRDA)
ODP (PPP)*	Openbaredeelnameproses
OIS (EIA)*	Omgewinsimpakstudie
OM (EA)*	Omgewingsmagtiging
WBG (WMA)*	Water Bestuursgebied

* **Die akroniem in hakkies is die algemeen gebruikte term en het sy oorsprong vanuit Engels. Engelse akronieme word deurgans in die dokument gebruik**

Tersaaklike Omgewingsmagtigings

Die DTJV moet al die nodige omgewingsmagtigings verkry alvorens die MWRP opgerig en bedryf kan word. Hierdie magtigings word verlang om te verseker dat die projek nie enige negatiewe impakte op die omgewing sal veroorsaak nie en om te verseker dat dit binne die beoogde spesifikasies bedryf word. Die volgende magtigings word verlang:

- 'n Magtiging ingevolge die Nasionale Wet op Omgewingsbestuur (NEMA) se nuwe EIA-regulasies, soos afgekondig op 18 Junie 2010 met inwerkingtreding vanaf 2 Augustus 2010;
- 'n Geïntegreerde watergebruiklisensie soos verlang ingevolge die bepalings van die Nasionale Waterwet (Wet 36 van 1998) (NWA) vir die MWRP en wysigings van bestaande NWA-lisensies vir die betrokke myne;
- 'n Lisensie vir die behandeling van water en wegdoening van afval ingevolge die bepalings van die Nasionale Wet op Omgewingsbestuur: Afval (Wet 59 van 2008) (NEM:WA); en
- 'n Erfenisimpakstudie ingevolge die bepalings van die Nasionale Wet op Erfenishulpbronne (Wet 25 van 1999);
- 'n EMPR wysiging in terme van die Minerale en Petroleum Hulpbron Ontwikkelingswet (Wet 49 van 2008) (MPRDA).

Omgewingsimpakstudie & Openbare Deelnameproses

Wat is 'n Omgewingsimpakstudie?

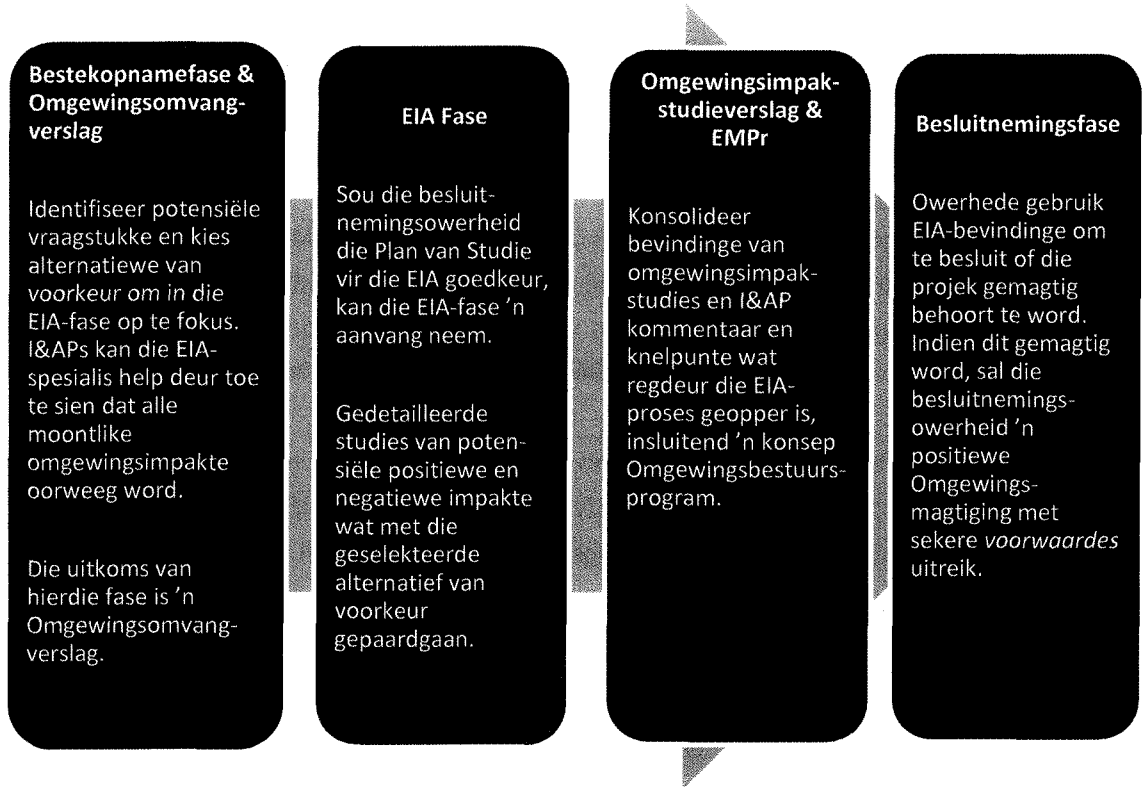
Omgewingsimpakstudies (EIA's) word deur ontwikkelaars (bv. mynmaatskappye) en owerhede gebruik om 'n objektiewe siening te verkry van die potensiële omgewings- en maatskaplike impakte wat kan voortspruit uit die oprigting, bedryf en sluiting van 'n voorgestelde ontwikkeling, soos die ontwikkeling en bedryf van die voorgestelde MWRP. Hierdie inligting moet 'n deeglike grondslag bied vir besluitneming deur die besluitnemingsowerheid.

Die eindproduk van 'n EIA is 'n *Omgewingsimpakverslag* wat die volgende moet doen:

- Die potensiële impakte van die voorgestelde ontwikkeling identifiseer;
- die vraagstukke, kommentaar en/of knelpunte en voorstelle wat deur I&Aps geopper word, aanteken; en
- die maatreëls beskryf wat geneem moet word om enige negatiewe impakte te vermy of te verminder en positiewe impakte te versterk. Die knelpunte en vraagstukke wat deur die I&APs geopper word, moet ook aangespreek word.

Die stappe van 'n tipiese EIA word in Figuur 4 hieronder beskryf.

Die Omgewingsbestuursprogram (EMPr) beskryf maatreëls om impakte wat tydens die EIA-proses vir die oprigting en bedryfsfases van die projek geïdentifiseer is, te bestuur.



Figuur 4: Omgewingsimpakstudieproses

Spesialis Omgewingstudies wat onderneem moet word

Ten einde te identifiseer hoe en waar 'n projek 'n impak op die omgewing kan hê, word spesialisstudies verlang om die EIA-proses, wat die Openbare Deelnameproses insluit, toe te lig. Die volgende spesialisstudies is tot dusver vir die voorgestelde MWRP geïdentifiseer:

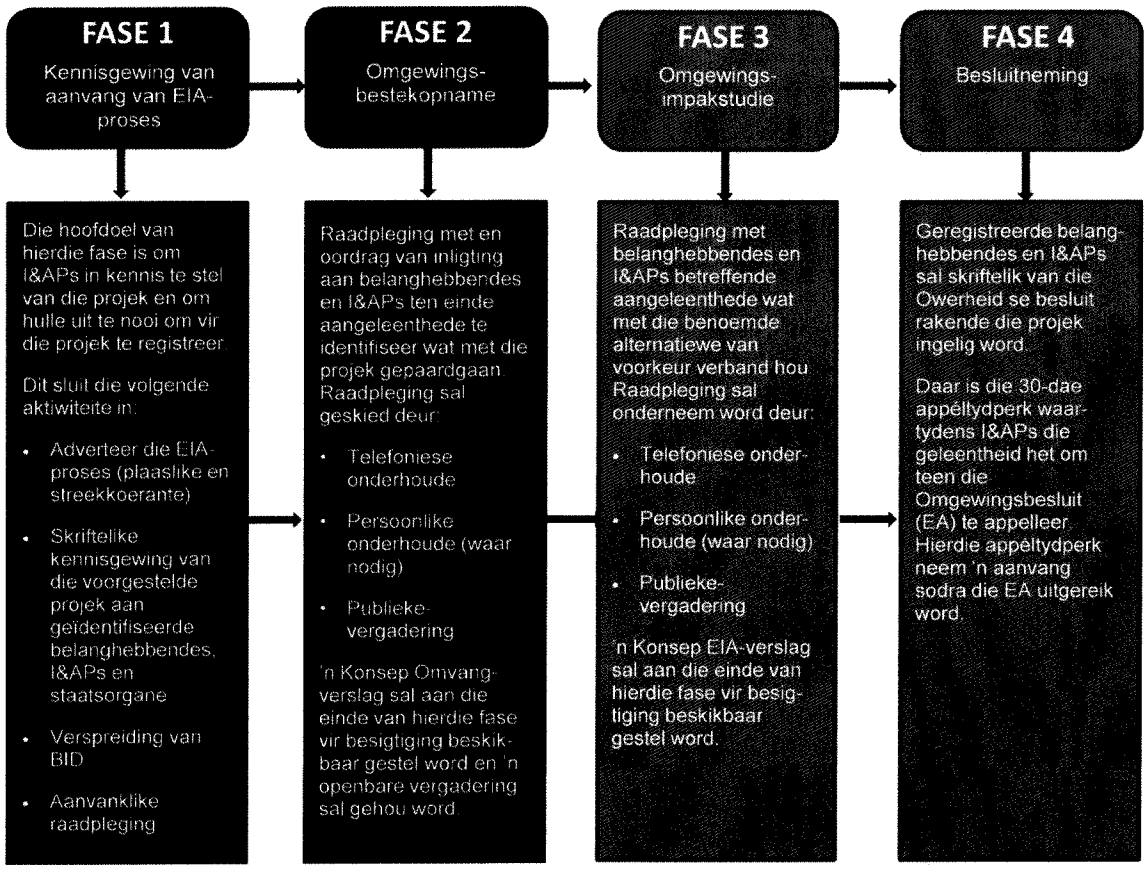
- Erfenis- en kultuurhulpbronstudie
- Biodiversiteitopname en -studie, insluitend water, vleilande, fauna en flora
- Grondwaterstudie (geohidrologiese evaluering)
- Hidroliese impakstudie van die Spookspruit tot by die samevloeiing van die Olifantsrivier
- Impakstudie van die oppervlak watergehalte van die Spookspruit en Loskopdam
- Vasstelling van oppervlak waterreserwe
- Geraasimpakstudie
- Luggehalte-impakstudie
- Geotegniese ondersoeke
- Sosio-ekonomiese impakstudie
- Verkeer

Die bevindinge en aanbevelings wat in die spesialisstudies gemaak word, sal die tegniese span help om maatreëls voor te stel wat die negatiewe impakte sal versag en die positiewe impakte te versterk. Daarbenewens sal dit gebruik word om die Omgewingsbestuursprogram (EMPr) te ontwikkel, wat verlang word om te verseker dat alle versagtende en ander omgewingsbestuursmaatreëls geïmplementeer en aan voldoen word, ten einde die omgewing tydens die konstruksie- en bedryf van die MWRP te beskerm.

Openbare Deelnameproses (PPP)

Openbare vergaderings sal as deel van die openbare deelnameproses (PPP) tydens die EIA gehou word en SiVEST is aangestel om die PPP te bestuur. Openbare deelname is die hoeksteen van enige EIA, soos ook die geval is vir hierdie voorgestelde projek. Die beginsels van die NEMA beheer baie aspekte van EIA's, insluitend openbare deelname.

Die stappe van 'n tipiese Openbare Deelnameproses word in Figuur 5 hieronder beskryf.



Figuur 5: Stappe wat vir die Openbare Deelnameproses gevolg sal word, vorm deel van die EIA vir die voorgestelde MWRP

Die hoofdoel van openbare deelname gedurende hierdie EIA sal wees om I&APs op deurlopende basis te voorsien van toereikende en deursigtige inligting om doeltreffende deelname regdeur die proses te verseker.As deel van hierdie openbare deelnameproses sal I&APs ook die geleentheid gebied word om kommentaar te lewer oor die bevindinge van die Bestekopname- en

Impakstudieverslae, asook die EMPr, wat tydens die proses vir publieke hersiening beskikbaar gestel sal word.

Hoe om aan die Openbare Deelnameproses deel te neem

Belanghebbendes word uitgenooi en aangemoedig om die EIA-span oor enige knelpunte rakende die projek te kontak deur:

- te reageer (telefonies, per faks of e-pos) op die uitnodiging om deelname aan die openbare deelnameproses, soos in die pers geadverteer is;
- die aangehegte Registrasie- en Kommentaarvorm in te vul en per SA pos, faks of e-pos aan SiVEST te stuur;
- die Openbare Vergaderings by te woon wat gedurende die verloop van die projek gehou sal word;
- die Openbare Deelname-span telefonies te kontak met navrae, kommentaar of versoek vir verdere projekinligting;
- die konsepverslae tydens die 40-dae hersieningstydperke wat in die advertensie en persoonlike briewe aangedui sal word, te besigtig.

U verantwoordelikhede

As 'n I&AP het u die reg om aan hierdie proses deel te neem deur verdere inligting te versoek of deur die konsultant van u knelpunte betreffende die omgewing en die voorgestelde Middelburg Waterherwinningsprojek te verwittig. Ingevolge die EIA-regulasies word u aandag gevestig op u verantwoordelikhede as 'n I&AP:

- Ten einde aan hierdie EIA-proses deel te neem moet u uself op die projek se databasis registreer.
- Verwittig enige ander partye (bure, vriende, kollegas, ens.) wat in die voorgestelde projek mag belangstel en/of daardeur geraak word van die EIA-proses en moedig hulle aan om betrokke te raak.
- Verseker dat enige kommentaar betreffende die voorgestelde projek ingedien word binne die tydraamwerke wat goedgekeur of deur die owerhede, soos MDEDET, opgestel is, of binne enige verlenging van 'n tydraamwerk waaroor deur die owerhede en die applikant (d.i. DTJV) ooreengekom is.
- Maak enige regstreekse sake, finansiële, persoonlike of ander belang wat u mag hê in die goedkeuring of weiering van die aansoek vir die voorgestelde Middelburg Waterherwinningsprojek bekend.

Ons verantwoordelikhede as onafhanklike konsultante

Ingevolge die EIA-regulasies sluit ons verantwoordelikhede in die openbare raadplegingsproses die volgende in:

- Ons moet verseker dat genoemsame inligting betreffende hierdie voorgestelde projek aan u beskikbaar gestel word, hetsy deur die BID of deur inligting te verskaf soos en wanneer dit versoek word.
- Ons moet toesien dat u 'n begrip vorm van die voorgestelde projek ten einde insiggewende kommentaar te lewer en om u in staat te stel om enige knelpunt op ingeligte wyse in te dien.
- Ons moet toesien dat die volgende aksies plaasvind wanneer enige kommentaar / navrae / vraagstukke ontvang word:
- Die kontakbesonderhede wat deur u verskaf word, moet in die projek se databasis ingevoer word en alle verdere inligtingstukke moet aan u gestuur word.
- Indien u navrae of kommentaar aan ons stuur, moet ons skriftelik daarop reageer.
- Indien u ons skakel, moet u besonderhede en navrae/kommentaar aangeteken word. Sou ons nie dadelik in staat wees om u vraag te beantwoord nie, sal u vraag so gou moontlik beantwoord word.

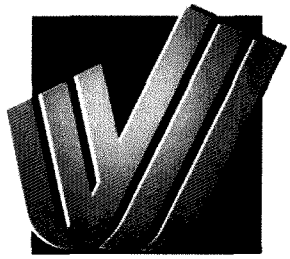
Wie om te kontak en hoe

SiVEST

Omgewingsafdeling
Wesselsweg 51, Rivonia, 2128
Posbus 2921, Rivonia. 2128

Kontakpersone:Nicolene Venter of **Andrea Gibb**

Telefoon:	**+27 11 798 0600**
Faks:	**+27 11 803 7272**
E-pos:	**andreag@sivest.co.za**
Webwerf:	**www.sivest.co.za**

	**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE DOUGLAS TAVISTOCK JOINT VENTURE'S (DTJV) PROPOSED MIDDELBURG WATER RECLAMATION PROJECT (MWRP), MIDDELBURG, MPUMALANGA PROVINCE** **(MDEDET Ref No: 17/2/3/N28 and DEA Ref No: 12/9/11/L492/6)** **REGISTRATION AND COMMENT FORM Accompanying Background Information Document February 2011**	**Public Participation Office** SiVEST Nicolene Venter/Andrea Gibb SiVEST Environmental PO Box 2921, RIVONIA, 2128 **Tel** (011) 798 0600 **Fax** (011) 803 7272 **Email** andreag@sivest.co.za

Please complete and return by post, fax or e-mail to the Public Participation Office (as above) by FRIDAY 11 MARCH 2011

TITLE		**FIRST NAME**	
INITIALS		**SURNAME**	
ORGANISATION			
POSTAL ADDRESS			
		POSTAL CODE	
TEL NO		**FAX NO**	
CELL PHONE NO			
E-MAIL ADDRESS			

REGISTRATION AS INTERESTED AND AFFECTED PARTY (I&AP) (please circle applicable box)

Please **formally register me as an interested and affected party (I&AP)** so that I may receive further information and notifications during the EIA process	**YES**	**NO**
I would like my notifications by* *Please tick the appropriate box	Letter (mail)	
	E-mail	
	Fax	
	Telephone (Telkom / Cellular)	
I would like to receive documents for comment as follows* * Please tick the appropriate box	Paper copies	
	By e-mail	
	On CD	

In terms of GNR 543 (Regulation 56 (1)(c)) (EIA process regulations) I disclose below any direct business, financial, personal or other interest that I may have in the granting or rejection of the application for environmental authorisation:

.....

.....

COMMENTS (please use separate sheets if you wish)

I suggest that the following issues of concern be investigated in the EIA:

.....

.....

I suggest the following for the EIA process and / or the public participation process:

.....

.....

Please contact the following colleagues/friends to register as I&APs for this EIA (*name and contact details e.g. e-mail address):*

.....

.....

THANK YOU FOR YOUR CONTRIBUTION

Signature **Date**

	OMGEWINGSIMPAKSTUDIE VIR DIE DOUGLAS-TAVISTOCK GESAMENTLIKE ONDERNEMING (DTJV) SE VOORGESTELDE MIDDELBURG WATERHERWINNINGSPROJEK (MWRP), MIDDELBURG, MPUMALANGA PROVINSIE **(MDEDET Verw No: 17/2/3/N28 en DEA Verw No: 12/9/11/L492/6)** **REGISTRASIE EN KOMMENTAARVORM** **Bykomend tot die Agtergrondinligtingsdokument** **Februarie 2011**	**Openbare Deelnamekantoor** SiVEST Nicolene Venter/Andrea Gibb SiVEST Environmental Posbus 2921, RIVONIA, 2128 **Tel** (011) 798 0600 **Faks** (011) 803 7272 **E-pos** andreag@sivest.co.za

Volgooi asb en stuur terug per pos, faks of e-pos aan die Openbare Deelnamekantoor (soos hierbo) voor of op VRYDAG 11 MAART 2011

TITEL		**NOEMNAAM**	
VOORLETTERS		**VAN**	
ORGANISASIE			
POSADRES			
		POSKODE	
TEL NO		**FAKS NO**	
SELFOONNO.			
E-POS ADRES			

REGISTRASIE AS BELANGHEBBENDE EN GEAFFEKTEERDE PARTY (I&AP) (omkring toepaslike antwoord)

Registreer my asseblief formeel as 'n **belanghebbende en geaffekteerde party (I&AP)** om te verseker dat veredere inligting en kennisgewings gedurende die EIA aan my gestuur word	**JA**	**NEE**
Ek verkies my kennisgewings per* *Dui asb u keuse aan met ✓	Brief (per pos)	
	e-pos	
	Faks	
	Telefoon (Telkom / Sellulêr)	
Ek sal graag projek dokumente soos volg wil ontvang* * Dui asb u keuse aan met ✓	Harde kopie	
	Per e-oos	
	Op CD	
In terme GNR 543 (Regulasie 56 (1)(c)) (EIA proses regulasies)verklaar ek hieronder enige direkte besigheid, finansiële, persoonlike of enige ander belang wat ek mag hê in die toestaan of weiering van die Omgewingsmagtiging Aansoek:		

KOMMENTAAR (u is welkom om 'n addisionele bladsy te gebruik, indien verkies)

Ek stel voor dat die volgende kwessies of kwellinge tydens die EIA ondersoek word:

.....

.....

Ek stel die volgende voor vir die EIA proses en / of die publieke deelnameproses:

.....

.....

Kontak asseblief die volgende kollegas/vriende om as 'n I&AP te registreer (*naam en kontakinligting bv e.g. e-pos adres):*

.....

.....

_____ **DANKIE VIR U DEELNAME** _____

Handtekening **Datum**

Appendix E

COPIES OF NEWSPAPER ADVERTISEMENTS & PHOTOS OF SITE NOTICES BOARDS

APPENDIX E - Table of Contents

NOTICE OF A SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT FOR DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT

Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET)
Reference Number: 17/2/3/N28

Department of Environmental Affairs (DEA) Reference Number: 12/9/11/L492/6

YOUR COMMENTS INVITED

Douglas Tavistock Joint Venture (DTJV), a BHP Billiton Energy Coal South Africa and Tavistock Collieries joint venture, proposes to design, construct and operate a mine water reclamation plant on mine property near Middelburg in the Mpumalanga Province. The proposed project will entail the collection, treatment and discharge of mine water into the Upper Olifants River catchment. The main objective of the proposed project is to treat excess impacted mine water to acceptable standards and make it available for re-use in the catchment.

The DTJV appointed Jones & Wagener Consulting Civil Engineers to conduct the Scoping and Environmental Impact Assessment (EIA) process, compile Integrated Water Use License Applications, develop amended Environmental Management Programmes and licence applications in accordance with requirements of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended, the National Water Act, Act No. 36 of 1998, as amended, the National Environmental Management: Waste Act, Act No. 59 of 2008, and the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002, as amended. SiVEST Environmental will conduct the public consultation process as required in the provisions of NEMA.

The Scoping and EIA process for environmental authorisation and licensing has been triggered by various activities listed in Government Notice R 544, R 545 and R 546, published on 18 June 2010, and GN 718 published on 3 July 2009. A list of these will be provided to registered interested and affected parties (I&APs).

As required by the NEMA, I&APs must register as stakeholders in order to participate in the Scoping and EIA process. I&APs who wish to participate and/or contribute comments are invited to register as stakeholders.

For more information and to register, contact Andrea Gibb by no later than Friday, 11 March 2011, at:

SiVEST Environmental
P O Box 2921
Rivonia, 2128
Tel: (011) 798 0600
Fax: (011) 803 7272
email: andreag@sivest.co.za

JT12-9529 ENG SOWETAN.pdf

Approved. 2011/02/01

NOTICE OF A SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT FOR DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT

Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET)
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email: andreag@sivest.co.za

SiVEST

JT12-9529 SIVEST ENG .pdf

Approved 2011/02/01

Moore

KENNISGEWING VAN 'n BESTEKOPNAME EN OMGEWINGSIMPAKSTUDIE VIR DIE DOUGLAS-TAVISTOCK GESAMENTLIKE ONDERNEMING SE VOORGESTELDE MIDDELBURG WATERHERWINNINGSPROJEK

Mpumalanga Departement Ekonomiese Ontwikkeling, Omgewingsake en Toerisme (MDEDET)
Verwysingsnommer: 17/2/3/N28

Departement Omgewingsake (DEA) Verwysingsnommer: 12/9/11/L492/6

U KOMMENTAAR GEVRA

Douglas-Tavistock Gesamentlike Onderneming (DTJV), 'n BHP Billiton Energy Coal Suid-Afrika en Tavistock Collieries gesamentlike onderneming stel voor die ontwerp, oprigting en bedryf van 'n mynwaterherwinningsaanleg op mynelendom naby Middelburg in die Mpumalangaprovinsie. Die voorgestelde projek sal die opvang, behandeling en loslating van mynwater in die Bo-Olifantsrivieropvangsgebied behels. Die hoofdoel van die voorgestelde projek is om die oormaat geimpakteerde mynwater te behandel tot aanvaarbare standaarde en om dit vir hergebruik in die opvangsgebied beskikbaar te stel.

Die DTJV het Jones & Wagener Raadgewende Siviele Ingenieurs aangestel om die Bestekopname- en Omgewingsimpakstudie (OIS) te onderneem, Geïntegreerde Watergebruiklisensie- aansoeke te doen, gewysigde Omgewingsbestuursprogramme en lisensie-aansoeke te doen ingevolge die Nasionale Wet op Omgewingsbestuur (NEMA), Wet 107 van 1998, soos gewysig, die Nasionale Waterwet, Wet 36 van 1998, soos gewysig, die Nasionale Wet op Omgewingsbestuur: Afval, Wet 59 van 2008 en die Wet op Minerale- en Petroleumhulpbronontwikkeling, Wet 208 van 2002, soos gewysig. Soos in die bepalings van NEMA verlang, sal SiVEST Environmental die openbare deelnameproses uitvoer.

Verskeie aktiwiteite gelys in Staatskennisgewing R544, R545 en R546, gepubliseer op 18 Junie 2010 en Staatskennisgewing 718 gepubliseer op 3 Julie 2009, gee aanleiding tot die Bestekopname en OIS-proses vir omgewingsmagtiging en lisensiëring. 'n Lys hiervan sal aan geregistreerde belangstellende en geaffekteerde partye (B&GP's) beskikbaar gestel word.

Soos NEMA vereis, moet B&GP's as belanghebbendes registreer ten einde aan die Bestekopname- en OIS-proses deel te neem. B&GP's wat graag wil deelneem en/of kommentaar wil lewer, word genooi om as belanghebbendes te registreer.

Vir meer inligting en om te registreer, kontak Andrea Gibb voor of op Vrydag 11 Maart 2011, by:

SiVEST Environmental
Posbus 2921
Rivonia, 2128
Tel: (011) 798 0600
Faks: (011) 803 7272
epos: andreag@sivest.co.za

SiVEST

JT12-9529 AFR.pdf

Approved 2011/02/01

gemeenskapsnuus

Are you registered to vote yet?

The municipal elections are around the corner. The 2011 municipal elections will take place in eight metropolitan councils, 226 local councils, 44 district councils and 4 277 wards.

The Independent Electrical Council has established 20 868 voting districts for this purpose, with 633 of the voting districts serving as voting centres and dedicated to servicing densely populated voting districts.

All the 20 868 voting districts will have their stations open for registration over the weekend of February 5 and 6 from 08:00 to 17:00 on each day.

Just over 60 000 registration officials have been trained for the voter registration weekend and no less than 196 000 staff members will be recruited for Election Day.

Party Liaison Committees have been consulted to ensure that presiding and deputy presiding officers comply with the criteria set for their appointment and that they would indeed discharge their responsibility impartially, efficiently and with distinction.

An SMS facility has been made available to voters to check their registration details through a cell phone. This facility is user-friendly and is available on all three networks, namely Vodacom, MTN and Cell C. All that a voter has to do is to type in his/her identity number and send it to 32810 on all three networks and he/she will in return receive confirmation of his/her registration details.

In addition registration details can be verified at any time through the 'Am I registered?' facility on the IEC website at www.elections.org.za. Voters can check whether they are registered and if not, where they should register.

You can go and register at one of the following stations

Sibongamandla High School
Fire Station
Roepersfontein Ministries
Reyno Rif Primary School
Kilpfontein Primary School
Patriot High School
Tsebetpark Primary School
Duvhapark Primary School
Pine Ridge Combined School
Phillip Ndimande Secondary School
Admin Paying Point ext 6
Edward Matyeka Primary School
Hlalanikahle Administration Offices
Zacheus Malezu Secondary School
Kwaguga Primary School
Empuyukweni Secondary School
Hostel 1 Office Tushanang
Kopanang High School
Magobene Combined School
Panorama Primary School
Clewer Primary School
Witbank Primary School
Kwaguga maintenance depot
Phakama Combined School
Sibukosethu Primary School
Bonginkimbi Secondary School
Mpondozankomo FET College
City Hall Civic Centre
Korfbal club of Witbank
Portuguese Hall
Ikhetelang Primary School
TMV Property
Tshwane University of Technology
ST Thomas Aquinas School
Tsalfess Primary School
Bohlale Pre- School
TP Sillic High School
Vikelwa Industriel School
Emphakathini Hall
Life Restoration Church
Laerakool Kriel Park
Greenside Recreation Centre
Lehlake Intermediate School
Colliery Training College
La-Petite Auberge cc
Rock of Ages Church
Alliance Church
Technical High School Witbank
Dunbar Primary School
Hlalanikahle Community Hall
Sicobile Disabled Centre

Kendal Power Station
Landau Combined School
Balmoral School
(Temporary voting station (Teodor Café)
Ogies council offices
Tholulwazi protective workshop
Thuthukani Primary School
Sukumani Primary School
Mehlwana Secondary School
Mabande High School
Matla Coal multipurpose hall
Kwanala Primary School
Bonani Primary School
Fleispruit Recreation Club
Imbalanhle School
Mpumalanga Regional Training Trust
Temporary voting station (Kwaguga ext 11)
Temporary voting station (Hlalanikahle council clinic)
Beslindle Higher Primary School
Temporary voting station (Gunner football ground)
Springbok School Mine
Mapule Sindane Combined School
Makause Combined School
Khanyimfundo Primary School
WH de Klerk School
Temporary voting station (open space Hlalanikhale ext 3)
Temporary voting station (Hlalanikahle ext 2)
Alex Mampane Intermediate School
Siyathela Early Learning Association
Lynnville Community Hall
Temporary voting station (Thembelomphakathi taxi rank)
Licensing office Witbank
Temporary voting station (soccer field Old Coronation)
J Kananda Primary School
Blackhill Schoongezight Primary School
Temporary voting station (Greenlight general dealer)
Moruti Makuse Primary School
Kriel High School
Bonginhlanhla Primary School
Chrisma Conference Centre
Jeremia Mdaka Primary School
Spring Valley School
Nelson Ngobeni Primary School
Open space ext 18 (opposite City West dry cleaners)
Open space ward 14
Puma Stadium
Living Word Church
Temporary voting station (open space in Vosman opposite stan
Köhler Oaita agents
Temporary voting station (Klarinet multipurpose sports ground)
Malema Primary School

You have the right to vote

Voters have the right to a secret vote, no one may know who you voted for.

Voters have the right to choose, no one may force, intimidate or bribe a voter to vote or not vote for a party.

Voters have the right to vote, no one may stop you from voting by forcing you to work or by preventing you from getting to the voting station .

Voters have a right to get information from parties, no one may stop parties or candidates from reaching voters.

Registration works like this

You need a green ID book with a bar code (issued after 1986) or a temporary ID document.

Go to the voting station on a public registration day (or the municipal office on a normal working day) and fill in a form to show that you live in the area.

A special machine (Zip-Zip) will be available in each voting district - it can read the bar code in your ID book and automatically records the correct information about your name and ID number for the voter's roll.

The machine also prints a sticker that will be pasted in your ID book to show that you have registered at that voting station.

The IEC has the whole voters' roll on one national computer and when you register the computer will check if your ID number already appears somewhere else.

If it does, the computer will automatically cancel your registration at your old voting district and only accept the latest registration.

NOTICE OF A SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT FOR DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT

Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) Reference Number: 17/2/3/N28

Department of Environmental Affairs (DEA) Reference Number: 12/11/1/492/6

YOUR COMMENTS INVITED

Douglas Tavistock Joint Venture (DTJV), a BHP Billiton Energy Coal South Africa and Tavistock Collieries joint venture, proposes to design, construct and operate a mine water reclamation plant on mine property near Middelburg in the Mpumalanga Province. The proposed project will entail the collection, treatment and discharge of mine water into the Upper Olifants River catchment. The main objective of the proposed project is to treat excess impacted mine water to acceptable standards and make it available for re-use in the catchment.

The DTJV appointed Jones & Wagener Consulting Civil Engineers to conduct the Scoping and Environmental Impact Assessment (EIA) process, compile Integrated Water Use License Applications, develop amended Environmental Management Programmes and licence applications in accordance with requirements of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended, the National Water Act, Act No. 36 of 1998, as amended, the National Environmental Management: Waste Act, Act No. 59 of 2008, and the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002, as amended. SiVEST Environmental will conduct the public consultation process as required in the provisions of NEMA.

The Scoping and EIA process for environmental authorisation and licensing has been triggered by various activities listed in Government Notice R 544, R 545 and R 546, published on 18 June 2010, and GN 718 published on 3 July 2009. A list of these will be provided to registered interested and affected parties (I&APs).

As required by the NEMA, I&APs must register as stakeholders in order to participate in the Scoping and EIA process. I&APs who wish to participate and/or contribute comments are invited to register as stakeholders.

For more information and to register, contact Andrea Gibb by no later than Friday, 11 March 2011, at:

SiVEST Environmental
P O Box 2921
Rivonia, 2128
Tel: (011) 798 0600
Fax: (011) 803 7272
email: andreag@sivest.co.za

SiVEST

Babas kan pryse wen

'n Inskrywingsvorm verskyn in vandag se uitgawe.

Die jaarlikse Walto Foto's en **Middelburg Observer** babakompetisie het weer afgeskop en die eerste agttien inskrywings is ontvang.

Die sluitingsdatum is op 16 Maart waarna al die babatjies in die uitgawe van 17 Maart gepubliseer gaan word.

Lesers kry dan die kans om tot 8:00 op 24 Maart per sms vir hulle gunsteling te stem. Die uitslag word in die uitgawe van 24 Maart bekend gemaak, met die prysuitdeling op 26 Maart 2011.

Lesers kan by Walto Foto's gaan inskryf teen R50 wat drie foto's insluit.

'n Inskrywingsvorm verskyn in vandag se uitgawe.

■Eerste prys in elke kategorie is R500, tweede prys R250 en derde prys R100.


Charmone van Vuuren.


Danika du Preez.


Allison Leigh Joubert.


Mia Duvenage.


Su-nico Loots.


Karlia Kruger.


Reinhardt van der Walt.


Leonard Weyers.


Vuyisile Mahlangu


Giovanni Weyers.


Rouchelle le Roux was een van die eerste inskrywings vir die jaarlikse babakompetisie.


Anke Goosen.


Nadine Roodt.


Gareth Zeelie.


Owethu Mazwayi.


Louis Botha.


Ntuthuko Mokwena.

NOTICE OF A SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT FOR DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT

YOUR COMMENTS INVITED

Douglas Tavistock Joint Venture (DTJV), a BHP Billiton Energy Coal South Africa and Tavistock Collieries joint venture, proposes to design, construct and operate a mine water reclamation plant on mine property near Middelburg in the Mpumalanga Province. The proposed project will entail the collection, treatment and discharge of mine water into the Upper Olifants River catchment. The main objective of the proposed project is to treat excess impacted mine water to acceptable standards and make it available for re-use in the catchment.

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For more information and to register, contact Andrea Gibb by no later than Friday, 11 March 2011, at:

SiVEST Environmental
P O Box 2921
Rivonia, 2128
Tel: (011) 798 0600
Fax: (011) 803 7272
email: andreag@sivest.co.za

SiVEST

KENNISGEWING VAN 'n BESTEKOPNAME EN OMGEWINGSIMPAKSTUDIE VIR DIE DOUGLAS-TAVISTOCK GESAMENTLIKE ONDERNEMING SE VOORGESTELDE MIDDELBURG WATERHERWINNINGSPROJEK

U KOMMENTAAR GEVRA

Douglas-Tavistock Gesamentlike Onderneming (DTJV), 'n BHP Billiton Energy Coal Suid-Afrika en Tavistock Collieries gesamentlike onderneming stel voor die ontwerp, oprigting en bedryf van 'n mynwaterherwinningsaanleg op myneiendom naby Middelburg in die Mpumalangaprovinsie. Die voorgestelde projek sal die opvang, behandeling en loslating van mynwater in die Bo-Olifantsrivieropvangsgebied behels. Die hoofdoel van die voorgestelde projek is om die oormaat geïmpakteerde mynwater te behandel tot aanvaarbare standaarde en om dit vir hergebruik in die opvangsgebied beskikbaar te stel.

Die DTJV het Jones & Wagener Raadgewende Siviele Ingenieurs aangestel om die Bestekopname- en Omgewingsimpakstudie (OIS) te onderneem, Geïntegreerde Watergebruiklisensie- aansoeke te doen, gewysigde Omgewingsbestuursprogramme en lisensie-aansoeke te doen ingevolge die Nasionale Wet op Omgewingsbestuur (NEMA), Wet 107 van 1998, soos gewysig, die Nasionale Waterwet, Wet 36 van 1998, soos gewysig, die Nasionale Wet op Omgewingsbestuur: Afval, Wet 59 van 2008 en die Wet op Minerale- en Petroleumhulpbronontwikkeling, Wet 208 van 2002, soos gewysig. Soos in die bepalings van NEMA verlang, sal SiVEST Environmental die openbare deelnameproses uitvoer.

Verskeie aktiwiteite gelys in Staatskennisgewing R544, R545 en R546, gepubliseer op 18 Junie 2010 en Staatskennisgewing 718 gepubliseer op 3 Julie 2009, gee aanleiding tot die Bestekopname en OIS-proses vir omgewingsmagtiging en lisensiëring. 'n Lys hiervan sal aan geregistreerde belangstellende en geaffekteerde partye (B&GP's) beskikbaar gestel word.

Soos NEMA vereis, moet B&GP's as belanghebbendes registreer ten einde aan die Bestekopname- en OIS-proses deel te neem. B&GP's wat graag wil deelneem en/of kommentaar wil lewer, word genooi om as belanghebbendes te registreer.

Vir meer inligting en om te registreer, kontak Andrea Gibb voor of op Vrydag 11 Maart 2011, by:

SiVEST Environmental
Posbus 2921
Rivonia, 2128
Tel: (011) 798 0600
Faks: (011) 803 7272
epos: andreag@sivest.co.za

SiVEST

Our Girls party with the stars. To hook up with them call 011-340-3962 or email: akulaiwa@sowetan.co.za

The good and the bad of Met

FUN: Somizi Mhlongo with Uyanda Mbuli PHOTO: ELVIS KANYELENZI

STARS OUTDO EACH OTHER AT CAPE TOWN EVENT

WE GIRLS love to party so off we went to Cape Town for the Met.

But we are sure you have heard all there is to hear, so let us show you, the good, the bad of the Met

Noleen-Maholwana Sanqu looked amazing in a green fitted and long gown by Gert-Coetzee, while Bonang Matheba looked disastrous in the outfit from the same designer. She looked like Lady Gaga on crack. Like she wore wheels around her waist – it was disastrous.

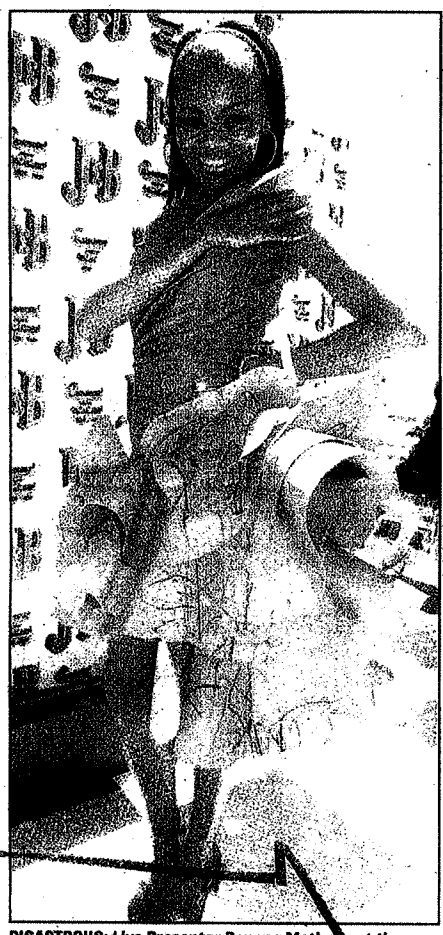
Joey Rasdien has a fiancé and she arrived in white shoes that broke during the J&B Met. Rasdien was seen asking folk for adhesive tape or glue to fix the shoes, which were clearly not expensive.

On the other side of the tent was Uyanda Mbuli in a pair of studded black shoes, which cost about R30 000. These did not break and she was not seen going around asking for adhesive tape.

Oh, Chester Williams looked like a member of the Coon Carnival and though we warned him, he looked hideous. He still grinned as if it were his birthday, so we left him alone.

● Speedy and that towel were everywhere. Like a Xhosa initiate, he walked up and down with the towel. His concept of the theme Larger than Life were a pair of jeans, sneakers and the towel – eish.

● Somizi Mhlongo wore an outfit that resembled a matadors, but unlike the Spanish bullfighters the choreographer had foundation streaming down his face like a woman. He won best-dressed with Uyanda Mbuli, who also looked amazing in a red-and-black Diamond Face Couture outfit. They won make-up, an oversees trip and loads of beauty products that made us feel sick with jealousy.



DISASTROUS: Live Presenter Bonang Matheba at the J&B Met in Cape Town. PHOTO:ELVIS KA NYELENZI

AMAZING: Winnie Khumalo and Abraham Mthiyane PHOTO:EDDIE MTSWENI

Bujee of Yfm was a great MC at the opening Met party the night before but, what we girls found ridiculous funny was that Metro [illegible] their party right next door to the [illegible] dinner.

But alas, because Met had run booze for much longer in the evening, we girls dumped Bujee and his studded head.

Yes, he actually glued plastic gems to his head. She [illegible] lost his bag the next day and went around asking folk if they had not Steel it. We guess if he had said steal, they would have understood him.

It was funny to see Sophie Ndaba's ex-boyfriend Tshepho. Shame, remember everyone was talking about their love affair and how lucky she was with an Usher lookalike. Well, we ladies can confirm that the love affair is over. We wondered what Ndaba meant when she referred to him as her soul mate when the relationship did not even last a month.

● Teunis Crous and Primrose were there in pink and we were all glad Teunis was not wearing skinny jeans since it is a sight that always makes us vomit.

Winnie Khumalo looked amazing all weekend long, even wearing what looked like a matric gown, when folk were at a dinner in jeans. Khumalo was the sweetest the whole weekend.

FREE SPRIT: Speedy at the Met. PHOTO: ELVIS KA NYELENZI

ENVIRONMENTAL IMPACT ASSESSMENT FOR DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT (MWRP)

NOTIFICATION OF DRAFT SCOPING REPORT AND INVITATION TO PUBLIC MEETING (MDEDET Ref. No: 17/2/3/N28 and DEA Ref. No: 12/9/11/L492/6)

SiVEST

The EIA notices advertised in February 2011 whereby notice was given that the Douglas Tavistock Joint Venture (DTJV) (a BHP Billiton Energy Coal South Africa (Pty) Limited and Tavistock Collieries (Pty) Limited joint venture) proposes to design, construct and operate a mine water reclamation plant on mine property near Middelburg in the Mpumalanga Province, have reference.

In terms of Government Notice R 544, R 545 and R 546, published on 18 June 2010, all interested and/or affected parties (I&APs) are hereby notified that the Draft Scoping Report for the MWRP will be made available at the venues below (hard copy), Jones & Wagener's website (http://www.jaws.co.za) and CD, on written request, for review and comment during the comment period from **Tuesday 15 March 2011** to **Tuesday 19 April 2011** (end of business day):

AREA	VENUE	STREET ADDRESS	CONTACT NO
Steve Tshwete Municipal Area	Middelburg Mines	Adjacent to Middelburg - Van Dyk's Drift Road, R575	Lindie Moore 013 689 3051
Steve Tshwete Municipal Area	Naledi Village	Adjacent to Middelburg - Van Dyk's Drift Road, R575	Lindie Moore 013 689 3051
Steve Tshwete Municipal Area	Gerard Sekoto Public Library	Wanderers Avenue, Middelburg	013 249 7297
Steve Tshwete Municipal Area	Mhluzi Library	Ngwako Street, Mhluzi	013 242 1030
Steve Tshwete Municipal Area	Eastdene Library	Verdoorn Street, Middelburg	013 249 7275

I&APs are also invited to attend the Public Meeting to be held on:

DATE	TIME	VENUE
Saturday, 12 March 2011	10:00 to 12:00	BusMid Auditorium, Walter Sisulu Street (Church Street), Middelburg

The purpose of the Public Meeting is to present the proposed project to the public, provide I&APs with the opportunity to interact with the project team, and to raise any further comments and/or concerns they might have regarding this proposed project.

Please direct your enquiries or comments **in writing** to the Public Participation Consultants below:

Nicolene Venter or Andrea Gibb
SiVEST Environmental
P O Box 2921
Rivonia, 2128
Tel: (011) 798 0600
Fax: (011) 803 7272
email: andreag@sivest.co.za

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Approved. Moore
2011/02/11

OMGEWINGSIMPAKSTUDIE VIR DOUGLAS TAVISTOCK GESAMENTLIKE ONDERNEMING SE VOORGESTELDE MIDDELBURG WATERHERWINNINGSPROJEK (MWRP)

KENNISGEWING VAN 'N KONSEP-OMVANGSVERSLAG EN UITNODIGING NA 'N OPENBARE VERGADERING
(MDEDET Verw. Nr: 17/2/3/N28 en DEA Verw. Nr: 12/9/11/L492/6)

SiVEST

Die Omgewingsimpakstudie kennisgewings wat in Februarie 2011 geadverteer is, waarin kennisgewing geskied het dat die Douglas Tavistock Gesamentlike Onderneming (DTJV) ('n BHP Billiton Energy Coal Suid-Afrika (Edms.) Bpk. en Tavistock Collieries (Edms.) Bpk. gesamentlike onderneming) die ontwerp, oprigting en bedryf van 'n mynwaterherwinnings-aanleg voorstel op myngrond naby Middelburg in die Mpumalanga Provinsie, verwys.

Ingevolge Staatskennisgewing R 544, R 545 en R 546, gepubliseer op 18 Junie 2010, word alle belangstellende en/of geaffekteerde partye (B&GPs) hiermee verwittig dat die Konsepomvangsverslag vir die MWRP by die onderstaande plekke (in gedrukte vorm), op Jones & Wagener se webwerf (http://www.jaws.co.za) en op CD (op skriftelike versoek) beskikbaar gestel sal word vir besigtiging en kommentaar tydens die kommentaartydperk vanaf **Dinsdag, 15 Maart 2011** tot **Dinsdag, 19 April 2011** (teen sluitingstyd):

GEBIED	PLEK	STRAATADRES	KONTAKNR
Steve Tshwete Munisipale Gebied	Middelburg Myn	Langs Middelburg - Van Dyk's Drifpad R575	Lindie Moore 013 689 3051
Steve Tshwete Munisipale Gebied	Naledi Village	Langs Middelburg - Van Dyk's Drifpad R575	Lindie Moore 013 689 3051
Steve Tshwete Munisipale Gebied	Gerard Sekoto Openbare Biblioteek	Wandererslaan, Middelburg	013 249 7297
Steve Tshwete Munisipale Gebied	Mhluzi Biblioteek	Ngwakostraat, Mhluzi	013 242 1030
Steve Tshwete Munisipale Gebied	Eastdene Biblioteek	Verdoornstraat, Middelburg	013 249 7275

B&GPs word ook uitgenooi om die Openbare Vergadering by te woon wat gehou word op:

DATUM	TYD	PLEK
Saterdag, 12 Maart 2011	10:00 tot 12:00	BusMid Ouditorium, Walter Sisulustraat (Kerkstraat), Middelburg

Die doel van die Openbare Vergadering is om die voorgestelde projek aan die publiek bekend te stel, om B&GPs die geleentheid te bied om met die projekspan te skakel en om enige verdere kommentaar en/of knelpunte wat hulle rakende hierdie voorgestelde projek mag hê, te opper.

Rig asseblief u **skriftelike** navrae of kommentaar aan die Openbare Deelnamekonsultante hieronder:

Nicolene Venter of Andrea Gibb
SiVEST Environmental
Posbus 2921
Rivonia, 2128
Tel: (011) 798 0600
Faks: (011) 803 7272
epos: andreag@sivest.co.za

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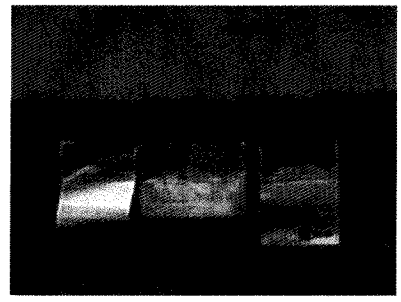
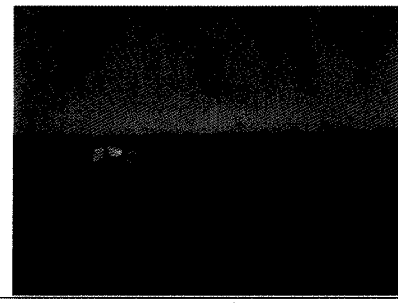
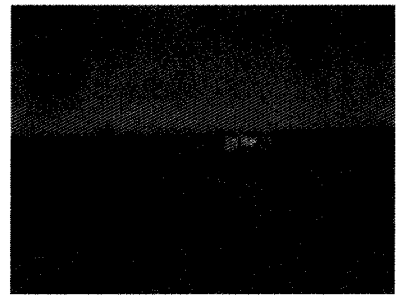
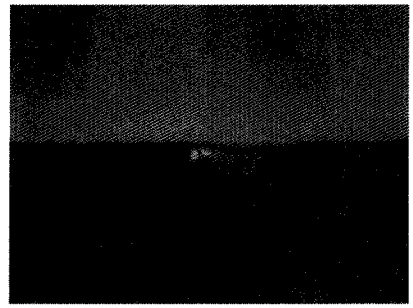
Approved. Moore
2011/02/11

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT

EIA Site Notices

DESCRIPTION	COORDINATES	PHOTO
Option 1: At the gate of the Naledi Village	S 25 54 36.4 E 29 23 30.3	  
Option2: Fence close to Kruger Dam (on mine property)	S 25 50 53.84 E 29 26 48.58	

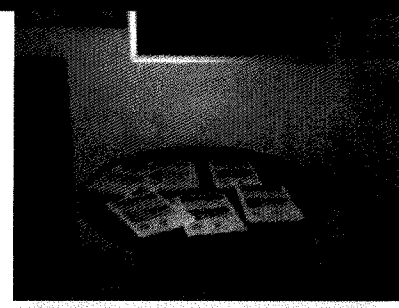
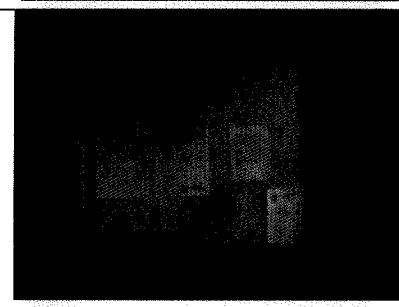
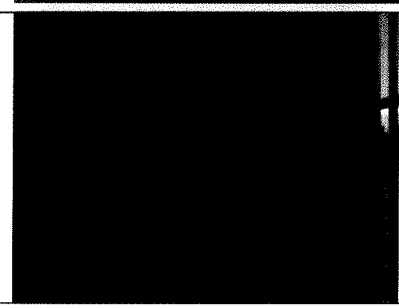


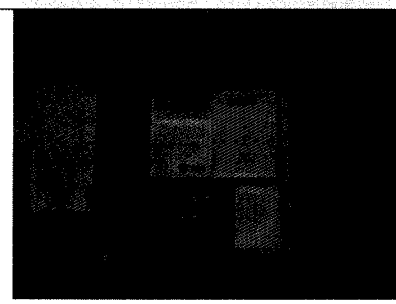
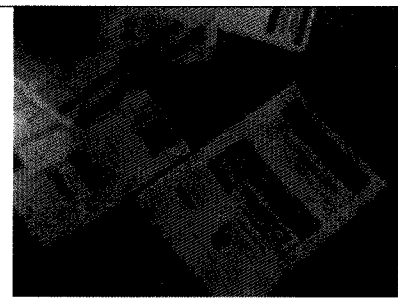


ENVIRONMENTAL IMPACT ASSESSMENT FOR THE DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT

Background Information Document place in public places and Posters displayed in public placing:

- ***EIA project notice***
- ***Availability of the Draft Scoping Report for public review***
- ***Invitation to Public Meeting***

PUBLIC PLACE	COORDINATES	PHOTO
Gerard Sekoto Library Cnr Walter Sisulu & Wanderes Streets Middelburg 1050	S 25° 46" 24.41' E 29° 27" 24.63'	
Eastdene Library VerdoornStr Eastdene Middelburg 1050	S 25° 46" 55.5' E 29° 28" 38.6'	
Ext 7 Library 11881 MakataStr Mhluzi 1053	S 25° 45" 48.0' E 29° 25" 09.9'	
Nasaret Library Cnr Velddrift & Fort Napier Streets Nasaret Middelburg 1052	S 25° 48" 08.0' E 29° 30" 38.4'	

Steve Tshwete Local Municipaliry Offices (Water & Electricipay pay points)	S 25° 46" 21.53' E 29° 27" 13.66'	
BusMed Info Centre Middleburg Chamber of Commerce and Industry 292 Walter Sisulu Middelburg	S 25° 45" 15.46' E 29° 27" 31.20'	
Naledi Community (Mr Themba Mavuso) NUM Shop Steward 26 Inyange Naledi	S 25° 54" 35.31' E 29° 23" 31.96'	Gave to someone and he did not want me to take photos
Clubville Library	S 25° 45" 03.4' E 29° 26" 51.5'	
Bambanani Medical Centre, 186 Cowen Ntuli Street, Middelburg	S 25° 46" 09.79' E 29° 27" 39.38'	

Medical Centre, Mhluzi, Maledi Street	S 25° 45" 25.04' E 29° 25" 39.11'	

Appendix F

LIST OF REGISTERED I&APS

APPENDIX F - Table of Contents

ENVIRONMENTAL IMPACT ASSESSMENT DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT		
REGISTERED I&Aps (in alphabetical order according to surname)		
SURNAME	**NAME/INITIALS**	**COMPANY / ORGANISATION**
		Anvin Beleggings
		Boshoff & Seuns Boerdery CC
.	Desmond	
Agenbach	Coenrad	Dept of Environmental Affairs and Tourism
Allen	MH	
Anthony	A	Dept of Roads & Transport- Province
Aucamp	JC	Polyce
Badenhorst	C	Steve Tshwete Local Municipality
Baker	Terry	Iliso Consulting
Baloyi	Solomon	Dept of Agriculture
Batchelor	Colin	ITT Water and Wastewater
Batchelor	Garth	MDEDET
Bester	Coen	MiddelBurg Chamberof Commerce
Bezuidenhout	Louis	Dept of Mineral Resources
Biyela	Thandiwe	Dept of Mineral Resources
Bloy	Steven	Middelburg Colliery
Booysen	Heather	Samancor Middelburg Ferrochrome
Bopape	Goodness	Dept of Water Affairs
Botha	Chris	Optimum Colliery
Bouwer	Rudolph	Steve Tshwete Local Municipality
Brachelor	Garth	MDEDET
Broadhurst	Jacky	BHP Billiton Energy Coal SA
Broomberg	Kevin	BHPBilliton
Brussow	Reuben	Columbus Stainless
Bruwer	Ilse	Optimum Colliery
Büchner	Lood	Kanhym
Caird	Marina	WESSA
Campbell	Nelson	Bank Collieries
Cass	Christa	Womens Agricultural Union
Cebekulu	Nokuthula	Dept of Water Affairs
Chipu	Sonia	Dept of Mineral Resources
Claesere	Frank	
Cogho	Vik	Olifants River Forum
Combrink	Mike	Dept of Land-Use
Comrie	Werner	Dept of Water Affairs

SURNAME	NAME	COMPANY / ORGANISATION
Cousins	Tessa	Association for Water & Rural Development (AWARD)
Cronje	Jannie	Middelburg Mine Services
Cronje	Andre	Dept of Mineral Resources
Cutshwa	Gugulethu	Dept of Mineral Resources
De Jager	JN	
de Lange	Marie	ITT Water and Wastewater
De Wet	NB	
Dieter	Hoffman	Provincial Roads Administration
Dippenaar	K	Polmaise Colliery
Dlamini	Cyril	Local Government and Housing
Dlamini	Thabisile	Nkangala District Municipality
Dooge	Nico	Xstrata Coal South Africa
du Plessis	Natasha	
du Toit	Leon	ALZU Voere
du Toit	Pieter	Kumba Resources
Erasmus	Francois	SAHRA: Mpumalanga
Essa	I	SANRAL
Faureman	Joppie	Farm: Surprise Klipbank
Ferrar	Tony	WESSA
Ferreira	Dan	Blackwattle
Fick	Izak & Karin	WESSA: Lowveld Region
Forbank	Muna	BHPBilliton
Fouche	W D	Steve Tshwete Local Municipality
Fouche	Willie	Steve Tshwete Local Municipality
Geldenhys	HA	Schoonoord
Geldenhys	JJ	Schoonoord
Gerrits	G	Gerrie Gerrits Boerdery
Gibson	Brian	Middelburg Ferrochrome
Gordon		
Grobler	Pieter	Aurecon
Gunther	Peter	eMalahleni Water Reclamation Plant
Hattingh	F	
Haupt	C	Arnot Power Station
Havenga	Beyers	Dept of Water Affairs
Henning	A	
Hex	Jacqui	Jones & Wagener
Hlabane	Matthews	SA Green Revolutionary Council
Hlatshwayo	Selby	MDEDET
Hoffman	Heine	Eskom Holdings
Hofmann	Andre	Mpumalanga Parks Board

SURNAME	NAME	COMPANY / ORGANISATION
Human		Boschmanspoort
January	Neo	SAHRA: Mpumalanga
Joubert	Martin	Muhanga Mine
Julyan	Jonathan	Key Plan
Kgomo	Andrew	Steve Tshwete Local Municipality
Kitto	Jennifer	SAHRA: Gauteng
Kleyn	D	Dept of Agriculture
Kleynhans	Jaco	Africa EPA
Kleynhans	E	Woestalleen Colliery
Kritzinger	Flip	Xstrata Coal South Africa
Labuschagne	Lebeau	Dept of Mineral Resources
Langa	GG	South African Local Government Association
Leshilo	Portia	Dept of Land Affairs
Liefferink	Mariette	Federation for Sustainable Environment
Lindstrom	Anton	Mpumalanga Parks Board
Lubisi	William	Dept of Health
Lukey	Peter	Dept of Environmental Affairs
Mabada	Donald	Dept of Water Affairs
Mabanola	T R	Steve Tshwete Local Municipality
Mabaso	Kleinbooi	Provincial Roads Administration
Mabogoane	Daphne	Eskom Generation
Mabutyana	Nkosinathu	Dept of Labour
Mabuza	David	Dept of Roads and Transport
Machaba	Thapelo	Water Quality Management
Machete	Nkosazana	SAHRA: Mpumalanga
Madamalala	Aubrey	Steve Tshwete Local Municipality
Mafagane	Muhadi	Dept of Mineral Resources
Magemba	Thabo	Dept of Labour
Mahlangu	Venty	Dept of Agric Conservation & Environment- Region
Mahlangu	S	Dept of Agriculture, Conservation, Environment and Land Administration
Mahlangu	FS	Dept of Land Affairs
Mahlangu	Siphiwe	Dept of Land Affairs
Mahlangu	Thabo	Steve Tshwete Local Municipality
Mahlangu	Delight	Steve Tshwete Local Municipality
Mahlangu	Martha	Steve Tshwete Local Municipality
Mahlangu	L	Steve Tshwete Local Municipality
Mahlangu	Vusi	Nkangala District Municipality
Mahlangu	I M	Steve Tshwete Local Municipality
Mahlangu	Ida	Steve Tshwete Local Municipality
Mahlangu	Mmanthakeng	Steve Tshwete Local Municipality

SURNAME	NAME	COMPANY / ORGANISATION
Makola	T C	Nkangala District Municipality
Malebe	Suzan	Dept of Mineral Resources
Mandlazi	Roy	Dept of Economic Development, Environment and Tourism
Mansoor	Nasreen	Dept of Water Affairs
Marotobolo	Johnson	Steve Tshwete Local Municipality
Masango	Elias	Steve Tshwete Local Municipality
Mashaba	Thapelo	Dept of Water Affairs
Mashamba	Thembani	Dept of Water Affairs
Mashego	Paris	National Union of Mine Workers
Mashego-Dlamini	Candith	Dept of Local Government and Housing
Mashele	Mandla	Dept of Public Works- Mpumalanga Province
Mashiane		Steve Tshwete Local Municipality
Mashiloane	AT	Steve Tshwete Local Municipality
Mashiloane	Andrei	Steve Tshwete Local Municipality
Masuku	Madala	Dept of Public Works, Roads, & Transport
Mathebula	Phillemon	Dept of Agriculture, Conservation, Environment and Land Administration
Mathebula	Elphus	Steve Tshwete Local Municipality
Matseba	Mogale	Dept of Water Affairs
Mavuso	Themba	National Union of Mine Workers
Mbhele	Mbali	Optimum Colliery
Mdluli	Lemmy	Dept of Economic Development and Planning
Meso	Kama	Dept of Water Affairs
Mey	Wendy	BHP Billiton Energy Coal SA
Mey	Ian	Jonati Environmental Services
Meyer	Rodney	Highveld Steel and Vanadium Corporation
Mhlabane	M	Dept of Transport
Mhlanga	Bheki	Dept of Economic Development, Environment and Tourism
Mile	Pamela S	Steve Tshwete Local Municipality
Mlabatheki	T	Mine Workers Union
Mnguni	Muka	Steve Tshwete Local Municipality
Mnisi	Petros	Middelburg Employment People's Structures
Moduka	Benjamin	Provincial Heritage Resources Authority
Mokino	Benjamin	Dept of Water Affairs
Molapo	Peter	Dept of Labour
Moloko	ETC	Dept of Health and Social Services
Moore	Lindie	
Mosia	Lebona	Mpumalanga Provincial Government
Moswathupa	linah	Mine Workers Union
Motsisi	Lungile	Eskom Transmission
Msiza	David	Dept of Mineral Resources

SURNAME	NAME	COMPANY / ORGANISATION
Mthethwa	S	Steve Tshwete Local Municipality
Mthimunye	Charity	Dept of Land Affairs
Mutambanengwe	Cecil	Digby Wells Environmental
Mutengwe	Mashudu	Dept of Mineral Resources
Ndobochani	Nonofho	SAHRA: Head Office
Nhlabathi	Aubrey	Samancor Chrome
Nhlapo	Stephen	National Union of Mine Workers
Nicodimus	Themba	Dept of Public Works, Roads, & Transport
Nieuwoudt	Marianna	Olifants River Forum
Nqana	N	Dept of Land Affairs
Oosthuizen	George	Dept of Water Affairs
Oosthuysen	Jaco	Jaco Oosthuysen Trust
Ott	Anna Marth	Middelburg Chamber of Commerce
Owen	Philip	Geasphere
Pather	T	National Nuclear Regulater
Phakathi	Nhlanhla	Dept of Mineral Resources
Phintshane	Temba	Nkangala District Municipality
Pienaar	Eugene	Alzu Ondernemings
Pilodia	R	Steve Tshwete Local Municipality
Potgieter	Lucas	Dept of Labour
Pretorius	Anneline	Eskom Distribution
Prinsloo	C	Foodcorp Operation Ltd
Prinsloo	T	Kanhym Landgoed
Pule	Dinah	Mpumalanga Provincial Government
Pule	Dinah	Dept of Agriculture, Conservation, Environment and Land Administration
Ramuya	TA	Anglo Coal: Goedehoop
Ratshibvumo	Erick	Steve Tshwete Local Municipality
Risimate	Nlteke	Nkangala District Municipality
Roux	Gawie	GD Roux Boerdey
Roux	Willem	GD Roux Boerdey
Sauerman	J	Farm: Surprise Klipbank
Scheermeyer	Colette	SAHRA: Head Office
Schoeman	C	Christo Schoeman Boerdery
Schoonbee	Johann	Eskom
Schultze	Anel	
Seboka	Tumi	Dept of Land Affairs
Sekgale	Jimmy	Dept of Mineral Resources
Selepe	Marcus	Dept of Water Affairs
Senyane	MJ	Dept of Mineral Resources
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SURNAME	NAME	COMPANY / ORGANISATION
Shongwe	Charles	Dept of Economic Development, Environment and Tourism
Sibiya	Moses	Shanduka Coal
Skhosana	SPD	Nkangala District Municipality
Skosana	SPD	Highveld Water and Sanitation Association
Skosana	KM	Steve Tshwete Local Municipality
Smit	Roelf	Mpumalanga Parks Board
Snyman	F	
Stander	Jan	Telkom SA
Steenkamp	JH	JPS Farming
Stoltz	Gert	Steve Tshwete Local Municipality
Stoltz	Gert	Steve Tshwete Local Municipality
Streicher	AC	Boschmanspoort
Strydom	G	Kanhym Estates
Subramanian	Richie	BHPBilliton
Swanepoel	Piet	Eskom: Arnot Krag Stasie
Swart	Elize	Dept of Mineral Resources
Swart	K	Steve Tshwete Local Municipality
Swart	Careen	National Department of Health
Swart	Kobus	Steve Tshwete Local Municipality
Sybil	S	Dept of Provincial Local Govt. & Housing
Taiwe	Mokope	Mpumalanga Provincial Government
Theledi	Fikile	MDEDET
Tshabidi	Tefo	Dept of Water Affairs
Tshehla	Daphney	Anglo Coal: Goedehoop
Tshikomba	Tovhowani	Eskom Generation
Tshivhalavhala	Godfrey	SAHRA: Mpumalanga
Tswai	Dineo	MDEDET
van Aswegen	Johan	Dept of Water Affairs
van den Berg	Tobie	Middelburg Observer/ Daller
Van Dyk	CJ	
Van Dyk	SM	
van Eeden	Nicholas	Josephine Landbou cc
van Zyl	Marius	Jones & Wagener
Venter	Jan	Dept of Agriculture and Land Administration
Venter	A	Dept of Health
Venter	Daniel	SANRAL
Viljoen	Michelle	ITT Water and Wastewater South Africa (Pty) Ltd
Viljoen	Ben	Provincial Roads Administration
Visagie	T	Jeffares&Green
Visser	J	

SURNAME	NAME	COMPANY / ORGANISATION
Voges	Piet	Middelburg Co-op
Webb	Elmien	Xstrata Coal
Webb	Kim	WESSA: Mpumalanga
Wessels	Dawie Schalk	Columbus Stainless
Xulu	Shirley	Middelburg Public Library
Yorke-Hart	Mike	SANRAL
Zwane	Abram	Highveld Water and Sanitation Association

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

ISSUES AND RESPONSES REPORT – DRAFT SCOPING REPORT

DOUGLAS TAVISTOCK JOINT VENTURE'S PROPOSED MIDDELBURG WATER RECLAMATION PROJECT

SUMMARY OF ENVIRONMENTAL ISSUES/CONCERNS AND SUGGESTIONS RAISED BY INTERESTED AND/OR AFFECTED PARTIES

FEBRUARY 2011 – MARCH 2011

Stakeholders who contributed issues ranging across all sectors of society are recorded in this Issues and Response Report (I&RR). Full record of every issue raised is available from the public participation office and is also included in the DSR (Appendix F). Similar issues raised have been grouped together. The name, affiliation and date of the commentator are also indicated. The issues raised by technical specialists and Douglas Tavistock Joint Venture, the project proponent, are not included in this document.

INDEX TO ISSUES IN THIS TABLE

Abbreviations

BID	**Background Information Document**
DSR	**Draft Scoping Report**
EIA	**Environmental Impact Assessment**
I&AP	**Interested and/or Affected Party**
MWRP	**Middelburg Water Reclamation Project**
PP	**Public Participation**

Issue/Comment	Raised By	Response
1. Groundwater Related Comments/Issues		
Suggested that the quality of groundwater be investigated in the EIA.	Nhlabathi, Aubrey Samancor Ghrome BID Registration and Comment Form: 16 February 2011	The potential impact on groundwater will be assessed during the impact phase.
2. Technical Comments/Issues		
Commented that the application affects various existing Eskom Distribution, Sub Transmission and Eskom Transmission power lines and services. Eskom Distribution, in principle, has no objection to the application provided that certain conditions are adhered to.	Pretorius, Annelien Eskom Distribution Letter: 22 February 2011	Correspondence acknowledged and forwarded to technical team for their attention.
3. Communication		
Requested to be registered as an I&AP for the proposed Middelburg Water Reclamation Project as a result of seeing the advertisement in the newspaper.	Moore, Fraser Telephone: 16 February 2011	Responded by confirming his registration as an I&AP and sending him the BID, Invitation Letter to participate in the EIA and PP process as well as the Registration and Comment Form. ***Andrea Gibb, SiVEST (E-mail 16 February 2011)***
Queried how she can register as an I&AP for the proposed Middelburg Water Reclamation Project, as a result of seeing the advertisement in the newspaper.	Viljoen, Michelle Sales and Marketing: ITT Water & Wastewater South Africa (Pty) Ltd Telephone: 23 February 2011	Suggested that she send an e-mail with all her contact details to be entered into the project database, thereafter she would receive a registration confirmation and BID. ***Andrea Gibb, SiVEST (Telephone 23 February 2011)*** Upon receipt of her e-mail responded by confirming that she has been registration as an I&AP and sending her the BID, Invitation Letter to participate in the EIA and PP process as well as the Registration and Comment Form. ***Andrea Gibb, SiVEST (E-mail 24 February 2011)***

Appendix G

FEASIBILITY GEOTECHNICAL EVALUATION OF TWO PROPOSED WATER TREATMENT PLANTS

(Jones & Wagener, 2008)

MIDDELBURG MINE SERVICES

FEASABILITY GEOTECHNICAL STUDY
PROPOSED PIPELINE ROUTES
MMS WATER PROJECT

Report No.: JW136/08/B478 - Rev A

September 2008

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DOCUMENT APPROVAL RECORD

Report No.: JW136/08/B478 - Rev A

ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	Geologist	B. Antrobus	2 Sept 2008	
Reviewed				
Approved				

RECORD OF REVISIONS AND ISSUES REGISTER

Date	Revision	Description	Issued to	Issue Format	No. Copies

SYNOPSIS

An airphoto interpretation terrain evaluation has been carried out for the proposed pipeline routes.

A number of terrain units have been identified and a brief description of the profile, horizon properties and excavation characteristics has been provided.

The pipeline is to comprise HDPE (PE 100 PN 16) pipe that will be buried at a depth of 1,5m.

The terrain evaluation, limited field inspection and data evaluation has indicated that over most of the routes, soft excavation can be expected and that the hillwash sand will provide material that could be considered for bedding and selected fill requirements.

A detailed investigation including TLB test pits and laboratory testing may be required once all routes and type of pipe are finalised.

CONTENTS PAGE

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MIDDELBURG MINE SERVICES

FEASABILITY GEOTECHNICAL STUDY
PROPOSED PIPELINE ROUTES
MMS WATER PROJECT

REPORT NO: JW136/08/B478 - Rev A

1. INTRODUCTION

This report presents an analysis of geotechnical parameters identified for the proposed 90 km's of pipeline for the Water Treatment Project.

The geotechnical investigation forms a section of an Environmental Impact Assessment report[1]. for the proposed Water Treatment Facility at Middelburg Mine.

The investigation was undertaken under Order No. 4300153009 requested by Middelburg Mine.

2. METHOD OF INVESTIGATION

The investigation was a feasibility study and was therefore limited to:

- an aerial photographic terrain evaluation.
- analysis of available data.
- limited field work.
- compilation of a geotechnical terrain data map.

3. AIR PHOTO INTERPRETATION (API)

Four defined routes of pipeline are currently proposed. The routes are shown on Drawing B478-02-001. Excavating test pits at regular intervals along each of the different routes to identify profile conditions as part of a feasibility study was not considered practical and

[1] Jones & Wagener. Feasibility Geotechnical Evaluation of Two Proposed Water Treatment Plants. Middelburg Mine, Middelburg. Report No. JW107/08/B478 - Rev. A.

consequently airphoto interpretation (API) with limited field work to define and confirm different land facets/elements or terrain units was proposed.

API identifies various terrain units or land elements that occur within the area. A terrain unit defines a specific land element that exhibits similar surface forms, soil, vegetation and lithology. Consequently similar geotechnical characteristics for similar units can also be expected.

Once the terrain units are identified and marked on a map, the expected profile conditions are confirmed by inspecting profile conditions in cuttings, river channels etc and by assessing profile conditions from available sources (e.g. geotechnical reports).

4. GEOLOGY

The general lithology in the area comprises Karoo Sequence sediments that locally consist of sandstones and shales of the Vryheid Formation, Ecca Group and felsites of the Selanorivier Formation, Rooiberg Group, Bushveld Complex and Post Rooiberg Group diabase intrusives are also present.

5. TOPOGRAPHY

The general topography of the area over which the different pipelines will traverse, is gently rolling and undulating.

The Spookspruit and Boesmankransspruit in the north and south respectively define the two rivers draining the study area. Associated with these streams are smaller gully tributaries.

The above landform will therefore typically comprise terrain units defined by alluvial zones, gullies, gentle convex sideslopes and convex crestal areas. Localised pan areas within the crestal zones are also present.

6. TERRAIN EVALUATION

The terrain units identified include

- crestal area on either Karoo Sediments or rhyolites of the Bushveld Complex.
- sideslope on residual Karoo sediments.
- sideslope on residual rhyolites.
- alluvial zones.
- gullywash zones.
- rehabilitated areas.

The terrain units and the location of test pits used in the evaluation of profile properties, are provided on Drawing B478-02-001.

The soil properties, excavation depths and material properties have been assessed for each terrain unit.

The pipes to be used for the different pipelines will all be HDPE (PE 100P N16) pipes that will be buried at a depth of 1,5m.

For this class of pipe we have assumed that a sandy bedding and backfill (i.e. material similar to selected fill material) will be suitable.

6.1 Crestal Areas

6.1.1 Soil Profile

The crestal areas are characterised by a gentle convex topographic form. The soil profile comprises moderately thick (1,0m to 1,5m) hillwash of slightly moist, yellow-brown, silty sand overlying a ferruginised hillwash to transition horizon. This horizon grades into a moderately ferruginised transition of silty sand and ferruginised concretions that is generally present from a depth of 1,3m to reach of TLB at about 2,5m.

Seepage may be encountered at the contact of the hillwash and well cemented hillwash / transition. Depth typically in the order of 2,0m.

6.1.2 Soil Properties

The hillwash comprise a fine clayey to silty sand that exhibits low heave characteristics. Sand content is likely to range from 50% to 70% and Plasticity Indices are expected to range from 10% to 14%.

This material could be considered for selected fill material particularly for HDE piping. Properties of the material should however be reviewed by the design engineer during the detailed study.

6.1.3 Excavation

Soft excavation characteristics are expected to a depth of approximately 2m in most cases within this unit. Locally, the ferruginised transition is dense to very dense and excavation with a TLB (Case 580G or equivalent) may be slow.

6.2 Sideslope Profile

6.2.1 General

The sideslope unit is characterised by a gently sloping convex topography. This unit represents the dominant terrain unit over which the pipe routes traverse.

The underlying lithology is dominantly a shale or sandstone of the Karoo Sequence but locally diamictite of the Dwyka Formation and rhyolite of the Silons River Formation are present. The geotechnical aspects of each unit are discussed below.

6.2.2 Sideslope on Karoo Shale or Sandstone

Profile

The transported soil (hillwash) comprises a variable thickness of a slightly moist, brown to yellow-brown, silty sand that grades with depth into a ferruginised hillwash. The hillwash is typically 0,8m to 1,2m thick and grades with depth into a nodular ferruginised sand. The degree of ferruginisation is moderate resulting in a dense to very dense horizon that extends to depths of approximately 1,5m. Below this depth a well cemented and ferruginised transition is present.

Along a short section south of the MMS entrance, a diabase intrusive is present. In this section the hillwash is in excess of 2,5m thick.

Seepage / perched water table development can be expected at the interface of the hillwash and well cemented and ferruginised horizon. Depth could vary from 1,6m to 2,7m.

Soil Properties
The hillwash sand is a fine to medium grained, slightly clayey sand that exhibits a low heave potential. The properties will be similar to those discussed for the crestal unit. This material, therefore, could be considered as selected fill material with design engineer's approval.

The ferruginised hillwash and transition may comprise material in excess of 30mm diameter and should be considered for main / general fill only.

Excavation Characteristics
Soft excavation is expected to depths of 2,5m. The ferruginised hillwash and transition may however be very dense and for a confined excavation may classify as intermediate.

6.2.3 Sideslope on Rhyolite

Soil Profile
This terrain unit is located in two areas, namely immediately south of the MMS entrance and approximately 1 km south of N4/R575 intersection and is characterised by a rough convex boulder outcrop topography.

The profile is represented by a thin (300mm to 500mm) brown to yellow-brown silty sand with occasional gravels and boulders (hillwash and colluvium) that is underlain by an irregularly developed dense to very dense ferruginised sand with mixed gravels and boulders typically 100mm to 400mm thick. A highly weathered, closely jointed, soft rock rhyolite underlies this horizon.

Seepage is only likely within the wetter summer months and is expected to be shallow (<1,0m) on the hillwash / residual interface.

Soil Properties
The hillwash and ferruginised horizons will comprise clayey sands as a matrix to mixed gravels and boulders while the rhyolite will occur as an angular gravel that ranges in size from 50mm to 150mm within a silt matrix.

These materials exhibit low heave characteristics but due to the likely presence of oversize material, the use of this material should be limited to general / main backfill requirements for pipe works.

Excavation Characteristics
The profile to a depth of approximately 1,5m is expected to classify as soft. Below this depth, a jointed rhyolite is expected that may classify as intermediate. Hard excavation can be expected below 2,0m.

The rhyolite exhibits variable depths and degrees of weathering, consequently soft excavation could range from a depth of about 0,5m to depths of 2,5m.

6.2.4 Sideslope on Diamictite

Profile
Locally around the sideslopes of the dominant drainage features i.e. Boesmankransspruit and Spookspruit, diamictites of the Dwyka Formation may be encountered.

Within these areas, the profile will comprise approximately 600mm of brown silty hillwash sand that is poorly ferruginised towards the base. This horizon overlies a residual diamictite of dense to very dense sandy silt with loosely packed subrounded mixed boulders.

Very slight seepage at the residual interface is possible.

Soil Properties
The transported and residual soils comprise a fine sandy silt with boulders. The material is expected to be inactive with regard to heave.

The excavated material is likely only to satisfy general / main fill requirements with regard to pipe laying specifications as excessive oversize material may be encountered. Where the hillwash horizon is >300mm thick, it should be excavated onto one side of the trench and stockpiled for selected fill requirements.

Excavation Characteristics
The diamictite ranges from a dense to very dense residual silt and boulder material to depths of about 2,5m. Soft excavation characteristics are expected to this depth while intermediate to hard may be encountered below 2,5m.

6.2.5 Gullywash Unit

Profile
The gullywash unit defines the secondary drainage features. The gullies are typically concave in profile with poorly defined flood plains that are limited in extent. The soil profile recorded within the area is fairly typical for the whole study area.

The profile comprises a very moist dark brown organic rich clayey to silty sand (200mm to 300mm thick) overlying a very moist to wet, brown, clayey sand to sandy clay 1m to 2m thick. Below this horizon residual soils comprising clayey silty to sandy clays will be present.

Ferruginisation from about 1m is common particularly along the sideslope / gullywash interface.

Seepage is commonly encountered below 0,9m.

Soil Properties
The gullywash soils comprise predominantly fine and medium sands. These are non-cohesive soils and consequently sidewall instability, particularly when wet, can be expected for excavations in this terrain unit

The sands could satisfy pipe bedding and selected fill requirements but the material will need to be stockpiled and allowed to dry out.

Excavation
Excavations to depths of 2,5m will classify as soft. Consideration to sidewall stability will have to be given to any excavation in this unit.

Along the flanks of the gullywash areas where a well cemented and ferruginised horizon and occasional very dense residual soils are encountered, intermediate excavation can be expected.

Due to the presence of a shallow water table, saturation of trench excavations will occur and the use of a dump rock pioneer to facilitate drainage during pipe laying may need to be considered.

6.2.6 *Pan Deposits*

Soil Profile

The pan deposits represent wetland areas that are usually located within the crestal terrain units. They are thought to represent old erosional features that have progated downwards as erosion of the landscape occurred. The profile within the pan basin comprises a very moist to wet, grey, soft, sandy clay with roots. The horizon is about 1m thick. Moist, stiff, sandy clays residual from Karoo sediments underlie the pan clays.

Seepage, where not on surface, is present at the transported / residual interface at a depth of about 1m.

Soil Properties

The transported and residual soils are predominantly fine grained silts and clays and consequently are expected to exhibit a moderate to high heave potential when the degree of saturation is low. Under current conditions, these soils are very moist to wet, and therefore saturated and consequently heave is not expected.

Excavation Characteristics

The profile to a depth of 2,5m will classify as soft excavation. Consideration must be given to sidewall stability, as any excavation in the pan area larger than test pit length (about 2m to 2,5m), is likely to be unstable.

6.2.7 *Alluvial Terrain Unit*

Soil Profile

The main alluvial drainage channels comprise thick (2,5m to 3,5m) alluvium of very moist to wet, grey, soft, fissured sandy clay. This typically overlies residual shale to sandstone comprising moist, yellow-brown, firm, sandy clay.

The alluvial profile will often be characterised by surface water.

The alluvial clays will thin as the sideslope units are approached and ferruginisation of the profile may be encountered.

Soil Properties

The alluvial clays normally exhibit moderate to high heave potentials in a partially saturated condition. However, as the soils are likely to be saturated, low to moderate heave potentials can be expected.

The wet clayey nature of the material will result in the material only being suitable for general backfill. These properties and the degree of saturation will adversely affect compaction of the backfill and consequently backfill in thin layers (<100mm thick) and light compacting may have to be considered.

Trenches excavated within the alluvial profile are likely to be unstable and battering back the sides to stable angles will be required.

Excavation Characteristics

The profile to a depth of 3m will generally classify as soft excavation. Locally on the flanks of the alluvial zones, medium hard rock sandstones may be encountered. These bands are likely to classify as hard excavation and use of a rock bucket on a suitably sized excavator may facilitate excavation through these lenses.

Excavation trenches will contain surface water and use of dump rock as a pioneer layer may be necessary to act as a capillary brick and ensure relatively dry conditions during pipe laying.

6.2.8 *Rehabilitated Areas*

Profile

Localised areas have been identified where backfill and rehabilitation of open cast areas has occurred. Within these areas, a thin (300mm to 500mm) soil capping cover overlies an end-tipped, loosely to closely packed, angular gravel and boulder rockfill with a sandy matrix. Boulders can be up to 2m x 2m x 2m.

Profile Properties

Due to the nature of placing of the backfill, washout of the fine matrix and consolidation are common. Settlement of fill with time, therefore, can be quite significant and such settlements could result in damage to pipes.

Records of incidences where combustion of the fill has occurred have been recorded and the heat generated from this combustion could result in damage to the pipeline.

Excavation

Excavation with the backfill is likely to classify as soft but allowance for Boulder Excavation Class B should be made due to the large boulders that may be encountered.

7. DISCUSSION

The terrain evaluation and feasibility study of available data and limited field work has indicated that most of the pipelines will be located within a sideslope terrain unit. Within these units, excavation to a depth of 2m is expected to classify as soft and suitable selected pipe backfill could be obtained from the hillwash horizon during excavation.

Excavation and stockpiling of the hillwash material and ferruginised hillwash, typically to a depth of 1,2m, on one side of the excavation should be considered. The material below this depth may contain oversize material and should be stockpiled on the other side of the trench and backfilled as main backfill once the pipes have been covered with the hillwash.

The stability of the trench sidewalls must be assessed as excavation advances. Where the hillwash is about 1m thick and underlain by a ferruginised hillwash / transition near vertical excavations are possible. Where the hillwash is up to 2m to 3m thick, battering the sidewalls will have to be considered as unstable sidewalls will occur in these areas.

The gullywash and alluvial areas will contain very moist to wet soils and unstable sidewalls must be assumed for these units.

Due to the nature of the development of transported and residual soil development and the erosional cycles that have occurred, variations in horizon thicknesses will occur.

The hillwash sand could be considered for use as a selected backfill (with Engineer's approval). This material is present along most sections but over the rhyolite aeras and alluvial and gullywash importing hillwash or suitable material will be required.

Within the gullywash unit and particularly the alluvial zones the base of the excavations are likely to be wet and consequently a pioneer dump rock layer may need to be considered.

Once the routes have been finalised, a detailed geotechnical investigation may be required to evaluate:

- rock exposures.
- excavation characteristics along the route and
- the soil properties with regard to selected backfill and granular backfill.

Granular backfill may have to be imported, if required, as the soil horizons and properties along the routes are unlikely to satisfy granular bedding requirements.

BRYAN ANTROBUS
for Jones & Wagener

2 September 2008

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DOUGLAS TAVISTOCK JOINT VENTURE

MIDDELBURG WATER RACLAMATION PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT

DRAFT SCOPING REPORT

Appendix H

MIDDELBURG MINE WATER TREATMENT PLANT: FLORAL ASSESSMENT

(Strategic Environmental Focus, 2008)

MIDDELBURG MINE WATER TREATMENT PLANT: FLORAL ASSESSMENT

SEF Ref No. 502018

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STRATEGIC ENVIRONMENTAL FOCUS

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EXECUTIVE SUMMARY

BHP Billiton Energy Coal South Africa (BECSA) is in the process of conducting a feasibility study into the construction and operation of a 25 Ml/d water treatment facility to be located on Middelburg Mine North Section. A component of the study is to determine the environmental impacts associated with the implementation of this project to ultimately determine the feasibility thereof. Strategic Environmental Focus (Pty) Ltd was tasked by Jones and Wagener (Pty) Ltd to undertake an ecological assessment of the Option 1 and Option 2 as well as the proposed pipeline routes.

This report focuses on the floral assessment segment of the ecological study and is supplementary to the wetland and faunal assessment. The purpose of this floral study was to assess the floral sensitivity of the sites and the possible pipe line routes and to inform the design of the planned project accordingly. This entailed the following:

1. Identification of the regional vegetation expected to occur on the sites;
2. Identification of the vegetation found on the sites;
3. Assessment of the status of the vegetation found on the site; and
4. Classification of the vegetation sensitivity of the sites and pipeline routes.

The regional vegetation that occurs in the Middelburg Mine area is Rand Highveld Grassland and Eastern Highveld Grassland. The wetland systems that occur in this region are known as the Eastern Temperate Freshwater Wetlands.

Rare and endangered species in grasslands are mostly small, very localised and visible for only a few weeks in the year when they flower. The probabilities of occurrence for these plants were based on on-site observations, distribution data and information gathered with regards to the area.

All water bodies and their associated buffers are classified as being of High Sensitivity. The high biodiversity found in rocky grassland habitats allowed for the whole of Option 2 to be classified as an area of High Sensitivity. Also, a substantial portion of Option 1 comprises primary grassland, which along with the pan and wetland vegetation is classified as an area of High Sensitivity.

Disturbances in and around the wetland on Option 1 had lead to the degradation of the grassland vegetation found there. This resulted in numerous exotic and pioneer species colonising the wetland area. Although this grassland is not in a pristine state, it nonetheless contributes to the health and functionality of the wetland and is classified as areas of High Sensitivity.

The eastern boundary of Option 1 is greatly transformed by pioneer plants such as *Seripheum plumosum* (Bankrupt Bush). The disturbance increases towards the south-

eastern corner where stands of *Eucalyptus* species (Bluegum) and *Acacia mearsnii* (Black Wattle) trees were found. Just east of the alien bush clumps, were fields of planted grazing. Little to no herbaceous species occurred here. These areas are classified as being of Low Sensitivity and could be used for the proposed project.

Due to the sensitivity of Option 2 and sensitive areas within Option 1, this report recommends that the disturbed areas of low sensitivity on Option 1 be utilised for the construction of the water treatment plant. However, the disturbed portion is in close proximity of highly sensitive areas and if construction takes place within the disturbed areas, it should be subjected to stringent mitigation measures as set out by this report as well as the faunal and wetland delineation report.

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1. INTRODUCTION

BHP Billiton Energy Coal South Africa (BECSA) is in the process of conducting a feasibility study into the construction and operation of a 25Ml/d water treatment facility to be located on Middelburg Mine North Section. This water treatment facility will treat all excess mine water produced by both Middelburg Mine Services (MMS) and Douglas Colliery (known as the Douglas Middelburg Optimization (DMO) project - BESCA) as well as mine water supplied from Bank /Goedehoop Colliery (Anglo Coal). The water will be treated to catchment standards for release into the catchment and/or to drinking water standard to supply to local users (Steve Tswete Municipality and neighboring mines).

Middelburg Mine Services proposed two possible localities for the construction of the water treatment plant. The localities are identified as Option 1 and Option 2. The pipeline route is envisaged to follow existing road reserves and railway reserves where possible. For the purpose of this report the pipeline route is separated into the two dirty water pipelines portrayed by their respective starting points: Douglas and Klipfontein dirty water pipeline and the resulting clean water pipelines to the Municipal Reservoir (Reservoir pipe line). The areas of investigation (water reclamation plant, waste disposal site and pipeline routes) however will be finalised during the definition phase of the project.

2. BACKGROUND AND TERMS OF REFERENCE

As part of the study, it was necessary to determine the environmental impacts associated with the implementation of this project to ultimately determine the feasibility thereof. Strategic Environmental Focus (Pty) Ltd was tasked by Jones and Wagener (Pty) Ltd to undertake an ecological assessment of Option 1 and Option 2 as well as the proposed pipeline routes. This report focuses on the floral assessment segment of the ecological study and is supplementary to the wetland and faunal assessment. The purpose of this floral study was to assess the floral sensitivity of the sites and the possible pipeline routes and to inform the design of the planned project accordingly. This entailed the following:

1. Identification of the regional vegetation expected to occur on the sites;
2. Identification of the vegetation found on the sites;
3. Assessment of the status of the vegetation found on the site; and
4. Classification of the vegetation sensitivity of the sites and pipeline routes.

3. BACKGROUND INFORMATION

3.1 Location

Middelburg Mine is situated adjacent to the R 575 in the Mpumalanga Province in close proximity (± 20km) of the towns of Witbank (Emelanghleni) and Middelburg. The mine falls within the 2529CD, 2529DC and 2629AB quarter degree squares and the proposed project involve the following farms: Goedehoop 315 JS, Hartbeesfontein 339 JS, Klipfontein 316JS, Driefontein 338JS and Rietfontein 314JS.

Option 1 is located on the farm Goedehoop, adjacent to the R 575 to Van Dyksdrif (Figure 1). Option 2 is also situated within Goedehoop North, adjacent to the Goedehoop dam (Figure 1).

The Pipeline routes are as follows:

Route A: Douglas route to Option 1: The dirty water pipeline originates on the property of Douglas Colliery and enters Middelburg Mine at the south western corner. The pipeline trails the R575 in the existing road- and railway reserve. The reserves comprise mostly alien invasive vegetation and disturbed grasslands crossing two drainage systems, HGM 6 and 7, en route to the water treatment plant on Option 1, adjacent to the R575.

Route B: Douglas route to Option 2: The dirty water pipeline follows the same route as route A, but from Option 1 the pipeline turns east, crossing over the Niekerkspruit and Spookspruit before the route amalgamates with the Klipfontein pipeline and continues northwards through invasive *Acacia mearsnii* (Black Wattle) plantations towards Option 2 (Figure 1).

Route C: Klipfontein route to Option 1: The dirty water pipeline route starts at the Klipfontein North Section (Middelburg Mine) adjacent to the Bethal Road (R35) and is proposed to run within the existing reserve of the coal conveyer in a westerly direction towards Option 1.

Route C and B: Klipfontein route to Option 2: The dirty water pipeline route starts at the Klipfontein North Section (Middelburg Mine) adjacent to the Bethal Road (R35) and is proposed to run within the existing reserve of the coal conveyer in a westerly direction (Route C). The route amalgamates with the Douglas pipeline and continues northwards through invasive *Acacia mearsnii* (Black Wattle) plantations towards Option 2 (Route B) (Figure 1).

Route D: Reservoir Pipeline from Option 1

The clean water pipeline aligns within the road reserve of the R575 northwards. The adjacent properties are private land. The pipeline crosses over the Spookspruit and a tributary of the Spookspruit before the N4 Highway to reach the Municipal Reservoir.

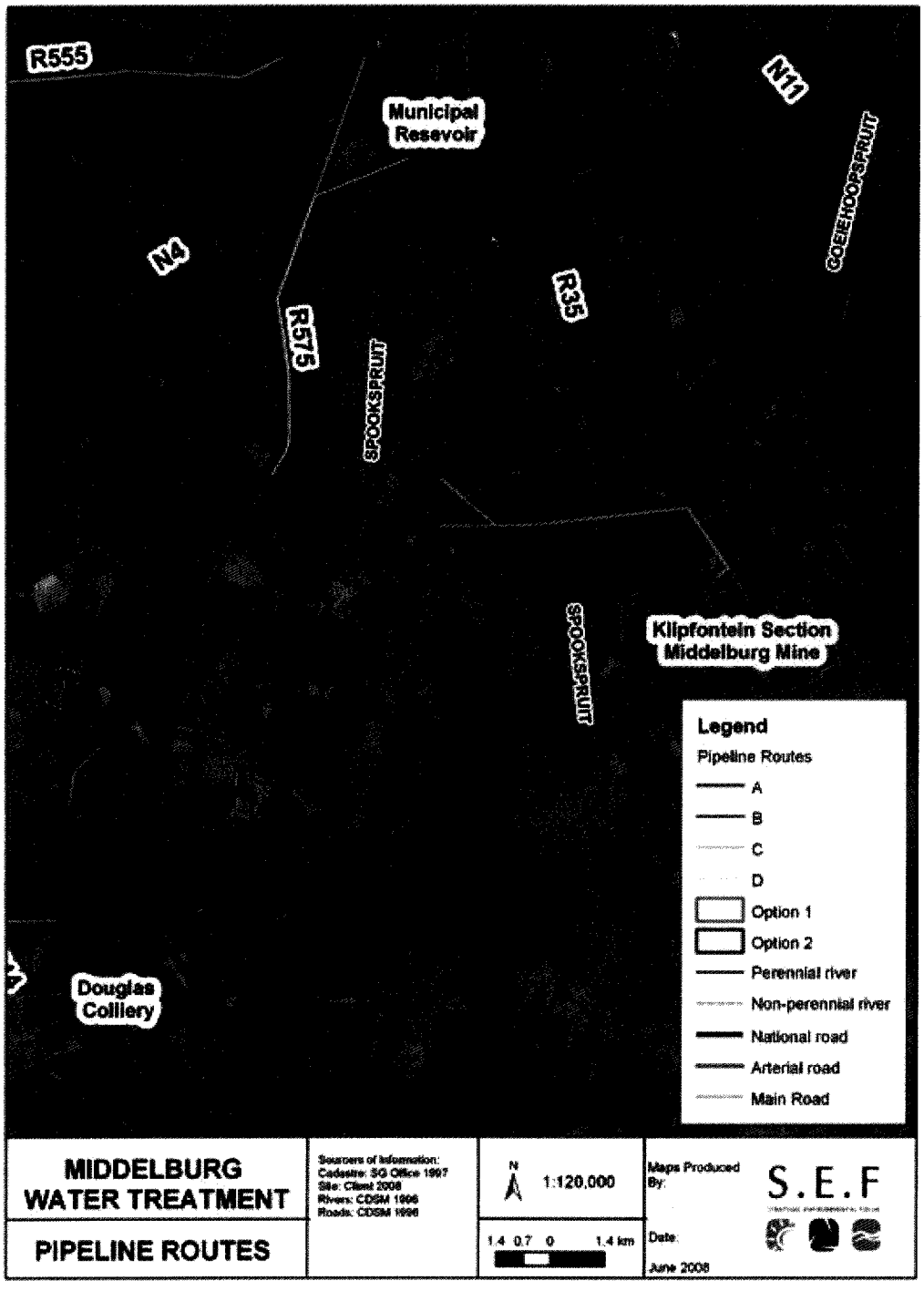


Figure 1: Site locality

Reservoir Pipeline from Option 2
Not specified yet.

3.2 Land Use

The land use is classified as vacant, cultivated, quarries and mining with wetlands and exotic plantations scattered throughout the region (DEAT, 2001). Option 1 comprises a pan, wetland, grazed grassland and exotic plantations, while Option 2 is largely characterised by relatively intact rocky grassland.

The pipeline routes are proposed to predominantly utilise existing road, railway and coal conveyer belt reserves. The reserves are either mowed, used for grazing, disturbed by mining activities or comprise a great number of exotic plant species. However, portions of the route cross water systems of which some are artificial water systems of MMS.

3.3 Biophysical Description

3.3.1 Climate

Mpumalanga Province experiences summer rainfall and very dry winters with frost. Temperature ranges between an average high of 34 °C and a low of 8°C. Rainfall is on average 710 mm per year (South Africa Weather Service, 2008).

3.3.2 Landscape features and soil

The landscape of the site is characterised by moderately undulating plains, with some low hills and pan depressions. There are several non-perennial rivers around the site, as well as various water bodies including a non-perennial pan on Option 1. The perennial Spookspruit River flows through the site and intersects the proposed pipeline route to the municipal reservoir in the North (Department of Environmental Affairs and Tourism (DEAT), 2001).

The site includes plinthic and red soils (DEAT, 2001). Plinthic soils contain high-chroma mottles and concretions (often with black centres). This takes place in zones periodically saturated with water (Soil Classification Working Group, 1991). Plinthic soils are thus associated with wetland conditions (Soil Classification Working Group, 1991).

3.3.3 Regional vegetation

The study site falls within the Grassland Biome (Rutherford & Westfall, 1994). High summer rainfall characteristic of the Grassland Biome combined with dry winters with night frost and marked diurnal temperature variations are unfavourable to tree growth. The Grassland Biome therefore comprises mainly of grasses and plants with perennial underground storage organs, for example bulbs and tubers and less trees.

The Grassland Biome can be divided into smaller units known as vegetation communities. Acocks (1988) described the vegetations of the regions as Bakenveld and more recently the regional vegetation was classified as Rand Highveld Grassland and Eastern Highveld Grassland (Mucina & Rutherford, 2006). The wetland systems that occur in this region are classified as the Eastern Temperate Freshwater Wetlands (Mucina & Rutherford, 2006).

Rand Highveld Grassland and Eastern Highveld Grassland are poorly conserved vegetation communities with much of its area transformed by cultivation, grazing, and mining. Where disturbances occur, the invasive exotic tree *Acacia mearnsii* (Black Wattle) can become dominant and displace the natural vegetation. Due to the extensive usage of the areas covered by the endangered Rand Highveld Grassland and Eastern Highveld Grassland vegetation types, the remaining portions are of high conservation value and sensitivity and are thus classified as endangered vegetation communities (Mucina & Rutherford, 2006).

The Eastern Temperate Freshwater Wetlands occur in flat landscapes or shallow depressions filled with water. The water bodies contain aquatic zones and outer parts with hygrophilous vegetation of temporary flooded grasslands (Mucina & Rutherford, 2006).

According to Emery *et al* (2002), of the 20 Acocks vegetation types in Mpumalanga, 17 are under-conserved, with the grasslands having less than 5% of their area conserved. The grassland communities are under the most strain of anthropogenic activities, which places emphasis on the importance of grasslands within Mpumalanga and their need for conservation (Emery *et al*, 2002). The study site comprises Bakenveld which is rated as having high sensitivity and importance (Figure 2).

Although mines and quarries are one of the smallest physical transformers of the vegetation communities and contributed just more than two percent to transformation in the Bankenveld, they do however have a much larger and less obvious effect on the surrounding communities through air, soil, water and noise pollution (Macdonald, 1991).

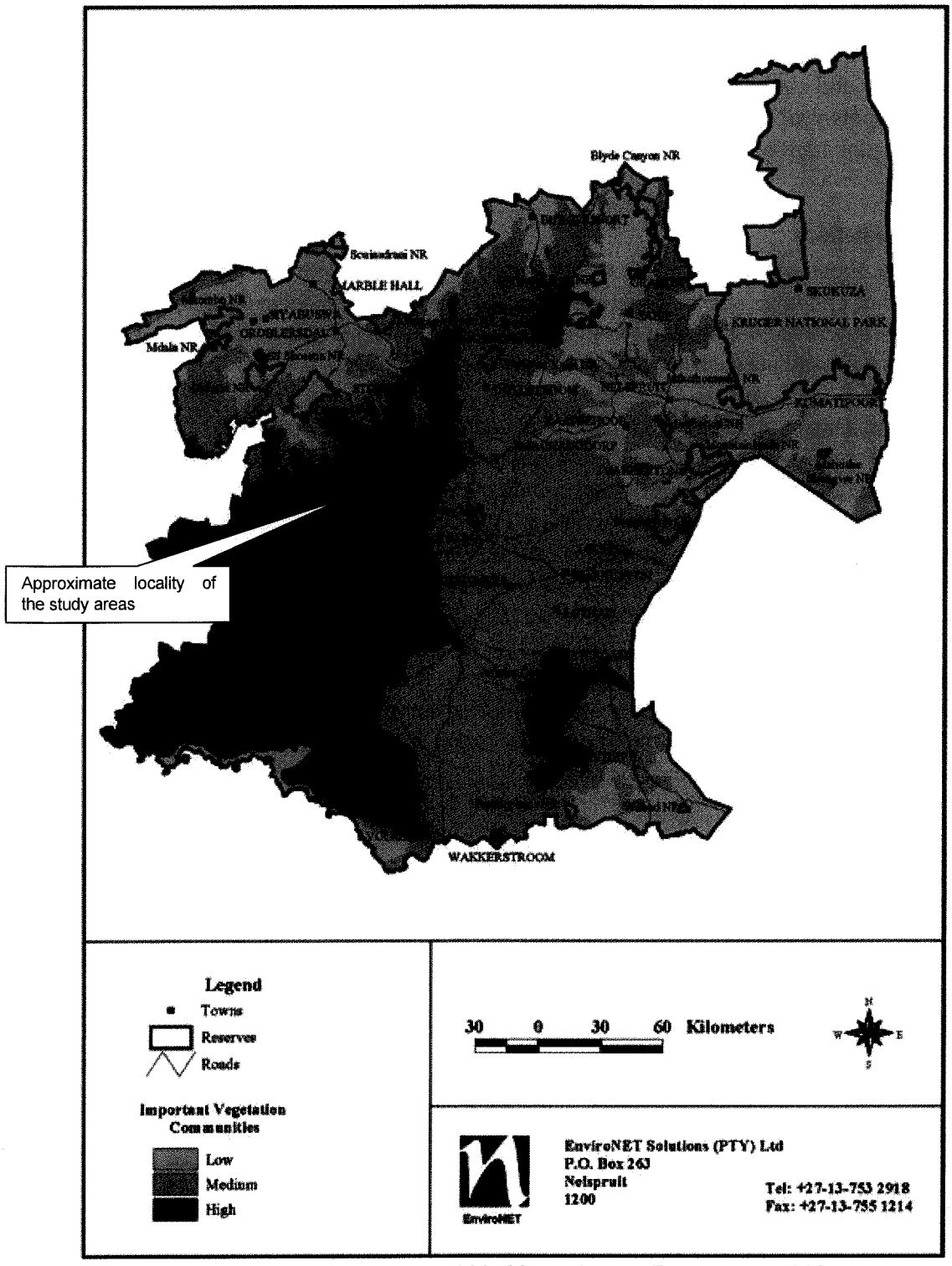


Figure 2: Importance of the Bakenveld in Mpumalanga (Emery *et al*, 2002).

4. STUDY APPROACH

The study was undertaken over a 5 day period from 21-25 April 2008. The floral assessment and sampling was mainly focussed onOption 1 and Option 2 earmarked for the development of the Water Treatment Plant. One day was allocated to survey the pipeline routes from accessible roads.

4.1 Limitations

In order to obtain a comprehensive understanding of the dynamics of communities and the status of endemic, rare or threatened species in an area, ecological studies should ideally be replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible.

The floral assessment was based on the proposed pipeline route as received from Jones & Wagener. Any severe deviations from this route can not be assessed by the outcome of this report. A number of portions along the pipeline routes were inaccessible due to open cast mining activities and observations thus depended on what could be viewed from accessible roads. Some portions of the proposed pipeline routes are not on the Middelburg Mine properties and some portions were already assessed during previous biological assessments (Natural Scientific Services, 2006).

Rare and endangered species in grasslands are mostly small, very localised and visible for only a few weeks in the year when they flower (Ferrar & Lötter, 2007). The probabilities of occurrence for these plants were based on distribution data and information gathered with regards to the area.

4.2 Assumptions

It was assumed that no Red Data species would occur on areas currently disturbed by open cast mining activities or rehabilitated land.

5. METHODOLOGY

5.1 Literature surveys

The description of the regional vegetation relied on literature from Acocks (1988), Emery *et al*, (2002) and Mucina & Rutherford (2006). Plant names follow Palgrave (1992), Van Wyk & Van Wyk (1997), Van Wyk & Malan (1997), Pooley (1998), Henderson (2001), Van Oudtshoorn (2002) and Schmidt *et al* (2002).

A list of threatened flora in Mpumalanga was derived from the Mpumalanga Biobase (Emery *et al*, 2002) This, along with the national list of Red Data floral species, was used as a guide to determine the presence and possibility of occurrence of these species on

the study sites. Additionally, a list of threatened plant records for the relevant quarter degree squares were obtained from the Mpumulanga Parks Board.

5.2 Field surveys

Images obtained from Jones and Wagener (Pty) Ltd. and topographical maps (scale: 1:50 000) were used to delineate relatively homogeneous units within the study area. The maps indicated that large areas of the site are currently subjected to open cast coal mining activities. Option 1 and Option 2 are largely situated in areas that house natural vegetation that could be separated into homogenous units. The chosen units were then surveyed by means of sampling plots. Sample plots of 10 x 10m were laid out in each of these homogenous units and species cover abundance was recorded according to the Braun-Blanquet cover abundance scale (Brown & Bezuidenhout, 2000; Appendix A). The size of the sample plots was determined by plotting a species accumulation curve by means of nested sampling plots as described by Barbour *et al* (1987; Appendix A).

Data was analysed using the computer programme Mosaic 3.01 (Smith, 2006). This allows for objective descriptions of vegetation communities. Descriptions regarding the methodology used during the assessment can be found in Appendix A.

Transects were walked within the perceived natural habitat types on the site, concentrating on moving through environmental gradients encountered within the vegetation type in order to identify species and communities. This was continued until few to no new species were encountered. Any additional information on any other feature thought to have ecological significance within the site, such as soil type, altitude, erosion, rocky cover, alien/exotic/invasive plants as well as Red Data species and/or their habitat were also recorded.

6. SITE SENSITIVITY

6.1 Sensitivity mapping and conservation importance of the study site

Based on the findings of the report and the following criteria, sensitive habitat or areas of conservation importance are classified on the basis of:

Ecological Sensitivity

The ecological sensitivity for each habitat was determined from two criteria; the ecological function and its conservation importance. These are defined as follows:

1. **Ecological Function:** The ecological function describes the intactness of the structure and function of an ecosystem in terms of the relationship between plant and animal assemblages and the surrounding abiotic environment. It also refers to the degree of ecological connectivity between systems within a landscape.

Therefore, systems with a high degree of landscape connectivity among each other are perceived to be more sensitive.

High – Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems that are considered important for the maintenance of ecosystem integrity. Most of these systems represent late succession ecosystems with high connectivity with other important ecological systems.

Medium – These systems occur at disturbances of low-medium intensity and representative of secondary succession stages with some degree of connectivity with other ecological systems.

Low – Degraded and highly disturbed systems with little ecological function.

2. **Conservation Importance:** The conservation importance of the site gives an indication of the necessity to conserve areas based on factors such as the importance of the site on a national and/or provincial scale and on the ecological state of the area (degraded or pristine). This is determined by the presence of a high diversity, rare or endemic species and areas that are protected by legislation. The criteria are defined as follows:

   High –Ecosystems with high species diversity and usually provide suitable habitat for a number of threatened species. These areas should be protected.

   Medium – Ecosystems with intermediate levels of species diversity without any threatened species.

   Low – Areas with little or no conservation potential and usually species poor (most species are usually exotic).

7. RESULTS:

Option 1 and Option 2 for the water treatment plant were surveyed. The vegetation and ecological features found on the site were compared to the desktop analysis of the regional vegetation and weighed according to the above mentioned sensitivity ratings.

7.1 Vegetation communities present on Option 1:

Option 1 comprises grassland which encloses a pan, wetland and an alien bush clump (Bluegum and Wattle trees). During the site visit, four (4) homogenous vegetation units were identified within which the Braun-Blanquet sample plots were undertaken. The different communities were similar with regards to species composition, ecological features or evidence of disturbance (e.g. overgrazing).

During the site visit, a total of 34 plots were sampled within the above mentioned vegetation communities on Option. For the purpose of sampling, the units were labelled as follows:

A – Grassland;
AD – Disturbed grasslands (including alien bush clumps);
P – Vegetation surrounding the pan; and
WL – Hydrophilic vegetation in and around the wetland.

A correspondence analysis resulted in the cluster diagram depicted in Figure 3. The sample plots that appear close to each other on Axis 1 are more similar with respect to species composition, while Axis 2 indicates the variance within the similar groups (e.g. species that are not in common or discriminant species). The majority of the plots, even though they were visually different from each other, thus have a number of species in common. Plots AD 19, AD 20 and P 33 and P 35 display clear differences in species composition.

Further analyses were done within each perceived vegetation community and indicated that Option 1 could be divided into four (4) vegetation communities. These communities are similar with regards to species composition, ecological features or evidence of disturbance (e.g. overgrazing). The vegetation communities are described as follows and their extent illustrated in Figure 4:

1 Hydrophilic vegetation (wetland and pan);
2 Primary grassland;
3 Disturbed grassland; and
4 Alien invasive bush clumps.

Sampling points are depicted in Figure 5.

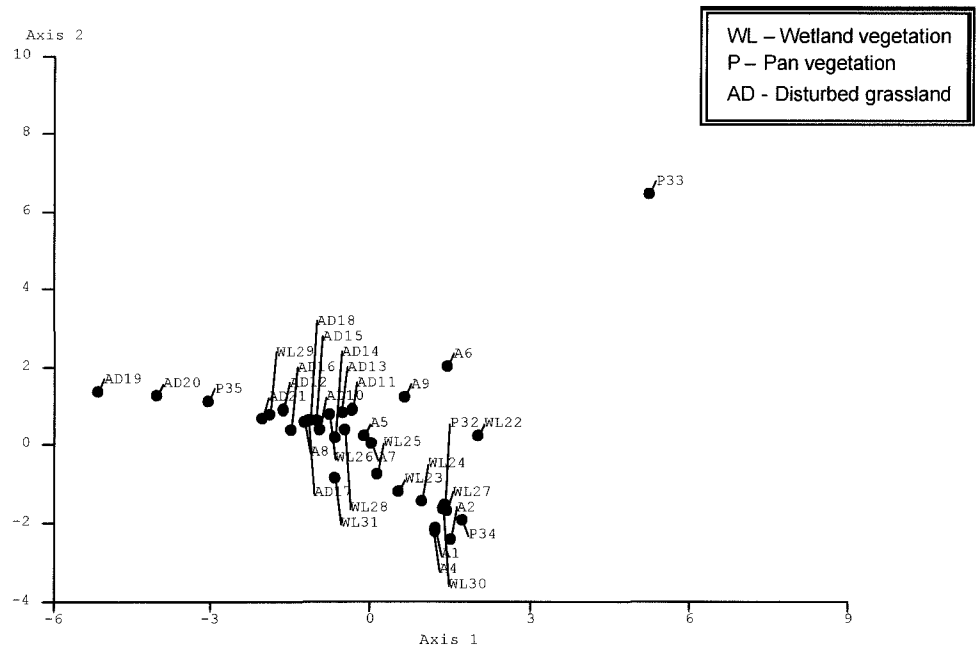


Figure 3: Cluster diagram of data obtained from Option 1

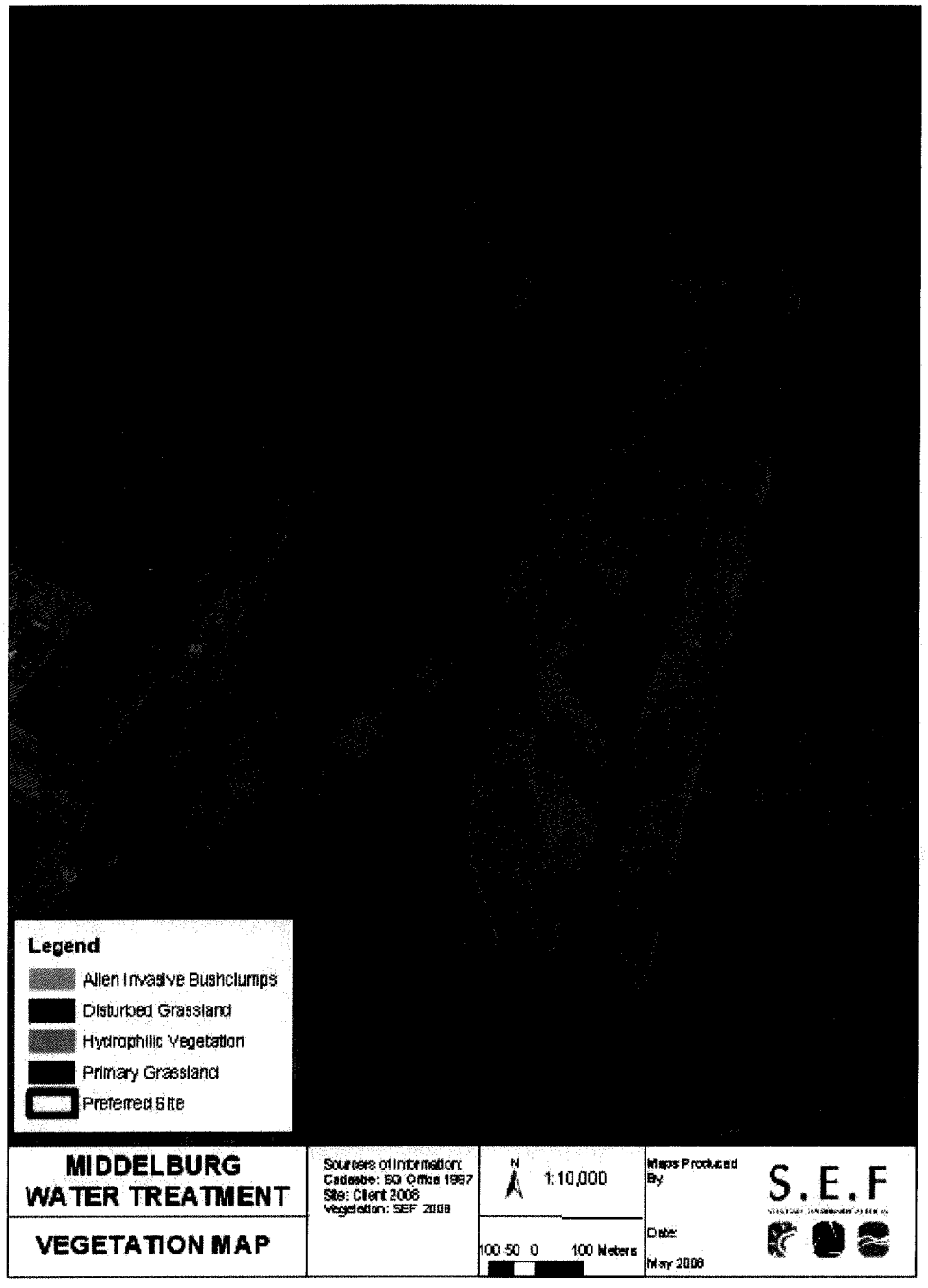


Figure 4: Vegetation Map for Option 1

Figure 5: Vegetation sample points for Option 1

7.1.1 Hydrophilic Vegetation Community

The south-western corner of the site displayed hydrophilic vegetation such as *Miscanthus junceus* (Sedge-leaved Broom Grass), *Mariscus congestus, Cyperus species, Nidorella anomala* and *Berkeya setifera* (Rasperdisseldoring). Historically, this wetland was dammed and various disturbances occurred. The wetland currently encompasses a small dam and seeps along the western boundary of the site (Strategic Environmental Focus A, 2008).

The multivariate data analysis for the sample plots in and around the perceived wetland area created a cluster diagram as represented by Figure 6. The sample plots indicated by WL 22, 23, 27 and 31 are closely related with regards to species composition. These sample plots were situated in visibly moist soils and have species such as *Miscanthus junceus* (Sedge-leaved Broom Grass), *Setaria pallida-fusca* (Garden Bristle Grass) and *Centella asiatica* (Marsh Pennywort) in common. Sampling of the wetland-area was complex as various disturbances occurred within the wetland such as dumping of soil within the wetland and the damming thereof. The result was that zoning did not follow an easily recognisable pattern from wetland conditions to terrestrial vegetation (Strategic Environmental Focus A, 2008).

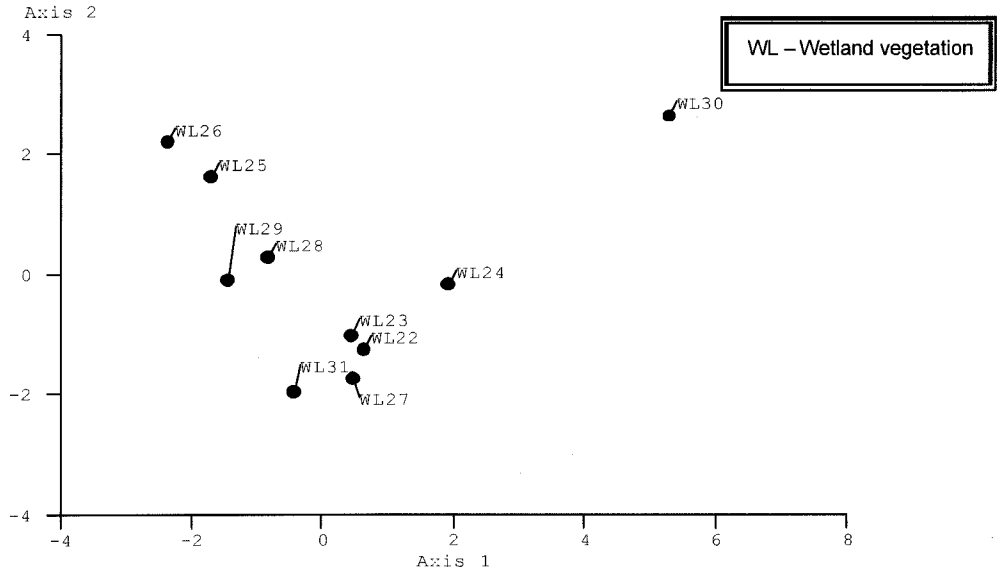
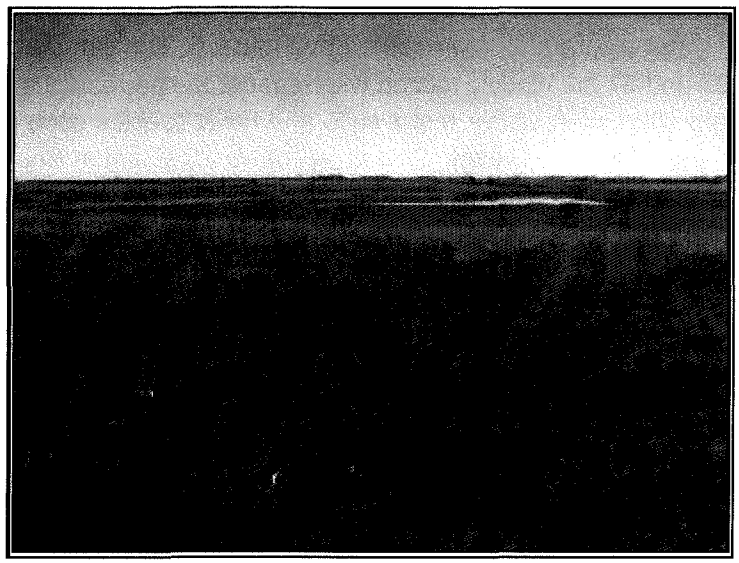


Figure 6: Cluster diagram of data sourced from the wetland area.

Sample plots WL 28-29 were both situated at the edges of the wetland, while WL 25 and WL 26 housed more terrestrial species such as *Hyparrhenia hirta* (Common Thatching Grass) and the forb *Hypoxis hemerocallidea*. Sample plot WL 30 was situated within submerged conditions and comprised large numbers of *Cyperaceae, Leersia hexandra* (Rice Grass) and *Eragrostis racemosa* (Narrow-heart love grass). The dam-area further housed sedges such as *Schoenoplectus corymbosus* and water loving grasses such as

Aristida junciformis (Gongoni Three-awn) and the exotic invasive *Persicaria* species (Knotweed/ Snakeroot).

The north-eastern portion of Option 1 contained a perennial pan (Photograph 1). The edges of the pan were inhabited by hydrophilic vegetation such as *Aristida junciformis* (Gongoni Three-awn), *Cyperus* spesies, *Leersia hexandra* (Rice Grass) and *Haplocarpa scaposa* (Tonteldoosbossie). Numerous grasses found around the pan further indicate moist soil conditions.



Photograph 1: The non-perennial pan on Option 1

When the multivariate data of the pan and wetland areas are analysed together within a cluster diagram (Figure 7), it can be concluded that both the areas share common species, although their full species composition differ. This can be explained by the historical disturbances within the wetland area that allowed various alien and pioneer species to inhabit this wetland-area.

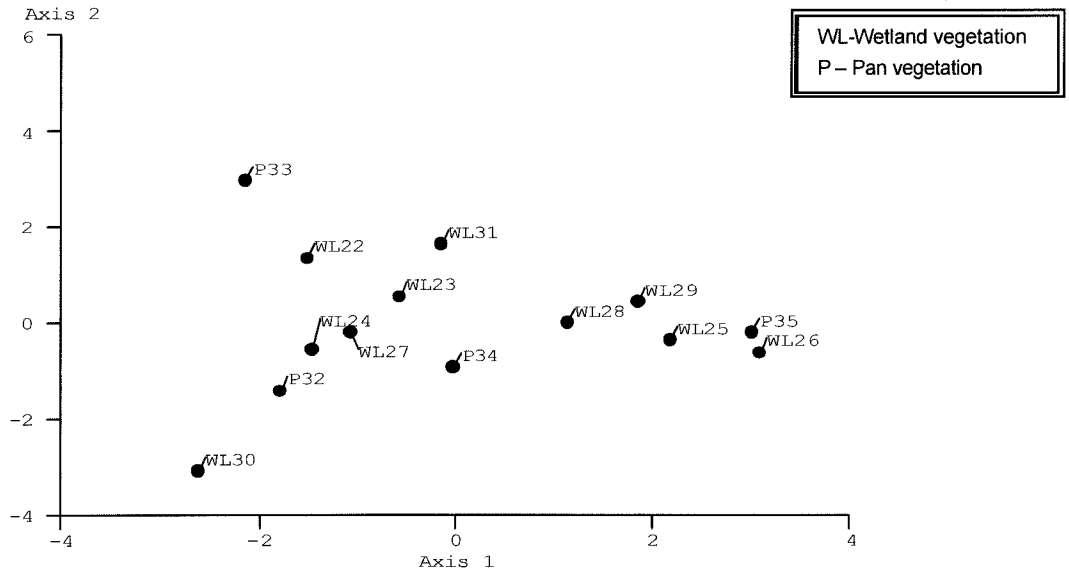


Figure 7: Cluster diagram of the hydrophilic vegetation

Mining activities are widespread in the Mpumalanga Province. According to Ferrar & Lötter (2007), opencast mines can totally destroy pans. The usage of water from or close to wetlands can lower the water table and this decrease the period of inundation in wetlands and pans. Furthermore, the wetlands and pans could be contaminated by acid mine drainage or local mine runoff. Although wetlands could improve the polluted water quality, it reduces the wetlands potential to purify water over the long term. Furthermore the dam and the pan, like the wetland, contained a high number of *Leersia hexandra* (Rice Grass). This grass is host to the endangered Red Data butterfly *Metisella meninx* (Marsh Sylph). Although the butterfly was not observed during the site visit, this specie always occurs in association with hydromorphic grass and sedge wetlands containing its host plant, *Leersia hexandra.* Thus, although *Metisella meninx* (Marsh Sylph) was not observed during the site visit, ideal habitat exists on the site. Previous ecological reports done in this area (Natural Scientific Services, 2006) confirmed the occurrence of the Marsh Sylph on the Goedehoop property. The water bodies were not particularly species-rich, however the surrounding tall grasses such as *Themedia triandra* (Red Grass), *Hypperrhenia hirta* (Common Thatching Grass) and *Setaria spachelata* (Bristle Grass) offered ideal habitats to protected faunal species such as *Tyto capensis* (Grass Owl) and *Pyxicephalus adspersus* (Giant Bull Frog) (Barnes, 2000; Minter *et al* 2004).

Due to its ecological functionality, the hydrophilic vegetation associated with the pan, dam and wetland is considered to be of high sensitivity. Although no protected plants were expected to grow here, the vegetation surrounding the wetlands, dam and pan play an important role in water catchments, assimilation of phosphates, nitrates and toxins as well as flood attenuation. Furthermore, the Mpumalnga Biobase (Emery *et al*, 2002) described wetlands as one of the most valuable ecosystems in the world and that all activities that impact on the functionality of wetlands in this area are prohibited to take place within a 30 meter buffer from the wetlands.

7.1.2 Primary Grassland Vegetation Community

Grassland extends from the pan in the north-eastern portion of the study site to the wetland in the south western corner. Although this grassland has been subjected to grazing in the past, a great number of forbs are still present. The high number of forbs encountered through much of the grassland signifies that the grassland is still in a healthy state and is considered to be Primary Grassland (Photograph 2). The grassland comprised at least twenty seven (27) grass species and a minimum of forty (40) herbaceous species. The various forb species that were found on Option 1s are indicative of the presence of Rand Highveld Grassland and Eastern Highveld Grassland. Forbs identified included *Dianthus mooienis* (Frilly Dianthus), *Aster harveyanus* (Bloublommetjie), the protected *Boopane distichia* (Poison Bulb), *Gladiolus* specie and the medicinal *Hypoxis hemerocallidea*. The cluster diagram (Figure 8) containing the grassland sample plots show clear similarities between most of the sample plots. Plots indicated by AD were grassland areas that were disturbed by grazing and the resulting establishment of pioneer plans or alien vegetation. These plots are grouped close together on Axis 1 and are discussed under Disturbed Grassland Vegetation Community.

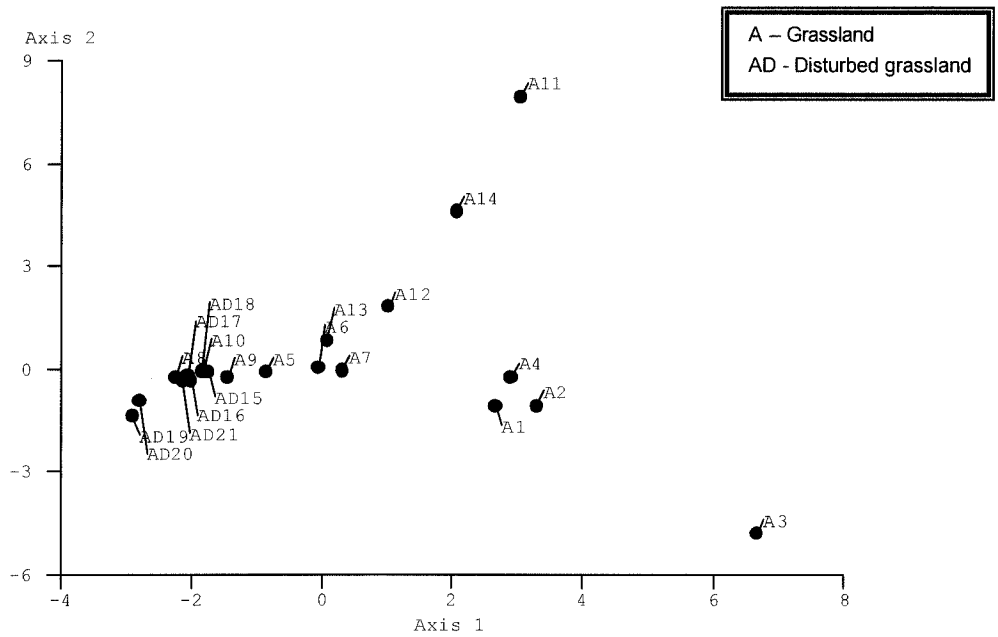


Figure 8: Cluster diagram of grassland sample plots

During the wetland analysis, a number of sample plots (e.g. WL 25) showed significant variation from the grouped sample plots. When these sample plots were compared to that of the grassland, it became evident that these wetland plots were transitional between the wetland and the grassland (Figure 9). The outlier plots from the grassland and the wetland together form the transitional grassland zone between these communities.

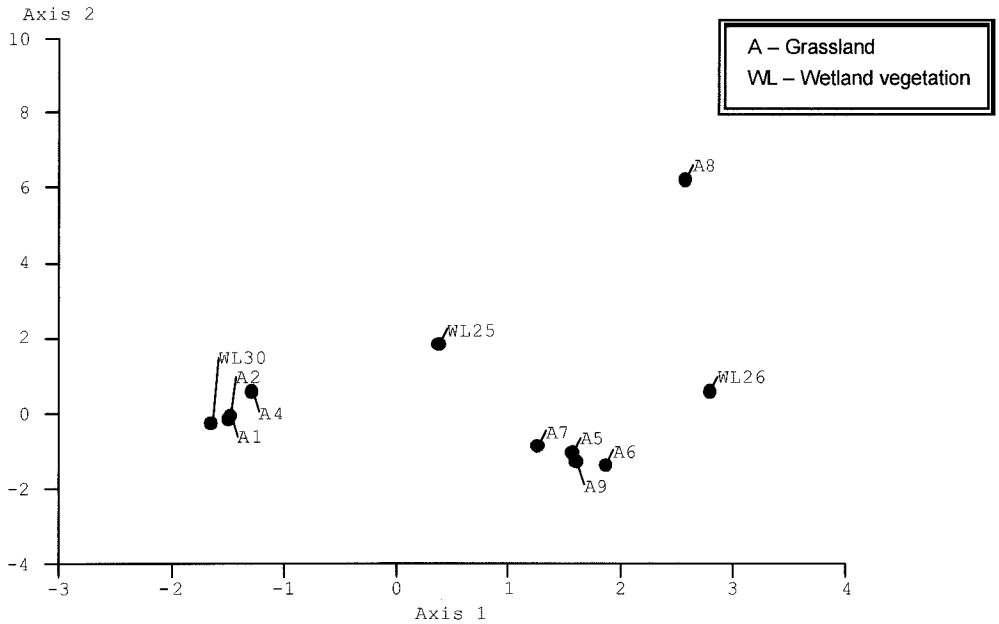
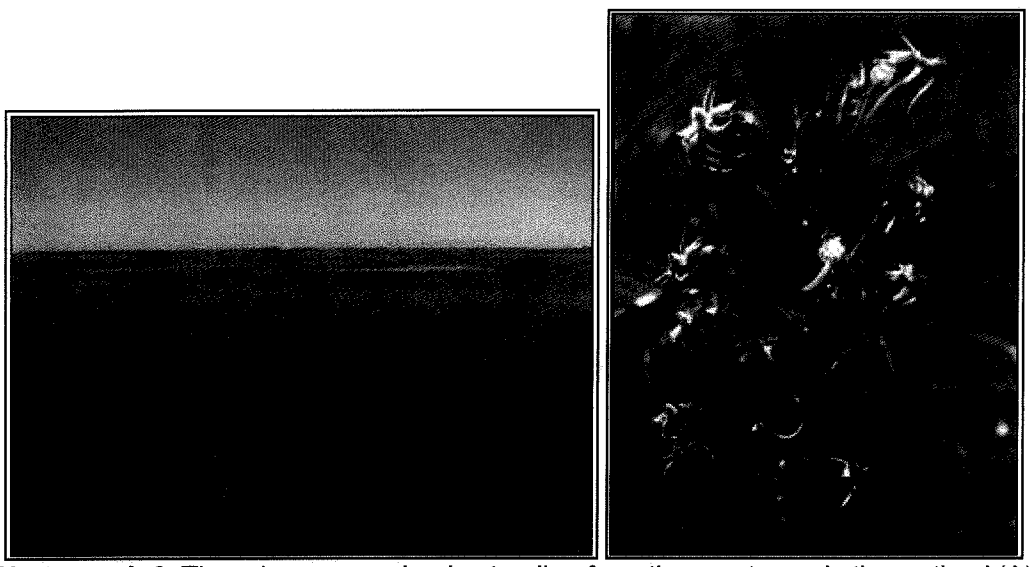


Figure 9: Cluster diagram representing the transitional zones

These zones housed the grass orchid, *Habenaria nyikana*. All plants from the family Orchidaceae are protected in Mpumalanga (Mpumalanga Nature Conservation Act, 1998). The grassland also plays an important role in the health and functioning of the wetlands and housed protected plants. Furthermore, the regional grassland (Rand Highveld Grassland) of this area is endangered and any functional and intact grassland is of high conservation concern. This area is indicated as being of High Sensitivity and should not be impacted upon by the proposed project.



Photograph 2: The primary grassland extending from the pan towards the wetland (A) and the grass orchid *Habenaria nyikana* (B).

7.1.3 Disturbed Grassland Vegetation Community

The disturbance on the site increased towards the southern and south-eastern boundary of the site, where the grasslands displayed signs of severe overgrazing. The pioneer shrub, *Seripheum plumosum* (Bankruptbush) grew abundantly with very few forbs and grass species present. In a sample plot here, *Seripheum plumosum* (Bankrupt Bush) typically covered up to 70% of the sample plot while grasses such as *Monocymbium ceresiliforme* (Boat Grass), *Perotis patens* (Cat's Tail) and *Aristida congesta* (Tassel Three-awn) completed the cover. This area also includes a patch of the exotic and invasive *Pennisetum clandestinum* (Kikuyu Grass). It appears that this grass was planted around a water crib for cattle.

All the perceived disturbed areas are plotted on a cluster diagram in Figure 10. Plots A 19 and A 20 were situated within the alien bush clumps and had *Eucalyptus* species in common, although they differed in the quantity of grass cover. The group of plots clustered together were similar with regards to the abundance *Seripheum plumosum* (Bankrupt Bush) cover (Photograph 3). Plots AD 11- 14 follows a gradient towards the highly disturbed alien bush clumps. The plot AD 11 comprises various grasses and forbs which numbers decline as the plots move closer to the disturbed alien bush clumps.

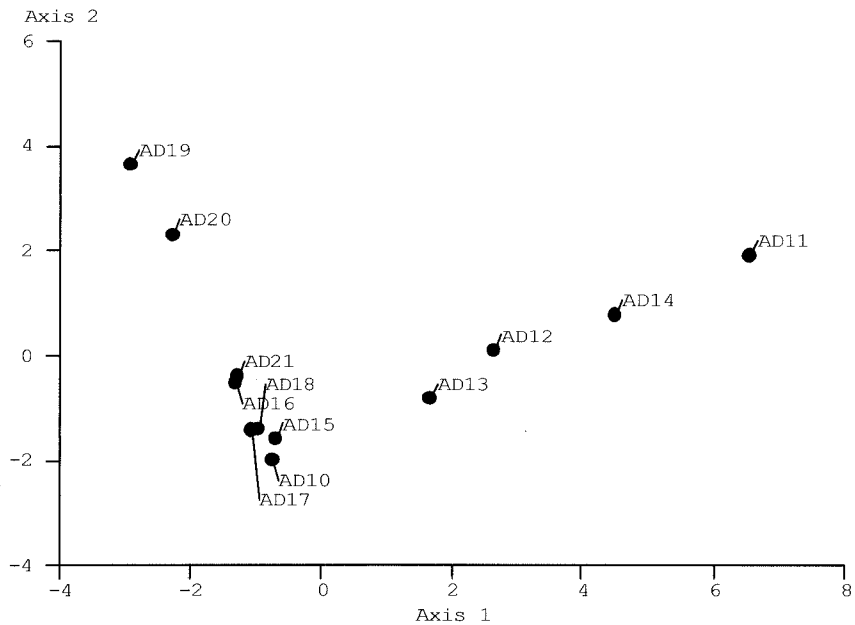


Figure 10: Cluster diagram of disturbed areas.

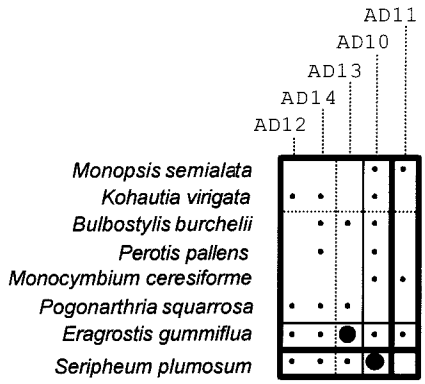
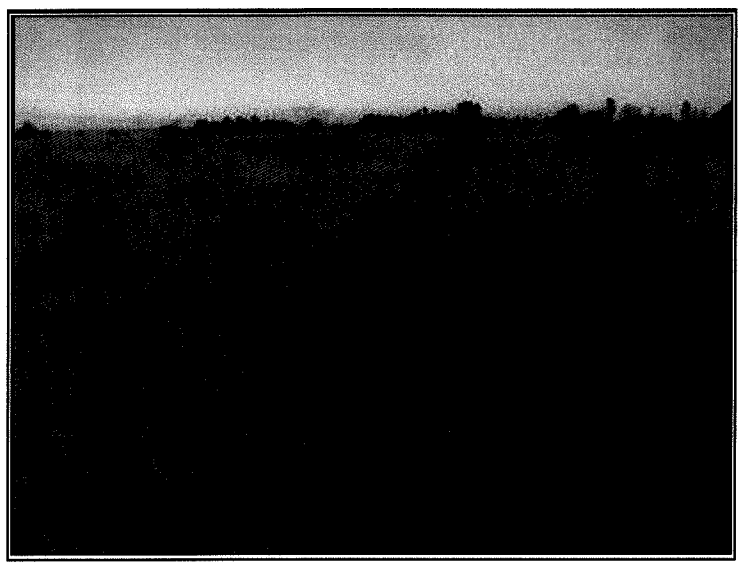


Figure 11: Two-way table depicting the dominant species in the disturbed grassland vegetation

Figure 11 shows the dominant species (dots in the majority of plots) in the disturbed areas to be *Eragrostis gummiflua* (Gum Grass) and *Seripheum plumosum* (Bankruptbush).

No threatened or protected plant species were encountered within this vegetation community and none were expected to grow here. Due to the disturbances, this vegetation community is regarded as being of low sensitivity and low conservation concern. The disturbance gradient increases towards the south-eastern corner of the site where the alien bush clumps were established.



Photograph 3: Dominance of *Seripheum plumosum* (Bankrupt Bush) within the disturbed grassland

7.1.4 Alien Bush Clump Vegetation Community

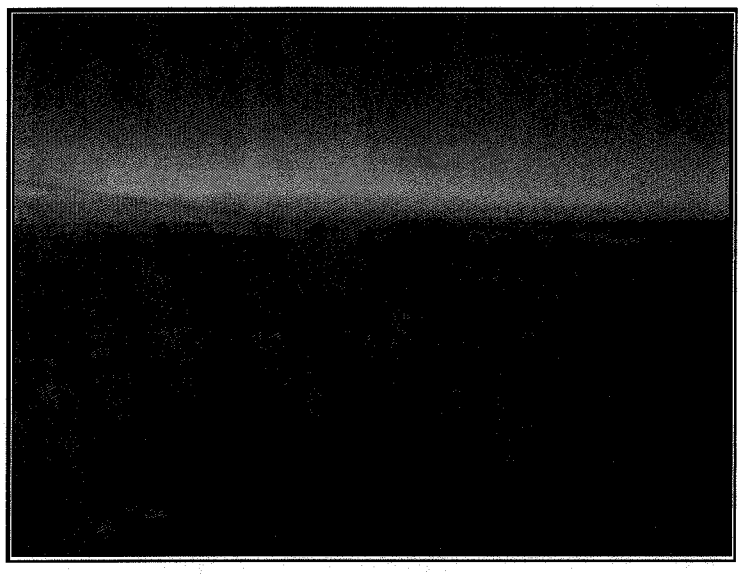
The remainder of the eastern portion of the site comprises of alien invasive bush clumps dominated by *Eucalyptus* species (Bluegum) and *Acacia mearsnii* (Black Wattle). Although an eradication plan seemingly fell and burned the Bluegum and Wattle trees, most of the trees have re-sprouted and are growing profusely (Photograph 4). The sample plots that contained the alien bush clumps characteristically had average cover abundances for Bluegum and Wattle trees of 37,5% and greater. The sample plots also contained grasses that are evident of the disturbed nature of this community and included *Cynodon dactylon* (Couch Grass) and *Eragrostis trichophora* (Hairy Love Grass). Declared weeds and invaders have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems.

East of the alien bush clumps, a large stretch of *Eragrostis chlormelas-Eragrostis curvula* grassland was found. This grassland was planted as grazing and little or no herbaceous plants were found growing here. This reduces the ecological importance of this vegetation community and it is thus regarded as being of low sensitivity.

Photograph 4: Alien bush clumps and *Seripheum plumosum* (Bankrupt Bush) in the foreground

7.2 Vegetation communities present on Option 2

Option 2 comprised relatively homogenous rocky grassland and a small patch of invasive bush clumps (Figure 12). The grassland supported more than fifteen (15) different grass species as well as a minimum of thirty (30) different herbaceous species. A dirt access road passed through the site which was bordered by two dirty water dams to the east. A number of patches within the grassland contained the pioneer shrub *Seripheum plumosum* (Bankrupt Bush), but severe disturbances were not apparent.



Photograph 5: Rocky grassland on Option 2.

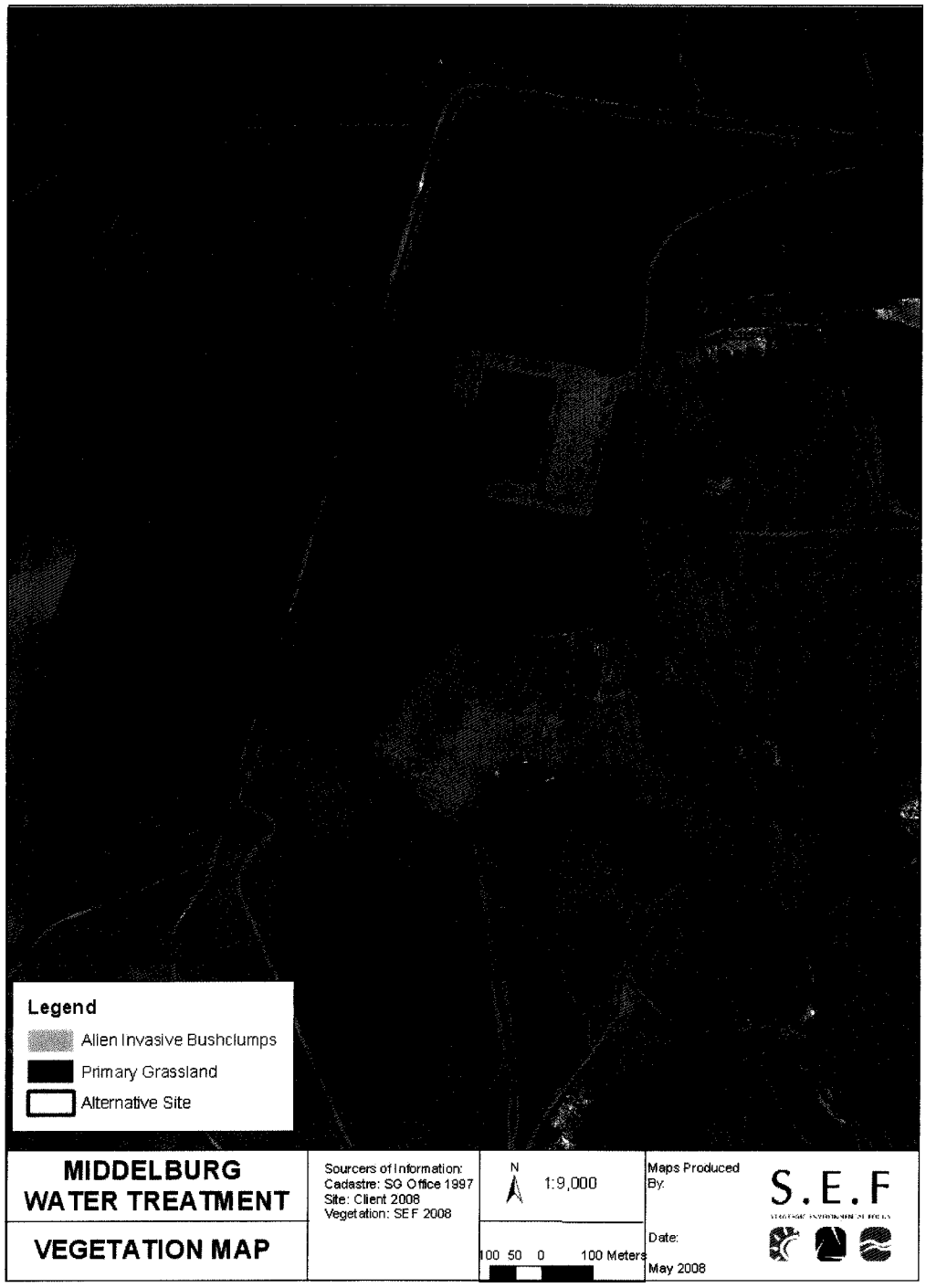


Figure 12: Vegetation communities present on Option 2

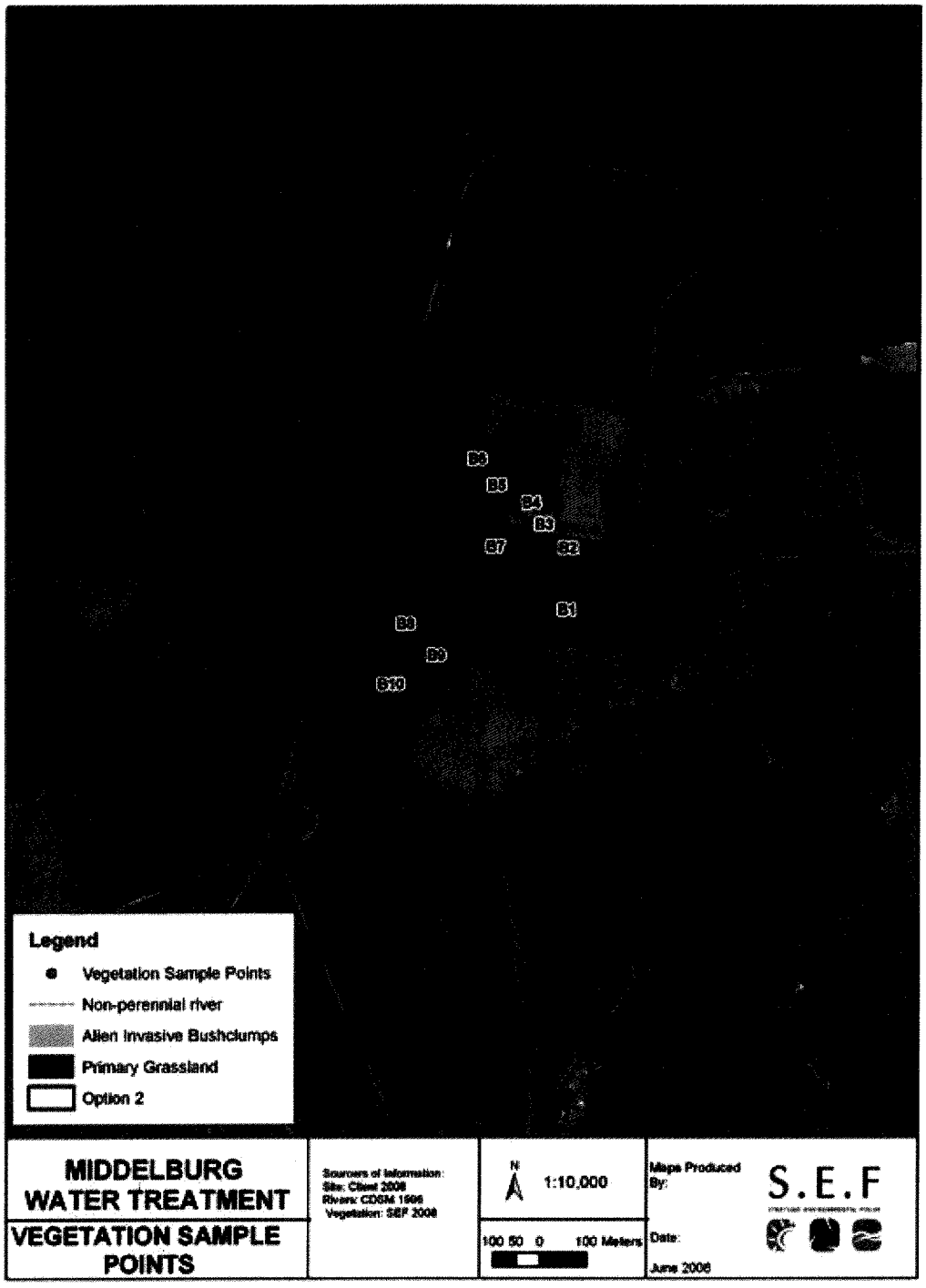


Figure 13: Vegetation sampling points for Option 2

Due to the homogenous nature of the vegetation, only 10 sample plots were surveyed on either side of the dirt road on Option 2 (Figure 13). For the purpose of sampling, the units were labelled as B 1-B10. Figure 14 depict the cluster diagram of the data collect on Option 2 The outlier plots (B2-4) were sampled in the disturbed patches of this grassland. The disturbances were the result of either grazing or alien invasive bush clumps. However, the disturbed portions were small in comparison to the extent of Option 2 The sample plots on Option 2 had numerous species in common which included grasses such as *Heteropogon contortus* (Spear Grass) and *Cymbopogon excavatus* (Broad-leaved Turpentine Grass). The healthy forb population included medicinal *Hypoxis* species, *Alectra sessiliflora* (Verfblommetjie), *Aster harveyanus* (Bloublommetjie), *Hermanna transvaalensis*, the protected *Boopane distichia* (Poison Bulb) and *Hypericum lalandii* (Spindly Hypericum).

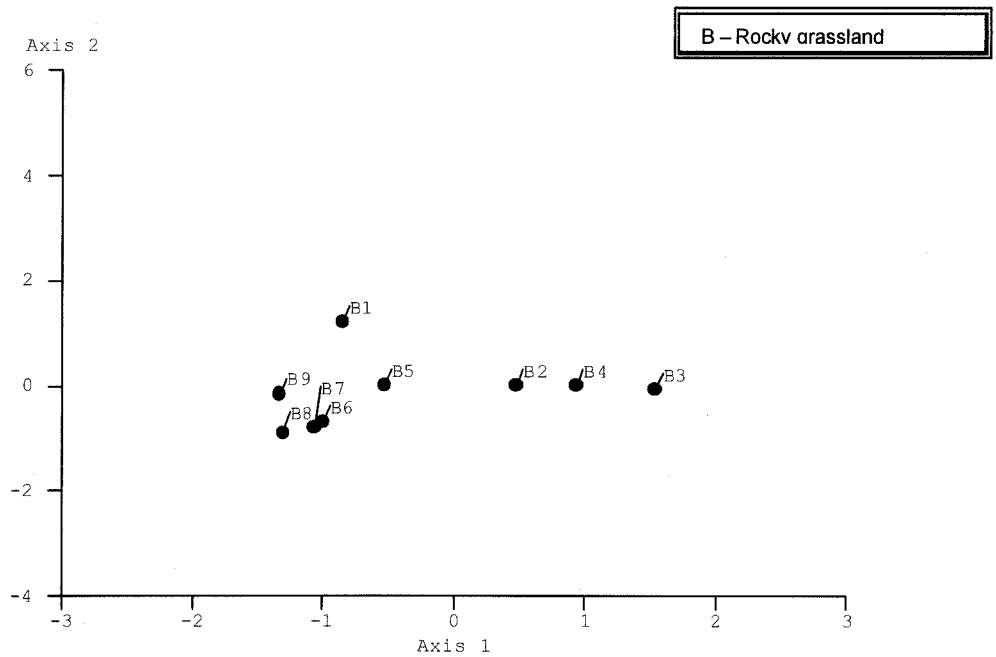


Figure 14: Cluster diagram of the sample plots from Option 2

Various plant species that indicate soil moisture was found on Option 2. Plants such as *Haplocarpa scaposa* (Tonteldoosbossie), *Pelargonium luridum* and *Polygala hottentotta* were found growing in moist or damp soils. Option 2 housed a number of these plants. Further investigation concluded that seepage from the dirty water dams to the south and east of Option 2 resulted in moister soils on the site. This in turn resulted in a higher soil moisture contents that allowed moisture loving plants to thrive in the damper patches on Option 2 Disturbed areas along the access road, dams and spoils housed the shrub *Lopholaena coriifolia* (Pluisbossie) which characteristically grows on rocky grassland and on ridges.

The rocky grasslands characteristically have higher biodiversity and are regarded as sensitive vegetation (Ferrar & Lötter, 2007). Furthermore, the Rand Highveld Grassland

is an endangered vegetation community which leads to Option 2 being regarded as being of Medium to High Sensitivity.

8. RESULTS: PIPELINE ROUTES

The majority of the routes were proposed to align within existing road-, railway or coal conveyer belt routes. The pipeline routes were assessed with regards to any sensitive vegetation or ecological features that it could impact upon during its construction phase or operational phase.

8.1 Douglas Colliery to Water Treatment Plant

The water treatment plant's proposed location is either on Option 1- or Option 2. The pipeline routes for both options follow the same course for much of its extent (Figure 1).

8.1.1 Douglas Colliery to Option 1 (Route A)

The pipeline originates on Douglas Colliery (Douglas Dirty Water Dam) and enters the Middelburg Mine property through disturbed open cast areas (Vlaklaagte Open Pit) and areas earmarked for rehabilitation. From here the pipe crosses onto the Middelburg Mine South Section land. The pipeline is proposed to flow northwards for approximately 15km within the eastern road reserve of the R575 and the railway reserve. The reserves comprise mostly alien invasive vegetation such as *Bidens formosa* (Cosmos), *Salix babylonica* (Willow) and disturbed grasslands dominated by grasses such as *Hyparrhenia hirta* (Common Thatching Grass), *Digitaria eriantha* (Common Finger Grass) and *Cymbopogon validus* (Giant Turpentine Grass). The route crosses through land planted with grasses for grazing (*Digitaria eriantha*) (Photograph 6).

Photograph 6: Planted grazing in between the R575 and railway line.

The pipeline also crosses over numerous water systems, one of which is a dirty and clean water separation system of the Middelburg Mine (Photograph 7). Where the pipeline crosses water systems, the pipe will be suspended over the water body. The water systems were degraded and no threatened floral species was expected to grow here. The vegetation of this extent of the pipeline route is classified as Low Sensitivity although caution is recommended where the pipeline crosses any water system.

Photograph 7: Clean and Dirty water Separation System of Middelburg Mine, adjacent to R575.

8.1.2 Douglas Colliery to Option 2 (B)

The pipeline will follow the same route as to Option 1 (above) from where it will continue in an eastern direction for 5km. The pipeline passes agricultural fields to the north and over the disturbed Niekerkspruit and Spookspruit River, along the coal conveyer from where it will amalgamate with the pipeline from Klipfontein (Photograph 8). This area is greatly disturbed by open cast mining activities and house invasive species such as *Cortaderia jubata* (Pampas Grass) and the naturalised *Bidens formosa* (Cosmos). The Niekerkspruit is degraded and the surrounding grasslands are inhabited by grasses such *Hyparrhenia hirta* (Common Thatching Grass), *Digitaria eriantha* (Common Finger Grass) and *Melinis repens* (Natal Red Top).The Niekerkspruit flows adjacent to a rocky outcrop that is yet undisturbed. The pipeline is proposed to follow in already disturbed areas and should not impact on the rocky outcrop.

The pipeline crosses over the Spookspruit, just north of a decant dam. The area is highly disturbed with *Arundo donax* (Spanish Reed) and *Cortaderia jubata* (Pampas Grass). The pipeline amalgamates with the Klipfontein pipeline and turn northwards towards Option 2 (approximately 9km). From here the pipeline trails through alien invasive *Acacaia mearsnii* (Black Wattle) plantations and areas disturbed by the building of the

new Goedehoop dam until it reaches Option 2. The pipeline route is considered as being of low floral sensitivity.

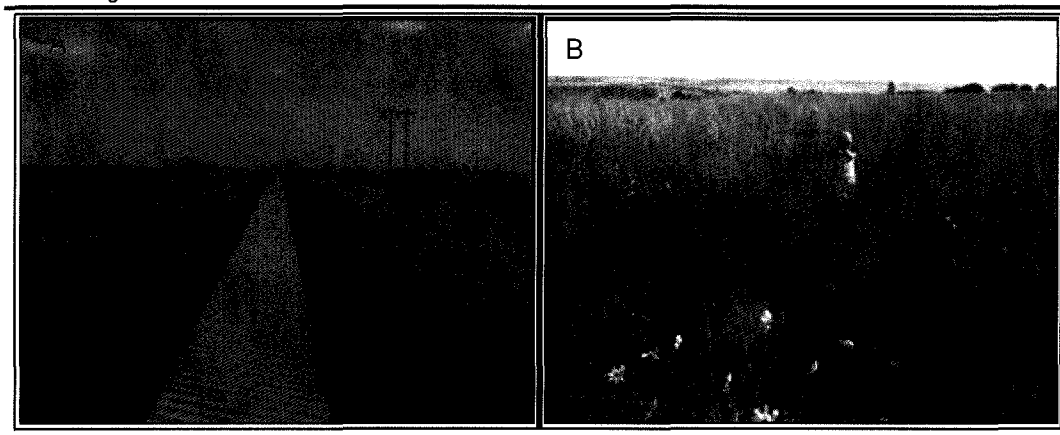
Photograph 8: Disturbed water systems and conveyer along the pipeline route

8.2 Klipfontein to Water Treatment Plant

The water treatment plants proposed location is either on Option 1 or Option 2. The pipeline routes for both options follow the same course for much of its extent (Figure 1).

8.2.1 Klipfontein to Option 1 (C)

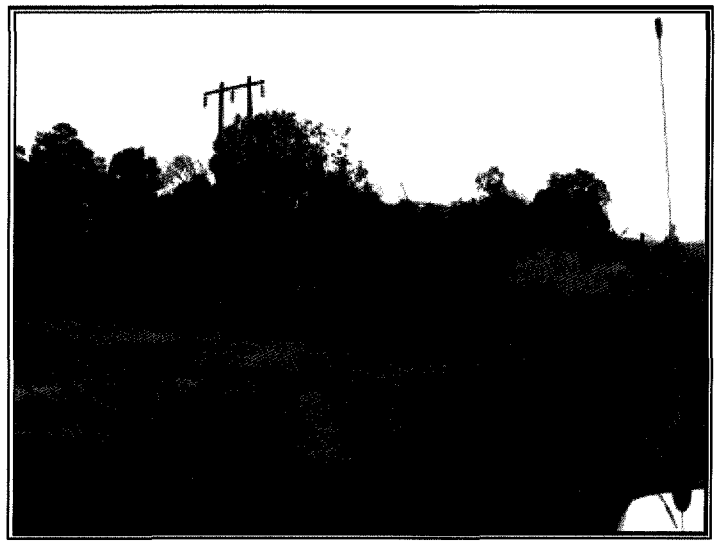
The pipeline originates at the Klipfontein North Section and follows a westerly direction underneath the R35 to Bethal. The pipeline route is proposed to be situated within the coal conveyer reserve as shown in Photograph 9A. The coal conveyer reserves are mowed regularly and are unlikely to house any species of conservation concern. Portions of this line will pass through rehabilitated land that is dominated by *Hyparrhenia hirta* (Common Thatching Grass) (Photograph 9B). The rehabilitated land is unlikely to house any threatened species. The pipeline continues west and passes through the much disturbed Niekerk- and Spookspruit (see 8.1.2) until it reaches Option 1's southern boundary.



Photograph 9 The coal conveyer and mowed reserves (A) and *Hyparrhenia hirta* rehabilitated land (B).

8.2.2 Klipfontein to Option 2 (Route C and B)

The pipeline originates at the Klipfontein North Section and follows a westerly direction underneath the R35 to Bethal (Route C). The pipeline route is proposed to be situated within the coal conveyer reserve as discussed in 8.2.1. The pipeline continues for approximately 7km and at 25°55'22"S and 29°26'1"E the pipeline turns northwards (Route B). From here the pipeline aligns through alien invasive *Acacia mearsnii* (Black Wattle) plantations (Photograph 10), disturbed areas due to the building of the new Goedehoop dam, past dam 6 to Option 2 (Approximately 9km). At dam 6 the pipeline crosses through a wetland area. The wetland is caused by spilling from the dam; nonetheless it currently houses wetland plant species (Strategic Environmental Focus A, 2008).



Photograph 10: Disturbed grassland and alien invasive plantations along the pipeline route.

8.3 Reservoir Pipeline

The reservoir pipeline (D) will either originate on Option 1 or on Option 2, depending on which is the most favourable with the least environmental impact (Figure 1).

8.3.1 Reservoir Pipeline from Option 1 (Route D)

The clean water pipeline is proposed to be situated within the road reserve of the R575 northwards. Most of the adjacent properties are private land. The pipeline crosses over the Spookspruit and turns eastwards before the N4 Highway to reach the Municipal Reservoir (approximately 10km).

Much of the proposed route will still align within the R575 road reserve, adjacent to private land. The vegetation comprised of grazed fields on the private holdings to cultivated land with *Bidens formasa* (Cosmos), *Hyparrhenia hirta* (Common Thatching Grass), *Digitaria eriantha* (Common Finger Grass) and *Cymbopogon validus* (Giant Turpentine Grass). Patches of *Eucalyptus* (Bluegum) trees occur within the road reserve along with an abundance of other weeds such as *Tagetes minuata* (Khakibos). For the most part along the R575, the pipeline will run through disturbed and degraded vegetation. The pipeline crosses over the Spookspruit River at the point where the river flows underneath the R575 at 25°51'31"S and 29°23'49"S (Photograph 11). This area could house various faunal species (Strategic Environmental Focus B, 2008).

Photograph 11: The Reservoir Pipeline route will cross the Spookspruit River

The Spookspruit River is classified as a Critically Endangered River (Nell *et al,* 2004). The conserved area is currently shorter than the conservation target set for this river (10% of its total length) and the river is greatly modified. Endangered ecosystems have lost significant amounts of their original natural habitat, so their functioning is compromised. From the road reserve, the pipeline veers eastwards across natural

grassland. The exact route was not yet clear at the time of the site visit. Once over the grassland, the pipeline will traverse through *Acacia mearsnii* (Black Wattle) plantations for at about 10km to reach the Municipal Reservoir, situated within the Black Wattle plantation.

8.3.2 Reservoir Pipeline from Option 2

No clear mapping was received for this pipeline route, although it is assumed that the water treatment pipeline will return via Route B to Option 1 location and then follow the Route D alignment

The majority of the proposed pipelines will impact on areas of low flora sensitivity. The clean water pipeline could impact on areas of natural grassland *en route* to the Municipal Reservoir. Mitigation measures should be employed to limit the negative environmental effect.

9. CONSERVATION CONCERNS

9.1 Alien Invasive Plants

Numerous stands of *Acacia mearsnii* and *Eucalyptus camaldulensis* were scattered throughout the sites. These species invade riparian and seep zones with disastrous impacts on water resources, especially within catchments regions. These species should be controlled to prevent further infestation and it is recommended that all individuals of the invader species be removed and eradicated.

Declared weeds and invaders have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that all these transformers (as defined above) be controlled and eradicated by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species (Henderson, 2001).

The amended Regulations (Regulation 15) of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) identifies three categories of problem plants:

- Category 1 plants may not occur on any land other than a biological control reserve and must be controlled or eradicated. Therefore, no person shall establish, plant, maintain, propagate or sell/import any category 1 plant species;
- Category 2 plants are plants with commercial application and may only be cultivated in demarcated areas (such as biological control reserves) otherwise they must be controlled; and

- Category 3 plants are ornamentally used plants and may no longer be planted, except those species already in existence at the time of the commencement of the regulations (30 March 2001), unless they occur within 30m of a 1:50 year flood line and must be prevented from spreading.

Table 1: Weeds and invader plants identified on the study sites.

Species Name	Common Name	Type	Category
Eucalyptus camaldulensis	Red River Gum	Invader	2
Pinus spp.	Pines	Invaders	1
Populus spp	Poplar	Invader	3
Salix babylonica	Weeping Willow	Invader	2
Arundo donax	Giant Reed	Declared Weed	
Cortaderia jubata	Pampas Grass	Declared Weed	
Melia azedarach	Seringa	Invader	3
Morus alba	Mulberry	Invader	3
Tagetes minuta	Khaki Weed	Weed in disturbed places	
Amaranthus hybridus	Pigweed	Weed in disturbed places	

Appendix C lists control and monitoring suggestions for the removal of alien invasive trees that occur on the site.

9.2 Species of conservation concern

9.2.1 Red Data and Threatened Plants

No Red Data or Threatened floral species were encountered during the site visit, although suitable habitat does exists for some Red Data floral species (Emery *et al*, 2002). Appendix D lists the threatened floral species of Mpumalanga and an indication of their probability of occurrence on the site.

9.2.2 Protected Plants

Protected plants are listed in the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998). A number of these plants were identified on the study sites, including *Boophane distichia* (Poison Bulb). *Boophane disticha* is a bulbous plant that occurs in grasslands and rocky areas. The plants were found growing onOption 1 and Option 2. Table 2 indicates the protected plants identified during the site visit and their locality.

Table 2: List of protected plants identified on the sites.

Specie	Protection	Locality
Boophane distichia (Poison Bulb)	Specie	Option 1
Crinum gramminicola	Whole genus	Preferred and Option 2
Gladiolus crassifolius	Whole genus	Option 1
Watsonia specie	Whole genus	Option 2
Habenaria falcicormis & *Habenaria nyiikana*	Whole family: Orhidaceae	Option 1 in moist grassland
Eulophia specie	Whole family: Orhidaceae	Option 1 in moist grassland

9.2.2 Medicinal Plants

The demand for medicinal plants is on the increase, whilst the frequently used plants and the communal land that it is harvested from are on the decline. With an increase in the country's population and the high rate of infectious diseases, this will put an even higher strain on the already scarce natural medicinal resources (Emery *et al*, 2002). Areas of high biodiversity are thus important for the conservation and sustainable use of these resources and should be safe-guarded. Table 3 present the medicinal plants found on the site as well as their conservation status (Emery *et al*, 2002).

Table 3: Medicinal plant species that were identified on the site

Scientific name	Common name	Conservation status (where applicable)
Acalypha angustata	Copper Leaf	
Acalypha vilicaulus		
Alloteropsis semialata	Black-seed Grass	
Amaranthus hybridus	Pigweed	
Asclepias fructicosus	Milkweed	
Asparagus cooperi		
Aster harveyanus	Bloublommetjie	
Berkeya setifera	Rasperdisseldoring	
*Bidens formosa**	Cosmos	
Boopane disticha	Poison Bulb	NT
Callilepsis lepthophylla	Bergbitterbossie	
Centella asiatica	Marsh Pennywort	
Chamaecrista comosa	Fishbone Cassia	
Comelina africana		
Crabbea acaulis		

Scientific name	Common name	Conservation status (where applicable)
Crinum graminicola	Graslelie	P
Cucumis zeyheri		
Dicoma anomala		
Dicoma zeyheri	Kafferdissel	
Elephantorrhiza elephantina	Elephant's root	
Felicia muricata		
Gazania krebsiana	Botterblom	
Gladiolus species		P
Gnidia capitata	Kerrieblom	
Haplocarpa scaposa	Tonteldoosbossie	
Helichrysum nudifolium	Hottentot's tea	
Hypoxis argentea	Small Yello Star-Flower	
*Hypoxis hemerocallidea***	Gifbol	
*Hypoxis rigidula***	Kaffirtulp	
Ipomoea transvaalensis		
Ledebouria ovatifolia		
Leonotis dysophylla	Wild Dagga	
Monopsis decipiens	Butterfly Lobelia	
Pelargonium luridum		
Pentanissia angustifolia		
Persicaria species*	Knotweed/ Snakeroot	
Pollichia campestris	Waxberry	
Polygala hottentotta		
Rhynchosia totta		
Schistostephium crataegifolium	Bergkruie	
Senecia coronatus	Sybossie	
Strigia elegans	Large Witchweed	
*Tagetes minuta**	Khaki Bush/ Blackjack	
Typha capensis	Bulrush	
Vernonia oligocephala	Bitterbossie	

* Naturalised weeds
NT Near Threatened (IUCN Categories)
P Protected (Mpumalanga Nature Conservation Act, 1998)

10. DISCUSSION

The Option 1 and Option 2 are classified according to the sensitivity of the vegetation communities identified on the site (Figure 15 and 16). The final sensitivity classification accounts for the theoretical sensitivity (as per literature review) and the on-the-ground sensitivity.

10.1 Areas of High Sensitivity

10.1.1 Water bodies and water courses

All flood lines, riparian zones, the pan and wetland along with corresponding buffer zones (minimum of 30 meters) are designated as sensitive vegetation. The areas surrounding the water bodies on the site (natural or man-made) are suitable to be inhabited by vulnerable avifauna species such as *Tyto capensis* (Grass Owl) and other faunal species. This increases the sensitivity of the areas surrounding water bodies. Furthermore, the Spookspruit River is listed as Critically Endangered based on the heterogeneity signature of the river. The conserved area is currently shorter than the conservation target set for this river (10% of its total length) and the river is greatly modified. Endangered ecosystems have lost significant amounts of their original natural habitat, so their functioning is compromised (Nel *et al*, 2004). Quality, quantity and sustainability of water resources are fully dependent on good land management practices within the catchments. All water bodies and their associated buffers are thus classified by this report as being of High Sensitivity.

10.1.2 Primary Grasslands

Option 2 as well as a substantial extent of Option 1 contains Primary Grassland. Most grassland species are perennials and surprisingly long lived, with very few annual species, which are the pioneer plants needed to repair disturbance. This makes the grasslands vulnerable to disturbance. Once the vegetation is cleared, the land is invaded by weedy pioneer plants that are mostly exotic. Although many grassland plants do produce seed, very little germinates, most being used as vital food for their rich rodent and insect fauna (Ferrar & Lötter, 2007). The highest biodiversity is found in rocky grassland habitats which permit the whole of Option 2 to be classified as an area of High Sensitivity. Also, a substantial portion of Option 1 comprises Primary Grassland, which along with the pan and wetland vegetation is classified as an area of High Sensitivity.

Due to the open cast mining, grazing and cultivation activities, the study area falls within a region classified as not-important to reach biodiversity targets (Ferrar & Lötter, 2007). However, the regional vegetation communities (Rand Highveld Grassland and Eastern Highveld Grassland) are endangered vegetation communities. The purpose of defining vegetation types in terms of their ecosystem status is to identify ecosystems at risk. The ecosystem status categories are similar to those used by the IUCN for species: Critically Endangered (CR), Endangered (EN), and Vulnerable (VU). A vegetation type is allocated an ecosystem status based on the proportion of its original natural habitat that

remains (Ferrar & Lötter, 2007). Furthermore, the conservation of remaining grassland vegetation is important to ensure the functionality and health of wetlands and rivers.

10.1.3 Secondary Grasslands

Disturbances in and around the wetland on Option 1 had lead to the degradation of the grassland vegetation found here. This allowed numerous exotic and pioneer species to colonise the wetland area. Although this grassland is not in a pristine state, it nonetheless contributes to the health and functionality of the wetland and is classified as areas of High Sensitivity.

10.2 Areas of Low Sensitivity

10.2.1 Alien Vegetation and Disturbed Grasslands

The eastern boundary of Option 1 is greatly transformed by pioneer plants such as *Seripheum plumosum* (Bankrupt bush). The disturbance increases towards the south-eastern corner where stands of Bluegum and Wattle trees were found. Just east of the alien bush clumps were fields of planted grazing. Little to no herbaceous species occurred here. These areas are classified as being of Low Sensitivity and could be used for the proposed project.

Although these areas are designated as being of low sensitivity and conservation value, they serve as ecological corridors for the movement of species. Any construction activities in these areas should be undertaken with consideration to the natural fauna and flora that inhabit the site and strive to destroy as little possible of the natural vegetation.

According to the Mpumalanga Tourism and Parks Agency (2008), areas to be disturbed by construction activities as well as areas for auxiliary activities must be clearly demarcated and limited to already disturbed areas or areas where they will cause minimal disturbance. Planning and implementation of the proposed project should adhere to mitigation and recommendations as set out by this report.

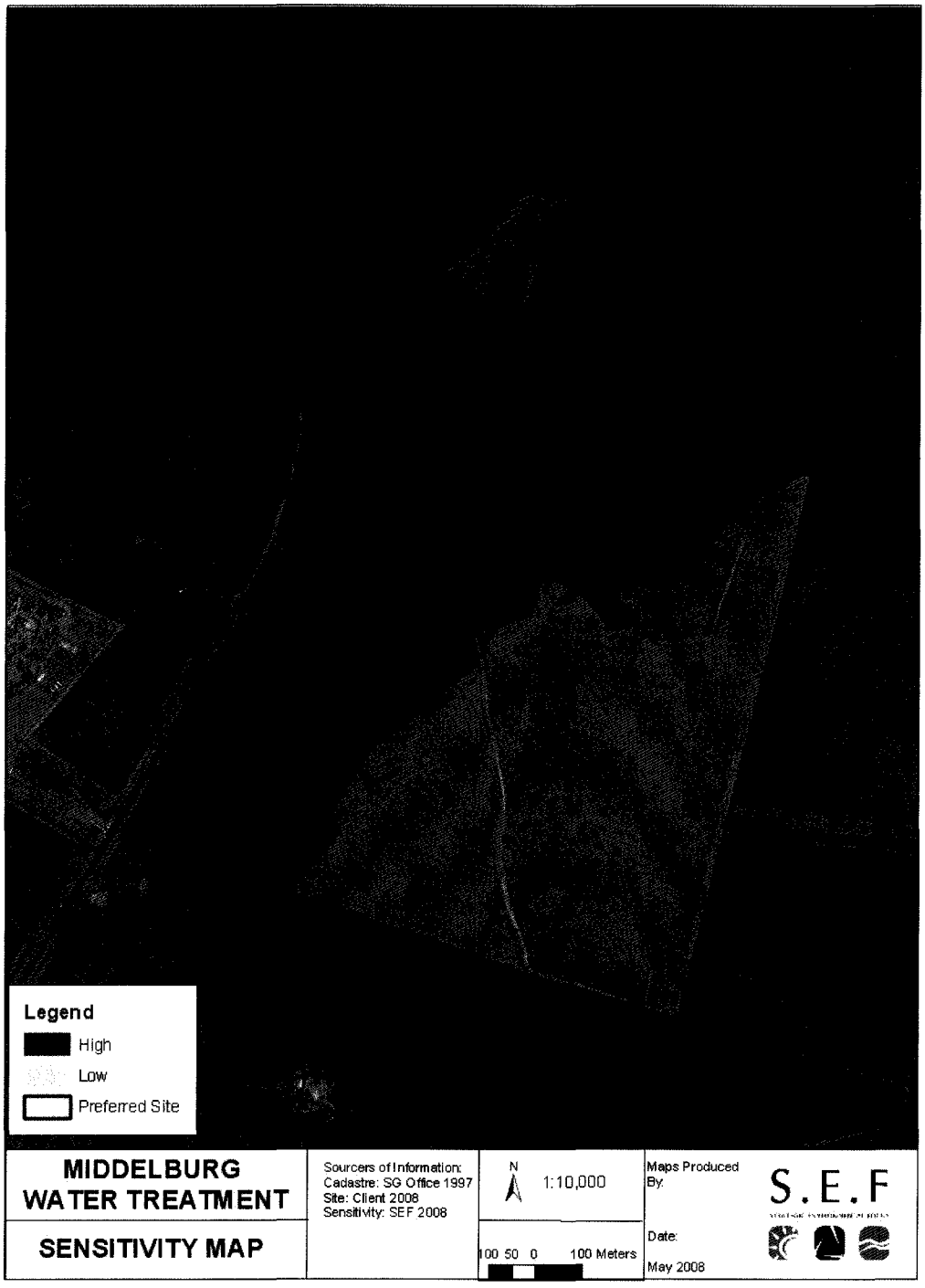


Figure 15: Sensitivity map for Option 1

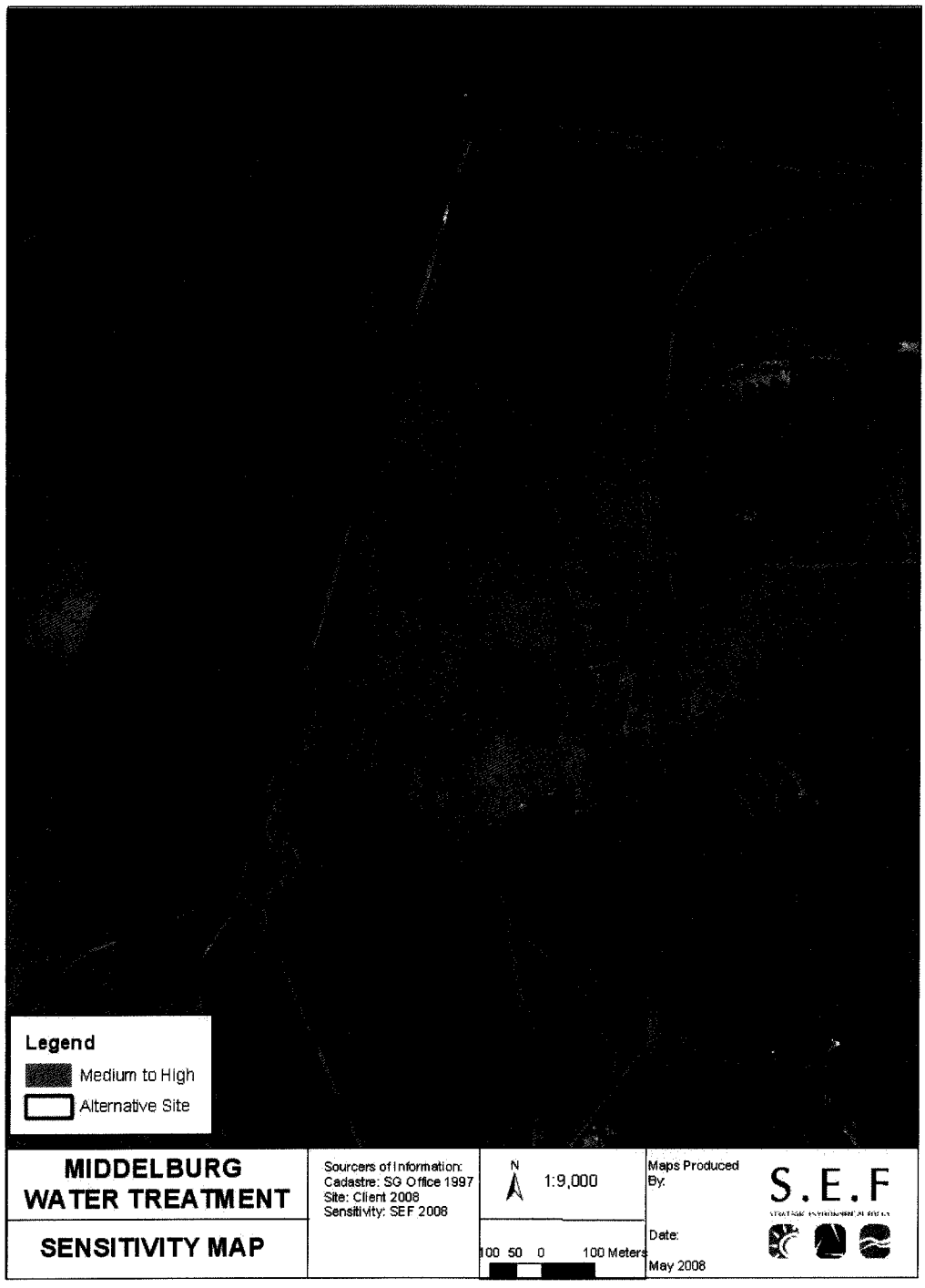


Figure 16: Sensitivity Map for Option 2

11. ENVIRONMENTAL RISKS AND THEIR ASSESSMENT

11.1 Assessment criteria

The environemtnal impacts are assessed with mitigation meassures (WMM) and without mitigation measures (WOMM) and the results presented in impact tables which summarise the assessment. Mitigation and management actions are also recommended with the aim of enhancing positive impacts and minimising negative impacts.

In order to assess these impacts, the proposed development has been divided into two project phases, namely the construction and operation phase. The criteria against which these activities were assessed are discussed below.

11.1.1 Nature of the Impact

This is an appraisal of the type of effect the project would have on the environment. This description includes what would be affected and how and whether the impact is expected to be positive or negative.

11.1.2 Extent of the Impact

A description of whether the impact will be local (extending only as far as the servitude), limited to the study area and its immediate surroundings, regional, or on a national scale.

11.1.3 Duration of the Impact

This provides an indication of whether the lifespan of the impact would be short term (0-5 years), medium term (6-10 years), long term (>10 years) or permanent.

11.1.4 Intensity

This indicates the degree to which the impact would change the conditions or quality of the environment. This was qualified as low, medium or high.

11.1.5 Probability of Occurrence

This describes the probability of the impact actually occurring. This is rated as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

11.1.6 Degree of Confidence

This describes the degree of confidence for the predicted impact based on the available information and level of knowledge and expertise. It has been divided into low, medium or high.

12. IMPACT DESCRIPTION, ASSESSMENT AND MITIGATION

The possible impacts of the water treatment plant and pipeline route on the sites are divided into two phases of activities: Construction phase and Operational phase of the development. Table 4, Table 5 and Table 6 lists a summary of the Possible Risks that could occur within the two phases.

Table 4: Risks during the Construction Phase Site is considered the area to be modified by construction activity.

Possible Risks	Source of the Risk	Site to be affected
Destruction of natural habitat	Construction workers and construction vehicles	Whole site
Exposure of the whole site to erosion	Construction activity	Whole site
Loss of the ecological function of the wetland and pan	Construction activity	Moist grassland
Destruction of sensitive vegetation types and protected plant species	Construction activity	Sensitive habitats
Destruction of faunal habitat and frightening away of sensitive faunal species (in particular the avifauna)	Construction activity	Whole site

Table 5: Risks during the Operational Phase of the water treatment plant. Site is considered the area to be modified by construction activity.

Possible Risks	Source of the Risk	Site to be affected
Reduction of natural migratory routes and faunal dispersal patterns.	Fragmented landscape	Whole site
Possible increase in exotic vegetation	Alien Bush Clumps spreading to disturbed soils	Whole site
Reduction in indigenous faunal species	Modification of natural habitat by landscaping	Whole site
Increased amounts of surface water runoff increasing the chance of flash floods in the area	Increased hard surface area due to buildings and road surfaces.	Whole site and surrounding area
Disturbance of fauna in sensitive vegetation	Human activity within the development could disturb fauna that depend on the sensitive vegetation (wetland)	Sensitive vegetation

Table 6: Risks during the Operational Phase of the pipelines

Possible Risks	Source of the Risk	Site to be affected
Contamination of water systems	Leakage from pipes	Pipeline routes
Increased amounts of surface water runoff increasing the chance of flash floods in the area	Broken or faulty pipes	Pipeline and surrounding area
Possible increase in exotic vegetation	Alien Bush Clumps spreading to disturbed soils	Whole pipeline route

12.1 Construction Phase

12.1.1 Destruction of natural habitat

Due to the nature of the construction activities over the site, even with mitigation much of the existing natural habitat will be destroyed. Heavy motor vehicle usage over the study site and adjacent land will expose the soils on the site to erosion and compaction.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Destruction of natural habitat	Whole site	Site	Permanent	High	Definite	High	Medium	High

Mitigating Measures:

1. Cordon off the sensitive vegetation to restrict the movement of construction vehicles and construction personnel; and
2. No development to be undertook within any area demarcated as sensitive natural open space.

12.1.2 Exposure of the site to erosion

Erosion of the soil surface due to surface vegetation being removed, causing exposed soil conditions where rainfall and high winds can cause mechanical erosion. This surface soil can wash into the possible wetland area if adequate precautions are not taken.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Exposure of the site to erosion.	Whole site	Site	Short term	High	Probable	High	Medium	High

Mitigating Measures

1. Sequential construction strategy i.e. phasing the construction of the site and rehabilitating the soil with indigenous plants immediately after each phase;
2. Not leaving soil surfaces open to erosion for lengthy time periods;
3. Implement sound storm water management measures; and
4. Timing construction so that construction takes place outside the rainy seasons, thus reducing opportunities for erosion from rainfall events.

12.1.3 Loss of the ecological function of the wetland

Construction will inevitably alter the landscape and influence the drainage processes on the site. This in turn, will influence the drainage and status of the pan and wetland area.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Loss of the ecological function of the potential wetland	Sensitive, moist grassland	Local	Permanent	High	Highly Probable	High	Medium	High

Mitigating Measures

1. No development in any areas demarcated as sensitive and preferably leave as much areas of medium sensitivity surrounding wetlands and pan intact;
2. Plan construction to avoid any impact on the natural drainage of the site and wetland functionality; and
3. Implement a sound storm water management system.

12.1.4 Destruction of sensitive vegetation types and protected plant species

Construction will destroy natural vegetation and alter the habitat in such a way that natural species cannot colonise the area. This could lead to certain species becoming rare in the local context.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Destruction of sensitive vegetation types and plants species	Whole site	Regional	Permanent	High	Probable	High	Low	High

Mitigating Measures

1. No construction should be allowed within sensitive vegetation;
2. Sensitive vegetation should be cordoned off to prevent any access to the area while construction takes place; and
3. No vehicles or access roads should be allowed through the sensitive areas.

12.1.5 Destruction of habitat and frightening away of sensitive faunal species (in particular avifauna).

Construction will inevitably alter or destroy the habitat of some fauna and the noise from construction vehicles and related activities will repel fauna from the study site and adjacent areas.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Destruction of faunal habitat and frightening away of sensitive faunal species	Whole site	Site	Permanent	High	Probable	High	Medium	High

Mitigating Measures

1. Cordoning off of the sensitive vegetation to restrict the movement of construction vehicles and construction personnel;
2. Not developing any sensitive natural open space;
3. Restrict construction activities to daylight hours to prevent any disturbance such as floodlights; and
4. Restrict access to the suitable and sensitive habitats of faunal species.

12.2 Operational Phase: Water treatment plant

12.2.1 Reduction of natural migratory routes and faunal dispersal routes.

The development will fragment the landscape and lead to a reduction in suitable migratory routes and dispersal patterns of fauna.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Reduction of faunal migratory routes and faunal dispersal patterns.	Fragmented landscape	Regional	Permanent	High	Highly Propable	High	Medium	High

Mitigating Measures

1. Leave as much of the natural vegetation intact in order to maintain ecological corridors for the movement of faunal species;
2. Incorporate sensitive vegetation into open space planning; and
3. No development or activities allowed to impact or alter the remainder of the natural vegetation.

12.2.2 Possible increase in exotic vegetation

Exotic vegetation may be introduced to the environment via the landscaping around the development. Also, the sites currently house alien bush clumps, which if not completely removed, could spread. Seedlings from the alien bush clumps can spread easily in disturbed soils after construction and invade natural vegetation

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Possible increase in exotic vegetation.	Site	Site	Permanent	Medium	Probable	High	Medium	High

Mitigating Measures

1. Implement a policy within the development that only indigenous plant species be used in the landscaping of the development;
2. Natural open spaces should be left in their undeveloped state and any existing or new exotic vegetation that is present on the site be removed and eradicated; and
3. Remove all exotic, invasive vegetation and implement a monitoring and eradication plan to keep the site free from invasive plants (Appendix D).

12.2.3 Reduction in indigenous faunal species

The development will modify the natural habitat of various faunal species. These species may no longer be able to find suitable habitat on the site or surrounding land. This could possibly lead to a decline and species numbers and ultimately extinction.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Reduction of indigenous faunal species	Site and surroundings	Regional	Permanent	Medium	Probable	High	Medium	High

Mitigating Measures

1. Create open, natural space within the development; and
2. Make provision for ecological corridors that allow for the movement of faunal species.

12.2.4 Increased amounts of surface water runoff

The increased amounts of surface water runoff from hard surfaces within the development may increase the chance of flash floods. With a single rainfall event many litres of water are released. These waters are would have been absorbed by the displaced grasslands and other vegetation.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Increased amounts of surface water runoff	Site and surroundings	Regional	Permanent	Medium	Probable	Medium	Low	High

Mitigating Measures

1. Create open, natural space within the development and reduce the amount of hard paved surfaces; and
2. Implement an ecologically sound storm water management plan.

12.2.5 Disturbances of fauna in sensitive vegetation

Human activity within the development could disturb faunal species that depend on the natural, sensitive vegetation on the site.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Disturbance of fauna in sensitive vegetation	Sensitive vegetation	Local and regional	Permanent	Medium	Probable	Medium	Low	Medium

Mitigating Measures

1. A management plan to prevent the occupants of the development from disturbing or harassing any faunal species; and
2. Implement a monitoring programme to regularly assess the presence of faunal species within the sensitive vegetation.

12.3 Operational Phase: Pipeline

12.3.1 Contamination of water systems and flash floods

Substandard material or equipment could cause leakages along the dirty water pipelines. The dirtywater could impact negatively on fauna and flora adjacent to these pipelines.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Contamination of water systems	Leakage from pipes	Pipeline routes	Short term	Medium	Probable	Medium	Low	Medium
Increased amounts of surface water runoff increasing the chance of flash floods in the area	Broken or faulty pipes	Pipeline and surrounding area	Short term	High	Probable	High	Low	Medium

Mitigating Measures

1. Monitoring plan or programme that regularly inspect the condition of the pipeline; and
2. Warning systems and corrective action plans in place.

12.3.2 Possible increase in exotic vegetation

The natural vegetation will be cleared to construct the pipeline. The bare soils, if not rehabilitated could become infested with weeds and alien invasive vegetations that are common in the region.

Impact	Site	Extent	Duration	Intensity	Probability of occurrence/risk	Significance		Confidence
						WOMM	WMM	
Possible increase in exotic vegetation	Alien Bush Clumps spreading to disturbed soils	Whole site	Long term	Medium	Probable	Medium	Low	Medium

Mitigating Measures

1. Re-vegetation of the pipelines after construction with indigenous plants that occur on the sites; and
2. Eradication and monitoring plan to identify and remove alien invasive species.

13 GENERAL MITIGATION AND RECOMMENDATIONS

General mitigation measures and recommendations include:

1. An Environmental Control Officer should be appointed to oversee mitigation measures during construction and will be responsible for the monitoring and auditing of contractor's compliance with the conditions of the Environmental Management Plan (Mpumalanga Tourism and Parks Agency, 2008);
2. No development should be allowed within any areas demarcated as sensitive and preferably leave as much areas of medium sensitivity surrounding wetlands intact;
3. Plan construction to avoid any impact on the natural drainage of the site and wetland functionality;
4. Cordon off the sensitive vegetation to restrict the movement of vehicles and personnel;
5. Use permeable fencing to cordon off areas as this allow species movement to continue;
6. Restrict activities to daylight hours to prevent any disturbance to faunal species such as floodlights;
7. Not leaving soil surfaces open to erosion for lengthy time periods;
8. Implement sound storm water management measures;
9. Timing construction so that construction takes place outside the rainy seasons, thus reducing opportunities for erosion from rainfall events. A buffer zone of at least a 30 meters is suggested around the healthy vegetation population(s);

10. Workers on site should be prevented from hunting or harassing any faunal life on the site;
11. Relocation of plants of conservation importance that should be implemented by a qualified specialist; and
12. Eradication and monitoring plan be developed in order to eradicate alien plants and limit their impact on the rivers and natural vegetation (Appendix D).

When a river/stream and/or wetland are present on site, the following mitigation measures are recommended:

1. No activities should take place in a buffer of at least a 30m from the edge of river, pans, drainage lines and wetlands (Mpumalanga Tourism and Parks Agency, 2008).
2. No surface water generated as a result of the activities may be discharged directly into any natural drainage system or wetland;
3. To avoid accidental spillages or emergencies that could contaminate the pan or wetlands on Option 1, the water treatment plant must be constructed as far south on the site as possible;
4. The water treatment plant must be designed in such a way that no spillages can flow from the water treatment plant into the pan or wetlands;
5. A comprehensive surface water runoff management plan, indicating the management of all surface runoff generated as a result of the activities prior to stormwater entering any natural drainage system or wetland, must be submitted (e.g. stormwater and flood retention ponds if relevant);
6. No activity such as temporary housing, temporary ablution, disturbance of natural habitat, storing of equipment or any other use of the buffer/flood zone whatsoever, may be permitted; and
7. The demarcated buffer zones must be fenced during the construction using permeable fencing.

No new roads should be constructed through wetlands, but in areas where this is unavoidable planning should be done to ensure minimum impact. This include among others (Kotze *et al.*, 2002):

- Access roads to Option 1 must enter the site on the southern side of the site;
- Roads must be constructed in such a way as to have a minimal impact on the flow of water through the wetland (e.g. by using a bridge or box culverts in preference to pipes);
- All roads within the plant should be tarred, as dirt roads will generate further erosion problems;
- Where a road runs adjacent to a wetland and impede natural runoff from a hill slope, the road should be separated by an appropriate buffer from the wetland boundary. Feed-off points should be incorporated into the road at regular intervals (at least every 100 m);

- Storm water originating from the roads should also not be allowed to enter directly into the wetland areas; and
- Compaction of soils should be limited as far as possible as it would reduce infiltration and result in increased runoff and erosion.

14 CONCLUSION

Both the sites proposed as location for the water treatment plant contain sensitive vegetation. The regional terrestrial vegetation that should occur on the site is Rand Highveld Grassland and Eastern Highveld Grassland. Both these vegetation communities are classified as Endangered (Mucina & Rutherford, 2006). Furthermore, the Eastern Temperate Freshwater Wetlands found in and around the site are classified as Vulnerable (Ferrar & Lötter, 2007). Although these areas are presently disturbed by mining activity, biodiversity assets in these landscapes contribute to natural ecosystem functioning, ensure the maintenance of viable species populations and provide essential ecological and environmental products and services across the landscape (Ferrar & Lötter, 2007). These areas may contribute little to the achievement of provincial and national biodiversity conservation targets, however they have significant environmental, aesthetic and social values and should not be viewed as areas of wastelands or unrestricted development (Ferrar & Lötter, 2007).

Option 2 comprises sensitive rocky grassland with little disturbances. The rocky habitat offers suitable environment for numerous faunal species (Strategic Environmental Focus B, 2008). Rocky grassland is generally species rich areas and in the light of the endangered regional vegetation, classified as sensitive. Although there are disturbances on Option 2, they are generally contained and limited to a small portion of the site. The extent of the disturbance is thus too small to be considered as a suitable position for the water treatment plant.

Option 1 comprises areas of high sensitivity as well as areas of low sensitivity. The wetland, pan and portion of primary grassland are classified as areas of high sensitivity. The disturbed portions include the secondary, overgrazed grassland and alien bush clumps. The disturbed, and consequently low sensitivity areas, could be of a sufficient dimension to contain the water treatment plant and its associated activities, provided that the plant is situated as far as possible south on the site.

Due to the sensitivity of Option 2 and sensitive areas within Option 1 this report recommend that the disturbed areas of low sensitivity be utilised for the construction of the water treatment plant. However, the disturbed portion is in close proximity of highly sensitive areas and if construction takes place within the disturbed areas, it should be subjected to stringent mitigation measures as set out by this report as well as the faunal and wetland delineation report. The water treatment plant should be situated as far as possible from the sensitive vegetation in order to limit the impact of any disturbances.

The pipeline route will, for most of its extent, align within the R757 road reserve, adjacent to private land, while the sections of the pipeline on the mine property will run through disturbed and degraded vegetation. The majority of the proposed pipelines will impact on areas of low floral sensitivity. The clean water pipeline could impact on areas of natural grassland *en route* to the Municipal Reservoir. Mitigation measures should be employed to limit the negative environmental effect. Where the pipeline crosses over the Spookspruit River, Niekerkspruit and other water bodies and drainage lines, caution should be applied to mitigate negative impacts that could be caused by the construction of the pipeline as well as any spillages that may occur during the operational phase.

15. GLOSSARY

Alien species Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity.

Biodiversity Biodiversity is the variability among living organisms from all sources including inter alia terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Biome A major biotic unit consisting of plant and animal communities having similarities in form and environmental conditions, but not including the abiotic portion of the environment.

Buffer zone A collar of land that filters edge effects.

Conservation The management of the biosphere so that it may yield the greatest sustainable benefit to present generation while maintaining its potential to meet the needs and aspirations of future generations. The wise use of natural resources to prevent loss of ecosystems function and integrity. Critically Endangered A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.

Correspondence Analysis Correspondence Analysis simultaneously ordinates species and samples

Detrend Correspondence Analysis Detrend Correspondence analysis (DCA) performs detrending to counteract the arch effect, a defect of correspondence analysis.

Ecosystem Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space.

Ecological Corridors Corridors are roadways of natural habitat providing connectivity of various patches of native habitats along or through which faunal species may travel without any obstructions where dher solutions are not feasible.

Edge effect Inappropriate influences from surrounding activities, which physically degrade habitat, endanger resident biota and reduce the functional size of remnant fragments including, for example, the effects of invasive plant and animal species, physical damage and soil compaction caused through trampling and harvesting, abiotic habitat alterations and pollution.

Endangered A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.

Exotic species	Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity
Fauna	The animal life of a region.
Flora	The plant life of a region.
Forb	A herbaceous plant other than grasses.
Habitat	Type of environment in which plants and animals live.
Indigenous	Any species of plant, shrub or tree that occurs naturally in South Africa.
Invasive species	Naturalised alien plants that have the ability to reproduce, often in large numbers. Aggressive invaders can spread and invade large areas.
Karoid	Dwarf xerophytic woody shrublets and succulents.
Outlier	An observation that is numerically distant from the rest of the data
Primary vegetation	Vegetation state before any disturbances such as cultivation, overgrazing or soil removal
Protected plant	According to the Transvaal Nature Conservation Ordinance of 1983 (No 12 of 1983), no one is allowed to sell, buy, transport, or remove this plant without a permit from the responsible authority.
Threatened	Species that have naturally small populations, and species which have been reduced to small (often unsustainable) population by man's activities.
Red data	A list of species, fauna and flora that require environmental protection. Based on the IUCN definitions.
Species diversity	A measure of the number and relative abundance of species.
Species richness	The number of species in an area or habitat.
Vulnerable	A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

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17. APPENDICES

Appendix A: Descriptions regarding the methodology used during the assessment.

Estimation of optimal plot size

A number of plots that represent a given community were subjectively chosen. A list of all species encountered was compiled for each plot. An area that best represented the community was located and the minimal area for sampling was determined (the smallest area within which the species of the community were adequately represented). The minimal area was determined by a species-area curve.

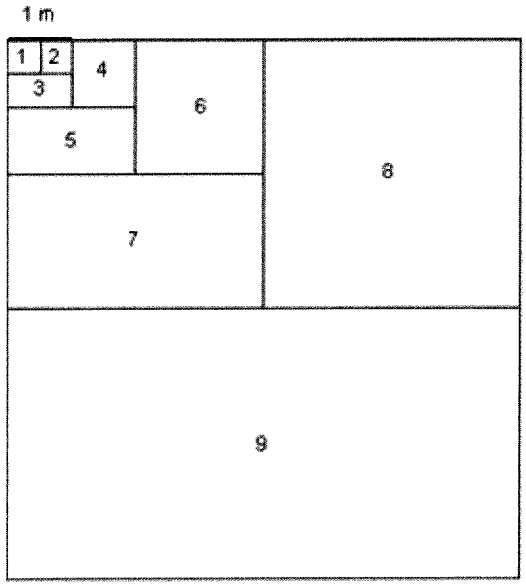

Figure 1: A system of nested plots for determining minimal area (Mueller-Dombois & Ellenberg, 1974).

A species-area curve was compiled by placing larger and larger plots on the ground in such a way that each larger plot encompassed all the smaller ones, an arrangement called nested plots (Barbour et al., 1987; Figure 1). As each larger plot was located, a list of additional species encountered was created. A point of 'diminishing return' was reached, beyond which increasing the plot area results in the addition of only a few more species. The point on the curve where the slope most rapidly approaches the horizontal is called the minimal area (Figure 2). Because this definition of minimal area is subjective, some define it instead as that area which contains some standard fraction of the total flora of a stand, for example, 95%. The most recently proposed solution is to plot the similarity between plots as plot size increases. Minimal area is thought by some ecologists to be an important community trait that is just as characteristic of a community type as the species that make it up.

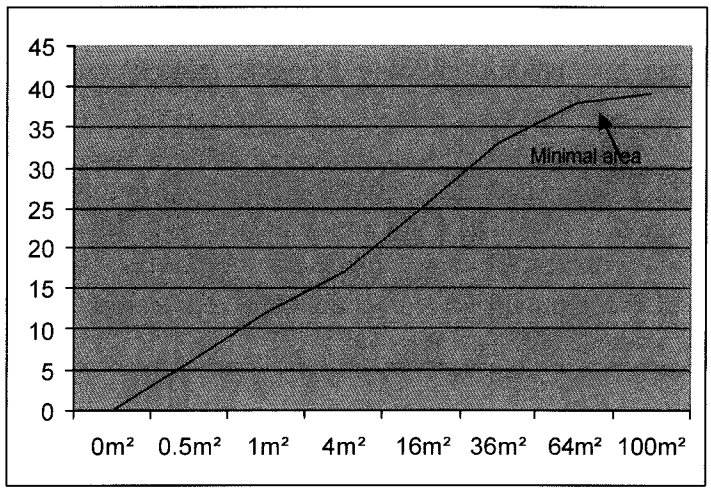

Figure 2: Species-area curve for the study area

Cover estimates

Cover was not measured precisely but is placed in one of seven categories by a visual estimate (Table 1). Braun-Blanquet and others recognise that plant cover is very heterogeneous from point to point and from time to time even within a small stand. The range of percentage points within each class allows for each observer's deviance from the correct cover percentage.

Table 1: Braun-Blanquet Cover classes (Mueller-Dombois & Ellenberg, 1974).

Class	Range of cover (%)	Mean
5	75-100	87.5
4	50-75	62.5
3	25-50	37.5
2b	13-25	19
2a	6-12	9
1	1-5	2.5
+	<1	0.1
r	<<1	*

* Individuals occurring only once; cover ignored and assumed to be insignificant.

Appendix B Plant species identified on the site

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Grasses					
Alloteropsis semialata	Black-seed Grass	Rocky, sour soil.		✓	
Andropogon eucomus	Old Man's Beard Grass / Veergras	Wet areas such as vlei's seepage lines.	✓		
Andropogon schirensis	Stab Grass	Rocky slopes in well-drained soils, often in moist places.		✓	
Aristida canescens	Pale Three-awn	Disturbed, eroded soil	✓	✓	
Aristida congesta subsp congesta	Tassel Three-awn	Disturbed, overgrazed or farmed land	✓	✓	
Aristida junciformis	Gongoni Three-awn	Grows in most soil types, often in moist soils	✓		
Bewsia biflora	False Love grass	Open Grassland	✓		
Brachiaria serrata	Saw-tooth grass	Rocky, undisturbed places	✓		
Bulbostylis burchellii		Grassland, common on rocky ridges	✓	✓	
Chloris virgata	Feather-top Chloris	Disturbed, moist areas, mostly clay soils and on edge of pans.	✓		✓
*Cortaderia jubata**	Pampas Grass				✓
Cymbopogon excavatus	Broad-leaved Turpetine Grass	Adapted to various growing conditions	✓		✓
Cymbopogon validus	Giant Turpentine Grass	Open veld in moist soils.		✓	✓
Cynodon nlemfuensis	Star Grass	Well adapted to any soils, grows mostly on disturbed land such as road reserves and old fields.	✓		✓
Cynodon dactylon	Couch grass	Most soils, usually in disturbed	✓	✓	✓

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
		areas			
Digitaria eriantha	Finger Grass	Sandy, rocky soil, next to rivers/vlei's in dry areas	✓	✓	✓
Diheteropogon amplectens	Broad-leaved Bluestem	Open grassland as well as open areas within bushveld. Mostly in poor rocky slopes.	✓		
Elionorus muticus	Copper grass	Common in overgrazed veld, sour grassland	✓	✓	
Eragrostis chloromelas	Narrow Curly leaf	Open Grassland.	✓	✓	✓
Eragrostis curvula	Weeping Love Grass	Mostly occurs in disturbed areas	✓	✓	
Eragrostis gummiflua	Gum Grass	Disturbed areas and often in moist soils	✓	✓	✓
Eragrostis inamoena	Tite Grass	Moist areas such as marshes, vlei's and drainage lines.	✓		✓
Eragrostis plana	Tough Love Grass	Disturbed areas, mostly in moist patches	✓	✓	
Eragrostis racemosa	Narrow Heart Love Grass	Various habitats, mostly sandy or rocky moist soils	✓		
Eragrostis superba	Saw-tooth love grass	Disturbed areas next to roads	✓	✓	
Eragrostis trichophora	Hairy Love Grass	Disturbed areas, mostly in shallow and rocky soils.	✓		
Harpochloa falx	Caterpillar Grass	Rocky slopes, well drained soil.	✓		
Heteropogon contortus	Spear Grass	Rocky, sloped land and common on disturbed road reserves	✓	✓	
Hyperrhenia hirta	Common Thatching Grass	Well drained, rocky soil in open grassland and disturbed areas	✓	✓	✓

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Imperata cylindrica	Cotton Wool Grass	Mostly in moist soils	✓	✓	
Leersia hexandra	Rice Grass	Grows in or near permanent water, often forming dense stands.	✓		
Melinis repens	Natal Red Top	Disturbed grassland	✓	✓	✓
Monocymbium ceresiliforme	Boat Grass	Grassland, rocky ridges or vlei's.	✓	✓	
Miscanthus junceus	Wireleaf Daba Grass	Riverbanks and vlei's, often in standing water.	✓		✓
Panicum natalense	Natal Panicum (Suurbuffelsgras)	Open, mountainous grassland on well drained soil. Often grows on rocky slopes and where veld is frequently burnt.	✓	✓	
*Paspalum dilatatum**	Dallis Grass	Introduced Grass, moist areas in vlei's and close to rivers	✓		✓
Paspalum urvillei	Vasey Grass	Moist areas such as marshes, vlei's and river banks,	✓		✓
*Pennisetum clandestinum**	Kikuyu	Disturbed, moist areas.	✓		✓
Perotis patens	Cat's Tail	Disturbed places, often in open dry patches. Also grows in cultivated lands and rocky slopes	✓		
Phragmites australis	Common Reed	Grows close to water sources such as rivers and wetlands.	✓		✓
Pogonarthria squarrosa	Herringbone Grass	Disturbed places, limited in natural, open grassland	✓	✓	
Schizachyrium sanguineum	Red Autumn Grass	Open grassland and Bushveld. Often in moist areas and vlei's.	✓	✓	
Setaria pallide-fuscua	Garden Bristle Grass	Disturbed areas e.g. next to	✓		

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
		roads and where rainwater collect			
Setaria spacelata	Bristle Grass	Rocky slopes or in moist soils	✓	✓	
Sporobulus frimbiatus	Dropseed Grass	Often on moist areas.	✓		
Themedia triandra	Red Grass	Undisturbed or disturbed open grassland			
Triraphis andropogonoides	Broom Needle Grass	Rocky slopes or deep sandy soils, mostly in open grassland			
Trichoneura grandiglumis	Small Rolling Grass	Open grassland and bushveld, rocky slopes, flood plains or as a sun climax grass in disturbed areas.			
Tristachya biseriata/rehmanni	Trident Grass	Closely related to *T. leucotrix*. Grows on sandy soil, open grassland and rocky slopes and marshy areas			
Tristachya leucothrix	Hairy Trident Grass	Commonly found in overgrazed veld and marshy areas	✓		
Urelytrum agropyroides	Qunine Grass Centipede Grass	Open Grassland, rocky slopes and sandy (moist) soils			
Herbaceous species					
Acalypha angustata	Copper Leaf		✓	✓	
Acalypha vilicaulus		Grassland, mainly rocky places with sandy soil.		✓	
Alectra sessiliflora	Verfblommetjie	Grassland	✓	✓	
*Amaranthus hybridus**	Pigweed	Weed in disturbed places	✓		✓
Anthospermum hispidulum		Summit grassland or rocky ridges		✓	

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Asclepias fructicosus	Milkweed		✓	✓	✓
Asparagus cooperi				✓	
Aster harveyanus	Bloublommetjie	Grassland.	✓	✓	
Berkeya radula	Boesmanrietjie	Moist grassland and vlei's	✓		
Berkeya setifera	Rasperdisseldoring	Grassland, usually in large colonies.	✓		
*Bidens formosa**	Cosmos	Weed in disturbed places			✓
*Bidens pilosa**	Khaki Bush/ Blackjack	Widespread weed.			✓
Boopane disticha	Poison Bulb	Grassland, often in rocky places	✓	✓	
Callilepsis lepthophylla	Bergbitterbossie	Grassland, often on rocky ridges.	✓	✓	
*Centella asiatica**	Marsh Pennywort	Marshes, vlei's.	✓		✓
Chamaecrista comosa	Fishbone Cassia	Grassland	✓	✓	
Comelina africana		Grassland	✓	✓	
Cotula anthemoides	Gansgras	Moist places, often forming dense stands.	✓		
Crabbea acaulis		Grassland	✓		
Crepsis hypochoeridea		Widespread in Grasslands.		✓	
Crinum graminicola	Graslelie	Grassland, usually in sandy soil, localized and rather rare.	✓	✓	
Cucumis zeyheri		Grassland	✓		✓
Denekia capensis		Moist places, sometimes in shallow water.	✓	✓	
Dianthus mooiensis	Frilly Dianthus	Grassland	✓		
Dicoma anomala		Grassland	✓	✓	
Dicoma zeyheri	Kafferdissel	Grassland	✓	✓	

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Dipcadi viride	Grootslymuinte	Grassland, often in vleis	✓	✓	
Dissotis phaeotricha	Dwarf Dissotis	Edge of marshes			
Elephantorrhiza elephantina	Elephant's root	Grassland	✓	✓	
Erica drakenbergensis	Drakensberg Heath	In moist places on forest margins or grassy slopes.	✓	-	-
*Eucalyptes species**	Bluegum	Declared invader, Category 2 (Henderson, 2001).	✓	✓	✓
Eulophia sp	Orchid family				
Euphorbia claviroides var. truncata	Vingerpol	Grassland, often in stony places.	-	✓	-
Felicia filifolia	Fine-leaved Felicia	Rocky places, a weed in overgrazed areas.	✓	✓	
Felicia muricata		Grassland, proliferating in overgrazed/disturbed places	✓	✓	
Gazania krebsiana	Botterblom	Grassland, widespread		✓	
Geigeria burkei	Vermeerbos	Grassland	✓	✓	
Gladiolus crassifolius		Grassland	✓		
Gnidia capitata	Kerrieblom	Grassland	✓		
*Gomphrena celosoides**	Batchelor's Button	Weed in disturbed places.		✓	
Habenaria nyiikana	Orchid family	Grassland	✓		
Habenaria falcicormis	Orchid family		✓		
Haplocarpa lyrata		Grassland, often in moist places.		✓	
Haplocarpa scaposa	Tonteldoosbossie	Grassland, often in moist places	✓	✓	
Helichrysum coriaceum	Vaalteebossie	Grassland		✓	
Helichrysum krausii		Grassland and bushveld,		✓	

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
		usually in dense stands, particularly on the summit of rocky ridges			
Helichrysum nudifolium	Hottentot's tea	Grassland	✓	✓	
Helichrysum rugulosum		Grassland in dense groups	✓		
Hermannia transvaalensis		Grassland.	✓	✓	
Hypericum lalndii	Spindly Hypericum	Swampy and moist grassland.		✓	
Hypoxis acuminata		Grassland, particularly damp places	✓		
Hypoxis argentea	Small Yello Star-Flower	Grassland		✓	
Hypoxis hemerocallidea	Gifbol	Grassland	✓	✓	
Hypoxis rigidula	Kaffirtulp	Grassland	✓	✓	
Ipomoea transvaalensis		Grassland, mainly on rocky slopes,	✓	✓	
Kohautia amatymbica		Grassland, often appearing after fire.	✓		
Kohautia virigata		Grassland and bushveld	✓	✓	
Ledebouria marginata		Grassland.	✓	✓	
Ledebouria ovatifolia		Grassland	✓	✓	
Ledebouria revoluta		Grassland.	✓	✓	
Leonotis dysophylla	Wild Dagga	Grassland and Bushveld, often in disturbed areas.	✓	✓	
Limosella maior		Shallow water or marshy places	✓		
Lobelia erinus	Wild Lobelia	Seasonally wet places in grasslands, often forming stands.	✓		
Lopholaena coriifolia	Pluisbossie	Rocky Grassland	-	✓	-

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Lotononis foiliosa		Grassland on rocky ridges.			
Mariscus congestus		Grassland, moist or marshy places	✓		
Monopsis decipiens	Butterfly Lobelia	Grassland, often in seasonally moist places.	✓		
Monsonia angustifolia	Pink Monsonia	Often in disturbed grassland	✓	✓	
Monsonia burkeana	Naaldebossie	Grassland often in sandy soils or rocky ridges.	✓	✓	
Nidorella anomala		Grassland, often occurring in groups in moist areas.	✓	✓	
Oldenlandia herbacea		Grassland.	✓		
Oxalis obliquifolia	Sorrel	Grassland, often in moist places			
Pelargonium luridum		Grassland, often in moist places.	✓	✓	
Pentanissia angustifolia		Grassland.		✓	
*Persicaria spp**	Knotweed/ Snakeroot	Exotic weed invading moist areas.(Naturalised).	✓		
Pollichia campestris	Waxberry	Grassland	✓	✓	
Polygala hottentotta		Common in grassland, often in damp places		✓	
Pygmaeothamnus zeyheri	Sand Apple	Sandy or stony grassland and bushveld, often forming colonies.	✓	✓	
Rhynchosia totta		Grassland		✓	
Schistostephium crataegifolium	Bergkruie	Grassland, moist places and around rocky outcrops.	✓	✓	
Sebaea grandis	Large Flower Sabaea	Grassland		✓	

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Senecia coronatus	Sybossie	Grassland usually in large colonies	✓	✓	
Senecio consonguineus	Starvatian Senecio	Grassland, weed on cultivated land.		✓	
Senecio gregatus		Along streams and marshes		✓	
Senecio venosus		Grassland, often in rocky places		✓	
Seripheum plumosum	Bankruptbush	Grassland, proliferating in overgrazed areas.	✓	✓	✓
Strigia elegans	Large Witchweed	Parasite on grasses	✓	✓	
*Tagetes minuta**	Khaki Bush/ Blackjack	Naturalised weed in disturbed places	✓	✓	✓
Tephrosia lupinifolia	Vingerblaarertjie	Grassland		✓	
Thesium utile	Besembossie	Hemi-root parasite in grassland	✓		
Ursinia nana				✓	
*Verbena bonariensis**	Wild Verbena	Exotic weed invading moist areas.(Naturalised).	✓	✓	
Vernonia oligocephala	Bitterbossie	Grassland	✓	✓	
Wahlenbergia krebsii		Grows in grassland and often in damp places	✓	✓	
Walafrida densiflora		Grassland and bushveld	✓	✓	
Zornia milneana		Grassland		✓	
Sedges					
Cyperus congestus			✓		
Cyperus esculentus		Weedy exotic in marshy areas	✓		
Cyperus rupestrs var rupestris		Moist or marshy places in grassland	✓	✓	

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Cyperus sp.			✓		
Cyperus spaerospermus		Moist places, marshes and swamps.	✓		
Fimbristylis complanata			✓		
Juncus effusus		In swamps and streambeds	✓		
Mariscus congestus		Grassland, moist or marshy places	✓	✓	✓
Phragmites australis	Common Reed	Marshy places along streams, often in pure stands.			✓
Schoenoplectus corymbosus/paludicola		Marshy grassland, forming stands.	✓		✓
Schoenoplectus decipiens			✓		✓
Typha capensis	Bulrush	Grows in marshy areas and along watercourses.			✓
Tree species					
Acacia mearsnii	Balck Wattle	Invader of grassland and riverbanks	✓	✓	✓
*Bidens formosa**	Cosmos	Weed in disturbed places	✓		✓
*Eucalyptes species**	Bluegum	Declared invader, Category 2 (Henderson, 2001).	✓		✓
Diospyros austro-africana	Jakkalsbos	Grassland on rocky outcrops and ridges		✓	
Melia azedarach	Syrina Tree	Declared invasive weed (Catergory		✓	✓
Morus alba	Mulberry	Invader	✓		✓
Pinus spp*.	Pines	Invaders			✓
Populus spp	Poplar	Invader			✓
Salix babylonica	Weeping Willow	Invader			✓

Scientific name	Common name	Relevant notes	Habitat		
			Option 1	Option 2	Pipeline Route
Solanum mauritianum	Bugweed	Declared Weed (Henderson, 2001).			✓
Tamarix chinensis	Tamarisk	Invader			✓

Appendix C: Suggested Alien Invasive control measures pertaining to the site.

1. Rationale of alien plant removal

Declared weeds and invaders have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and functioning of natural ecosystems. Therefore, it is important that these transformers be controlled and eradicated by means of an eradication and monitoring programme.

Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species. These species invade riparian and seep zones with disastrous impacts on water resources, especially within catchments regions. These species should be controlled to prevent further infestation and it is recommended that all individuals of the invader species be removed and eradicated.

2. Removal methods and guidelines

There are three commonly used methods of alien plant removal. An effective approach often entails a combination of methodologies. The mechanical method involves tree felling and a 'hands on' removal approach often paired with the use of fire. For chemical methods, environmentally safe herbicides are used. The third method of biological control involves introducing species-specific insects and diseases that are used to control the alien plant in its country of origin.

2.1 Mechanical and chemical methods

Mechanical and chemical methods are seen to have short-medium term effectiveness. Follow-up removals are needed periodically to prevent plant re-colonization:

1. Labour intensive physical removal methods are preferable and ensure the entire removal of a plant. Where there are species which are unsuited to this method, the use of ecologically acceptable chemical herbicides may, with care, be used.
2. The following herbicides may be used as per the specified application:
   Chopper - applied to a cut stump;
   Access - applied to a cut stump / foliar (more effective for grasses);
   Glyphosate - applied to a cut stump / foliar spray; and
   Garlon - applied to a stem / cut stump / foliar spray.
3. If alien plant seeds are present, it is preferable to remove them to reduce the re-infestation.
4. After the initial removal, a follow up programme should be done timeously, as areas exposed for the first time are usually devoid of vegetation and are therefore prone to heavy re-infestation by alien species.

2.2 Biological control

Biological control is seen to be an effective long-term approach to controlling alien plants, however, an ethical issue arises with trying to control an alien plant with an alien insect or pathogen. Specialist knowledge is crucial to guide biological control measures.

3. Control methods specific to species encountered on the site:

3.1 *Eucalyptus* species.

These plants are widespread invaders. Specific mechanical and chemical methods are as follows (adapted from Working for Water, 2007):

- Basal Bark Method involves the application of a suitable herbicide with diesel and can be applied to the bottom 250mm of the stem. Applications should be by means of a low pressure, coarse droplet spray from a narrow angle solid cone nozzle.
- Hand Pull Method is simple and involves gripping the young plant low down and pulling it out by hand (using gloves).
- For the Ring Barking Method, bark must be removed from the bottom of the stem to a height of 0.75-1.0m. All bark must be removed to below ground level for good results. Where clean de-barking is not possible due to crevices in the stem or where exposed roots are present, a combination of bark removal and basal stem treatments should be carried out. Bush knives or hatchets should be used for debarking.
- Frill Method involves using an axe or bush knife. Angled cuts should be made downward into the cambium layer through the bark in a ring. Cuts should be distributed around the entire stem and herbicide applied into the cuts.

Where trees can be felled and removed, the use of chainsaws, bow saws, brush cutters or cane knives should be made.

- For the cut stump treatment, stems should be cut as low as possible. Herbicides are applied with diesel or water as recommended for the herbicide. Applications in diesel should be to the whole stump and exposed roots and in water to the cut area.

3.2 *Acacia dealbata* and *Acacia mearsnii* (Wattle trees)

Initially, *Acacia dealbata* and *Acacia mearnsii* must be removed mechanically. Mechanical removal would entail removal of the entire plant (including roots) or cutting the bark as low to the ground as possible. The stumps are to be cut low, about 100 – 150 mm above ground, and then applied with a registered herbicide. The herbicide should be applied either through spraying or painting it onto the stump. Long-term control of these plants is problematic as they coppice easily and produce large numbers

of seed. These seeds remain dormant for years. The use of fire is not advised as the germination of these seeds is stimulated by fire. Introducing competitive crop cover (of indigenous species) serves to succeed the exotic plants and occupy their niches thus preventing their return to a site.

3.3 Pinus species (Pine trees)

Pinus species are particularly problematic to control as the seeds easily spread and establish themselves. This is often the case in moist soil. Ring-barking should be used for larger plants or alternatively felling and treating the plant with a soil-acting herbicide is effective. For young plants, uprooting of the entire plant is most successful; this is easily achieved by spraying and softening the surrounding soil with water or herbicide beforehand.

3.3 Melia azedarach (Seringa)

The *Melia azedarach* plant is extremely difficult to remove as it coppices from the stumps. One method is therefore physical removal of the entire plant including stumps and roots. Alternatively, larger established trees should have their trunks cut close to the ground and a registered herbicide applied to the stump. Herbicide is often mixed with diesel oil for greater effectiveness.

4. Rehabilitation

Once the initial removal efforts are complete, the following measures ought to be applied.

1. Replanting: As the removal of alien plants leaves the ground bare, it is necessary to revegetate these bare areas immediately. Since indigenous plants may also be invasive, revegetation ought to be with indigenous plants that previously occurred on site, and are well adapted to the local conditions. For the grass layer, grass seeds may be used in the re-planting efforts. However, in the herb layer, young and established indigenous trees and shrubs should be planted instead of seed. This is due to the longer germination and growth times of herbaceous plants from seed.

2. Monitoring: Follow-up control and on-going monitoring is necessary to ensure that the indigenous plants are establishing themselves, and that alien plants are not returning to a site. This is necessary because the seeds of alien plants may remain dormant in the soil for years to come (Macdonald, 1985). The stringent removal methods outlined previously should be undertaken with each removal effort to ensure an alien plant is effectively removed.

Appendix D: Threatened plants that occur in the region (Emery *et al*, 2002).

The species that were identified on the site are indicated as well as those that have a possibility of occurrence on the site, but might not heave identified due to the end of the flowering season (e.g. suitable habitat exists).

NT- Near Threatened
VU- Vulnerable
EN- Endangered
EW- Extinct in the Wild
CR- Critically Endangered
Y- Yes
N- No

Scientific Name	Conservation Status	Suitable habitat on site Y/N	Identified on site Y/N
Allophylus chaunostachys	NT	N	N
Aloe albida	EN	N	N
Aloe dewetii	VU	N	N
Aloe hlangapies	NT	N	N
Aloe integra	VU	N	N
Aloe kniphofioides	VU	N	N
Aloe kraussii	NT	N	N
Aloe modesta	EN	N	N
Aloe reitzii	VU	Y	N
Aloe simii	CR	N	N
Aloe thorncroftii	CR	N	N
Aloe vryheidensis	VU	N	N
Brachystelma chlorozonum	NT	Y	N
Brownleea recurvata	VU	Y	N
Cassipourea swaziensis	VU	N	N
Ceropegia distincta	VU	N	N
Cineraria hederifolia (Senecia hederifolia)	VU	Y	N
Crocosmia mathewsiana	VU	Y	N
Cyrtanthus bicolor	NT	Y	N
Cyrtanthus epiphyticus	NT	N	N
Cytinus sp	VU	N	N
Disa amoena	VU	-	N
Disa extinctoria	NT	N	N
Disa hircicornis	NT	N	N
Disa maculomarronina	VU	N	N
Disa montana	CR	N	N
Disperis stenoplectron	VU	N	N
Elephantorrhiza praetermissa	NT	N	N
Encephalartos cupidus	CR	N	N

Scientific Name	Conservation Status	Suitable habitat on site Y/N	Identified on site Y/N
Encephalartos heenanii	CR	N	N
Encephalartos humilis	VU	N	N
Encephalartos laevifolius	CR	N	N
Encephalartos lanatus	NT	N	N
Encephalartos lebomboensis	CR	N	N
Encephalartos middelburgensis	EN	N (in close proximity of suitable habitat)	N
Encephalartos paucidentatus	VU	N	N
Erica revolute	EN	N	N
Erica rivularis	VU	N	N
Eucomis vandermerwei	EN	N	N
Eugenia pusilla	EW	N	N
Eulophia leachii	NT	N	N
Faurea macnaughtonii	NT	N	N
Frithia humilis	EN	N	N
Gladiolus appendiculatus	EN	N	N
Gladiolus calcaratus	VU	N	N
Gladiolus cataractarum	CR	N	N
Gladiolus macneilii	EN	(Grassland)	N
Gladiolus rufomarginatus	VU	Y	N
Gladiolus varius	VU	N	N
Gladiolus vernus	NT	Y (Rocky grassland)	N
Habenaria ciliosa	VU	N	N
Kniphofia triangularis	NT	N	N
Ledebouria appresifolia	VU	-	N
Ledebouria sp.	EN	Y (Grassland)	N
Leucospermum gerrardii	EN	N	N
Leucospermum saxosum	NT	N	N
Nerine gracilis	VU	Y (moist depressions in grassland)	N
Orbea paradoxa	VU	N	N
Orbeanthus hardyi	VU	N	N
Platycoryne mediocris	CR	-	N
Protea comptonii	NT	N	N
Protea curvata	VU	N	N
Protea laetans	VU	N	N
Protea roupelliae	CR	N (In close proximity of	N

Scientific Name	Conservation Status	Suitable habitat on site Y/N	Identified on site Y/N
		suitable habitat)	
Protea subvestita	NT	N	N
Resnova megaphylla	VU	-	N
Rhus batophylla	VU	N	N
Satyrium microrrhynchum	VU	N	N
Schizochilus crenulatus	EN	N	N
Schotia latifolia	VU	N	N
Streptocarpus decipiens	VU	N	N
Streptocarpus denticulatus	VU	N	N
Streptocarpus occultus	EN	N	N
Streptocarpus pogonites	VU	N	N
Watsonia latifolia	NT	Y	N
Watsonia occulta	VU	N	N
Watsonia wilmsii	EN	N	N
Zantedeschia pentlandii	VU	Y (Rocky grassland)	N

Appendix I

MIDDELBURG MINE WATER TREATMENT PLANT: FAUNAL ASSESSMENT

(Strategic Environmental Focus, 2008)

MIDDELBURG MINE WATER TREATMENT PLANT: FAUNAL ASSESSMENT

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S.E.F
STRATEGIC ENVIRONMENTAL FOCUS

June 2008

EXECUTIVE SUMMARY

BHP Billiton Energy Coal South Africa (BESCA) is in the process of conducting a feasibility study into the construction and operation of a 25Ml/d water treatment facility to be located on Middleburg Mine North Section. A component of the study is to determine the environmental impacts associated with the implementation of this project to ultimately determine the feasibility of the project. Strategic Environmental Focus (Pty) Ltd was tasked by Jones and Wagner (Pty) Ltd to undertake an ecological assessment of two sites; Option 1 and Option 2 as well as the proposed pipeline routes.

This report focuses on the faunal assessment segment of the ecological study and is supplementary to the wetland and floral assessment. The purpose of this study was to assess the faunal sensitivity of Option 1 and Option 2 and the proposed pipeline routes and to inform the design of the project accordingly. This entailed the following:

1. Identification of the broad-based vegetation units on site pertaining to faunal habitats;
2. Lists of faunal species recorded and expected to occur on site; and
3. Classification of the faunal sensitivity of the sites and pipeline routes.

Data was collected from background research, including correspondence with Mpumalanga Parks and Tourism Authority, species distribution lists and a sampling exercise.

Option 2 recorded lower faunal numbers than Option 1 as a result of less suitable habitat, a rocky ground layer which is unsuitable for burrowing, a disturbed environment surrounding the site and the absence of natural water features. Option 2 was therefore regarded to be of Medium Sensitivity with constraints to development that can be mitigated.

A natural pan and wetland systems were present at Option 1. These areas provide suitable habitat to *Dingana fraternal* (Stoffberg Widow Butterfly) and *Metisella meninx* (Marsh Sylph), two Red Data invertebrate species, as well as the Red Data amphibian *Pyxicephalus adspersus* (Giant Bullfrog). Additionally, a Red Data bird *Geronotus calvus* (Bald Ibis) and a Red Data mammal *Ourebia ourebi* (Oribi) were recorded during sampling at Option 1.

Small mammal colonies and individuals were recorded within the alien bush clumps at Option 1 and this habitat type now has functional value for faunal species. Nine species of small mammal were recorded within the rocky grassland on site. As a result of these sensitivities, Option 1 was deemed more unsuitable for the development. The high ecological functions in terms of habitats, ecosystems and species carried out at Option 1

pose serious constraints, making sensitive sections at this site unsuitable for development.

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GLOSSARY OF TERMS

Alien species: Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity.

Biodiversity: Biodiversity is the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Conservation: The management of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. The wise use of natural resources to prevent loss of ecosystem function and integrity.

Ecosystem: Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space.

Endemic: Occurring in a particular region, and nowhere else.

Habitat: Type of environment in which a plant or animal lives

Herpetofauna: Scientific term for reptiles and amphibians.

Red Data species: A species that occurs on the IUCN list of declining species and is protected nationally and internationally by legislation. The presence of this species in an area warrants the conservation of that area.

Species diversity: A measure of the number and relative abundance of species (see biodiversity).

Threatened species: Species, which have naturally small populations, and species which have been reduced to small (often unstable) populations by man's activities.

Transect: A transect is a path along which one records and counts occurrences of the phenomenon of study.

Quadrat: A quadrat is a measured and marked rectangle, often a square, used in ecology to isolate a sample area for the purpose of measuring the abundance of different species within that area.

1 INTRODUCTION

BHP Billiton Energy Coal South Africa (BESCA) is in the process of conducting a feasibility study into the construction and operation of a 25Ml/d water treatment facility to be located on Middleburg Mine North Section. This water treatment facility will treat all excess mine water produced by both Middleburg Mine Services (MMS) and Douglas Colliery (known as the DMO project) as well as mine water supplied from Bank and Goedehoop Colliery (Anglo Coal). The water will be treated to catchments standards for release into the catchments and/or to drinking water standard to supply to local users.

Middleburg Mine Services proposed two possible localities for the construction of the water treatment plant. The localities are identified as Option 1 and Option 2. The pipeline route is envisaged to follow existing road and railway reserves where possible. For the purpose of this report, the pipeline route is separated into the two dirty water pipelines portrayed by their respective starting points namely Douglas and Klipfontein dirty water pipelines, and the resulting distribution water pipelines to the Municipal Reservoir (Reservoir pipeline). However, the areas of investigation (water reclamation plant, waste disposal site and pipeline routes) will only be finalised during the definition phase of the project.

2 TERMS OF REFERENCE

In order to address the environmental suitability of the project and incorporate ecological sensitivities into the project planning phase, Strategic Environmental Focus (Pty) Ltd was tasked by Jones and Wagner (Pty) Ltd to undertake an ecological assessment of Option 1 and Option 2 as well as the proposed pipeline routes. This report focuses on the faunal assessment segment of the ecological study and forms part of a collection of ecological assessments including a wetland and floral assessment. The purpose of this faunal study was to assess the sensitivity of the sites and the proposed pipeline routes and to inform the design of the project. This entailed the following:

1. Identification of the broad-based vegetation units on site pertaining to faunal habitats;
2. Lists of faunal species recorded and expected to occur on site; and
3. Classification of the faunal sensitivity of the sites and pipeline routes, if any.

3. BACKGROUND INFORMATION

Middleburg Mine is situated adjacent to the R 575 road in Mpumalanga Province in close proximity (± 20km) to the towns of Witbank and Middleburg. The study area falls within

the quarter degree squares 2529CD, 2529DC and 2629AB, and the proposed project will involve the farms: Goedehoop 315 JS, Hartbeesfontein 339 JS, Klipfontein 316JS, Driefontein 338JS and Reitfontein 341JS.

Option 1 is located on the farm Goedehoop 315 JS, adjacent to the R575 road near to Van Dyksdrift. Option 2 is also situated within the northern section of Goedehoop Farm, adjacent to the Goedehoop dam (Figure 1).

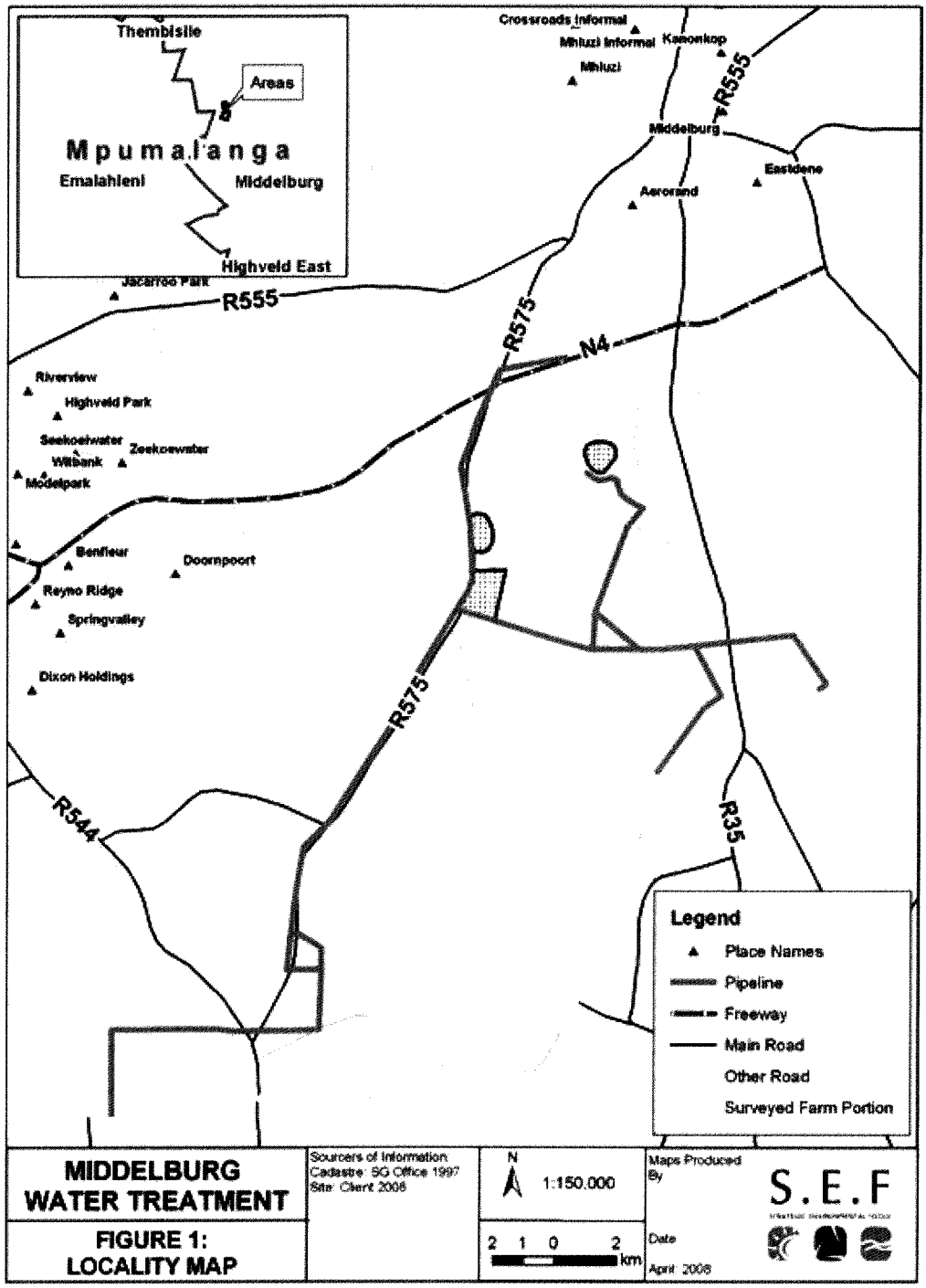

Figure 1. Locality Map

The Pipeline routes (depicted in Figure 2) are as follows:

Route A: Douglas route to Option 1: The pipeline originates on the property of Douglas Colliery and enters Middleburg Mine at the south western corner. The pipeline follows the R575 road in the existing road and railway reserves. The reserves comprise mostly alien invasive vegetation and disturbed grasslands crossing two drainage systems *en route* to the water treatment plant at Option 1 (Figure 2).

Route B: Douglas route to Option 2: The pipeline follows the same route as route A, but from Option 1 the pipeline turns east, crossing over the Niekerkspruit and Spookspruit before the route joins with the Klipfontein pipeline and continues northwards through invasive *Acacia mearsnii* (Black Wattle) plantations towards Option 2 (Figure 2).

Route C: Klipfontein route to Option 1: The route starts at the Klipfontein North Section of Middleburg Mine adjacent to the Bethal Road (R35) and is proposed to run within the existing reserve of the coal conveyer in a westerly direction towards Option 1.

Route D: Reservoir Pipeline from Option 1:
The distribution water pipeline lies within the road reserve of the R575 road northwards. The adjacent properties are private land. The pipeline crosses over the Spookspruit and a tributary of the Spookspruit before the N4 Highway to reach the Municipal Reservoir.

Reservoir Pipeline from Option 2
Not specified yet.

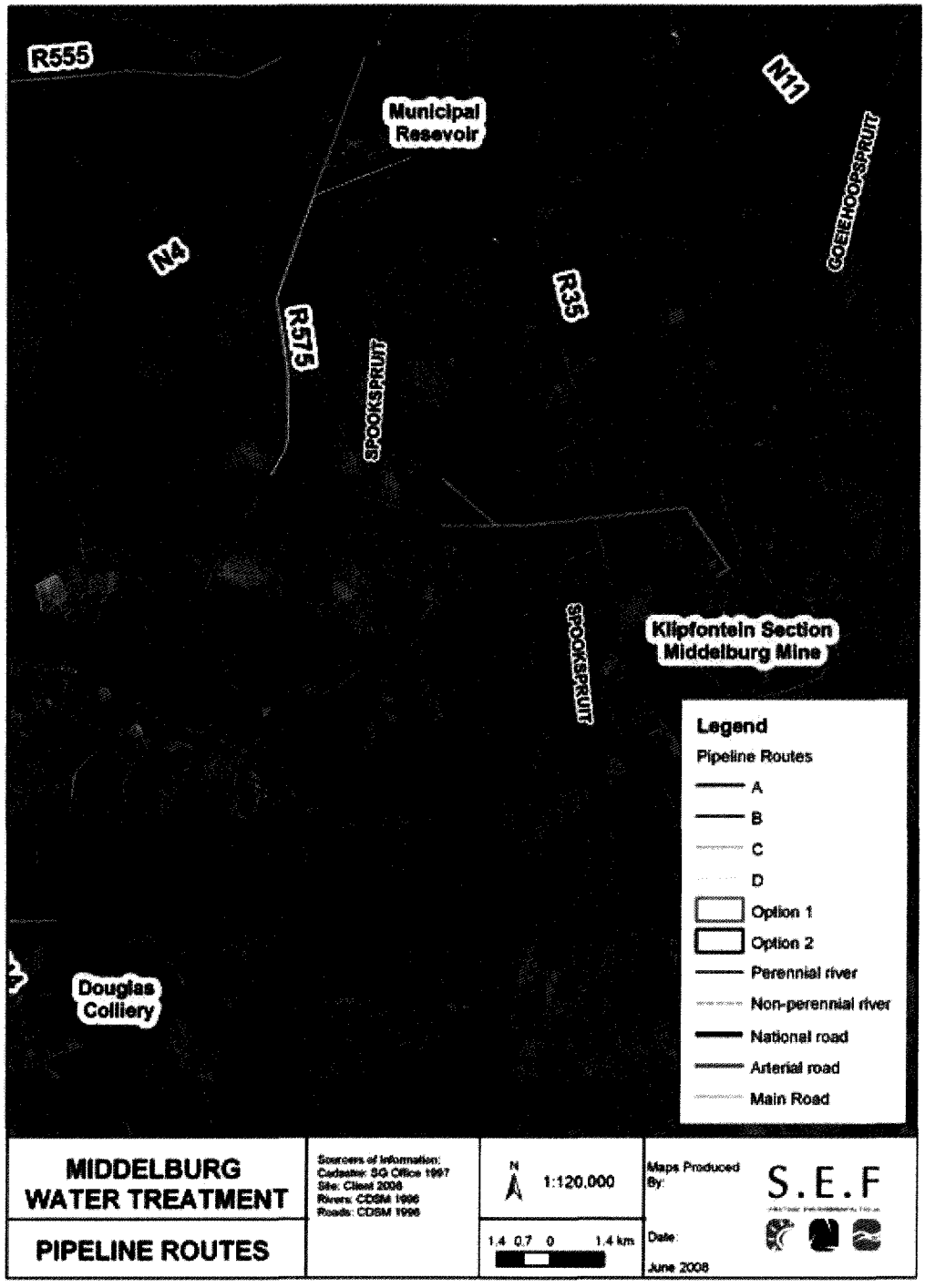

Figure 2. Pipeline Routes & Faunal Sampling Points

3.1 Land Use

The land use is classified as vacant, cultivated, quarries and mining with wetlands and exotic plantations scattered throughout the region (DEAT, 2001). Option 1 comprises a pan, wetlands, rocky grassland and exotic plantations, while Option 2 is largely characterised by rocky outcrop grassland.

The pipeline routes are proposed to predominantly utilise existing road, railway and coal conveyer belt reserves. The reserves are either mowed, used for grazing, disturbed by mining activities or comprise a great number of exotic plant species. However, portions of the route cross water systems, of which some are dirty water systems, and also run along a sensitive rocky ridge.

3.2 Biophysical Description

3.2.1 Climate

Mpumalanga Province experiences summer rainfall and very dry winters with frost. Temperature ranges between an average high of 34 °C and a low of 8°C. Rainfall is on average 710 mm per year (South Africa Weather Service, 2008).

3.2.2 Landscape features and soil

The landscape of the site is characterised by moderately undulating plains, with some low hills and pan depressions. The vegetation is species rich with common highveld grasses such as *Themeda trianda* (Red Grass), *Heteropogon contortus* (Spear Grass) *Eragrostis* species and *Digitaria* species (Mucina & Rutherford, 2006). There are several non-perennial rivers around the site, as well as various water bodies including a non-perennial pan and wetland system at Option 1. The perennial Spookspruit River flows through the site and intersects the proposed pipeline route to the municipal reservoir in the north (DEAT, 2001).

The site includes plinthic and red soils (DEAT, 2001). Plinthic soils contain high-chroma mottles and concretions (often with black centres). This takes place in zones periodically saturated with water (Soil Classification Working Group, 1991). Plinthic soils are thus associated with wetland conditions (Soil Classification Working Group, 1991).

3.2.3 Regional vegetation

The study site falls within the Grassland Biome (Rutherford & Westfall, 1994). High summer rainfall combined with dry winters, night frost and marked diurnal temperature variations which are unfavourable to tree growth are characteristic of the Grassland Biome. The Grassland Biome therefore comprises mainly grasses and plants with perennial underground storage organs, for example bulbs and tubers, and less trees.
The Grassland Biome can be divided into smaller units known as vegetation communities. Acocks (1988) described the vegetation of the region as Bakenveld and

more recently the regional vegetation was classified as Rand Highveld Grassland and Eastern Highveld Grassland (Mucina & Rutherford, 2006). The wetland systems that occur in this region are classified as the Eastern Temperate Freshwater Wetlands (Mucina & Rutherford, 2006).

Rand Highveld Grassland and Eastern Highveld Grassland are poorly conserved vegetation communities and most areas are transformed by cultivation, grazing and mining. Where disturbances occur, the invasive exotic tree *Acacia mearnsii* (Black Wattle) can become dominant. Due to the land transformation of these vegetation types, the remaining portions are of high conservation value and are thus classified as endangered vegetation communities (Mucina & Rutherford, 2006).

Eastern Temperate Freshwater Wetlands occur throughout the region in flat landscapes or shallow depressions filled with water. The outer parts of waterbodies are lined with hygrophilous vegetation of temporary flooded grasslands (Mucina & Rutherford, 2006).

Although mines and quarries are one of the smallest physical transformers of the vegetation communities and contributed just more than two percent to transformation in the Bankenveld, they do however have a much larger and less obvious effect on the surrounding communities through air, soil, water and noise pollution (Macdonald, 1991).

4. STUDY APPROACH

The study was undertaken over a five day period from 21-25 April 2008. The sampling was focussed on Option 1 and Option 2 earmarked for the development of the Water Treatment Plant. One day was allocated to visually survey the pipeline routes from accessible roads.

4.1 Limitations

A complete study can only take place if target populations are small, the study area is small and well delineated and resources are unlimited. However, in practice, ecological studies are constrained by the interrelated factors of surveying time and duration of the survey, finance and resources.

Scientific methodology therefore prescribes that good survey practices are employed to gain sufficient quality data in a defined sample (either area or population) that can be extrapolated to make predictions about the entire area or population.

Constraints to fieldwork

The following constraints were experienced during sampling

- Time constraints: Ideally an ecological assessment should be carried out over a longer time frame and should be replicated over several seasons. Due to the constraints of time and a large study area, the results were collected and concluded from sample plots laid out in areas of natural vegetation at Option 1 and Option 2. A general observation whilst driving along the pipeline route and a survey of aerial imagery also assisted in gathering information.

- The large study area did not allow for the finer level of assessment that can be obtained in smaller study areas. Therefore, data collection in this study relied heavily on data from representative sections within Option 1 and Option 2.

4.2 Assumptions

Faunal diversity is expected to be greater in areas of natural vegetation where disturbances are low.

5. METHODOLOGY

5.1 Sampling Protocol

Fieldwork and sampling was undertaken over a five day period from 21-25 April 2008. During this time, sampling was focused on Option 1 and Option 2, while the pipeline routes were visually assessed. Figure 2 indicates the faunal sampling sites.

Invertebrate sampling methodology

Due to limitations, the survey design was aimed at species of conservation concern. However, reporting addresses all the biodiversity collected on site. The grasslands were sampled by means of random linear transect lines each approximately 100m in length using a standard handnet. This is a useful method for the identification and verification of butterfly species and other flying invertebrates.

Ground-dwelling invertebrates were sampled by means of active searching under stones and rocks within the rocky grassland and rocky outcrops grassland on site. Additionally strategically placed pitfall traps were placed in rocky outcrop grassland in 3 x 3 grids with each grid placed 5m apart. Therefore two grids, each of nine pitfalls were placed in the rocky outcrops grasslands. Pitfalls were left overnight for a four day period. All captured taxa were identified.

Invertebrate taxa were identified and named according to Woodhall (2005), Picker *et al* (2004) and Leroy & Leroy (2003).

Herpetofauna sampling methodology

Reptile sampling involved active searching under stones and rocks at both Option 1 and Option 2.

Formal sampling was not undertaken for amphibians and background research, data from previous fieldwork in the area as well as distribution lists enabled a desktop survey of amphibian inhabitants.

Herpetofauna were identified and named according to Carruthers (2001) and Branch (1998).

Mammal sampling methodology

For the sampling of mammal taxa, the following sampling protocol was applied;

- Sightings of individual animals or signs of occurrence (spoor, droppings, nests and burrows);
- Walking and searching predefined transects or grids; and
- Placement of galvanised live metal traps.

Where sightings were successful, the following were recorded:

- A picture, including a scale object;
- Location of the site with a Garmin 76 Versatile Navigator Global Positioning System (GPS); and
- Relevant notes on the landscape at this point.

A total of 50 galvanised metal live traps (300mm x 100mm x 100mm) were then set out at two locations on each site. One set of 10 and another of 15 traps were spaced 5m apart in two and three parallel trap lines, each consisting of 5 traps. Traps were baited with a mixture of oats, peanut butter, marmite and sunflower oil. Traps were set out for three consecutive nights and were checked and reset each morning and afternoon. Captured animals were identified and released.

Mammal taxa were identified and named according to Cillie (2007) and Friedmann and Daly (2004).

Avifauna sampling methodology

Birds were identified by means of random transects walked whilst covering as much of the available habitat as possible. Species were verified where necessary using Sasol Birds of Southern Africa (Sinclair *et al.* 2002). Birds were also identified by means of their calls, signs of nests, footprints and feathers. A desktop assessment and distribution maps indicating avifaunal distribution data for the quarter degree squares supplemented data collection (Appendix 3).

Avifauna were identified and named according to Sinclair *et al* (2002) and Barnes (2000)

5.2 Compilation of the Sensitivity Map

A sensitivity map was compiled as a precursor to this report. Low, medium and high sensitivity ratings were assigned to Option 1 and Option 2 (Figure 4 and Figure 6). The ratings are explained as follows:

- High sensitivity: these are areas with a high ecological sensitivity as a result of high species diversity recorded here and the presence of sensitive species, there are significant constraints to development.
- Medium sensitivity: these are areas with intact vegetation that offer suitable habitat to faunal inhabitants. They have a moderate ecological sensitivity and constraints to development which can be mitigated.
- Low sensitivity: these are areas with no ecological sensitivity and no constraints to development. Faunal species diversity is low and no individuals that occur here are of conservational importance.

6. RESULTS & DISCUSSION

Areas of high faunal sensitivity were derived from data collected during the site visit, and supplemented by the perusal of aerial imagery. These areas comprise the Wetland/Pan, Alien Bush Clumps and Rocky Grassland at Option 1. These are sensitive habitats as a result of the high faunal diversity they support.

Areas of medium sensitivity are areas that may be natural or in a semi degraded state. They are marginally suitable habitat for important animal species. This is comprised of the Rocky Outcrop Grassland at Option 2.

Areas of low sensitivity contain no species of importance. They have no ecological sensitivity and pose no constraints to development. The Degraded Grassland is included in this category.

6.1 Option 1

Four faunal habitat types were delineated at Option 1 (Figure 3). These comprised the Wetland/Pan Areas, Degraded Grassland, Rocky Grassland and Alien Invasive Bush clumps.

The Rocky Grassland and Wetland/Pan areas are natural areas where a high faunal activity was recorded. Of the twelve mammal species recorded, ten species were recorded from the rocky grassland on site. All the avifaunal species listed in Appendix 3 are partially or wholly reliant on aquatic systems for habitat. Research by Allen & Flecker (1993) confirms a greater faunal diversity in freshwater aquatic systems than the surrounding landscape. In addition, highly mobile organisms like water birds have population dynamics that require the use of multiple wetland systems (Haig *et al*, 1998).

As water is the basic unit of life, its importance for biodiversity, nutrient cycling and movement corridors has not gone unlegislated, and the National Water Act (Act 36 of 1998) [NWA] highlights its importance, requiring that hydrological features are delineated and buffered, and protected from development.

The Namaqua Rock Rat (*Aethomys namaquensis*), the Bushveld Gerbil (*Tatera leucogaster*) and the Single Stripped Mouse (*Lemniscomys roscilia*) were all recorded in the Alien Invasive Bush clumps on site. These bush clumps recorded a higher number of small mammal colonies (burrows) than the rocky grassland. Though the Alien Invasive Bush clumps are an exotic habitat type, sampling success in similar studies has also yielded a higher diversity in these areas. Small mammals are thought to favour closed canopy woodland over open grasslands for protection from avifaunal predators. Also, as a result of the moisture retained by trees, the soils under tree canopies are easier for burrowing.

Option 1 is characterised by high sensitivity areas as a result of the high number of sensitive mammal and avifauna species recorded, as well as the suitable habitat for sensitive invertebrates and amphibians. The ecological functionality is therefore high with constraints to the development of a water treatment plant.

6.2 Option 2

Two habitat types were present on this site namely Rocky Outcrop Grassland and Alien Bush Clumps (Figure 5). Sampling was focussed within two locations in the Rocky Outcrop Grassland. No mammals were recorded during sampling and no spoor, droppings or sightings of individuals were observed on site. A number of invertebrates were recorded, but no species were of conservational importance (Appendix 1). Though the rocky habitat was suitable for ground dwelling invertebrates and reptiles, none were recorded during active searching. Sensitive amphibians and birds are also not expected to occur at this site due to the lack of natural water features on site.

Option 2 is surrounded by disturbed previously mined areas, which have disrupted the landscape and created stockpile features. Noise disturbances from heavy vehicle traffic along the adjacent roads also constitute a faunal disturbance, and as a result larger mammals are likely not present. Burrowing small mammals are also excluded as a result of the rocky ground layer as well as noise disturbance and vibrations. Only aerial species with diverse habitat requirements were noted during sampling including White Rumped Shrike (*Apus cafer*), Common Fiscal Shrike (*Lanius collaris*) and Cloud Cisticola (*Cisticola textrix*).

The Alien Bush clumps at Option 2 are awarded a medium sensitivity rating. These Alien Bush Clumps are made up of *Eucalyptus grandis* (Giant Eucalyptus) and *Pinus* spp (Pine), different species to the *Acacia mearnsii* (Black Wattle) at Option 1. *Eucalyptus grandis* (Giant Eucalyptus) and *Pinus* spp. (Pine) are commonly planted on farms as wind breaks and for the delineation of boundaries. The spatial alignment of the trees, in rows, indicates this function and tree distribution at Option 2 differs from the scattered and clumped appearance of *Acacia mearnsii* (Black Wattle) trees at Option 1. In addition the noise disturbance restricting faunal presence in the Rocky Outcrop Grassland at Option 2 is expected to have the same effect within the Alien Bush Clumps. The Alien Bush Clumps at Option 2 are therefore not matched functionally to clumps at Option 1, and are therefore awarded a lower sensitivity.

Option 2 is of a lower sensitivity than Option 1, with the entire site characterised by a medium sensitivity (Figure 6). Though no species of importance were recorded, the intact vegetation state on site (SEF, 2008a) is potential habitat for sensitive reptile, arachnid and mammal species.

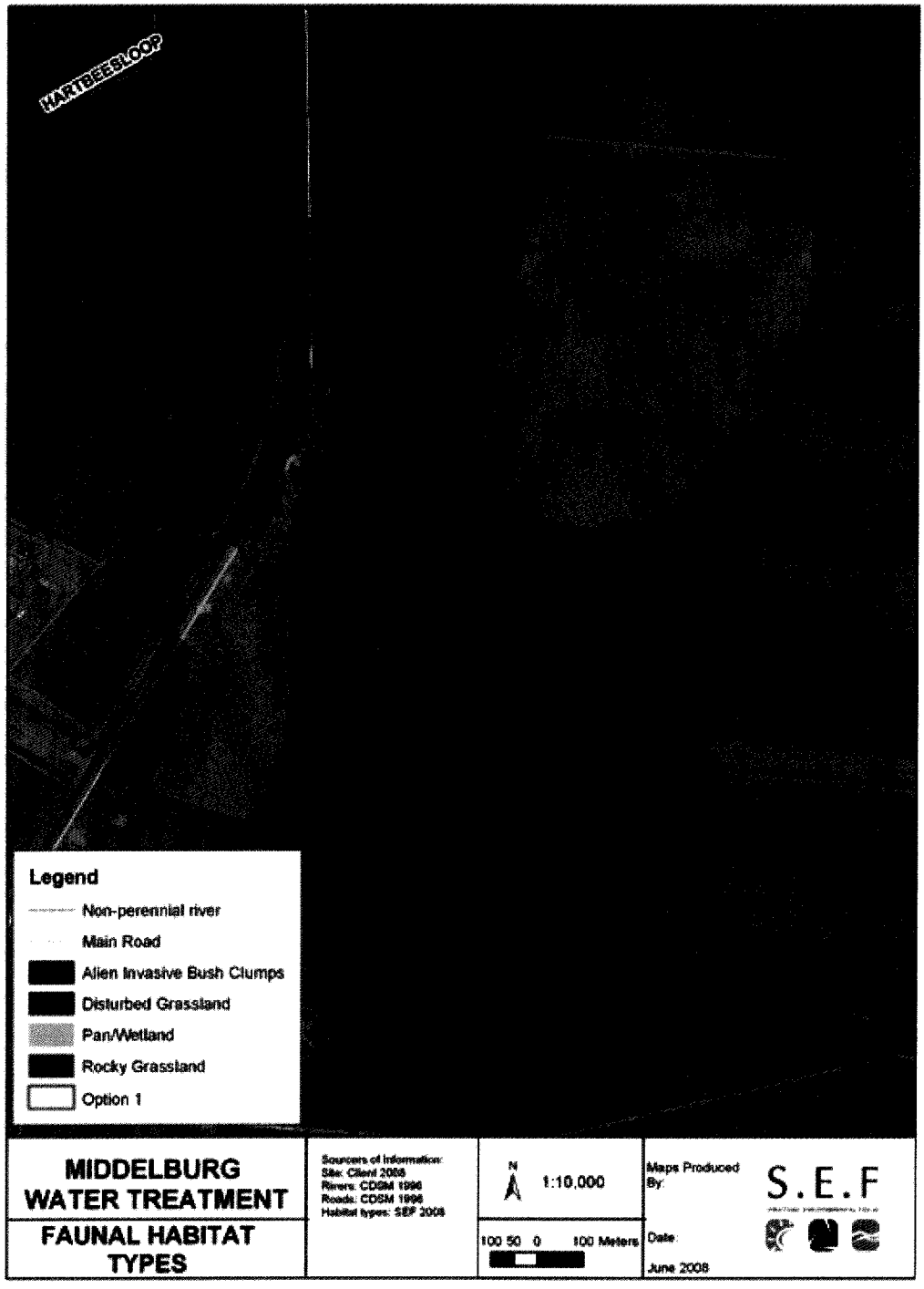

Figure 3. Faunal Habitat Map of Option 1

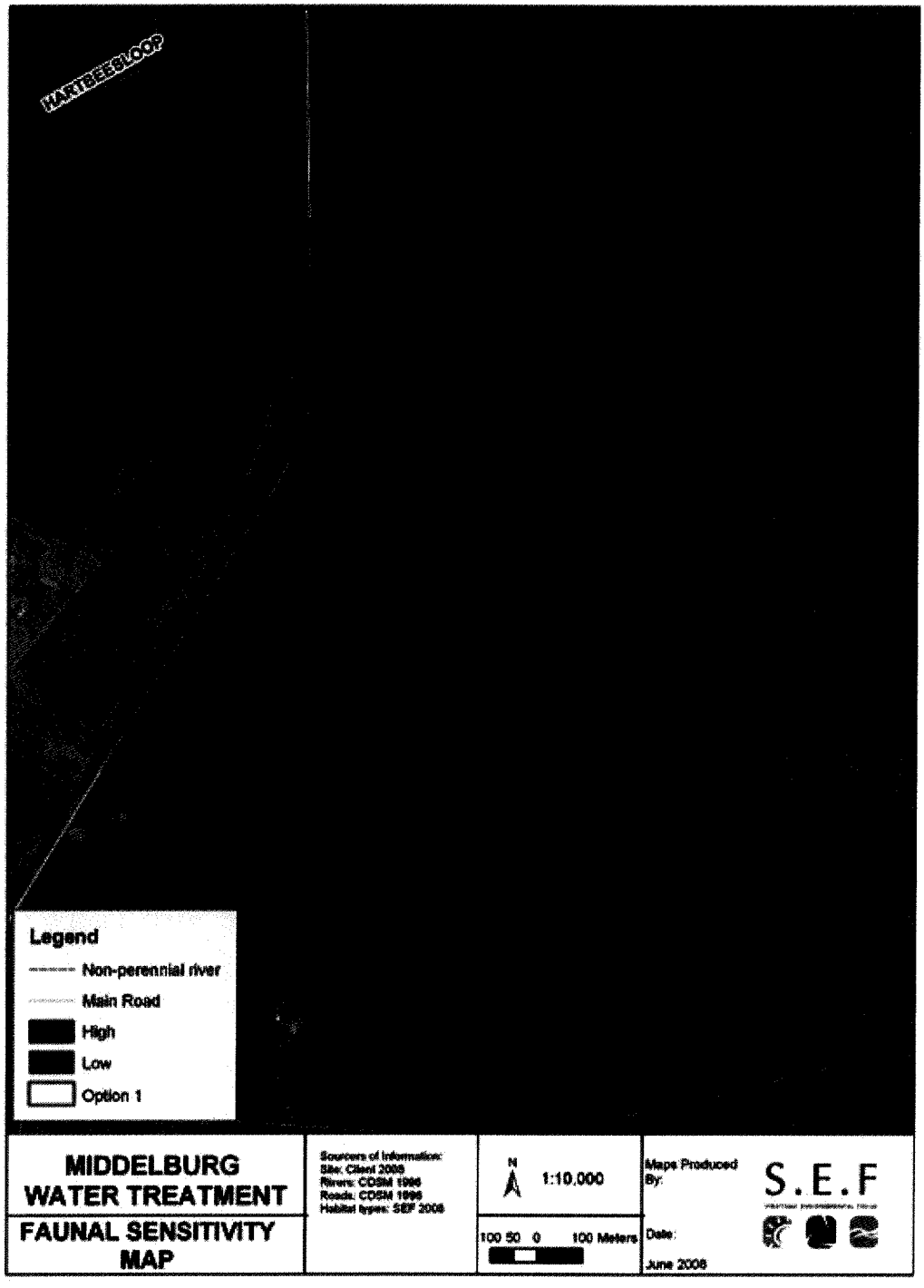

Figure 4. Sensitivity Map of Option 1

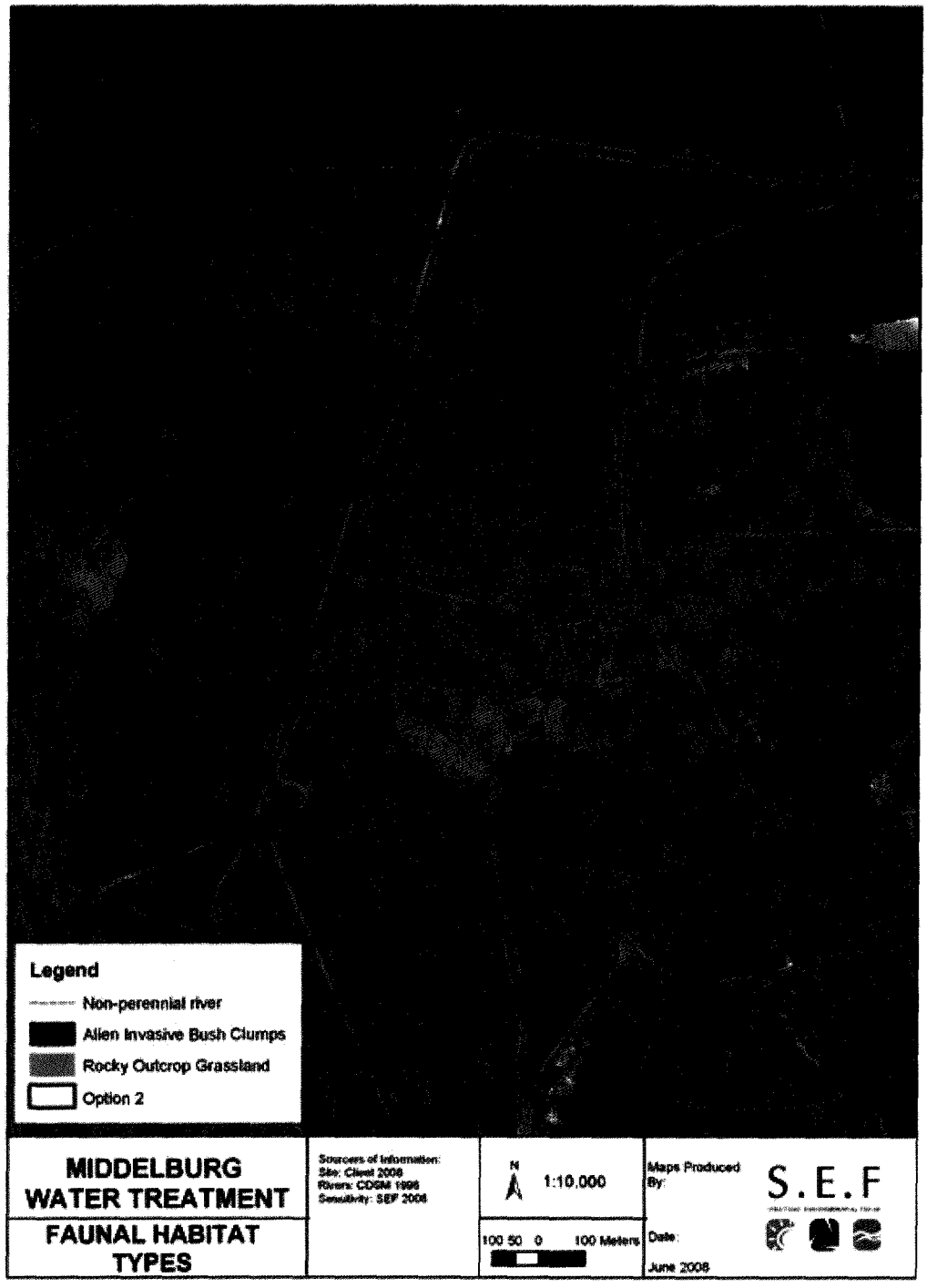

Figure 5. Faunal Habitat Map of Option 2