

Proposed Seaview and Greenbushes Bulk Water Infrastructure Expansion, Port Elizabeth

Draft Environmental Management Programme

Report Prepared for

Bosch Semele (Pty) Ltd.

Report Number 485194/2



Report Prepared by

The logo for srk consulting, featuring a stylized orange and grey graphic to the left of the text 'srk consulting'.

October 2016

Proposed Seaview and Greenbushes Bulk Water Infrastructure Expansion, Port Elizabeth

Draft Environmental Management Programme

Report Prepared for

Bosch Stemele Pty Ltd
PO Box 27158
Greenacres
6057

Report Prepared by

SRK Consulting (South Africa) (Pty) Ltd.
Ground Floor Bay Suites
1a Humewood Rd.
Humerail
Port Elizabeth 6001
South Africa
e-mail: portelizabeth@srk.co.za
website: www.srk.co.za

Tel: +27 (0) 41 509 4800
Fax: +27 (0) 41 509 4850

SRK Project Number 485194

October 2016

Compiled by:

Tammy Burton
Environmental Scientist
Karissa Nel
Senior Environmental Scientist

Email: knel@srk.co.za

Authors:

T. Burton & K. Nel

Peer Reviewed by:

Rob Gardiner
Partner, Principal Environmental
Scientist

Table of Contents

1	Introduction	1
2	Scope of Report.....	1
2.1	Environmental Assessment Practitioner (EAP)	1
2.1.1	Expertise of EAP	1
2.1.2	Environmental Assessment Practitioner Details	2
3	Project Description	4
3.1	Project Description.....	4
4	Environmental Objectives	5
4.1	Planning and Design.....	5
4.2	Construction phase	5
4.2.1	Impacts on Terrestrial Ecology and Biodiversity	6
4.2.2	Impacts on Wildlife:.....	6
4.2.3	Impacts on Surface Water and Aquatic Resources:	7
4.2.4	Impacts on Soil and Landscape	7
4.2.5	Drainage and Stormwater Management	8
4.2.6	Impacts on Traffic.....	8
4.2.7	Noise Impacts.....	8
4.2.8	Impacts on Air Quality:	8
4.2.9	Impacts on Archaeological Resources:.....	8
4.2.10	Impacts on Cultural/ Historical Resources:	9
4.2.11	Impacts on Palaeontological Resources:	9
4.2.12	Waste Management:	9
4.2.13	Socio-Economic Impacts:.....	9
4.2.14	Impacts on Existing Infrastructure and Services:.....	9
4.2.15	Impacts on Landowners and Private Property	10
4.3	Rehabilitation after construction	10
4.4	Operational phase.....	10
4.4.1	Loss of Water	10
4.4.2	Safety issues due to potential inadequate servitude maintenance	10
4.4.3	Improved water supply	10
4.4.4	Visual Impacts	11
4.4.5	Aquatic Impacts.....	11
4.4.6	Socio-Economic Impacts.....	11
4.5	Closure/ Decommissioning Phase.....	11
5	Impact Management.....	14

6 Monitoring, Reporting and Auditing	30
7 Environmental Awareness Plan	30
8 Organisational Structure	30
8.1 The Developer: Nelson Mandela Bay Municipality (NMBM).....	30
8.2 The Contractor	31
8.3 The Environmental Control Officer (ECO)	31
9 EMPr Procedure	31
Appendices	32
Appendix A: CV of Environmental Assessment Practitioner	33
Appendix B: Site Layout Diagram	34
Appendix C: Contractor Code of Conduct	35
Appendix D: Guidelines for the identification of archaeological and historical material	37

List of Figures

Figure 1: Site locality map	3
Figure 2: Environmental Sensitivities map for the proposed alignment	12
Figure 3: Aquatic systems surrounding the proposed site	13

List of Tables

Table 1: List of plant species of special concern identified in the study area	6
Table 2: Mitigation and management measures for the construction phase	14
Table 3: Mitigation and management measures for the operational phase	29

Acronyms

CBA: Critical Biodiversity Area

DEA: Department of Environmental Affairs (National)

DEDEAT: Department of Economic Development, Environmental Affairs and Tourism

EAP: Environmental Assessment Practitioner

ECPHRA: Eastern Cape Provincial Heritage Resources Authority

ECO: Environmental Control Officer

EIA: Environmental Impact Assessment

EMPr: Environmental Management Programme

NEMA: National Environmental Management Act

NMBM: Nelson Mandela Bay Municipality

RP: Representative Person (developer) who is responsible for the implementation of the EMPr.

1 Introduction

SRK Consulting (SRK) has been appointed by Bosch Stemele on behalf of the Nelson Mandela Bay Municipality (NMBM) to undertake an environmental assessment process for the proposed expansion of the Seaview and the Greenbushes bulk water infrastructure expansion, which includes the compilation of this Draft Environmental Management Programme (EMPr).

2 Scope of Report

The environmental management measures recorded in this EMPr are based on information supplied to SRK during the compilation of the Basic Assessment Report, including information from the applicant and the recommendations from specialists. This EMPr has been compiled to comply with the specific requirements of the National Environmental Management Act (No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations (2014).

It should be noted that the EMPr is written as if the project has been authorised. This approach in no way presupposes that the project will be authorised, rather, the style of writing is aimed at making the EMPr easier to read and more easily converted into a practical management tool should the application be approved.

SRK has exercised all due care in reviewing the supplied information provided during the course of the environmental assessment process and has included the requirements of commenting authorities. The appropriateness and practicality of the management measures presented in this EMPr has been considered in terms of comments received and discussed with the applicant as necessary. The NMBM is fully responsible for the implementation of the EMPr.

SRK cannot be held responsible for failure of NMBM to comply with the EMPr. The EMPr is by nature a dynamic document and NEMA provides for continual updating of the EMPr, with approval from the Competent Authority.

The aim of this EMPr is to ensure that construction, operation, and maintenance activities are conducted such that potential negative environmental impacts are minimised and positive impacts are enhanced. This EMPr is not a health and safety plan and this EMPr makes no attempt to satisfy the requirements of the Occupational Health and Safety Act

2.1 Environmental Assessment Practitioner (EAP)

2.1.1 Expertise of EAP

This EMPr was prepared by Tammy Burton and Karissa Nel and reviewed by Rob Gardiner.

Tammy Burton (BSc Hons, CEAPSA and NDip Safety Management) is an Environmental Scientist in the SRK Port Elizabeth office. She has four years experience in the field of Environmental Management (locally) and two years experience in the field of Environmental and Safety Management in a construction environment (based in Mozambique). Her expertise includes Environmental Basic Assessments, Environmental Impact Assessments, Mining Environmental Management Plans, Environmental Auditing, Waste License and Water Use License Applications, environmental leading indicator assessment, HSE Officer work, construction environmental project coordination and corporate social community development.

Karissa Nel (MEM, CEAPSA) is a Senior Environmental Scientist, with more than 10 years environmental consulting experience in Environmental Impact Assessments (EIA), Environmental Management Programmes (EMPr), environmental auditing and licensing. Her training is in zoology, microbiology, aquatic ecosystems, wetland assessment and environmental management. Karissa's CV is attached as Appendix A.

Rob Gardiner (MSc, MBA, Pr Sci Nat) is a Principal Environmental Scientist and head of SRK's Environmental Department in Port Elizabeth. He has more than 20 years environmental consulting

experience covering a broad range of projects, including Environmental Impact Assessments (EIA), Environmental Management Systems (EMS), Environmental Management Programmes (EMPr), and environmental auditing. His experience in the development, manufacturing, mining and public sectors has been gained in projects within South Africa, Lesotho, Botswana, Angola, Zimbabwe, Suriname and Argentina.

2.1.2 Environmental Assessment Practitioner Details

EAP	Tammy Burton
Company:	SRK Consulting (South Africa) (Pty) Ltd
Qualifications:	BSc Hons
Professional Registration	Certified Environmental Assessment Practitioner South Africa though the Interim Board of EAPASA
Tel:	(041) 405 4800
Fax:	(041) 405 4850
Postal Address	PO Box 21842, Port Elizabeth, 6000
Email	Email: tburton@srk.co.za

EAP	Karissa Nel
Company:	SRK Consulting (South Africa) (Pty) Ltd
Qualifications:	MEM
Professional Registration	Certified Environmental Assessment Practitioner South Africa though the Interim Board of EAPASA
Tel:	(041) 405 4800
Fax:	(041) 405 4850
Postal Address	PO Box 21842, Port Elizabeth, 6000
Email	Email: knel@srk.co.za

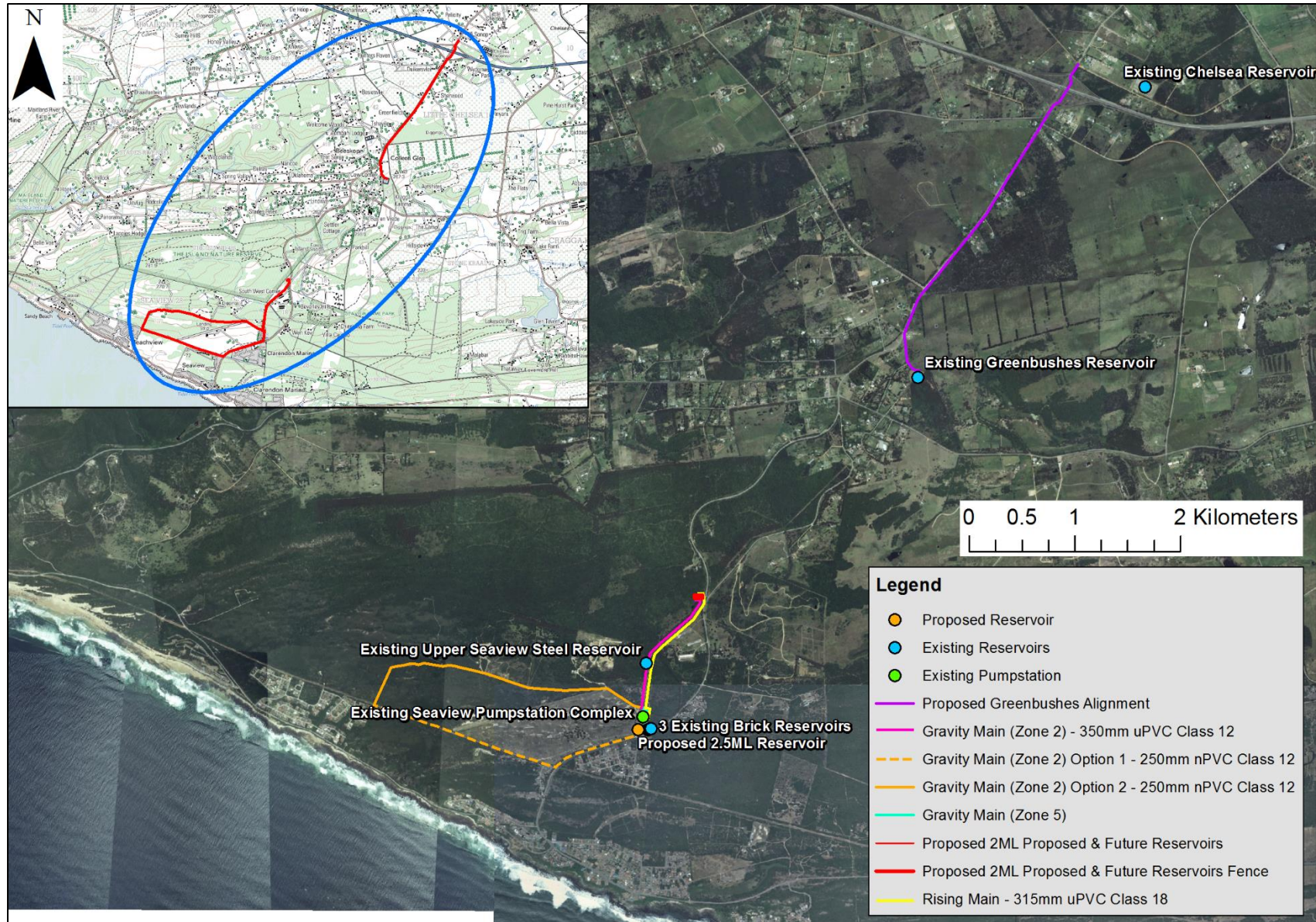


Figure 1: Site locality map

3 Project Description

3.1 Project Description

The proposed development aims to expand current bulk water supply infrastructure in order to address the future provision of potable water to the Seaview and Greenbushes supply areas. The Nelson Mandela Bay Municipality proposes to develop Phase 1 which entails the provision of bulk water infrastructure to 8,020 erven within Supply Zones 1, 2, 4 & 5 for the Seaview Area and Supply Zone 7 for the Greenbushes Area. The proposed bulk infrastructure for this phase is based on current water demands and is currently at planning stage.

Seaview Bulk Water Supply (Phase 1)

This supply area is currently supplied from the Seaview pump station 1.2 ML sump/ reservoir and via a number of small local schemes drawing water directly from the two adjacent Churchill pipelines. The proposed infrastructure development aims to construct those elements of the long-term plan which are required for bulk water supply to the area now and to eliminate the minor connections from the Churchill pipelines where feasible. The existing Seaview pump station complex will be expanded to accommodate the proposed bulk infrastructure.

The infrastructure planned for the Seaview supply area is as follows:

- The construction of a 2.5 ML clear water bulk storage reservoir (T.W.L = 79.5 mamsL) at the existing lower Seaview pump station complex to serve Zone 1 & 4 (please refer to Appendix A for a map of the supply zones). It is anticipated that this reservoir will have a grassed embankment;
- The clearance of a ± 2 , 400 m² footprint for the establishment of a 2.5 ML clear water bulk storage reservoir (T.W.L = 160 mamsL) at the proposed Upper Seaview Bulk Storage greenfield reservoir site to gravity serve Zone 2 & 5. This footprint includes space for a potential additional future reservoir. The entire footprint will be fenced. It is anticipated that this reservoir will have a grassed embankment;
- The construction of a 3 m wide gravel access road to the proposed 2.5 ML reservoir at the Upper Seaview Bulk Storage Reservoir site. It is anticipated that the alignment of this access road will fall within pipeline servitude;
- The augmentation of the pump station at the existing Seaview pump station complex to supply the proposed 2.5 ML reservoir at the Upper Seaview reservoir site at 160 mamsl (53 l/s);
- The construction of a rising main (yellow line) 315 mm \varnothing class 18 uPVC pipeline from the Seaview pump station complex to the 2.5 ML Upper Seaview Bulk Storage Reservoir, approximately 1,400 m in length within a proposed 5 m wide servitude;
- The construction of a gravity main (pink line) 350 mm \varnothing class 12 uPVC pipeline, from the Seaview pump station complex to the 2.5 ML Upper Seaview Bulk Storage Reservoir, approximately 1,300 m in length within an existing 5 m wide servitude; and
- The construction of a pumping main 315 mm \varnothing class 16 uPVC pipeline at the Seaview pump station complex, approximately 250 m in length within the footprint of the complex.

The construction of a 250 mm \varnothing class 12 uPVC gravity main pipeline connecting Zones 2 & 5 to the existing Seaview pump station complex, along a 3m wide pipeline servitude. Two alignment options are being assessed:

- Option 1 (preferred) (dotted orange line): The alignment (approximately 2,900 m in length) follows the Seaview Road up to the Churchill pipeline servitude where the alignment turns towards the west and follows the existing pipeline servitude to a point where it connects to existing infrastructure at Beachview; and

- Option 2 (solid orange line): This alignment (approximately 2,460 m in length) follows an existing gravel road which starts just north of the Seaview pump station complex and runs in a westerly direction. At a point where the gravel road turns north, the alignment continues further westwards through forest and then turns southwestwards to a point where it connects into existing infrastructure at Beachview;
- Gravity connections from the service reservoirs to existing and proposed reticulation (inter-connections between proposed and new pipelines within the Seaview pump station complex, 150 mm, 200 mm, 250 mm, 300 mm and 450 mm via connections of not more than 20 m in length each); and
- Installation of metering at the Seaview pump station complex.

There is an existing power supply at Lower Seaview pump station. The NMBM Electricity Directorate will be contacted to determine whether there is spare capacity for the proposed requirements.

Proposed abandonment and/ or demolition

- There are three brick reservoirs south of the Seaview pump station complex which supplies Seaview and Kini Bay. These reservoirs are currently in poor condition and it is proposed that these reservoirs also be abandoned and demolished once the proposed reservoir at the Seaview pump station is constructed; and
- Claredon Marine is supplied via a connection to the existing 120 kL Upper Seaview steel reservoir off the existing Seaview rising mains pumping to Greenbushes/ Chelsea. It is proposed that the reservoir will be abandoned/ demolished once the proposed Upper Seaview reservoir (160 mamsl) is constructed.

Greenbushes Bulk Water Supply (Phase 1)

The existing Greenbushes reservoir currently supplies the Chelsea Reservoir via a 525 mm \emptyset gravity pipeline and a 375 mm \emptyset gravity pipeline. However, the 525 mm \emptyset gravity pipeline is dedicated to an emergency supply to the Chelsea Reservoir, which has a supply function outside the project area. Due to increasing developments inland and up to Cape Road it is necessary to augment the reticulation of water to this area. Therefore, it is proposed to install a 750 mm (outside diameter) gravity main steel pipeline (purple line), approximately 3,500 m in length, connecting the Greenbushes reservoir to the existing pipework near the existing Chelsea reservoir site. It is noted that this pipeline will tie into an existing 375mm diameter pipeline that connects to the Chelsea Reservoir.

4 Environmental Objectives

This section specifies the impact management objectives and outcomes used to determine the extent of management action(s) required to mitigate the impacts identified during the impact assessment process.

4.1 Planning and Design

There were no impacts identified for this phase, however a number of the mitigation measures proposed in the subsequent phases are relevant to the design phase and influences design considerations (see Table 1 and Table 2).

The objective of this phase is to design the bulk water infrastructure with minimal environmental impacts during the subsequent phases.

4.2 Construction phase

Construction is expected to continue over a period of 16 months. The following impacts and associated management objectives are described for the construction phase:

4.2.1 Impacts on Terrestrial Ecology and Biodiversity

Clearing of vegetation as well as in-filling and cutting of landforms for infrastructure will result in loss of vegetation and disturbance to natural habitats. According to the NMBM Bioregional Plan, most of the vegetation types that falls within the study area are classified critically endangered, endangered or vulnerable. Furthermore, the proposed Upper Seaview Reservoir and access road as well as the road reserve for sections of the Seaview 350 mm Gravity Main pipeline and 315 mm Rising Main pipeline fall within a Protected Area known as the Island Nature Reserve. Moreover the Greenbushes pipeline alignment falls within a threatened ecosystem classified by the National Environmental Management: Biodiversity Act (G 34809, GoN 1002, 9 December 2011) Vulnerable Algoa Sandstone Fynbos (code FFs 29) as well as within a terrestrial CBA.

Vegetation clearing will result in the loss of potential threatened, rare, endemic or protected plant species. The Vegetation Specialist identified at least twelve plant species of special concern that occur within the study area and will be potentially destroyed by construction activities. However most of these species tend to have widespread distributions and would thus not be under any significant threat as a result of proposed construction works.

Table 1: List of plant species of special concern identified in the study area

Botanical Name	Family	Status
<i>Acrolophia capensis</i>	Orchidaceae	PNCO
<i>Astephanus marginatus</i>	Apocynaceae	PNCO
<i>Carpobrotus edulis</i>	Mesembryanthemaceae	PNCO
<i>Carpobrotus sp.</i>	Mesembryanthemaceae	PNCO
<i>Cynanchum sp.</i>	Apocynaceae	PNCO
<i>Erica chloroloma</i>	Ericaceae	PNCO
<i>Indet.</i>	Scrophulariaceae	PNCO
<i>Indet.</i>	Rutaceae	PNCO
<i>Indet.</i>	Restionaceae	PNCO
<i>Scadoxus puniceus</i>	Amaryllidaceae	PNCO
<i>Secamone alpinii</i>	Apocynaceae	PNCO
<i>Sideroxylon inerme</i>	Sapotaceae	NFA

PNCO: Protected by the Provincial Nature Conservation Ordinance of 1974

NFA: Protected by the National Forests Act 84 of 1998

Some sections of the road reserve are characterised by a number of alien invasive plant species (e.g. Eucalyptus, Pine, Rooikrans, Long-leaved Wattle, Black Wattle, Port Jackson willow and American nightshade) and are therefore more susceptible to the establishment and spread of invasive plant species.

The impact management objective for this impact is:

- Minimise impacts to natural vegetation, Protected Area's (i.e. Island Nature Reserve), the terrestrial Critical Biodiversity Area and the Vulnerable Algoa Sandstone Fynbos threatened ecosystem;
- Minimise the spread of invasive alien plants through appropriate invasive alien control; and
- Rehabilitate disturbed areas of the site as soon as possible.

4.2.2 Impacts on Wildlife:

Clearance of vegetation and earthworks activities will have a direct impact on fauna and reptile habitats. Gathering of stormwater in open trenches during construction may also pose a risk to the

livelihood of fauna. Clearing of large trees could result in destruction of animal and bird habitats. Noise resulting from construction activities may furthermore displace and disturb local wildlife.

The impact management objective for this impact is:

- Minimise wildlife disturbance.

4.2.3 Impacts on Surface Water and Aquatic Resources:

Six natural and six artificial wetlands were observed within 500 m of proposed construction activities (Refer to Figure 3). A portion of the Greenbushes alignment falls within an Aquatic CBA 2 within quaternary catchment M20A (Baakens estuary). There is also a drainage line that crosses both the Seaview 350 mm diameter Gravity Main and 315 mm diameter Rising Main north of the existing Upper Seaview Steel Reservoir (25°21'51.8"E; 33°59'46"S). A potential drainage line was also observed crossing a point on the preferred Option 1 250 mm ø class 12 uPVC gravity main pipeline (25°21'1.6"E ; 34°0'17.3"S).

Construction clearing activities and earth works could potentially have an impact on instream/riparian vegetation of potential wetlands in close proximity. When vegetation is cleared, large quantities of loose earth may easily be washed from the construction area and be transported downstream during high rainfall events, resulting in increased sedimentation of aquatic systems occurring downstream. This would impact on vegetation and biota of these systems, but could also influence the geomorphology and overall functioning, in severe circumstances, of downstream watercourses and wetlands. Furthermore Construction activities could cause contamination of watercourses on site and downstream if proper management is not practiced. Accidental spills of hydrocarbons (oils, diesel, etc.) or leakage of such substances from construction machinery may enter the watercourse directly, through surface runoff during rainfall events or subsurface movement (through groundwater) and then migrate to downstream systems. Such chemicals, fuels or pollutants would alter the water quality within the systems, having an effect on ecology in the form of biodiversity loss, i.e. the loss of vegetation and aquatic fauna that are sensitive to changes in water quality (especially from toxicant inputs). Ablution facilities that are not properly maintained during the construction phase may also result in pollution of ground and surface water. Solid waste in the form of general litter left by labourers such as construction materials (gloves, excess materials, cement, etc.) as well as domestic litter (plastic and styrofoam) can also affect the aquatic systems in close proximity and downstream if waste is not appropriately managed and disposed of. This can establish a barrier to water movement and may also alter the quality of water within the resource negatively

The impact management objective for this impact is:

- Minimise impacts to Aquatic CBA;
- Minimise impacts to hydrological regime of affected watercourses;
- Minimise impacts that may result from water contamination and may affect the water quality and functioning of aquatic systems;
- Minimise potential for increased erosion and sedimentation; and
- Minimise destruction of aquatic habitats, ecosystems and biota.

4.2.4 Impacts on Soil and Landscape

The clearing of vegetation for proposed works will expose soils and increase the risk of soil erosion through wind and storm water run-off, particularly on slopes and potential embankment cuttings. Construction vehicles are likely to compact soil in construction areas which may suppress plant growth if not appropriately rehabilitated. Soils could be contaminated by potential plant and equipment leaks and/ or spills or could be contaminated with subsoil (which cannot be used for rehabilitation).

The management objectives for this impact are:

- Minimise soil contamination impacts resulting from construction activities;

- Minimise risk of erosion; and
- Minimise disturbance to vegetation regrowth via soil compaction.

4.2.5 Drainage and Stormwater Management

Construction activities within the road reserve could potentially change the profile of road verges and/ or negatively impact stormwater channels which may result in stormwater ponding and/ or exacerbate erosion.

The management objectives for this impact are:

- Minimise disturbance to stormwater flow paths; and
- Ensure accurate profiling of stormwater flow paths following construction.

4.2.6 Impacts on Traffic

Equipment, materials and possible abnormal loads will need to be transported to site using existing provincial roads which may result in traffic congestion and disruptions. The provincial road expected to be the most affected is the Seaview Road, where plant will need to turn off to access the proposed pipeline alignments and reservoirs (e.g. the turnoff point for the access road to the proposed Upper Seaview Reservoir). There is also a possibility for temporary blocking off of section of one lane in certain areas due to construction vehicles and activities occurring within the road reserve which may extend slightly into the road. This will therefore present a temporary safety risk for vehicles travelling on the Seaview Road. Temporary detour roads are proposed to accommodate vehicles and pedestrians where necessary.

The impact management objective for this impact is:

- Minimise disturbance of regular traffic along the Seaview Road and at road crossings; and
- Prevent safety impacts on surrounding residents and vehicle on the road.

4.2.7 Noise Impacts

Noise generation (and potential vibrations) will be forthcoming as a result of construction activities such as excavation of trenches using earth moving equipment and directional drilling under roads as well as the general movement of heavy vehicles. Impacts will however be temporary in nature and are not anticipated to be significant.

The management objectives for this impact are:

- Minimise noise impacts; and
- Legal compliance with regard to noise generation.

4.2.8 Impacts on Air Quality:

Temporary emissions that may be generated during the construction phase are in the form of wind-blown dust from clearing, excavation and stockpiling activities as well as vehicle entrainment on dirt access roads and exhaust emissions from construction vehicles and equipment. These impacts will likely be most experienced by vehicles and pedestrian by-passers adjacent to the road reserve.

The impact management objective for this impact is:

- Minimise air pollution.

4.2.9 Impacts on Archaeological Resources:

Although the proposed activities are located in an area of low archaeological cultural sensitivity, it is possible that archaeological heritage material exists below the surface and could be impacted during construction.

The impact management objective for this impact is:

- Preservation of archaeological resources.

4.2.10 Impacts on Cultural/ Historical Resources:

The three brick reservoirs south of the Seaview Complex Pump Station are currently in poor condition and it is proposed that these reservoirs, as well as the Upper Seaview Steel Reservoir may potentially be demolished.

The impact management objective for this impact is:

- Preservation of cultural/ historical resources.

4.2.11 Impacts on Palaeontological Resources:

Although the proposed alignment is located in an area of low palaeontological cultural sensitivity, it is possible that palaeontological heritage material exists below the surface and could be impacted during construction.

The impact management objective for this impact is:

- Preservation of palaeontological resources.

4.2.12 Waste Management:

Construction waste as well as small amounts of domestic waste will be generated. Lack of proper management of the waste on the site may lead to wind-blown litter and dumping creating a negative visual impact and potentially impacting on aquatic ecosystems. Sewage will be generated at construction sites and if workers do not use provided chemical toilet and/ or ablution facilities sewage could potentially result in soil and surface water contamination. Hazardous substances such as cement, tar/bitumen and diesel/oil all have the potential to contaminate water sources and the surrounding environment (soil, surface/groundwater, etc.) if not managed properly

The impact management objective for this impact is:

- Prevent pollution of terrestrial and aquatic habitats; and
- Legally compliant management of solid waste.

4.2.13 Socio-Economic Impacts:

Employment Creation (positive impact):

The project may generate local temporary employment opportunities and skills development for semi-skilled and unskilled workers.

The impact management objective for this impact is:

- Maximise employment of local labour; and
- Maximise skills transfer.

Deterioration of Existing Roads (negative impact):

The increase in heavy construction vehicles and equipment and potential abnormal loads may lead to excessive wear and tear of existing provincial roads, particularly the Seaview Road.

The management objectives for this impact are:

- Minimise damage to existing road infrastructure.

4.2.14 Impacts on Existing Infrastructure and Services:

Construction activities (mainly excavations for pipeline installation) may impact existing infrastructure along servitudes and pipeline alignments. This includes damage and interference to existing pipelines, powerlines, telephone lines, provincial road crossings (e.g. Wyndomayne Road, N2 off ramp to Seaview Road, N2 on ramp from Seaview Road and potentially the N2 on and off ramps

from the Seaview Road) and stormwater infrastructures (e.g. culverts and side drains – i.e. Erf 486, Erf 62/10 and Erf 80/10).

Pipelines will however be laid under provincial roads via directional drilling in order to limit disturbance to road infrastructure and avoid traffic disruptions to road users

The impact management objective for this impact is:

- Avoid damage to existing infrastructure and services.

4.2.15 Impacts on Landowners and Private Property

Pipeline construction activities may inconvenience landowners, particularly those whose driveways, gardens and fences may be intersected by the proposed pipeline alignments (particularly on the Greenbushes pipeline alignment).

The management objectives for this impact are:

- Avoid damage to private property.

4.3 Rehabilitation after construction

Rehabilitation should commence immediately after construction in the relevant areas using uncontaminated topsoil previously stripped (as a result of construction activities). Rehabilitated areas should be monitored regularly and measures must be implemented to ensure that topsoil does not wash away or become infested with invasive alien plants. If erosion and/or sedimentation of downstream areas occur, appropriate measures must be implemented to prevent further erosion and to trap any excessive sediments generated during and after construction.

The management objectives for this impact are:

- Rehabilitation as soon as possible after construction to prevent impacts.

4.4 Operational phase

The following impacts and associated management objectives are described for the operational phase:

4.4.1 Loss of Water

Leaks or bursts in the pipeline, or failure of the reservoirs, are unlikely risks if the infrastructure is designed and built properly. However, these incidents would have the potential to cause damage to road infrastructure and adjacent land.

The management objective for this impact is:

- Ensure regular maintenance of newly installed infrastructure to prevent water loss.

4.4.2 Safety issues due to potential inadequate servitude maintenance

Overgrown pipeline maintenance servitudes or alternatively over-use of service roads could result in safety concerns for vehicles accessing the pipeline or erosion and undermining of roads if not properly maintained.

The management objective for this impact is:

- Ensure regular maintenance of pipeline servitudes to prevent safety risks.

4.4.3 Improved water supply

The proposed development aims to expand current bulk water supply infrastructure in order to address the future provision of potable water to the Seaview and Greenbushes supply areas. Water supply will be improved and secured within Supply Zones 1, 2, 4 & 5 for the Seaview Area and

Supply Zone 7 for the Greenbushes Area. Formal water supply will also be provided to the two existing informal settlement adjacent to the existing seaview pump station complex.

The management objective for this impact is:

- Ensure optimisation of infrastructure functioning to provide improved water supply.

4.4.4 Visual Impacts

A visual impact of the proposed 2.5 ML Upper Seaview Reservoir from the Seaview Road could potentially occur if it is not adequately designed or positioned in relation to the landscape. The proposed reservoir site is hidden within the forest (large trees) which will act as a natural visual barrier if forest is not unnecessarily cleared during construction.

The management objective for this impact is:

- Minimise visual impacts resulting from the proposed Upper Seaview Reservoir.

4.4.5 Aquatic Impacts

Sedimentation of wetlands during operation can occur should soil become exposed in areas due to inadequate rehabilitation measures or erosion. The construction of infrastructure services and roads in watercourses could potentially influence the natural hydrology of the system if designs do not allow for flows to be similar to the pre-development scenario.

The management objectives for this impact are:

- Ensure ongoing rehabilitation of eroded areas; and
- Ensure the natural hydrology of stormwater and stream flows are not altered.

4.4.6 Socio-Economic Impacts

There is a potential for local job creation for pipeline and access road maintenance works during the operational phase of the project.

The management objectives for this impact are:

- Ensure the services of local contractors are used for maintenance activities.

4.5 Closure/ Decommissioning Phase

The life expectancy of the new infrastructure is approximately 50 years. It is however unlikely that the pipelines will be decommissioned. However, should the pipeline be decommissioned, a Decommissioning Plan must be prepared and implemented, to mitigate and manage potential negative impacts on the biophysical and socio-economic environments. Post closure measures are not applicable for the listed activities.

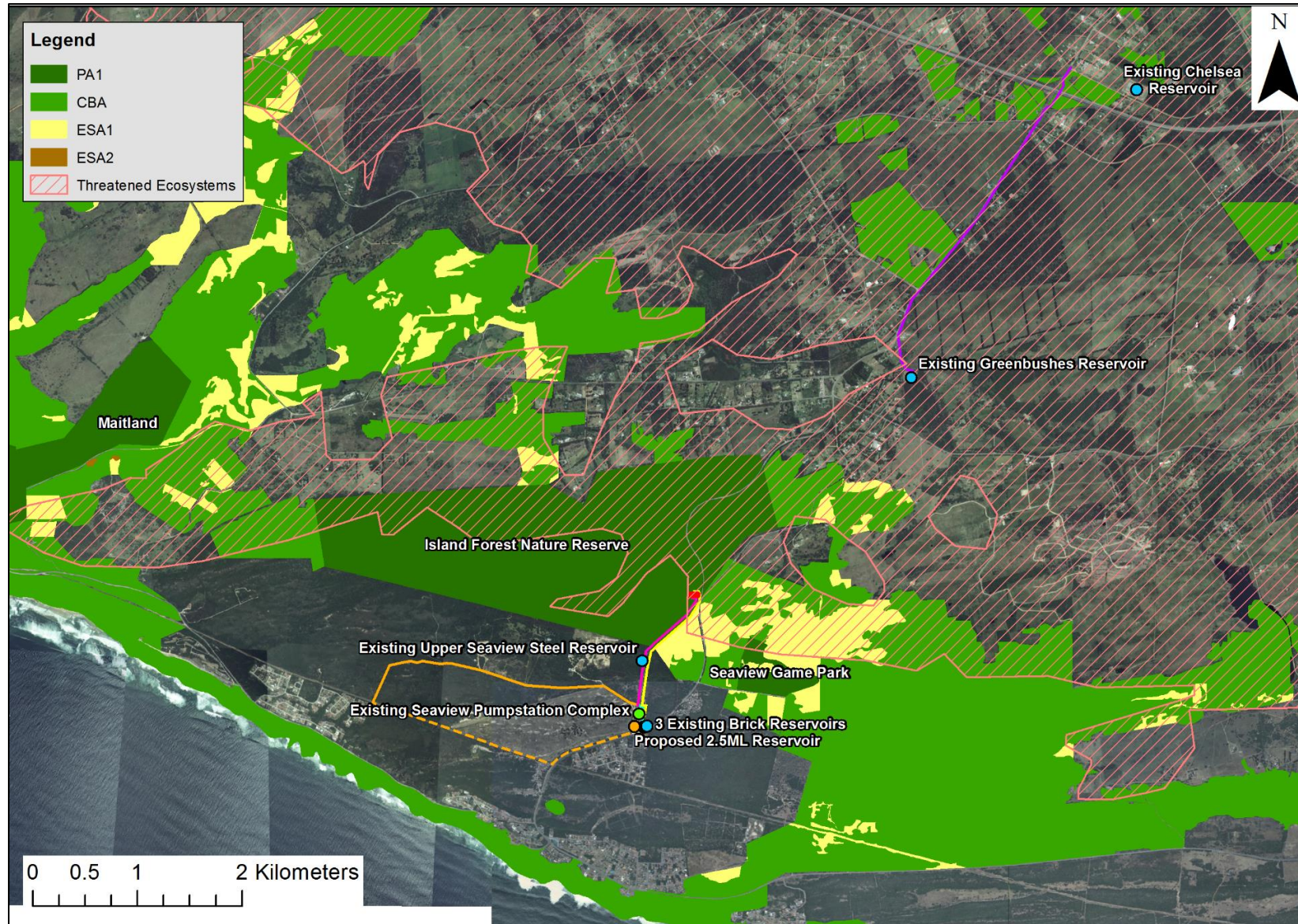


Figure 2: Environmental Sensitivities map for the proposed alignment

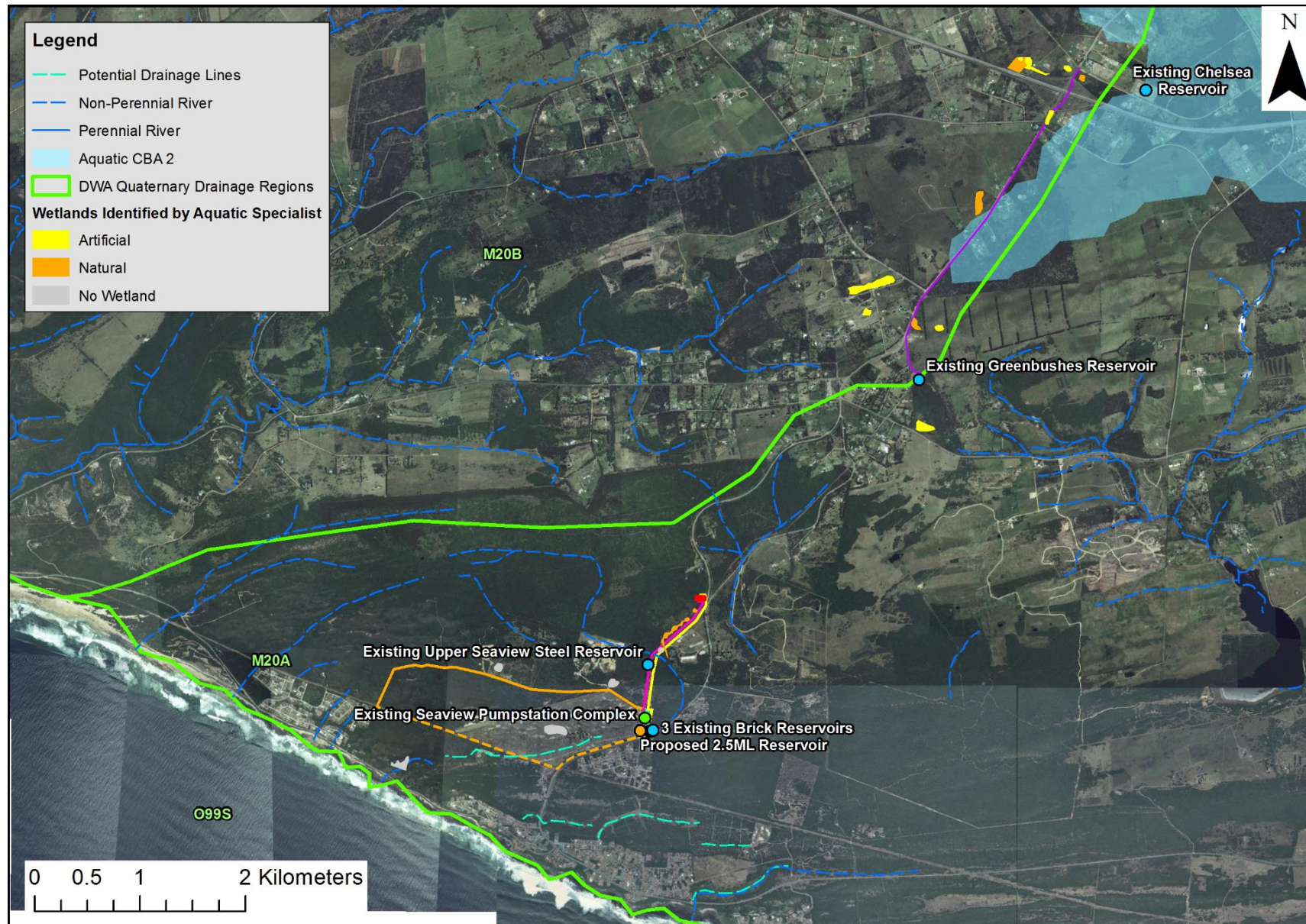


Figure 3: Aquatic systems surrounding the proposed site

5 Impact Management

This section specifies the impact management outcomes and impact management actions required for the aspects and potential impacts related to the proposed bulk water infrastructure expansion. The manner in which the impact management objectives and outcomes, identified above, will be achieved. Where applicable actions will include activities to:

- (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
- (ii) comply with any prescribed environmental management standards or practices;
- (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and
- (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable

The above are detailed in Table 2 and Table 3 for the construction and operational phases respectively.

Table 2: Mitigation and management measures for the construction phase

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
Construction and domestic waste generated during construction	<p><u>Waste Management Impacts</u></p> <p><u>Solid Waste</u></p> <p>Construction waste as well as small amounts of domestic waste will be generated. Lack of proper management of the waste on the site may lead to wind-blown litter and contamination. Pollution and accumulation of construction waste such as rubble, creates a negative visual impact and could potentially have an impact on surrounding natural ecosystems.</p>	<p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> • All non-hazardous waste generated on site shall be collected and appropriately disposed of at a registered municipal landfill site; • Appropriate scavenger-proof solid waste receptacles fitted with lids must be provided and must be regularly emptied. The contractor shall be responsible for the disposal of domestic waste generated as a result of work activities; • Recycling of waste per waste stream and reuse of waste where possible must be undertaken. Waste receptacles should be labelled accordingly; • Where possible, waste should be recycled and re-used; • No waste is to be buried or burned on the site; • Littering and contamination of ground or water sources during construction must be prevented by effective construction camp management; • Littering is strictly prohibited. Litter shall be disposed of in the on-site bins; • Records of disposal of all waste generated on site shall be maintained; and • All temporary soil stockpiles, construction materials, litter and rubble must be 	Duration of construction	Contractor and Sub-contractors

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		removed on completion of construction activities. No dumping or burning of waste material is permitted.		
	<u>Sewage management</u> Sewage will be generated at construction sites and if workers do not use provided chemical toilet and/ or ablution facilities sewage could potentially result in soil and surface water contamination.	<u>CONSTRUCTION MEASURES:</u> <ul style="list-style-type: none"> Chemical toilets must be provided for workers and these must be regularly serviced (and proof of correct sewage disposal maintained for auditing purposes); The construction camp and necessary ablution facilities meant for construction workers must be beyond the 32m of any of the watercourses; Toilets are to be provided by the contractor for workers at a ratio of at least 1 toilet per 20 workers or as per specifications of the supplier, and must be situated in close proximity to all work areas; Prohibit the use of natural areas as toilets; and Monitor the sewerage facilities for spillages, and handle any spillages as hazardous waste. 	Duration of construction	Contractor and Sub-contractors
Operation of construction vehicles and traffic control measures and use of equipment, including maintenance	<u>Traffic Safety</u> Equipment, materials and possible abnormal loads will need to be transported to site using existing provincial roads which may result in traffic congestion and disruptions. There is also a possibility for temporary blocking off of section of one lane in certain areas due to construction vehicles and activities occurring within the road reserve which may extend slightly into the road. This will therefore present a temporary safety risk for vehicles travelling on the Seaview Road.	<u>CONSTRUCTION MEASURES:</u> <ul style="list-style-type: none"> Ensure that there are flag men in place on the Seaview Road at access points to construction work fronts; Contractor must identify optimal ways to minimize disruptions and interruptions to traffic; Existing roads must be utilised as far as reasonably practical; Use appropriate road signage, in accordance with the South African Traffic Safety Manual, providing flagmen, barriers etc. at the various access points, when necessary; Establish speed limits (not more than 40km per hour) for all construction related traffic; Ensure that heavy construction vehicles are suitably marked to be visible to other road users and pedestrians; Operation, storage and maintenance of machinery and construction-related equipment in close proximity to wetlands must be limited as far as possible; 	Duration of construction	Contractor and NMBM

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<ul style="list-style-type: none"> No unnecessary driving over verges and/or private property; Appropriate traffic warning signage to be in place; and It is recommended that abnormal loads and vehicles transporting materials to site avoid peak traffic hours. 		
	<p><u>Deterioration of existing roads</u></p> <p>The increase in heavy construction vehicles and equipment and potential abnormal loads may lead to excessive wear and tear of existing provincial roads, particularly the Seaview Road</p>	<p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> Ensure that vehicle axle loads do not exceed the technical design capacity of provincial roads; Establish speed limits (not more than 40km per hour) for all construction related traffic; Ensure that construction vehicle tyres are inflated according to the manufacturer's specifications for optimum load/inflation pressure; and No indiscriminate driving will be allowed by construction vehicles. 	Duration of construction	Contractor
	<p><u>Contamination of soil</u></p> <p>Soils could be contaminated by potential plant and equipment leaks and/ or spills or could be contaminated with subsoil (which cannot be used for rehabilitation).</p>	<p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> Maintenance of equipment on site is prohibited; Drip trays must be in place under all leaking equipment and during re-fuelling of equipment; Plant and equipment must be checked regularly for potential leaks and ground / soil pollution (hydrocarbon spillages). Action must be taken as soon as spillages have been identified; and Machinery and vehicles are to be removed from site for maintenance and repair. No repair / maintenance will be conducted on site. 	Duration of construction	Contractor
Storage and handling of environmentally hazardous materials	<p><u>Contamination of soil and water</u></p> <p>Leaks and spills of environmentally hazardous materials (e.g. cement, oils and fuels) has the potential to impact on surface and/ or groundwater resources if not correctly managed. Accidental spills of hydrocarbons (oils, diesel, etc.)</p>	<p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> The proper storage and handling of hazardous substances (hydrocarbons and chemicals) needs to be administered; Spillages should be cleaned up immediately and contaminants properly drained and disposed of using appropriate waste facilities (not to be disposed of within the natural environment). Any contaminated soil from the construction site must be removed and disposed of appropriately; 	Duration of construction	Contractor

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
	<p>or leakage of such substances from construction machinery may enter the watercourse directly, through surface runoff during rainfall events or subsurface movement (through groundwater) and then migrate to downstream systems. Such chemicals, fuels or pollutants would alter the water quality within the systems, having an effect on ecology.</p>	<ul style="list-style-type: none"> • Drip-trays must be provided beneath standing vehicles and machinery, and routine checks should be done to ensure that these are in a good condition; • No waste water or hazardous substances will be disposed of into the surrounding environment; • Storage areas for hazardous material must be concreted, bunded, covered, labelled and well ventilated; • All fuel, oil and other hydrocarbon storage areas will be bunded to contain 110% of the stored volume; • Bunded areas will be constructed of a material impermeable to the hazardous substance stored within; • The bunded areas will be constructed with an internal sump whereby spillages will easily flow and allow for easy clean up; • Bunded areas will be clearly marked with their volume capacity and appropriate safety signage; • Spill kits to be made available at areas of possible spillages of hazardous substances; • Rainwater entering the bunded areas, will be considered hazardous and will be treated as such; • Should the bunded areas be damaged, this will be immediately rectified. • Contaminated soils and materials should be disposed of in a separate hazardous waste bin prior to collection and disposal; and • All hazardous waste must be disposed of at a registered hazardous waste disposal facility and proof of disposal maintained. <p>Should cement be used on site, the following guidelines apply:</p> <ul style="list-style-type: none"> • Any cement batching activities should occur outside of the delineated wetland boundaries and conducted on an impermeable surface. Cement products/ wash may not be disposed of into the natural environment; • Carefully control all on-site operations that involve the use of cement and concrete; 		

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<ul style="list-style-type: none"> • Limit cement and concrete mixing to single sites where possible; • Use plastic trays or liners when mixing cement and concrete: Do not mix cement and concrete directly on the ground; • Dispose of all visible remains of excess cement, cement bags and concrete after the completion of tasks at a licensed waste disposal facility; and • Dispose of in the approved manner (solid waste concrete may be treated as inert construction rubble, but wet cement and liquid slurry, as well as cement powder must be treated as hazardous waste). 		
Clearing of vegetation for construction works as well as earthworks, vehicle movement on unpaved surfaces and stockpiling of soils	<p><u>Impacts on Terrestrial Ecology:</u></p> <p>Loss and disturbance of fauna and flora habitat and biodiversity and the spread of invasive alien vegetation may be promoted through the disturbance to land.</p>	<p><u>DESIGN MEASURES:</u></p> <ul style="list-style-type: none"> • Ensure design plans specify construction footprints within servitudes which are to be adequately demarcated during the construction phase; • It is recommended that vegetation within the future planned reservoir construction area be left intact until commencement of future construction activities; and • The 2.5 ML Upper Seaview Reservoir must be accurately surveyed and marked prior to vegetation removal or commencement of construction. In addition, it is recommended that the fence line for the reservoir first be erected prior to establishment of the reservoir in order to contain construction activities and minimise the construction footprint. <p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> • Construction footprints must be demarcated to minimise unnecessary clearing of vegetation and disturbance to soils; • Sensitive vegetation that may be impacted by construction activities should be cordoned off prior to clearing and earthworks activities to restrict the movement of vehicles and potential disturbance to vegetation; • Immediately prior (i.e. a few days before) to excavation, vegetation within the construction footprint should preferably be cleared by brush cutters / slashers to encourage any fauna and reptiles present to move out of the area; • Excavation of trenches as well as clearing of vegetation to be conducted in a phased manner; 	Design, construction and defects liability period (1 year)	Engineers, Contractor, ECO and Search and Rescue Team

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<ul style="list-style-type: none"> • Minimise cleared and disturbed areas by using already transformed areas where possible. An already transformed area should also be utilised for the contractor's site camp; • All cleared vegetation (other than invasive aliens) should preferably be chipped and used as mulch; • Rehabilitation of cleared areas with topsoil and indigenous vegetation as soon as construction is completed. Disturbed areas will be ripped and scarified in order to promote vegetation growth. A seed mix of indigenous vegetation species will be prepared for the rehabilitation of the site should natural vegetation not succeed; • Use existing access roads and do not establish any new roads without authorisation; • Harvesting or removal of any plant material is strictly prohibited – other than for search and rescue purposes (with permits in place) and for the authorised clearing of vegetation for construction; • Appoint an independent Environmental Control Officer (ECO) for the duration of the construction to monitor construction activities; • Pipeline cross section widths and working spaces (i.e. construction footprints) must be identified and agreed upon in consultation with the ECO – working spaces must consider space required for: <ul style="list-style-type: none"> ○ Battering of trench slopes; ○ Storage of topsoil; ○ Storage of excavated material suitable for backfill/ unsuitable for backfill; ○ Storage of bedding sand; ○ Stringing of pipe along the trench before installation; ○ Machinery and equipment along the trench before installation; ○ Limitations where alignments cross environmentally sensitive areas; and 		

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<ul style="list-style-type: none"> • Pipeline installation and reservoir establishment Method Statements must include environmental considerations and must be forwarded to the ECO for approval before construction. • The SSC noted in Table 1 of this report will require permits from the respective departments where appropriate; • Certain species (such as trees and cosmopolitan species that are however protected by the legislation) are not necessarily suited to relocation and permits must be obtained before destruction; • The Vegetation Specialist recommended that any <i>Acrolophia capensis</i> and <i>Scadoxus puniceus</i> species (Protected by the Provincial Nature Conservation Ordinance of 1974) within any areas to be destroyed be translocated as they are suited to relocation. Dormant species including bulbs and species belonging to the Iridaceae were not observed but may be present within the proposed servitude. These should be relocated during the construction phase if necessary; • Cleared invasive alien plants must be removed and disposed of at the landfill and proof retained for auditing purposes; • Remove all invasive alien plants from disturbed areas before they reach seed-bearing age. This needs to occur on a regular basis (at least monthly) until the end of the contractor's liability period; and • CARA listed species require removal as per Conservation of Agricultural Resources Act and a management plan should be incorporated into the EMPr to retain the servitude invasive free. 		
	<p><u>Impacts on Fauna and Faunal Habitat</u></p> <p>Clearance of vegetation and earthworks activities will have a direct impact on fauna and reptile habitats.</p>	<p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> • Immediately prior (i.e. a few days before) to excavation, vegetation within the construction footprint should preferably be cleared by brush cutters / slashers to encourage any fauna and reptiles present to move out of the area; and • No faunal or reptile species are to be disturbed, trapped, hunted or killed. 	Duration of Construction	Contractor
	<p><u>Impacts on Soil and landscape</u></p>	<p><u>CONSTRUCTION MEASURES:</u></p>	Duration of	Contractor

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
	The clearing of vegetation for proposed works will expose soils and increase the risk of soil erosion through wind and storm water run-off, particularly on slopes and potential embankment cuttings.	<ul style="list-style-type: none"> The construction process should be phased so as to limit the extent of exposed areas at any one time, and so that for any specific area, the time between initial disturbance and completion of construction is as short as possible; To minimise the risk of erosion, the extent of disturbed vegetation and soil should be kept to a minimum; Topsoil must be stripped from the proposed pipeline footprint and stockpiled (separately from subsoil) for further use in rehabilitation; Topsoil should only be exposed for minimal periods of time and adequately stockpiled (less than 2 m high) to prevent the topsoil loss and runoff. They should furthermore be protected against erosion of wind through covering or barricading; Ensure the pipeline is aligned and constructed as to take into account any undermining activities. Any potential embankment cuttings must be appropriately stabilised and revegetated; Note that authorisation from the Department of Mineral Resources is required for the establishment of borrow pits should material be required for the establishment of the Upper Seaview Reservoir access road or any potential maintenance works; and Cut and fill to be avoided as far as reasonably practical. 	Construction	
	<p><u>Aquatic Impacts</u></p> <p>Destruction of wetland habitat, sedimentation into wetlands and pollution into wetlands and potential to affect water quality.</p>	<p><u>CONSTRUCTION:</u></p> <ul style="list-style-type: none"> All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds; Stockpiles must be located away from river channels; Preventing wet conditions to develop on the road reserve in the case of Wetlands 4 and 9. Drainage systems should allow water to flow through a pipe, under the road. This will prevent damming and the enhanced wetland conditions on the road reserve will disappear; Care should be taken to ensure that the construction does not create new depressions where water can accumulate; 	Duration of Construction	Contractor

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<ul style="list-style-type: none"> • Proper drainage and management of stormwater is necessary to avoid undesirable accumulation of rainwater and erosion; • Avoid erosion at all times to avoid sedimentation or pollution of nearby wetlands or drainage lines. Erosion control measures should form part of the planning as well as the construction and implementation phases of the development. A rehabilitation plan should be put into place that will address any erosion of the general area; • Re-vegetating of cleared areas with suitable indigenous species as soon as possible after the disturbance, together with an alien species monitoring and eradication program during the liability period should prevent encroachment of alien species. • Construction activities must be limited to the pipeline servitude. No vehicles may move across any watercourse or wetland area; • Wetlands and watercourses (go and no-go areas) will be demarcated and no activity will be allowed within no-go areas, unless otherwise approved by the ECO; • Authorisation must be obtained from the Department of Water and Sanitation for the WULA's for the wetlands identified by the Aquatic Specialist; • The construction site camp should not be sited within 50 m of any wetland or watercourse and preferably further away if possible; • Any erosion gullies/ channels created during construction should be filled immediately to ensure silt does not drain into the wetland; and • Should sedimentation and erosion of the pipeline servitude/ construction site prove to be significant, erosion berms in the pipeline servitude are recommended to be installed and/ or sediment barriers (e.g. silt fences, sandbags or hay bales) immediately downstream of active work areas (particularly on channel banks) as necessary, to trap any excessive sediments generated during construction. 		

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
	<p><u>Nuisance Impacts</u></p> <p>Impacts on the air quality of the surrounding area, such as the generation of dust, and exhaust emissions.</p>	<p>Impacts on air quality:</p> <p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> • Dust suppression measures (e.g. dust shields and wetting) need to be implemented to reduce the liberation of dust (especially under windy conditions and in high traffic areas); • Construction footprints must be demarcated to minimise unnecessary clearing of vegetation and disturbance to soils; • Avoid clearing of vegetation until such time excavations are required; • Excavation of trenches as well as clearing of vegetation to be conducted in a phased manner; • An environmental complaints register must be made available and should any complaints be received (including dust complaints), these should be logged in the complaints register and reported to the responsible person on site. The register must list: <ul style="list-style-type: none"> ○ Complainant name and contact details; ○ Date complaint was lodged; ○ Person who recorded complaint; ○ Nature of complaint; ○ Actions taken to investigate the complaint and outcome of the investigation; ○ Action taken to remedy the situation; ○ Date on which feedback was provided to complainant; • Subsoil from trenches must be used for backfill and should additional material be left, it should be disposed of to landfill; • If possible, locate soil stockpiles in sheltered areas where they are not exposed to wind; • Topsoil stockpiles must be used for rehabilitation; • There should be strict speed limits on dusty roads (i.e. not more than 40km per hour); and 	<p>Duration of construction</p>	<p>Contractor</p>

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<ul style="list-style-type: none"> Bare surfaces must be rehabilitated as soon as possible with indigenous vegetation that will be able to grow in the area. <p>Noise impacts:</p> <p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> Construction activities to be limited to normal working hours 06h00-18h00 Mondays – Saturdays and 08h00 – 14h00 on Sundays); Should after-hours work be required, residents must be given notice beforehand; All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993); No sound amplification equipment such as sirens, loud hailers or hooters are to be used on site except in emergencies and no amplified music is to be permitted on site; Equipment that is fitted with noise reduction facilities (e.g. side flaps, silencers, etc.) must be used as per operating instructions and maintained properly during site operations; Maintain construction equipment and vehicles in good working order; and A complaints register must be made available and should any complaints be received, these should be logged in the complaints register and reported to the responsible person on site. 		
	<p><u>Stormwater Impacts</u></p> <p>Activities could change the profile of road reserves and negatively impact stormwater flow paths.</p>	<p><u>DESIGN MEASURES:</u></p> <ul style="list-style-type: none"> Scour chambers must be designed to prevent scour damage and erosion where raw water is to be discharged; and Design measures must accommodate pipeline watercourse crossings as during flooding events, pipelines can be exposed to damage. Appropriate stormwater design and mitigation measures must be implemented at these points (i.e. crossing at the Seaview 350 mm Gravity Main and 315 mm Rising Main) and any other watercourse crossings along proposed alignments. <p><u>CONSTRUCTION MEASURES:</u></p>	Design and duration of construction	Engineer and Contractor

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<ul style="list-style-type: none"> • Correct drainage measures must be installed and disturbed areas must be suitably levelled following installation of the pipelines and associated ancillaries; • Natural and artificial drainage gradients must be reinstated; • Stockpiling will only be done in areas that will not interfere with the natural drainage paths of the environment; • Steep areas may require berms and temporary drainage diversion; • Appropriate dewatering measures must be in place and discharge from any pumps shall be disposed of in accordance with the instructions given by the ECO; and • Installation of permanent drainage measures and rehabilitation of disturbed areas must be implemented as early as possible. 		
Excavation activities	<u>Archaeological, Cultural/ Historical and Palaeontological disturbance:</u> Damage or destruction of archaeological, cultural or historical and palaeontological resources.	Historical/Cultural Heritage <u>DESIGN MEASURES:</u> Before the commencement of construction activities, a historian must be appointed to provide input regarding the age and historical value of the potential heritage structures (i.e. brick reservoirs at Seaview Pump Station Complex and Upper Seaview Steel Reservoir) should they need to be demolished, and whether a permit would be required before demolition.	Design	NMBM and Historian
		Archaeology <u>CONSTRUCTION MEASURES</u> <ul style="list-style-type: none"> • An archaeologist should be appointed to monitor the vegetation clearing of the areas that could not covered during the survey owing to inaccessibility. Further recommendations on whether an archaeologist should conduct further monitoring during the excavations for the infrastructure or possible phase 2 mitigation should be at the discretion of the appointed archaeologist monitoring the area on the results of the vegetation clearing; • The environmental control officer (ECO) as well as the construction managers/ foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and 	Duration of construction	Contractor, ECO and Archaeologist

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
		<p>the procedures to follow when they find sites; and</p> <ul style="list-style-type: none"> If concentrations of archaeological and/ or historical heritage material, marine shells, and / or human remains are uncovered during construction, all work must cease immediately and be reported to the Albany Museum (Tel. 046 622 2312) and/or the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) (Tel. 043 745 0888) so that systematic and professional investigation/ excavation can be undertaken. 		
		<p><u>CONSTRUCTION MEASURES</u></p> <p>Palaeontology</p> <ul style="list-style-type: none"> Monitoring of all substantial (> 1m) bedrock excavations on an on-going basis for chance fossil finds (e.g. petrified wood, shells, bones & teeth) by ECO; Reporting of new palaeontological finds to ECPHRA for possible specialist mitigation. Should any well-preserved fossil remains (e.g. vertebrate bones and teeth, petrified wood, plant or trace fossil assemblages, fossil shells) be encountered during excavation, these should be safeguarded, preferably in situ, and reported by the ECO to ECPHRA (i.e. The Eastern Cape Provincial Heritage Resources Authority. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; smokhanya@ecphra.org.za and/or the Albany Museum, Somerset Street, Grahamstown (+27 46 622 2312)). This is necessary so that so that the fossil specimens may be professionally examined, recorded and, if necessary, excavated at the developer's expense; and The specialist involved would require a collection permit from SAHRA (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000; Tel: 021 462 4502; Email: cscheermeyer@sahra.org.za). Fossil material must be curated in an approved repository (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA. 	Duration of construction	NMBM, Contractor and ECO and potentially a Palaeontology Specialist

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
	<p><u>Impacts on Fauna and Faunal Habitat</u></p> <p>Clearance of vegetation and earthworks activities will have a direct impact on fauna and reptile habitats. Gathering of stormwater in open trenches during construction may also pose a risk to the livelihood of fauna. Clearing of large trees could result in destruction of animal and bird habitats. . Noise resulting from construction activities may furthermore displace and disturb local wildlife.</p>	<p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> Any trees that are to be cut down should be checked by the ECO for any nests that could be impacted; Ends of trenches to be sloped to allow trapped animals to escape; Trenches to be checked by construction staff daily to assist any trapped animals; and Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This can be prevented by excavating and backfilling trenches as construction progresses. 	Duration of construction	Contractor and ECO
	<p><u>Damage and/ or interruption of services</u></p> <p>Damage or destruction of existing service infrastructure and/ or private property.</p>	<p><u>DESIGN MEASURES:</u></p> <ul style="list-style-type: none"> Identify and demarcate existing utilities and in-situ services prior to construction; Ensure that routing of the pipelines prevent the disruption of services as far as possible and that effective communication is maintained with utility providers to avoid and minimize interruptions of services during pre-construction and construction; Ensure Eskom is approached to agree upon appropriate safety clearance distances when working under powerlines and potential need for temporary disconnection of powerlines; and <p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> Should any damage to existing infrastructure or private property occur, the relevant service provider/ landowners should be contacted and appropriate repairs/ replacements commissioned to the satisfaction of the service provider /landowner. 	Design and Duration of construction	Engineer and Contractor

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
	<p><u>Landowner issues and private property</u></p> <p>Pipeline construction activities may inconvenience landowners, particularly those whose driveways may be intersected by the proposed pipeline alignments.</p>	<p><u>CONSTRUCTION MEASURES:</u></p> <ul style="list-style-type: none"> • Notice (in advance) to be given to all neighbours whose property will be affected by pipeline crossings; and • Contractors to establish landings over private property driveways. 	Duration of construction	Contractor
Workers on site	<p><u>Employment opportunities and skills development</u></p> <p>There would be a positive socio-economic impact as a number of short term jobs (i.e. 45) will be created during the construction phase. This will result in skills development for semi-skilled and unskilled workers</p>	<p><u>CONSTRUCTION MEASURES</u></p> <ul style="list-style-type: none"> • Maximise opportunities for the training of unskilled workers from local communities and use local sub-contractors, where possible; • Increase employment opportunities (e.g. secondary service provision of food, toilet hires, and equipment etc.); and • Source construction materials from local sources and suppliers, where possible. 	Duration of construction	NMBM and Contractor
	<p><u>Potential Fires</u></p> <p>Presence of construction workers on site may lead to various impacts on the surrounding area and disturbance such as fire.</p>	<p><u>CONSTRUCTION MEASURES</u></p> <ul style="list-style-type: none"> • No fires are permitted on site; • Smoking shall only be permitted in designated smoking areas in the site camp; • A fire officer shall be appointed by the contractor who shall be responsible for co-ordinating rapid, appropriate responses in the event of a fire; and • Sufficient fire-fighting equipment shall be maintained and accessible on site at all times. 	Duration of construction	Contractor

Table 3: Mitigation and management measures for the operational phase

Environmental Aspect	Potential Environmental Impact	Recommended Mitigation measures		
		Management and mitigation measure	Time-frame	Responsibility
Pipeline and related infrastructure maintenance	<u>Loss of water</u> Due to the potential wear and tear of pipes and reservoirs if not regularly maintained	<u>OPERATIONAL MEASURES:</u> Pipelines and reservoirs should be regularly inspected for any possible damage or corrosion to prevent water leakages. Any damaged pipes should be immediately replaced.	Duration of operation	NMBM
Servitude maintenance	<u>Safety issues</u> Due to potential inadequate servitude maintenance and sedimentation of wetlands due to inadequate erosion control as well as potential wetland hydrology alteration.	<u>OPERATIONAL MEASURES:</u> <ul style="list-style-type: none"> According to the Engineer's design report, a complete operation and maintenance manual with a training programme will be supplied in duplicate by the Engineer to the Nelson Mandela Bay Municipality on commissioning of the project. Nelson Mandela Bay Municipality will be responsible for the operation and maintenance of the proposed infrastructure. The NMBM must ensure that access road servitudes are appropriately maintained; Ensure that the natural hydrology and stormwater flows are maintained; and Any erosion gullies/ channels that occur during operation must be filled, stabilised and revegetated as soon as possible as part of maintenance procedures. Also, disturbed and bare ground surfaces should be rehabilitated with suitable indigenous vegetation to stabilise soils. 	Duration of operation	NMBM
	<u>Local Job Creation</u> Potential for local job creation for pipeline and access road maintenance works	<u>OPERATIONAL MEASURES:</u> During pipeline routine maintenance and repair work, the Municipality should use the services of local contractors based on the Expanded Public Works Programme and NMBM Exempted Micro-Enterprises Supply Chain requirements.	Duration of operation	NMBM
Establishment of 2.5 ML Upper Seaview Reservoir	<u>Potential Visual Impacts</u> Potential visual impact of the proposed 2.5 ML Upper Seaview Reservoir from the Seaview Road if it is not adequately designed or positioned in relation to the landscape.	<u>DESIGN MEASURES:</u> <ul style="list-style-type: none"> The proposed 2.5 ML Upper Seaview Reservoir must be designed and positioned in such a way to minimise its visual appearance from the Seaview Road. The engineering design should be based on site topography and adjacent vegetation; Avoid use of intrusive lighting; and Avoid unnecessary clearing of forest which naturally acts as a visual barrier. 	Design and duration of operation	Project Engineers and NMBM

6 Monitoring, Reporting and Auditing

Site inspections by an Environmental Control Officer (ECO) must be conducted on a monthly basis during construction to ensure continued compliance with the conditions of the environmental authorisation and the measures contained in the approved EMPr.

Monthly audit reports are to be prepared by the ECO and submitted to the developer, engineering representative, contractor, and competent authority.

Monitoring measures during the operational phase is as follows:

- Regular visual inspections must be conducted of bulk water infrastructure to check for wear or damage according to an infrastructure maintenance plan.

7 Environmental Awareness Plan

On-site training must be provided for all contractors and personnel during both the construction and operational phases of the project. No personnel may be allowed onto site without having been instructed on the requirements of the approved EMPr and the Environmental Authorisation conditions.

The training must deal specifically with triggers that would require the implementation of mitigation measures contained in the EMPr. These include, but are not limited to:

- Identification and avoidance of environmentally sensitive features on/ near the site, specifically watercourses and wetlands;
- Identification of potential heritage resources (see app for guidelines for the identification of archaeological and historical material);
- Materials handling practices; and
- Waste management practices.

It is incumbent upon the contractor to convey the sentiments of the EMPr to all personnel involved in the construction operations (including sub-contractors) and the specific provisions of the EMPr. This should be done via regular toolbox talks as well as more formal training sessions, and attendance registers maintained for auditing purposes.

8 Organisational Structure

The general roles and responsibilities of various parties are outlined below.

8.1 The Developer: Nelson Mandela Bay Municipality (NMBM)

NMBM shall ultimately be responsible for the implementation of the EMPr and shall appoint a representative, the Responsible Person (RP), who shall:

- Ensure that the Contractor is duly informed of the EMPr and associated responsibilities and implications of this EMPr;
- Monitor the Contractor's activities with regard to the requirements outlined in the EMPr;
- Act as a point of contact for local residents and community members;
- Ensure that the Contractor remedies problems in a timely manner and to the satisfaction of the authorities; and
- Notify the authorities and the Environmental Control Officer (ECO) should problems arise that are not remedied effectively, or of any change in the development or changes in project specification that could significantly impact negatively on the environment.

8.2 The Contractor

The contractor will be responsible for:

- Ensuring all activities on the site are undertaken in accordance with the EMPr;
- Informing all employees and sub-contractors of their roles and responsibilities in terms of the EMPr;
- Ensuring that all employees and sub-contractors comply with this EMPr; and
- The Contractor has a duty to demonstrate respect and care for the environment in which they are operating. They will be responsible for the cost of rehabilitation, to the satisfaction of the ECO, of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation.

8.3 The Environmental Control Officer (ECO)

An Environmental Control Officer (ECO) who is a qualified environmental professional with the relevant environmental expertise, and independent of the RP, shall be appointed for the duration of the construction activities. The ECO's duties are as follows:

- The ECO shall undertake an initial site visit in conjunction with the Contractor, during which sensitive areas that should be avoided will be identified, and environmental concerns discussed;
- Photographs should be taken of the construction area and area allocated for the construction camp from logged (co-ordinate) points by the ECO before construction commences and after construction has been completed;
- Undertake monthly audits on the implementation of the EMPr and submit audit reports to the project engineers, NMBM and the environmental authorities on request; and
- Undertake a post-construction inspection, which may result in recommendations for additional clean-up and rehabilitation measures.

9 EMPr Procedure

The EMPr implementation procedure is outlined below:

- The ECO shall undertake an initial site visit in conjunction with the RP and the Contractor, during which sensitive areas that should be avoided will be identified, and environmental concerns discussed;
- Photographs should be taken of the construction area and area allocated for the construction camp from logged (co-ordinate) points by the ECO before construction commences and after construction has been completed;
- The contractor shall train his employees regarding the importance of the EMPr;
- The ECO shall undertake monthly audits of the construction activities and submit the reports to DEDEAT, the project engineers and the developer in order to ensure that the EMPr is being implemented; and
- The ECO shall undertake a final audit of the site on completion of construction and submit a Final Audit Report to DEDEAT and the developer.

Appendices

Appendix A: CV of Environmental Assessment Practitioner

Rob Gardiner

Principal Environmental Scientist



Profession	Principal Environmental Scientist
Education	MBA, Port Elizabeth Technikon, 2004 MSc, Chemistry – Industrial, University of Leeds, 1993 BSc (Hons), Chemistry, University of Cape Town, 1989
Registrations/ Affiliations	Pr Sci Nat, Environmental Scientist (South Africa) 400079/03 Member, International Association of Impact Assessors

Specialisation Environmental impact assessments, environmental management systems, ISO 14001, environmental management plans, environmental monitoring, and environmental auditing.

Expertise Rob Gardiner has been involved in the field of environmental consulting for over 22 years. His expertise includes:

- environmental impact assessments (EIA);
- environmental management systems (EMS) and management plans (EMP);
- water quality monitoring; and
- environmental due diligence and environmental auditing.

His experience in the development, mining, manufacturing and public sectors has been gained in projects within South Africa, Lesotho, Botswana, Angola, Zambia, Zimbabwe, Democratic Republic of Congo, and Suriname.

Employment

2001 – present	SRK Consulting (Pty) Ltd, Principal Environmental Scientist and responsible for the Eastern Cape Environmental Department, Port Elizabeth
1998 – 2001	Gardiner Associates, Sole Proprietor and Environmental Consultant, Port Elizabeth. Assisted numerous clients in implementation, and aspects of, ISO 14001. This included conducting Initial Reviews, implementing environmental monitoring and management programmes, conducting third party audits of suppliers and contractors, and identifying and assessing compliance with legal and other requirements.
1991 – 1998	CSIR, Division of Textile Technology, Port Elizabeth. Responsible for the Division's environmental management offerings to the South African textile industry, including ISO 14001 awareness and eco-labelling. Also responsible for the CSIR's environmental impact assessment offerings in the Eastern Cape Region.

Languages English – read, write, speak
Afrikaans – read, write, speak

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: coastal management

Location: St Francis Bay, Eastern Cape, South Africa
 Project duration & year: 2002 to 2007 (including discontinuities)
 Client: Kouga Municipality
 Name of Project: St Francis Bay Beach Remediation
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Co-ordinator for initial EIA, Project Manager for revision of EIR
 Value of Project: ± R 500,000

Location: Nelson Mandela Metropolitan Municipality, Eastern Cape, South Africa
 Project duration & year: 6 months, 2005
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Integrated Beach Development Plan
 Project Description: Strategic Environment Assessment
 Job Title and Duties: Environmental Assessor
 Value of Project: ± R 100,000

Key Experience: Environmental assessment: linear projects

Location: St Marks to Sabalele village, Eastern Cape, South Africa
 Project duration & year: 9 months, 2014
 Client: South African National Roads Agency SOC Limited
 Name of Project: Upgrade of the DR 08376 from the R61 at St Marks to Sabalele Village
 Project Description: Environmental Assessment of the widening and surfacing of the R61 at St Marks to Sabalele Village (19 km), including assessment of borrow pits and river crossings
 Job Title and Duties: Environmental Assessment Practitioner, Project Director
 Value of Project: ± R 300,000

Location: Cradock to Middleburg, Eastern Cape, South Africa
 Project duration & year: 9 months, 2012
 Client: South African National Roads Agency SOC Limited
 Name of Project: Upgrade of National Route 10, Section 4, Cradock to Knutsford
 Project Description: Environmental Assessment Services
 Job Title and Duties: Project Director
 Value of Project: ± R 250,000

Location: Ngcobob, Eastern Cape, South Africa
 Project duration & year: 9 months, 2012
 Client: South African National Roads Agency SOC Limited
 Name of Project: Upgrade of Route 61, Section 6 from Qumanco River to Ngcobob Town
 Project Description: Environmental Assessment Services
 Job Title and Duties: Project Director
 Value of Project: ± R 250,000

Location: Orange Free State, South Africa
 Project duration & year: 9 months, 2012
 Client: South African National Roads Agency SOC Limited
 Name of Project: Upgrade of National Route 1, Section 14, between Trompsburg Interchange and Fonteintjie
 Project Description: Environmental Assessment Services
 Job Title and Duties: Project Director
 Value of Project: ± R 250,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: linear projects

Location: Graaff-Reinet to Cradock, Eastern Cape, South Africa
 Project duration & year: 9 months, 2011
 Client: South African National Roads Agency SOC Limited
 Name of Project: Upgrade of Route 61, Section 2: Draairivier to Elinus Farm between Graaff-Reinet and Cradock
 Project Description: Environmental Assessment Services
 Job Title and Duties: Project Director
 Value of Project: ± R 250,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 24 months 2009 to 2011
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: 132 kV Overhead Powerline from Bloemendal to Tembani T-off
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 300,000

Location: Uitenhage, Eastern Cape, South Africa
 Project duration & year: 24 months 2009 to 2011
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: 132 kV Overhead Powerline from Sans Souci Substation to the new Nivens Drift substation
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 300,000

Location: Cradock to Middleburg, Eastern Cape, South Africa
 Project duration & year: 7 months, 2010
 Client: South African National Roads Agency SOC Limited
 Name of Project: Upgrade of National Route 10, Section 4 (± 24 km) Tafelberg to Middelburg
 Project Description: Environmental Assessment Services
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 100,000

Location: Cradock to Middelburg, Eastern Cape, South Africa
 Project duration & year: 7 months, 2010
 Client: South African National Roads Agency SOC Limited
 Name of Project: Upgrade of National Route 10, Section 4 (±24 km) Tafelberg to Middelburg
 Project Description: Environmental Assessment Services
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 100,000

Location: Seaview, Eastern Cape, South Africa
 Project duration & year: 8 months, 2009, and reassessed in 2016
 Client: Nelson Mandela Bay Municipality
 Name of Project: Seaview Bulk Water Supply
 Project Description: Environmental Assessment for a bulk water infrastructure, including two 2.5 ML clear water reservoirs, one in the Island Nature Reserve, and 10 km of new pipelines, ranging from 200 mm to 700 mm diameter, near Seaview, Port Elizabeth
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: ± R 150,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: linear projects

Location: Addo to Motherwell, Eastern Cape, South Africa
 Project duration & year: 36 months, 2007 to 2010
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Nooitgedagt/Coega Low Level Scheme water supply pipeline
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 500,000

Location: Gonubie, East London, Eastern Cape
 Project duration & year: 9 months, 2008
 Client: Eastern Cape Department of Roads and Public Works
 Name of Project: East Coast Resorts Road Upgrade
 Project Description: Basic Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 150,000

Location: St Francis Bay, Eastern Cape, South Africa
 Project duration & year: 9 months 2003
 Client: Kouga Municipality
 Name of Project: St Francis Bay Bulk Water Supply (16 km) Pipeline
 Project Description: Environmental Scoping Study
 Job Title and Duties: Project Manager
 Value of Project: ± R 60,000

Location: Matatiele to Mount Frere, Eastern Cape, South Africa
 Project duration & year: 4 months, 2003
 Client: Eastern Cape Department of Roads and Public Works
 Name of Project: Environmental Assessment and Environmental Management Plan, Trunk Road 08015 (± 22 km), between Mount Frere and the R 56 between Matatiele and Mount Fletcher.
 Project Description: Environmental Scoping Study and Environmental Management Plan
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 50,000

Location: Port Elizabeth, Eastern Cape
 Project duration & year: 2014
 Client: Airports Company South Africa
 Name of Project: Port Elizabeth Airport Runway End Safety Area and Strip Compliance
 Project Description: Environmental Assessment for the Extension of the Runway End Safety Area to comply with the recommendations of the International Civil Aviation Authority
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: R 140,000

Key Experience: Environmental assessment: energy

Location: Coega Industrial Development Zone
 Project duration & year: 12 months, 2016
 Client: Coega Development Corporation
 Name of Project: Coega Gas to Power Project
 Project Description: Environmental Impact Assessment and Air Emission License application for 4500 MW Combined Cycle Gas Turbine Project, including regasification unit.
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: R 800,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: energy

Location: Groot Winterhoek Mountains, Kirkwood, Eastern Cape, South Africa
 Project duration & year: 18 months, 2014 (on going)
 Client: Vulisango Holdings (Pty) Ltd
 Name of Project: Inyanda – Roodeplaats 150 MW Wind Energy Facility
 Project Description: Environmental Assessment for the Inyanda-Roodplaats 150 MW Wind Energy Facility in the Groot Winterberg Mountains, Kirkwood, Eastern Cape
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: R 1,200,000

Location: Hopetown, Northern Cape, South Africa
 Project duration & year: April 2015 - current (on going)
 Client: Afri-Coast Energy (Pty) Ltd
 Name of Project: Kloofsig 450 MW photovoltaic solar energy facility
 Project Description: Environmental Assessment for the 450 MW Kloofsig photovoltaic (PV) solar energy facility, Hopetown, Northern Cape
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: R 1,000,000

Location: Humansdorp, Eastern Cape
 Project duration & year: 2 months, 2013
 Client: Rushmere Noach Incorporated
 Name of Project: Banna Ba Pifhu 50 MW Wind Energy Project
 Project Description: External review of the Environmental Assessment for the 50 MW Wind Energy Project (17 turbines, ranging from 1.2 MW to 3.2 MW)
 Job Title and Duties: External Review
 Value of Project: R 50,000

Location: Molteno, Eastern Cape, South Africa
 Project duration & year: 24 months, 2015 (on going)
 Client: Afri-Coast Energy (Pty) Ltd
 Name of Project: Molteno 840 MW Wind Energy Facility
 Project Description: Environmental Impact Assessment (currently in planning stages)
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: R 5,000,000 (current estimate)

Location: Port Elizabeth Eastern Cape, South Africa
 Project duration & year: 6 months, 2015
 Client: Afri-Coast Energy (Pty) Ltd
 Name of Project: Hopewell Conservation Estate, 9 MW photovoltaic solar energy facility
 Project Description: Basic Assessment
 Job Title and Duties: Environmental Assessment Practitioner / Project Director
 Value of Project: ±R 100,000

Location: Cradock, Eastern Cape, South Africa
 Project duration & year: 12 months, 2012
 Client: Af-Rom (Pty) Ltd
 Name of Project: Dobbin 75 MW photovoltaic solar energy facility
 Project Description: Environmental Impact assessment
 Job Title and Duties: Environmental Assessment Practitioner / Project Manager
 Value of Project: R 600,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: energy

Location: Victoria West, Northern Cape, South Africa
 Project duration & year: 12 months, 2012
 Client: Af-Rom (Pty) Ltd
 Name of Project: Brakpoort 75 MW photovoltaic solar energy facility
 Project Description: Environmental Impact assessment
 Job Title and Duties: Environmental Assessment Practitioner / Project Manager
 Value of Project: R 600,000

Location: Uitenhage, Eastern Cape, South Africa
 Project duration & year: 5 months, 2011
 Client: Afri-Coast Engineers (Pty) Ltd
 Name of Project: Ranger Wind Energy Facility
 Project Description: Environmental Screening
 Job Title and Duties: Environmental Assessment Practitioner / Project Manager
 Value of Project: ± R 100,000

Location: Uitenhage, Eastern Cape, South Africa
 Project duration & year: 1 month, 2014
 Client: Afri-Coast Engineers (Pty) Ltd
 Name of Project: Ranger Wind Energy Facility
 Project Description: Preparation of an Environmental Management Plan for 3 x 1 MW wind turbines on the Ranger game farm, adjacent to the Groendal Nature Reserve
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: ± R 50,000

Location: Blue Horizon Bay, Eastern Cape, South Africa
 Project duration & year: 1 month, 2014
 Client: Afri-Coast Engineers (Pty) Ltd
 Name of Project: Betshanger Wind Energy Facility
 Project Description: Preparation of an Environmental Management Plan for 3 x 1 MW wind turbines on the farm Betshanger, Blue Horizon Bay
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: ± R 50,000

Location: Upington, Northern Cape, South Africa
 Project duration & year: 11 months, 2009 / 2010
 Client: Fluopro Investments (Pty) Ltd
 Name of Project: Upington 1.5 MW photovoltaic solar energy facility
 Project Description: Environmental Assessment
 Job Title and Duties: Environmental Assessment Practitioner / Project Manager
 Value of Project: ± R 100,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 8 months, 2012
 Client: Orion Engineered Carbons
 Name of Project: Orion 19.5 MW Cogeneration Plant
 Project Description: Environmental Assessment and Air Emission License amendment, for the development of a 19.5 MW electrical power cogeneration plant
 Job Title and Duties: Environmental Assessment Practitioner, Project Manager
 Value of Project: ± R 180,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: energy

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 18 months, 2009 to 2010
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: NMBM / CEF 27 MW Wind Energy Facility EIA
 Project Description: Environmental Assessment for a 27 MW Wind Energy Facility on three potential sites within the Nelson Mandela Bay Municipal area
 Job Title and Duties: Environmental Assessment Practitioner / Project Review
 Value of Project: ± R 1,600,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 24 months, 2012 to 2013
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: 27 MW van Stadens Wind Energy Facility
 Project Description: Environmental consulting services for the construction of the 27 MW van Stadens Wind Energy Facility
 Job Title and Duties: Environmental Assessment Practitioner / Project Review
 Value of Project: ± R 1,400,000

Key Experience: Environmental assessment: mining & industrial

Location: Bas Congo Province, Democratic Republic of Congo
 Project duration & year: May 2013 - August 2013
 Client: Nyumba Ya Akiba sarl
 Name of Project: Nyumba Ya Akiba 3,000 tpd Cement Project
 Project Description: Environmental & Social Impact Assessment
 Job Title and Duties: Client Liaison, Environmental Assessment Practitioner
 Value of Project: ± USD 350,000

Location: Coega Industrial Development Zone, Eastern Cape, South Africa
 Project duration & year: 12 months, 2012/13
 Client: Afrisam (Pty) Ltd
 Name of Project: Coega 3,000 tpd Cementitious Material Grinding & Blending Plant
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 700,000

Location: Great Dyke (Selous to Ngezi), Zimbabwe
 Project duration & year: 12 months, 2012
 Client: Zimplats
 Name of Project: Phase 3 Expansion: Consolidated Environmental Impact Assessment
 Project Description: Environmental & Social Impact Assessment
 Job Title and Duties: Project Manager
 Value of Project: ± R 2,500,000

Location: Selous Metallurgical Complex, Zimbabwe
 Project duration & year: 3 months, 2012
 Client: Zimplats
 Name of Project: Sulfur Dioxide Abatement Installation at Selous Metallurgical Complex (SMC)
 Project Description: Environmental & Social Impact assessment
 Job Title and Duties: Environmental Assessment Practitioner
 Value of Project: ± R 1,500,000

Location: Coega Industrial Development Zone, Eastern Cape, South Africa

Rob Gardiner

Principal Environmental Scientist

Key Experience: **Environmental assessment: mining & industrial**

Project duration & year: 18 months, 2006/2007
 Client: Straits Chemicals
 Name of Project: Straits Chemicals Chlor-Alkali Plant EIA
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 1,000,000

Location: Hankey, Eastern Cape, South Africa
 Project duration & year: 4 months, 2009
 Client: Nkari Mining
 Name of Project: Prospecting EMP
 Project Description: Environmental Management Programme
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 100,000

Location: Paterson, Eastern Cape, South Africa
 Project duration & year: 6 months, 2010
 Client: Vulani Coronation Mining
 Name of Project: Prospecting permit application for silica mine
 Project Description: Environmental Management Plan for Prospecting Right
 Job Title and Duties: Project Director
 Value of Project: ± R 100,000

Key Experience: **Environmental assessment: housing / change in land use**

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 9 months, 2014
 Client: Nelson Mandela Bay Municipality
 Name of Project: Walmer erf 1948 Housing Development
 Project Description: Basic Assessment
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: ± R 150,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 24 months, 2014 (on going)
 Client: Nelson Mandela Bay Municipality
 Name of Project: Walmer erf 11305 Housing Development
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: ± R 1,200,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2009 – 2016
 Client: Nelson Mandela Bay Municipality
 Name of Project: Seaview Low Cost Housing
 Project Description: Environmental Impact Assessment for the development of a Low Cost Housing and associated wastewater treatment works
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: ± R 470,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: housing / change in land use

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 36 months, 2012 – 2015
 Client: Nelson Mandela Bay Municipality
 Name of Project: Jachtlake Integrated Human Settlement EIA
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Environmental Assessment Practitioner, Project Review
 Value of Project: ± R 1 000,000

Location: Motherwell, Eastern Cape, South Africa
 Project duration & year: 36 months (2009 to 2012)
 Client: NuWay Housing
 Name of Project: Coega Ridge Integrated Housing Development
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 1 000,000

Location: Gqebera, Walmer, Eastern Cape, South Africa
 Project duration & year: 12 months, 2010
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Walmer/Gqebera Low Cost Housing EIA
 Project Description: Environmental Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 250,000

Location: Rosedale, Uitenhage, Eastern Cape, South Africa
 Project duration & year: 9 months, 2009
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Rosedale Low Cost Housing EIA
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 200,000

Location: St Albans, Eastern Cape, South Africa
 Project duration & year: 9 months, 2009
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: St Albans Low Cost Housing EIA
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 300,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 12 months, 2006
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: SEA of the Greater Happy Valley area
 Project Description: Strategic Environmental Assessment
 Job Title and Duties: Project Manager
 Value of Project: ± R 150,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: housing / change in land use

Location: St Francis Bay, Eastern Cape, South Africa
 Project duration & year: 9 months 2006
 Client: Watersplash Investments (Pty) Ltd
 Name of Project: Change in Land Use Application for Part 2 of Farm 707, Osbosch 707
 Project Description: Environmental Scoping Study
 Job Title and Duties: Project Manager
 Value of Project: ± R 150,000

Location: Coega Industrial Development Zone, Eastern Cape, South Africa
 Project duration & year: 18 months, 2005/2006
 Client: Coega Development Corporation
 Name of Project: Change in Land use of the Remainder of the Coega IDZ (± 7200 Hectares)
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 500,000

Location: Motherwell, Eastern Cape, South Africa
 Project duration & year: 6 months, 2005
 Client: Motherwell Urban Renewal Project
 Name of Project: Motherwell Golf Course
 Project Description: Environmental Scoping Study
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 100,000

Location: Uitenhage, Eastern Cape, South Africa
 Project duration & year: 8 months, 2004/2005
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Nelson Mandela Bay Logistics Park Scoping Study
 Project Description: Environmental Scoping Study
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 100,000

Location: St Francis Bay, Eastern Cape, South Africa
 Project duration & year: 9 months, 2003
 Client: Golf Data
 Name of Project: St Francis Golf Links EIA
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Manager, Environmental Assessment Practitioner
 Value of Project: ± R 300,000

Key Experience: Environmental auditing & due diligence

Location: Coega Industrial Development Zone, Eastern Cape, South Africa
 Project duration & year: 6 months, 2012
 Client: Coega Development Corporation
 Name of Project: Environmental Due Diligence study for Zones 12 of the Coega Industrial Development Zone
 Project Description: Phase 1 & 2 Environmental Due Diligence Study
 Job Title and Duties: Project Manager, Environmental Scientist
 Value of Project: ± R 250,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental auditing & due diligence

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2 months, 2014
 Client: SAB Miller
 Name of Project: Water Vulnerability Assessment for iBhayi Brewery, Perseverance, Port Elizabeth
 Project Description: Assess vulnerability to changes in quality and availability of water supply
 Job Title and Duties: Environmental Scientist
 Value of Project: ± R 150,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2 months, 2009
 Client: SAB Miller
 Name of Project: Water Vulnerability Assessment for iBhayi Brewery, Perseverance, Port Elizabeth
 Project Description: Assess vulnerability to changes in quality and availability of water supply
 Job Title and Duties: Environmental Scientist
 Value of Project: ± R 100,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2 months, 2009
 Client: Coca Cola Fortune (Pty) Ltd
 Name of Project: Water Vulnerability Assessment for Lakeside Plant, North End, Port Elizabeth
 Project Description: Assess vulnerability to changes in quality and availability of water supply
 Job Title and Duties: Environmental Scientist
 Value of Project: ± R 100,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2 months, 2010
 Client: Environ, on behalf of Evonik
 Name of Project: Project Casablanca – Phase I Environmental Due Diligence of Algorax
 Project Description: Phase 1 Environmental Due Diligence Study
 Job Title and Duties: Environmental Scientist
 Value of Project: ± R 150,000

Location: Coega Industrial Development Zone, Eastern Cape, South Africa
 Project duration & year: 6 months, 2008
 Client: Coega Development Corporation
 Name of Project: Environmental Due Diligence study for Zones 6 & 7 of the Coega Industrial Development Zone
 Project Description: Phase 1 & 2 Environmental Due Diligence Study
 Job Title and Duties: Project Manager, Environmental Scientist
 Value of Project: ± R 250,000

Location: Coega Industrial Development Zone, Eastern Cape, South Africa
 Project duration & year: 6 months, 2004
 Client: Coega Development Corporation
 Name of Project: Environmental Due Diligence study for Zones 1, 2 and 3 of the Coega Industrial Development Zone
 Project Description: Environmental Due Diligence Study
 Job Title and Duties: Project Manager, Environmental Scientist
 Value of Project: ± R 250,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental auditing & due diligence

Location: Luanda, Angola
 Project duration & year: 2 months, 2002
 Client: BP
 Name of Project: BP Waste Management Audits
 Project Description: Third party waste contractor audits
 Job Title and Duties: Lead Auditor
 Value of Project: ± R 50,000

Key Experience: Environmental monitoring & remediation

Location: Paramam, Suriname
 Project duration & year: 6 months, 2011 / 2012
 Client: Suriname Aluminum Company, LLC
 Name of Project: Geochemical assessment of pit lake water and sediment
 Project Description: Water quality monitoring
 Job Title and Duties: Environmental Scientist
 Value of Project: R 300,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2004 to present
 Client: Nelson Mandela Bay Municipality
 Name of Project: Landfill Monitoring
 Project Description: Monitoring of groundwater, surface water and landfill gas at the Koedoeskloof, Arlington, KwaNobuhle, and iBhayi Landfill Sites
 Job Title and Duties: Environmental Scientist, Project Reviewer
 Value of Project: R 3,500,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 6 months, 2009
 Client: Nelson Mandela Bay Municipality
 Name of Project: North End Lake Water Quality Management Plan
 Project Description: Water Quality Management Plan
 Job Title and Duties: Project Manager, Environmental Scientist
 Value of Project: R 150,000

Location: Struandale, Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 6 months, 2009
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Decommissioning of the NMBM Gas Works
 Project Description: Basic Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 150,000

Location: North End, Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 6 months, 2009
 Client: Transnet Capital Projects
 Name of Project: Decommissioning of Transnet's North End Ash Deposit
 Project Description: Site Contamination Assessment & Basic Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 150,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental monitoring & remediation

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2 years, 2005/2007
 Client: Confidential
 Name of Project: Groundwater Contamination Assessment at manufacturing concern
 Project Description: Delineation and monitoring of chlorinated hydrocarbon plume in groundwater
 Job Title and Duties: Project Manager, Environmental Scientist
 Value of Project: ± R 600,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2 years, 2003/2004
 Client: Client confidential
 Name of Project: In-Situ Chemical Oxidation of Chlorinated Hydrocarbon Contamination
 Project Description: In-situ chemical oxidation with potassium permanganate
 Job Title and Duties: Project Manager, Environmental Scientist
 Value of Project: ± R 500,000

Location: Port of Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 3 months, 2003
 Client: Transnet National Port Authority
 Name of Project: Water Quality Monitoring Programme for the Port of Port Elizabeth
 Project Description: Development of a water quality monitoring programme
 Job Title and Duties: Project Manager, Environmental Scientist
 Value of Project: ± R 50,000

Key Experience: Environmental assessment: waste management

Location: Port of Port Elizabeth and Port of Ngqura, Eastern Cape, South Africa
 Project duration & year: 12 months, 2009/2010
 Client: Transnet National Ports Authority
 Name of Project: Waste Management Plans for the Ports of Port Elizabeth and Ngqura
 Project Description: Waste Management Plan
 Job Title and Duties: Project Director
 Value of Project: ± R 500,000

Location: Nelson Mandela Bay Municipality, Eastern Cape, South Africa
 Project duration & year: 24 months, 2008 to 2009
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: NMBM Waste Transfer Sites: Environmental Screening
 Project Description: Environmental Screening / Site selection
 Job Title and Duties: Project Director
 Value of Project: ± R 300,000

Location: Cacadu District Municipality, Eastern Cape, South Africa
 Project duration & year: 2 months, 2008
 Client: Cacadu District Municipality
 Name of Project: Cacadu District Municipality: Integrated Waste Management Plan
 Project Description: Status Quo Assessment of Waste Management Facilities
 Job Title and Duties: Project Manager
 Value of Project: ± R 60,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental assessment: waste management

Location: Graaff Reinet, Eastern Cape, South Africa
 Project duration & year: 24 months, 2007 to 2008
 Client: Camdeboo Local Municipality
 Name of Project: Establishment of new landfill site for Graaff Reinet
 Project Description: Environmental Impact Assessment
 Job Title and Duties: Project Director / Environmental Assessment Practitioner
 Value of Project: ± R 250,000

Location: Walmer, Eastern Cape, South Africa
 Project duration & year: 6 months, 2004
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Walmer Qebera Landfill Site: Landfill Gas Risk Assessment
 Project Description: Qualitative Environmental Risk Assessment
 Job Title and Duties: Environmental Assessor
 Value of Project: ± R 100,000

Location: iBhayi, Eastern Cape, South Africa
 Project duration & year: 9 months, 2002
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: iBhayi Landfill Site: Application for Buffer Zone Relaxation
 Project Description: Quantitative Environmental Risk Assessment
 Job Title and Duties: Project Manager
 Value of Project: ± R 150,000

Key Experience: Environmental management systems

Location: Nelson Mandela Metropolitan Municipality, Eastern Cape, South Africa
 Project duration & year: 3 years, 2002 to 2005
 Client: Nelson Mandela Metropolitan Municipality
 Name of Project: Environmental Management System implementation
 Project Description: Environmental Management System (ISO 14001 based)
 Job Title and Duties: Project Manager, Environmental Consultant
 Value of Project: ± R 1,200,000

Location: Cato Ridge, KwaZulu Natal, South Africa
 Project duration & year: 5 months, 2003
 Client: Assmang
 Name of Project: ISO 14001 Implementation
 Project Description: Environmental Management System (ISO 14001 compliant)
 Job Title and Duties: Project Review
 Value of Project: ± R 200,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 9 months, 2002
 Client: Delphi Catalysts
 Name of Project: 14001 implementation
 Project Description: Environmental Management System (ISO 14001 certified)
 Job Title and Duties: Environmental Consultant
 Value of Project: ± R 150,000

Rob Gardiner

Principal Environmental Scientist

Key Experience: Environmental management systems

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 4 months, 2000
 Client: PPC
 Name of Project: PPC Grassridge Quarry: ISO 14001 implementation
 Project Description: Environmental Management System (ISO 14001 certified)
 Job Title and Duties: Technical advisor
 Value of Project: ± R 50,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 4 months, 1999
 Client: CSIR, Division of Textile Technology
 Name of Project: ISO 14001 implementation
 Project Description: Environmental Management System (ISO 14001 certified)
 Job Title and Duties: Technical advisor
 Value of Project: ± R 50,000

Location: Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 9 months, 1998/1999
 Client: Duracell Eveready
 Name of Project: Duracell Eveready: ISO 14001 implementation
 Project Description: Environmental Management System (ISO 14001 certified)
 Job Title and Duties: Environmental Consultant
 Value of Project: ± R 150,000

Key Experience: External Review

Location: Graaff-Reinet, Eastern Cape
 Project duration & year: 4 months, 2015
 Client: Richardt van Rensburg Inc
 Name of Project: Irharfu Minerals, erf 1814, Graaff-Reinet
 Project Description: Review of the Draft EIA & EMP for the mining of hard rock aggregate on erf 1814, Graaff-Reinet, adjacent to the Camdeboo National Park
 Job Title and Duties: External reviewer
 Value of Project: ± R 200,000

Location: Port Elizabeth, Eastern Cape
 Project duration & year: 1 Month, 2015
 Client: Nelson Mandela Bay Municipality
 Name of Project: Kabega Road low level bridge review
 Project Description: Review of the environmental assessment and EMP for repair works to the Kabega Road low level bridge
 Job Title and Duties: External reviewer
 Value of Project: ± R 20,000

Location: Port Elizabeth, Eastern Cape
 Project duration & year: 2 months, 2014
 Client: Chlor Alkali Holdings
 Name of Project: Cerebos Closure Liability Assessment
 Project Description: External review of mine closure costs for Cerebos' Coega River, Sundays River, Swartkops River, and Berg River salt pans.
 Job Title and Duties: External reviewer
 Value of Project: R 200,000

Karissa Nel

Senior Environmental Scientist



Profession: Senior Environmental Scientist

Nationality: South Africa

Education: MEM (Environmental Management), UFS, 2007
BSc (Hons) (Zoology), UFS, 2005
BSc (Zoology, Microbiology), UFS, 2004

Registrations and Affiliations: Certified Environmental Assessment Practitioner (EAP(SA))
Member, International Association of Impact Assessors (IAIA(SA))

Awards: Bloemwater Prize for Best Magister Student in Environmental Management at UFS

Specialisation

Environmental Impact and Basic Assessments; Environmental Management Plans; Environmental Monitoring, Environmental Auditing, Environmental Licensing.

Expertise

Karissa Nel has been involved in environmental projects for 10 years, with experience in the following:

- Basic Assessments (BA);
- Environmental Impact Assessments (EIA);
- Wetland Screening and Impact Assessments;
- Environmental Management Plans/ Programmes (EMPr);
- Environmental Auditing;
- Public Participation/ Stakeholder Engagement;
- Water Quality Monitoring;
- Environmental Licensing (Air Emission, Water Use, Waste, etc.); and
- Geographic Information Systems (using ArcGIS 10).

Employment

2009 – present	SRK Consulting (Pty) Ltd, Environmental Scientist
2005 - 2009	MDA Consulting, Environmental Scientist
2005	University of the Free State, Research Assistant

Languages

Afrikaans – read, write, speak
English – read, write, speak

Karissa Nel

Senior Environmental Scientist

Key Experience: ENVIRONMENTAL IMPACT ASSESSMENTS

Name of Project: Jachtvlakte Precinct Sustainable Human Settlement Plan
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: EIA for the Mixed-use housing, commercial and industrial development at Jachtvlakte, Nelson Mandela Bay
 Project duration/date: 2011 - present
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of scoping and EIA reports; facilitation of public participation process.

Name of Project: Witteklip Wastewater Treatment Works
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: EIA for the proposed Wastewater Treatment Works at Witteklip, Nelson Mandela Bay
 Project duration/date: 2012 - present
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of scoping and EIA reports; facilitation of public participation process.

Name of Project: Realignment of the 132 kV powerline from Marconi Street to the Tembani line
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: EIA for the realignment of an existing powerline and additional of a new 132 kV powerline, Nelson Mandela Bay
 Project duration/date: 2010 - 2012
 Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping and EIA reports; facilitation of public participation process.

Name of Project: Mixed-use housing development at KwaNobuhle Extension 11, Uitenhage
 Location: Uitenhage, Eastern Cape
 Project Description: EIA for the Mixed-use housing development at KwaNobuhle Extension 11, Uitenhage
 Project duration/date: 2011
 Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping and EIA reports; co-author of terrestrial ecological specialist study; facilitation of public participation process.

Name of Project: Subdivision of the Farm Morgenzon, Bloemfontein, Free State Province.
 Location: Bloemfontein
 Project Description: EIA for the subdivision of a farm
 Project duration/date: 2006
 Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Fuel filling station on both sides of the N1 National Road on the Farm Harmonia 867, Winburg, Free State Province.
 Location: Winburg
 Project Description: EIA for the construction of a fuel filling station
 Project duration/date: 2008 - 2009
 Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Karissa Nel
Senior Environmental Scientist

Name of Project: Fuel filling station in Sluiters road in Colesberg, Northern Cape Province.
Location: Colesberg
Project Description: EIA for the construction of a fuel filling station
Project duration/date: 2007
Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Township establishment at Kuyasa (Colesberg), Northern Cape Province.
Location: Colesberg
Project Description: EIA for township establishment
Project duration/date: 2006 – 2007
Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Township establishment on the Farm Bayswater 2865, Bloemfontein, Free State Province.
Location: Bloemfontein
Project Description: EIA for town development in a sensitive area
Project duration/date: 2006 – 2009
Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping and EMP reports; facilitation of public participation process.

Name of Project: Township establishment on Portions of the Farms Cecilia 2352, Kwaggafontein 2300 and Bloemfontein 654, Bloemfontein, Free State Province (known as the Cecilia development).
Location: Bloemfontein
Project Description: EIA for a large town development
Project duration/date: 2007 – 2008
Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Stafford Hill Golf and Polo Estate, Ficksburg, Free State Province.
Location: Ficksburg
Project Description: EIA for golf and polo estate
Project duration/date: 2006 – 2007
Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Grootrivier Golf Estate on the Vaal River, Christiana, Free State Province.
Location: Christiana
Project Description: EIA for a golf estate
Project duration/date: 2007 – 2009
Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Karissa Nel

Senior Environmental Scientist

Name of Project: Enlargement of the off-channel raw water storage dam on the Remainder of the Farm Brandhoek no. 20, Lindley District, Free State Province.

Location: Lindley

Project Description: EIA for the enlargement of a dam

Project duration/date: 2007

Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Water pipeline development between Jagersfontein & Fauresmith, Free State Province.

Location: Jagersfontein tot Fauresmith

Project Description: Scoping for a water pipeline and reservoir

Project duration/date: 2006

Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping and EMP reports; facilitation of public participation process.

Name of Project: 132 kV overhead power line, 132 kV cable, distribution centre and switching station in the Fichardtpark and Willows area in Bloemfontein, Free State Province.

Location: Bloemfontein

Project Description: EIA for overhead power line and cable, distribution centre and switching station.

Project duration/date: 2007 – 2008

Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Proposed construction of a new solid waste site in Sterkspruit

Location: Sterkspruit, Eastern Cape Province.

Project Description: EIA for construction of a new solid waste site.

Project duration/date: 2008 – 2009

Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Name of Project: Upgrading of Colesberg Wastewater Treatment Works

Location: Colesberg, Northern Cape Province

Project Description: EIA for Upgrading of Wastewater Treatment Works.

Project duration/date: 2007 – 2008

Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of scoping, EIA and EMP reports; facilitation of public participation process.

Key Experience: BASIC ASSESSMENTS

Name of Project: Walmer 132 kV Powerline, Port Elizabeth

Location: Walmer, Nelson Mandela Bay, Eastern Cape Province

Project Description: Installation of a 132 kV overhead powerline from the Lorraine Substation to the 17th Avenue Substation

Project duration/date: 2015 - ongoing

Job Title and Duties: Liaison with client and environmental authorities; project co-ordination &

Karissa Nel
Senior Environmental Scientist

management; compilation of Basic Assessment Report and EMPr and responding to public comments.

Name of Project: Filling Station at Kenton-on-Sea
 Location: Kenton-on-Sea, Eastern Cape Province
 Project Description: Basic Assessment process for the development of a filling station at the entrance to Kenton-on-Sea
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; compilation of Basic Assessment Report, EMPr and appeal responses.

Name of Project: Wittekleibosch Milking Parlour, Humansdorp, Eastern Cape Province
 Location: Humansdorp, Eastern Cape Province
 Project Description: Basic Assessment and Water Use License Application for a milking parlour near Humansdorp in the Eastern Cape Province
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; compilation of Basic Assessment report, EMPr and Water Use License Application.

Name of Project: Langbos Bulk Infrastructure, Addo, Eastern Cape Province
 Location: Addo, Eastern Cape Province
 Project Description: Basic Assessment and Water Use License Application for the installation of bulk water and sewer infrastructure for Langbos, near Addo in the Eastern Cape Province
 Project duration/date: 2014 - 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; compilation of Basic Assessment report and Water Use License Application.

Name of Project: Revetments along the Swartkops River at Redhouse
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Basic Assessment for the installation of stormwater management structures along the portion of the Swartkops River
 Project duration/date: 2011 – 2012
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Basic Assessment report; facilitation of public participation process.

Name of Project: Upgrade of the National Road 10 Section 4 from Tafelberg to Middelburg South Interchange
 Location: Middelburg, Eastern Cape
 Project Description: Basic Assessment for the upgrade of the National Road 10 Section 4 from Tafelberg to Middelburg South Interchange
 Project duration/date: 2009 – 2010
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Basic Assessment report; facilitation of public participation process.

Karissa Nel

Senior Environmental Scientist

Name of Project: Upgrade and Rehabilitation of the National Road 2 Section 11, Coega to Colchester, Eastern Cape
 Location: Coega to Colchester, Eastern Cape
 Project Description: Basic Assessment for the upgrading of a road
 Project duration/date: 2009 - 2010
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Basic Assessment report; facilitation of public participation process.

Name of Project: Rezoning of erven in Graaff-Reinet for industrial purposes
 Location: Graaff-Reinet, Eastern Cape
 Project Description: Basic Assessment for the rezoning of erven
 Project duration/date: 2009 - 2010
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Basic Assessment report; facilitation of public participation process.

Name of Project: Establishment of a cemetery in Kleinpoort
 Location: Kleinpoort, Eastern Cape
 Project Description: Basic Assessment for the establishment of a cemetery
 Project duration/date: 2009
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Basic Assessment report; facilitation of public participation process.

Name of Project: Hotel, residential, business and office development on the Remainder of Plot 28, Rayton Small Holdings and Subdivision 2 of the Farm Rayton 431, Bloemfontein
 Location: Bloemfontein, Free State Province
 Project Description: Basic Assessment for a hotel, residential, business and office development
 Project duration/date: 2007
 Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of Basic Assessment report; facilitation of public participation process

Name of Project: Leisure residential development on the Farm Welgelegen, Clarens
 Location: Clarens, Free State Province
 Project Description: Basic Assessment for the development of 15 leisure residential units.
 Project duration/date: 2006 – 2008
 Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of Basic Assessment report; facilitation of public participation process.

Name of Project: Upgrading of the road between Kuruman van Vryburg
 Location: Kuruman/ Vryburg, North West Province
 Project Description: Basic Assessment for upgrading of a road.
 Project duration/date: 2008
 Job Title and Duties: Liaison with client and environmental authorities; assisting with project co-ordination; compilation of Basic Assessment report; facilitation of public participation process.

Karissa Nel

Senior Environmental Scientist

Key Experience: **ATMOSPHERIC EMISSION LICENSE APPLICATIONS**

Name of Project: Manganese Ore Berth AEL
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Atmospheric Emission License Application for the Manganese Ore Berth at the Port Elizabeth Port, Nelson Mandela Bay
 Project duration/date: 2010 - 2011
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of the Atmospheric Emission License Application Form

Name of Project: EC Biomass Fuel Pellets - Biomass drying and pelletising plant
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Atmospheric Emission License Application for a biomass drying and pelletising plant in the Coega IDZ, Nelson Mandela Bay
 Project duration/date: 2010 - 2011
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of the Atmospheric Emission License Application Form

Key Experience: **ENVIRONMENTAL MANAGEMENT PLANS/ PROGRAMMES (to DMR or as a separate document – not associated with a BA or EIA)**

Name of Project: Upgrading of the National Road 10 Section 4 from Tafelberg to Middelburg South Interchange
 Location: Middelburg, Eastern Cape
 Project Description: EMPr for borrow pits for the upgrading of the National Road 10 Section 4 from Tafelberg to Middelburg South Interchange
 Project duration/date: 2010
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Construction Environmental Management Programme.

Name of Project: Upgrading and Rehabilitation of the National Road 2 Section 11 from Coega to Colchester
 Location: Colchester, Eastern Cape
 Project Description: EMPr for borrow pits for the upgrading and rehabilitation of the National Road 2 Section 11 from Coega to Colchester
 Project duration/date: 2009 - 2010
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Construction Environmental Management Programme.

Name of Project: Construction of Romany Road and associated infrastructure, Port Elizabeth
 Location: Port Elizabeth, Eastern Cape
 Project Description: Construction Environmental Management Plan for the construction of a road and associated infrastructure
 Project duration/date: 2010
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Construction Environmental Management Plan.

Name of Project: EMPR for borrow pits between Coega and Colchester
 Location: Between Coega and Colchester, Eastern Cape
 Project Description: Environmental Management Plan for borrow pits
 Project duration/date: 2009 - 2010
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination; compilation of Environmental Management Plan.

Karissa Nel

Senior Environmental Scientist

Name of Project: EMPR for borrow pits – Ladybrand, Free State Province
 Location: Ladybrand
 Project Description: EMPR for borrow pits
 Project duration/date: 2007
 Job Title and Duties: Liaison with client and mining authorities; compilation of Environmental Management Plan

Key Experience: ENVIRONMENTAL AUDITING

Name of Project: Monitoring of the Construction of Nooitgedagt-Coela Low Level Supply Scheme Pipeline, Port Elizabeth, Eastern Cape
 Location: Port Elizabeth, Eastern Cape
 Project Description: Monitoring of the construction of a pipeline from the existing Nooitgedagt WTW to Olifantskop Reservoir (approx. 20 km)
 Project duration/date: 2011 - Ongoing
 Job Title and Duties: Liaison with client, contractor and environmental authorities; compilation of ECO reports.

Name of Project: Monitoring of the Construction of Romany Road and associated infrastructure, Port Elizabeth, Eastern Cape
 Location: Port Elizabeth, Eastern Cape
 Project Description: Monitoring of the construction of a road and associated infrastructure
 Project duration/date: 2010
 Job Title and Duties: Liaison with client, contractor and environmental authorities; compilation of ECO reports.

Name of Project: Monitoring of the construction of the new FNB Building, Newton Park, Port Elizabeth
 Location: Port Elizabeth, Eastern Cape
 Project Description: Monitoring of the construction activities at the new FNB Building, Newton Park, Port Elizabeth
 Project duration/date: 2010 - Ongoing
 Job Title and Duties: Liaison with client, contractor and environmental authorities; compilation of ECO reports.

Name of Project: Monitoring of environmental compliance at construction phase of Noordstad power line construction, Bloemfontein, Free State Province.
 Location: Bloemfontein
 Project Description: Monitoring of environmental compliance
 Project duration/date: 2008
 Job Title and Duties: Liaison with client and contractor; compilation of ECO report.

Key Experience: WATER USE LICENSE APPLICATIONS

Name of Project: Jachtlakte Precinct Sustainable Human Settlement Plan
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Water Use License Application for Phase 1 of the Mixed-use housing, commercial and industrial development at Jachtlakte, Nelson Mandela Bay
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; compilation of the Water Use License Application document.

Name of Project: Wittekleibosch Milking Parlour, Humansdorp, Eastern Cape Province
 Location: Humansdorp, Eastern Cape Province

Karissa Nel

Senior Environmental Scientist

Project Description: Water Use License Application for a milking parlour near Humansdorp in the Eastern Cape Province
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; compilation of the Water Use License Application document.

Name of Project: Langbos Bulk Infrastructure, Addo, Eastern Cape Province
 Location: Addo, Eastern Cape Province
 Project Description: Water Use License Application for the installation of bulk water and sewer infrastructure for Langbos, near Addo in the Eastern Cape Province
 Project duration/date: 2014 - 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; compilation of the Water Use License Application document.

Name of Project: Witteklip Wastewater Treatment Works
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Water Use License Application for the proposed Wastewater Treatment Works at Witteklip, Nelson Mandela Bay
 Project duration/date: 2013 - present
 Job Title and Duties: Project management; liaison with client and relevant authorities; compilation of the Water Use License Application Forms

Name of Project: KwaNobuhle Extension 11 Mixed-use Housing Development
 Location: Uitenhage, Eastern Cape
 Project Description: Water Use License Application for a proposed mixed-use housing development at KwaNobuhle Extension 11, Nelson Mandela Bay
 Project duration/date: 2013 - present
 Job Title and Duties: Project coordinator; liaison with client and relevant authorities; compilation of the Water Use License Application Forms

Name of Project: Khayamnandi Extension Housing Development
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Water Use License Application for a proposed housing development at Khayamnandi, Nelson Mandela Bay
 Project duration/date: 2012 - 2013
 Job Title and Duties: Project coordinator; liaison with client and relevant authorities; compilation of the Water Use License Application Forms

Key Experience: WASTE LICENSE/ INTEGRATED WASTE LICENSE APPLICATIONS

Name of Project: Wittekleibosch Milking Parlour, Humansdorp, Eastern Cape Province
 Location: Humansdorp, Eastern Cape Province
 Project Description: Integrated Environmental Authorisation and Waste License Application for a milking parlour near Humansdorp in the Eastern Cape Province
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; compilation of the of Basic Assessment report, EMPr and Water Use License Application.

Name of Project: Witteklip Wastewater Treatment Works
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Waste License Application for the proposed Wastewater Treatment Works at Witteklip, Nelson Mandela Bay
 Project duration/date: 2012 - present

Karissa Nel

Senior Environmental Scientist

Job Title and Duties: Project management; liaison with client and environmental authorities; compilation of the Waste License Application Form

Name of Project: Newco Tyre Recycling Plant in Markman
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Waste License Application for the proposed Tyre Recycling Plant in Markman, Nelson Mandela Bay
 Project duration/date: 2012 - 2013
 Job Title and Duties: Project management; liaison with client and environmental authorities; compilation of the Waste License Application Form

Key Experience: WETLAND/ AQUATIC SPECIALIST ASSESSMENTS

Name of Project: Bloemendal Arterial Extension, Port Elizabeth
 Location: Nelson Mandela Bay, Eastern Cape
 Project Description: Aquatic Impact Assessment for the proposed Extension of the Bloemendal Arterial, Port Elizabeth
 Project duration/date: 2016 - ongoing
 Job Title and Duties: Liaison with client; project co-ordination & management; site work and analysis, compilation of Aquatic Impact Assessment Report.

Name of Project: Proposed Housing Development on Portions 25 & 45 of Farm Cragga Kamma No. 23, Port Elizabeth
 Location: Port Elizabeth, Eastern Cape
 Project Description: Wetland Impact Assessment for the proposed Housing Development on Portions 25 & 45 of Farm Cragga Kamma No. 23, Port Elizabeth
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; site work and analysis, compilation of Wetland Impact Assessment Report.

Name of Project: Proposed Fuel Service Station at Kenton-on-Sea
 Location: Kenton-on-Sea, Eastern Cape
 Project Description: Wetland Screening Study for the proposed Fuel Service Station at Kenton-on-Sea
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; desktop research, compilation of Wetland Screening Study Report.

Name of Project: Proposed Upgrade of the Wastewater Treatment Works at Paterson
 Location: Paterson, Eastern Cape
 Project Description: Wetland Impact Assessment for the proposed Wastewater Treatment Works Upgrade at Paterson
 Project duration/date: 2015
 Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; site work and analysis, compilation of Wetland Impact Assessment Report.

Name of Project: Langbos Bulk Infrastructure, Addo, Eastern Cape Province
 Location: Addo, Eastern Cape Province
 Project Description: Wetland Impact Assessment for the installation of bulk water and sewer infrastructure for Langbos, near Addo in the Eastern Cape Province

Karissa Nel
Senior Environmental Scientist

Project duration/date: 2014
Job Title and Duties: Liaison with client and environmental authorities; project co-ordination & management; site work and analysis, compilation of Wetland Impact Assessment Report.

Key Experience: OTHER SPECIALIST STUDIES

Name of Project: CBA trade-off study for the proposed Jachtvlakte Precinct Sustainable Human Settlement Plan

Location: Nelson Mandela Bay, Eastern Cape

Project Description: An investigation into potential trade-offs in the Jachtvlakte Precinct to be made for proposed development areas that were originally planned in Critical Biodiversity Areas. The study included much work in ArcGIS.

Project duration/date: 2013

Job Title and Duties: Project management; compilation of trade-off report; ArcGIS calculations and plans; liaison with client and environmental authorities.

Name of Project: Terrestrial ecological specialist study for the proposed mixed-use housing development at KwaNobuhle Extension 11, Uitenhage

Location: Uitenhage, Eastern Cape

Project Description: Main author of the terrestrial ecological specialist study done for the EIA for the proposed mixed-use housing development at KwaNobuhle Extension 11, Uitenhage. The study involved much ArcGIS work.

Project duration/date: 2011

Job Title and Duties: Identification and assessment of impacts, compilation of specialist report; ArcGIS calculations and map generation.

Tamarin (Tammy) Burton

Environmental Scientist



Profession

Environmental Scientist

Education

Nat Dip, Safety Management, University of South Africa, 2015
 NOSA Train the Trainer Certification, February 2014
 First Aid Level 1, St Johns Ambulance, 2013
 Tools for Wetland Assessment (TWA), Rhodes University, 2012
 BSc, Hons, Botany, Nelson Mandela Metropolitan University, 2010
 BSc, Botany and Geography, Nelson Mandela Metropolitan University, 2009

**Registrations/
Affiliations**

CEAPSA, SACPCMP in process

Awards

The International Award for young people, 2005

Specialisation

Environmental impact assessments, basic assessments, environmental management programmes, mining management programmes, public participation, waste license applications, water use license applications, municipal infrastructure grant applications, environmental auditing and safety management

Expertise

Tammy Burton has been involved in the field of environmental science for the past six years. Her expertise includes:

- environmental auditing;
- environmental officer work;
- environmental impact assessments;
- environmental basic assessments;
- mining environmental management programmes;
- waste license applications;
- water use license applications;
- public participation facilitation.

Her training is in Botany, Geography and Safety Management. Her main expertise includes:

- basic assessments and environmental impact assessments for renewable energy projects;
- basic assessments and license applications for waste facilities;
- basic assessments and mining management plans for road upgrades;
- environmental control officer work for the construction on water supply schemes, water treatment works, booster pump stations, reservoirs and wind farms; and
- environmental coordination and HSE officer work.

Employment

Jan 2016-present	SRK Consulting (Pty) Ltd, Environmental Scientist (Consultant), Port Elizabeth
June 2014- Jan 2016	Kentz (member of SNC-Lavalin), HSE Officer and Environmental Project Coordinator for on the VALE Moatize Expansion Project ,Tete - Mozambique
March 2010 – May 2014	SRK Consulting (Pty) Ltd, Environmental Scientist (Consultant), Port Elizabeth

Publications

None

Languages

English – read, write, speak (Excellent)
 Afrikaans – read, write, speak (Good)
 Portuguese - read, write, speak (Poor)

Key Experience: HSE Officer

Location: Tete - Mozambique
 Project duration & year: 2014-2016
 Client: Concremat (Project Engineer) and VALE (Client to Concremat)
 Name of Project: VALE Moatize Expansion Project
 Project Description: Expansion of the coal handling and processing plant of one of Africa's largest coal mines located in Tete, Mozambique
 Job Title and Duties: Kentz (member of SNC-Lavalin), HSE Officer and Environmental Project Coordinator
 Value of Project: 175 Million USD

Key Experience: Environmental Legal Review/ Sensitivity Assessment

Location: Whittlesea in the Eastern Cape
 Project duration & year: 2016
 Client: Lukhanji Municipality
 Name of Project: Proposed Whittlesea Community Centre
 Project Description: Review of the potential need for environmental authorisation for the proposed activity in terms of the Environmental Impact Assessment 2014 (EIA) regulations in accordance with the National Environmental Management Act (no. 107 of 2006) (NEMA), as amended, as well as the National Water Act (no. 36 of 1998).
 Job Title and Duties: Review of project, assessment of legislation and compilation of letter
 Value of Project: Unknown

Location: Bhisho in the Eastern Cape
 Project duration & year: 2016
 Client: Aurecon
 Name of Project: Kei Road Water Treatment Works and Conveyance Project
 Project Description: Desktop review of the biophysical features of the study area as well as their conservation value as well as a legal review
 Job Title and Duties: Review of project, assessment of legislation, sensitivity analysis and compilation of letter
 Value of Project: Unknown

Key Experience: Environmental Impact Assessments

Location: Nelson Mandela Bay, Eastern Cape
 Project duration & year: 2011 - present
 Client: Nelson Mandela Bay Municipality
 Name of Project: Jachtlakte Precinct Sustainable Human Settlement Plan
 Project Description: Environmental Impact Assessment for the Mixed-use housing, commercial and industrial development at Jachtlakte, Nelson Mandela Bay
 Job Title and Duties: Assisted with the review of specialist reports and compilation of Draft Environmental Impact Assessment Report.
 Value of Project: Unknown

Location: Cradock, Eastern Cape
 Project duration & year: Feb 2012 – Dec 2012
 Client: AF-Rom Energy Pty Ltd
 Name of Project: Environmental Impact Assessment for the proposed Dobbin 75 MW Solar Facility
 Project Description: Environmental Impact Assessment comparing two alternative photovoltaic solar panel layouts (fixed and tracking) for a Photovoltaic Solar Facility (and associated power line and substation) covering an area of 275 ha on Portion 1 of Farm Het Fortuin No. 66 in the Inxuba Yethemba Local Municipality, in the

Job Title and Duties: Eastern Cape
Project co-ordinator - liaison with client, Interested and Affected Parties, specialists and relevant authorities; compilation of scoping and EIA reports; management of specialists and review of specialist reports; facilitation of public participation process

Value of Project: ± R680,000

Location: Victoria West, Northern Cape
Project duration & year: Feb 2012 – Dec 2012
Client: AF-Rom Energy Pty Ltd
Name of Project: Environmental Impact Assessment for the proposed Brakpoort 75 MW Solar Facility
Project Description: Environmental Impact Assessment comparing two alternative photovoltaic solar panel layouts (fixed and tracking) for a Photovoltaic Solar Facility (and associated power line and substation) covering an area of 360 ha on Portion 2 of Farm Kliphokkies No. 173 in the Ubuntu Local Municipality, in the Northern Cape
Job Title and Duties: Project co-ordinator - liaison with client, Interested and Affected Parties, specialists and relevant authorities; compilation of scoping and EIA reports; management of specialists and review of specialist reports; facilitation of public participation process

Value of Project: ± R650,000

Location: Nelson Mandela Bay, Eastern Cape
Project duration & year: Feb 2009 – Sep 2010
Client: Rubicept (Pty) Ltd
Name of Project: The 27M MetroWind Van Stadens Wind Farm
Project Description: Environmental Impact Assessment comparing three alternative sites for the establishment of a 27 MW Wind Farm in the Nelson Mandela Bay Area, Eastern Cape Province
Job Title and Duties: Assisted with the review of specialist reports, compilation of Environmental Impact Assessment Reports, liaison with environmental authorities, facilitation of public participation process and amendments to environmental authorisation.

Value of Project: R 2,000,000

Location: Motherwell, Eastern Cape, South Africa
Project duration & year: 2009 to 2012
Client: Nu-Way Housing Developments
Name of Project: Coega Ridge Integrated Housing Development
Project Description: Environmental Impact Assessment for the Coega Ridge Integrated Housing Development
Job Title and Duties: Assisted with the compilation of Environmental Impact Assessment Reports

Value of Project: ± R 500,000

Key Experience: Basic Assessments, Environmental Management Programmes, Mining Management Plans and Water Use License Applications

Location: Between Cradock and Knutsford
Project duration & year: 2012 - 2013
Client: SANRAL
Name of Project: Proposed Rehabilitation of the N10 (Section 4): Between Cradock and Knutsford
Project Description: Rehabilitation of a 22 km section of the N10/s4 including the geometric improvements to two intersections and a climbing lane
Job Title and Duties: Project co-ordinator - Compilation of Draft and Final Basic Assessment Reports, Environmental Management Programme, Mining EMP and Water Use Applications, liaison with client, environmental authorities and specialist

Value of Project:	Unknown
Location:	Between Graaff-Reinet and Cradock
Project duration & year:	2011 - 2014
Client:	SANRAL
Name of Project:	Proposed Upgrade of the Route 61, Section 2: Draairivier to Elinus Farm between Graaff-Reinet and Cradock
Project Description:	Assessment of the widening of the Route 61, Section 2 road reserve
Job Title and Duties:	Project co-ordinator – Compilation of Draft and Final Basic Assessment Reports, Mining EMP and Water Use License Applications, liaison with client, environmental authorities and specialists
Value of Project:	Unknown
Location:	Between Majola Tea (Km 51) and Tombo (Km 66)
Project duration & year:	2012-2013
Client:	SANRAL/ PDNA
Name of Project:	Rehabilitation of National Route R61 Section 8 between Majola Tea (Km 51) and Tombo (Km 66)
Project Description:	Basic Assessment, Water Use License Applications and Mining Environmental Management Plan for the rehabilitation of National Route R61 Section 8 between Majola Tea (Km 51) and Tombo (Km 66)
Job Title and Duties:	Project co-ordinator – Compilation of Draft and Final Basic Assessment Reports, Mining EMP and Water Use License Applications, liaison with client, environmental authorities and specialists
Value of Project:	R330,000
Location:	Redhouse, Port Elizabeth
Project duration & year:	2012
Client:	Nelson Mandela Bay Municipality
Name of Project:	Proposed Revetments along the Swartkops Estuary at Redhouse, Port Elizabeth
Project Description:	Basic Assessment Report for the establishment of revetments along a 220 m section of the Swartkops Estuary to assist with erosion control
Job Title and Duties:	Compilation of the Basic Assessment Report and Environmental Management Programme
Value of Project:	R70,000
Location:	Port Elizabeth to Colesberg
Project duration & year:	2011 - 2012
Client:	FibreCo
Name of Project:	Basic Assessment for route 6 of the proposed fibre optic data cable project.
Project Description:	Basic Assessment for the establishment of a long-haul fibre optic data cable (between PE and Colesberg) necessary to carry data communications over long distances at higher bandwidths.
Job Title and Duties:	Assisted with the compilation of the Basic Assessment Report and review of specialist reports.
Value of Project:	R 3 million
Location:	George to Port Elizabeth
Project duration & year:	2011 - 2012
Client:	FibreCo
Name of Project:	Basic Assessment for route 4 of the proposed fibre optic data cable project.
Project Description:	Basic Assessment for the establishment of a long-haul fibre optic data cable (between George and PE) necessary to carry data communications over long distances at higher bandwidths.
Job Title and Duties:	Assisted with the compilation of the Basic Assessment Report and review of specialist reports.
Value of Project:	R 3 million
Location:	Graaff-Reinet
Project duration & year:	2011-Present

Client: Camdeboo Municipality
 Name of Project: Basic Assessment for the Proposed Closure and Rehabilitation of the Existing Waste Landfill Site, Graaff – Reinet
 Project Description: Compilation of Basic Assessment Report and Waste Licence Application
 Job Title and Duties: Project co-ordinator - liaison with client, Interested and Affected Parties, specialists and relevant authorities; compilation of Basic Assessment report; management of specialists and review of specialist reports; facilitation of public participation process
 Value of Project: R117,000

Location: Qumanco River to Ngcobo Town
 Project duration & year: 2011-2012
 Client: PDNA
 Name of Project: Proposed Upgrade of the Route 61, Section 6 from Qumanco River to Ngcobo Town
 Project Description: Liaison with client, environmental authorities and specialists and assistance with compilation of Mining EMP and Water Use License Applications
 Job Title and Duties: Assisted with the compilation of the Mining EMP and Water Use License Applications, amendment to the Basic Assessment authorisation and compilation of the Basic Assessment Final Environmental Management programme.
 Value of Project: R180,000

Location: Centani to Kei River
 Project duration & year: 2011-2012
 Client: Makhetha Development Consultants
 Name of Project: Proposed Upgrade of the Provincial Road from Centane to Kei River Mouth
 Project Description: Liaison with client, environmental authorities and specialists and assistance with compilation of Mining EMP and Water Use License Applications
 Job Title and Duties: Assisted with the compilation of the Mining EMP and Water Use License Applications
 Value of Project: R150,000

Location: Port Elizabeth
 Project duration & year: 2011
 Client: Nelson Mandela Bay Municipality
 Name of Project: CE2865 NCLLS Booster Pump Stations: Environmental Management Plan
 Project Description: EMPr for the establishment of two booster pump stations as part of the Nooitgedagt Coega Low Level Water Supply Scheme
 Job Title and Duties: Compilation of the EMPr
 Value of Project: Unknown

Location: Port Elizabeth
 Project duration & year: 2011
 Client: Nelson Mandela Bay Municipality
 Name of Project: CE2865: Environmental Management Programme
 Project Description: EMPr for the upgrading of a section of the Chatty pipeline
 Job Title and Duties: Compilation of EMPr
 Value of Project: Unknown

Location: Port Elizabeth
 Project duration & year: 2011
 Client: Nelson Mandela Bay Municipality
 Name of Project: CE2733: Water Sampling Programme for Nooitgedagt / Coega Low Level Water Supply Scheme Project
 Project Description: Water Sampling Programme to monitor water quality levels before and after construction of pipeline through the Coega River
 Job Title and Duties: Compilation of Water Sampling Programme
 Value of Project: Unknown

Location: Port Elizabeth
 Project duration & year: 2011
 Client: Nelson Mandela Bay Municipality
 Name of Project: Strategy Plan for Control of Contamination of the Swartkops River
 Project Description: Coordination and control of NMBM resources for contamination control
 Job Title and Duties: Attended meetings and took minutes as well as assisted with the capturing of data
 Value of Project: R 500,000

Location: Jansenville, Eastern Cape, South Africa
 Project duration & year: 2010 to 2011
 Client: Eonian Development
 Name of Project: Proposed 10 MW Solar Farm in the Jansenville District, eastern Cape
 Project Description: Basic Assessment for a 10 MW photovoltaic solar farm located just outside of Jansenville.
 Job Title and Duties: Liaison with client and environmental authorities, assisting with project coordination, compilation of Basic Assessment Report and EMP report and facilitation of public participation process.
 Value of Project: R50, 000

Location: Nelson Mandela Bay, Eastern Cape, South Africa
 Project duration & year: 2010-2011
 Client: Freeworld Automotive Coatings (Pty) Ltd
 Name of Project: Freeworld Basic Assessment & Waste Management License Application
 Project Description: Basic Assessment and Waste License Application for the licensing of an existing hazardous waste storage facility
 Job Title and Duties: Project co-ordination - liaison with client, Interested and Affected Parties, and relevant authorities
 Value of Project: R 48,500

Location: Perseverance, Port Elizabeth, Eastern Cape, South Africa
 Project duration & year: 2010
 Client: Clover SA
 Name of Project: Report Regarding Environmental Considerations for Boilers at the Clover Perseverance Facility
 Project Description: Letter report comparing oil fired and heavy fuel fired boilers.
 Job Title and Duties: Completion and submission of an application for approval of fuel burning appliances. Consultation with neighbouring industries. Letter report comparing the health risks, carbon footprint, fuel emission, waste disposal costs and storage requirements associated with coal and heavy fuel oil fired boilers.
 Value of Project: R80, 000

Key Experience: Waste License Applications

Location: Graaff-Reinet
 Project duration & year: 2011- 2013
 Client: Camdeboo Municipality
 Name of Project: Waste License for the Proposed Closure and Rehabilitation of the Existing Waste Landfill Site, Graaff - Reinet
 Project Description: Application for the closure of the existing Graaff-Reinet Landfill
 Job Title and Duties: Compilation of a waste license application.
 Value of Project: Unknown

Location: Graaff - Reinet
 Project duration & year: 2010
 Client: Camdeboo Municipality
 Name of Project: Graaff - Reinet Waste Landfill Site Waste License
 Project Description: Application for the licensing of a new waste landfill site in Graaff Reinet.
 Job Title and Duties: Compilation of a waste license application.

Value of Project: R20, 000

Key Experience: Environmental Control Officer Work

Location: Between Cradock and Knutsford
 Project duration & year: 2013
 Client: SANRAL
 Name of Project: N10 Section 4 road rehabilitation
 Project Description: Interim auditing of road works
 Job Title and Duties: Interim Environmental Control Officer
 Value of Project: Unknown

Location: Van Stadens, Port Elizabeth
 Project duration & year: Nov 2012 – Mar 2014
 Client: Rubicept
 Name of Project: 27 MW MetroWind van Stadens Wind Farm and associated 22 kV power line 24k m in length
 Project Description: Monthly audit site visits, compilation of reports and attending contract meetings
 Job Title and Duties: Environmental Control Officer
 Value of Project: ± R 1,630, 000

Location: Port Elizabeth
 Project duration & year: 2011-2014
 Client: Nelson Mandela Bay Municipality
 Name of Project: CE2733:Nooitgedagt/Coega Low Level Water Supply Scheme – Pipeline from Olifantskop Reservoir to Motherwell Reservoir
 Project Description: Monthly audit site visits, compilation of reports and attending contract meetings
 Job Title and Duties: Environmental Control Officer
 Value of Project: R 400,000

Location: Port Elizabeth
 Project duration & year: 2011-2014
 Client: Nelson Mandela Bay Municipality
 Name of Project: CE2732:Nooitgedagt/Coega Low Level Water Supply Scheme – Pipeline from Nooitgedagt WTW to Olifantskop
 Project Description: Monthly audit site visits, compilation of reports and attending contract meetings
 Job Title and Duties: Environmental Control Officer
 Value of Project: R 400,000

Location: Port Elizabeth
 Project duration & year: 2011-2014
 Client: Nelson Mandela Bay Municipality
 Name of Project: CE2729: Nooitgedagt/Coega Low Level Water Supply Scheme – Construction of the Olifantskop Reservoir
 Project Description: Monthly audit site visits, compilation of reports and attending contract meetings
 Job Title and Duties: Environmental Control Officer
 Value of Project: R 400,000

Location: Port Elizabeth
 Project duration & year: 2011-2014
 Client: Nelson Mandela Bay Municipality
 Name of Project: CE2865:Nooitgedagt/Coega Low Level Water Supply Scheme – Construction of Standford Road and Motherwell Pump Stations
 Project Description: Monthly audit site visits, compilation of reports and attending contract meetings
 Job Title and Duties: Environmental Control Officer
 Value of Project: Unknown

Location: Port Elizabeth
 Project duration & year: 2011-2014

Client: Nelson Mandela Bay Municipality
 Name of Project: CE2728:Nooitgedagt/Coega Low Level Water Supply Scheme – Extension of the Nooitgedagt Treatment Works
 Project Description: Monthly audit site visits, compilation of reports and attending contract meetings
 Job Title and Duties: Environmental Control Officer
 Value of Project: Unknown

Location: Port Elizabeth
 Project duration & year: 2011
 Client: Nelson Mandela Municipality
 Name of Project: Papekuils Sewer Protection Construction Works
 Project Description: Interim auditing of construction works
 Job Title and Duties: Interim Environmental Control Officer
 Value of Project: Unknown

Location: Port Elizabeth
 Project duration & year: 2010
 Client: Nelson Mandela Bay Municipality
 Name of Project: Churchill Pipeline Upgrade
 Project Description: ECO for upgrade of Churchill pipeline and construction of booster pump station
 Job Title and Duties: Environmental Control Officer duties for installation of pipeline at Driftsands area and Gamtoos River area
 Value of Project: R200 000

Key Experience: Conservation

Location: Port Elizabeth
 Project duration & year: November 2010
 Client: The Matrix
 Name of Project: Aloes and Van Der Kemps Kloof Draft Declaration
 Project Description: Project to facilitate the declaration of the Aloes and Van Der Kemps Kloof Nature Reserves
 Job Title and Duties: Completed a site assessment form for the proposed reserves.
 Value of Project: R70 000 each

Location: Aberdeen
 Project duration & year: 2010
 Client: Camdeboo Municipality
 Name of Project: The Fonteinbos Nature Reserve Management Plan
 Project Description: Management plans with a co-ordinated policy framework, planning measures, controls and performance criteria, a programme for the implementation of the plan and its costing, procedures for public participation, and zoning plan.
 Job Title and Duties: Compilation of the Fonteinbos Strategic Management Plan and Annual Plan of Operations as well as managing of subsidiary plans
 Value of Project: R162, 000


Location: Port Elizabeth
 Project duration & year: 2010
 Client: Nelson Mandela Bay Municipality
 Name of Project: NMBM Biodiversity Stewardship Programme
 Project Description: Programme to form partnerships with private landowners in order to achieve the NMBM's biodiversity targets.
 Job Title and Duties: Assisting with the development of the Programme and responsible for the development of a template management plan.
 Value of Project: R356,459

Location: Nelson Mandela Bay
 Project duration & year: 2010
 Client: Nelson Mandela Bay Municipality

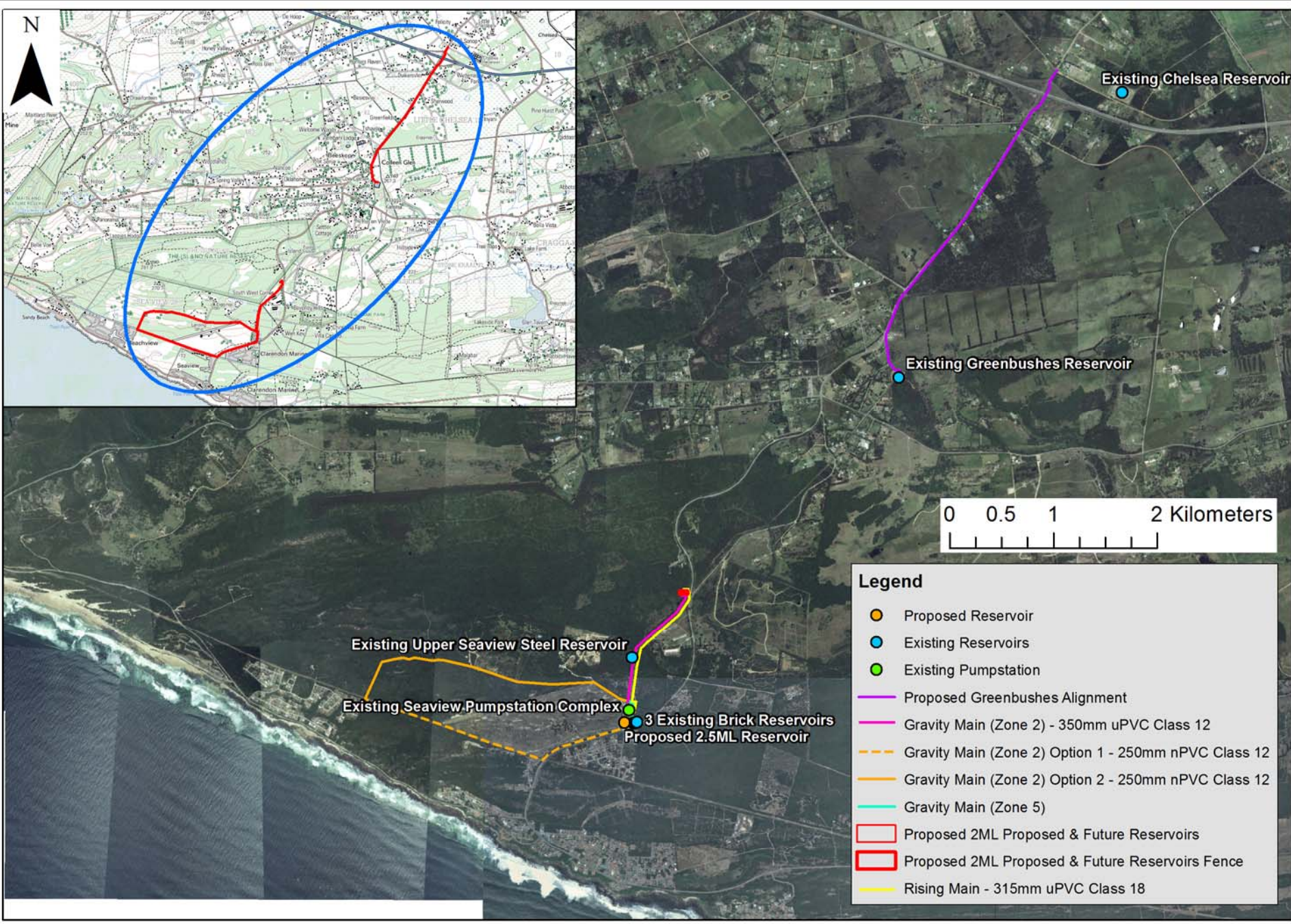
Name of Project:	Conservation Development Framework for the Springs Nature Reserve and surrounding private land
Project Description:	Assessment of landscape sensitivity, identification of appropriate land-use zones and appropriate management strategies for the nature reserve and surrounding private land
Job Title and Duties:	Assisted with the compilation of the CDF, facilitation of public participation process and stakeholder engagement.
Value of Project:	Unknown

Key Experience: Municipal Infrastructure Grant Applications

Location:	Port Elizabeth
Project duration & year:	November 2010
Client:	Nelson Mandela Bay Municipality
Name of Project:	NMBM MIG Application
Project Description:	Application for funding to fence the Van Der Kemp's Kloof Nature Reserve & invasive plant control operations within the Swartkops River.
Job Title and Duties:	Preparation of the MIG application and liaison with the NMBM.
Value of Project:	R24,500

Certification:	
I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.	
 <p>SRK Consulting - Certified Electronic Signature /42542/Proposal 1898-2849-4964-BUTA This signature has been printed digitally. The Author has given permission for its use for this document. The details are stored in the SRK Signature Database</p>	Date: 23/06/2016
Full name of staff member:	Tamarin Veronica Burton

Appendix B: Site Layout Diagram



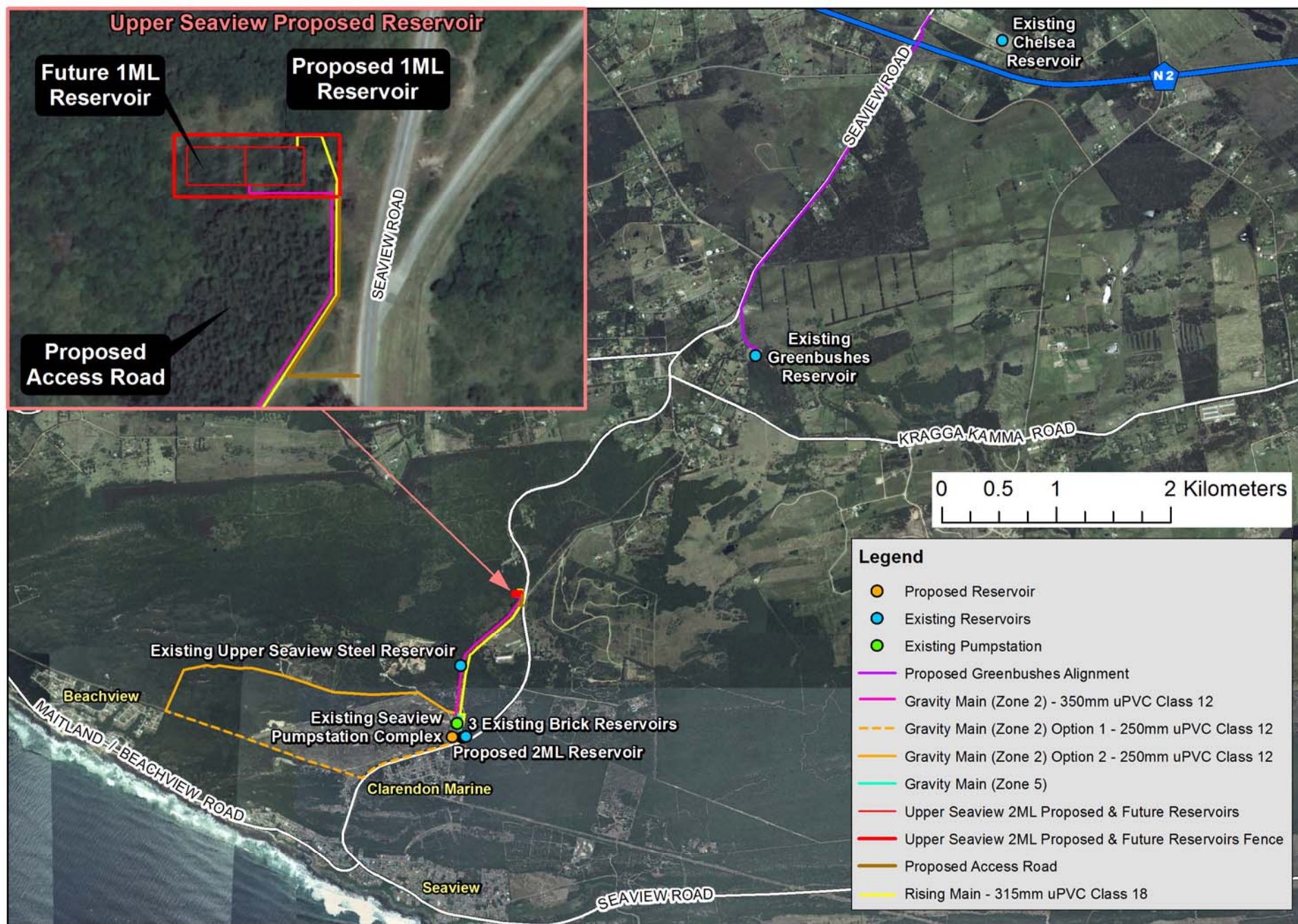
Legend

- Proposed Reservoir
- Existing Reservoirs
- Existing Pumpstation
- Proposed Greenbushes Alignment
- Gravity Main (Zone 2) - 350mm uPVC Class 12
- - - Gravity Main (Zone 2) Option 1 - 250mm nPVC Class 12
- Gravity Main (Zone 2) Option 2 - 250mm nPVC Class 12
- Gravity Main (Zone 5)
- ▭ Proposed 2ML Proposed & Future Reservoirs
- ▭ Proposed 2ML Proposed & Future Reservoirs Fence
- Rising Main - 315mm uPVC Class 18

Scale:	1:50 000	A4
Projection:	TM	Datum: HH94
Central Meridian/Zone:		Lo25
Date:	10/10/2016	Compiled by: VERJ
Project No.	485194	Fig No. 002



Seaview & Greenbushes Bulk Water Supply Locality



Legend

- Proposed Reservoir
- Existing Reservoirs
- Existing Pumpstation
- Proposed Greenbushes Alignment
- Gravity Main (Zone 2) - 350mm uPVC Class 12
- Gravity Main (Zone 2) Option 1 - 250mm uPVC Class 12
- Gravity Main (Zone 2) Option 2 - 250mm uPVC Class 12
- Gravity Main (Zone 5)
- Upper Seaview 2ML Proposed & Future Reservoirs
- Upper Seaview 2ML Proposed & Future Reservoirs Fence
- Proposed Access Road
- Rising Main - 315mm uPVC Class 18

Scale:	1:45 571	A4
Projection:	TM	Datum: HH94
Central Meridian/Zone:	Lo25	
Date:	07/10/2016	Compiled by: VERJ
Project No.	485194	Fig No. 012

Appendix C: Contractor Code of Conduct

Nelson Mandela Bay Municipality (NMBM)

ENVIRONMENTAL CODE OF CONDUCT FOR BUILDING CONTRACTORS

Contractors shall ensure that all sub-contractors, employees, suppliers, agents, etc., are fully aware of the environmental issues detailed in the Environmental Management Plan. Contractors must investigate and comply with all existing regulations and laws/ bylaws unless the Relevant Authority grants specific written authority waiving compliance with any legislation.

The following list represents the basic Do's and Don'ts towards environmental awareness, which all participants in this project must consider whilst carrying out their tasks. These are not exhaustive and serve as a quick reference aid.

DO:

- Clear your work areas of litter and building rubbish at the end of each day – use the waste bins provided and ensure that litter will not blow away.
- Maintain waste removal system.
- Dispose of cigarettes and matches carefully. (These pose a fire risk and furthermore littering is an offence.)
- Use the toilet facilities provided and keep them clean.
- Report dirty or full toilet facilities.
- Prevent contamination or pollution of streams and water channels.
- Concrete batching areas should be appropriately placed and cement effluent from washing areas should be contained and evaporated and the remaining sludge disposed of at a registered disposal facility.
- Report injured animals.
- Report heritage remains immediately.
- Ensure that vehicles and machinery do not leak fuel or oils.
- Report all fuel or oil spills immediately & stop the spill continuing.
- Confine work and storage of equipment to within the immediate work area.
- Prevent excessive dust and noise.
- Use safety equipment and comply with all safety procedures.
- Ensure a working fire extinguisher is immediately at hand if any “hot work” is undertaken e.g. Welding, grinding, gas cutting etc.
- Drive on designated routes only.
- Respect existing services at all times.

DO NOT:

- Remove or damage vegetation without direct instruction.
- Injure, trap, feed or harm any animals – this includes birds, frogs, snakes, lizards etc.
- Remove any heritage remains.
- Make fires.
- Allow cement or cement bags to blow around.
- Litter or leave food lying around.
- Allow waste, litter, oils or foreign materials into streams.
- Enter any fenced off or marked area.
- Overnight on site.
- Speed or drive recklessly.

Appendix D: Guidelines for the identification of archaeological and historical material

Guidelines for the identification of archaeological and historical material

1. Human Skeletal material

Human remains, whether the complete remains of an individual buried during the past, or scattered human remains resulting from disturbance of the grave, should be reported. In general the remains are buried in a flexed position on their sides, but are also found buried in a sitting position with a flat stone capping and developers are requested to be on the alert for this.

2. Freshwater mussel middens

Freshwater mussels are found in the muddy banks of rivers and streams and were collected by people in the past as a food resource. Freshwater mussel shell middens are accumulations of mussel shell and are usually found close to rivers and streams. These shell middens frequently contain stone tools, pottery, bone, and occasionally human remains. Shell middens may be of various sizes and depths, but an accumulation which exceeds 1 m² in extent, should be reported to an archaeologist.

3. Stone artefacts

These are difficult for the layman to identify. However, large accumulations of flaked stones which do not appear to have been distributed naturally should be reported. If the stone tools are associated with bone remains, development should be halted immediately and archaeologists notified

4. Fossil bone

Fossil bones may be found embedded in geological deposits. Any concentrations of bones, whether fossilized or not, should be reported.

5. Large stone features

They come in different forms and sizes, but are easy to identify. The most common are roughly circular stone walls (mostly collapsed) and may represent stock enclosures, remains of wind breaks or cooking shelters. Others consist of large piles of stones of different sizes and heights and are known as isisivane. They are usually near river and mountain crossings. Their purpose and meaning is not fully understood, however, some are thought to represent burial cairns while others may have symbolic value.

6. Historical artefacts or features

These are easy to identify and include foundations of buildings or other construction features and items from domestic and military activities.

SRK Report Distribution Record

Report No.

Copy No.

Name/Title	Company	Copy	Date	Authorised by
Mr Andries Struwig	DEDEAT	1	24 October 2016	R Gardiner
Mr Rowan Bode	Bosch Stemele	2	24 October 2016	R Gardiner
Mr David Bligh	DWS	electronic	24 October 2016	R Gardiner
Thabo Nokoyo	DAFF	3	24 October 2016	R Gardiner
Librarian	PE Public Library	4	24 October 2016	R Gardiner
SRK Library	SRK Port Elizabeth	5	24 October 2016	R Gardiner

Approval Signature:



This report is protected by copyright vested in **SRK Consulting**. It may not be reproduced or transmitted in any form or by any means whatsoever to any person without the written permission of the copyright holder, SRK.