

# ***Knight Piésold*** **CONSULTING**

## **ENVIRONMENTAL MANAGEMENT PLAN**

**FOR THE**

**NORTHERN AQUEDUCT AUGMENTATION:**

**PHASE 4 PROJECT**

**KWAZULU-NATAL**

**EIA No: DM/0065/2012**

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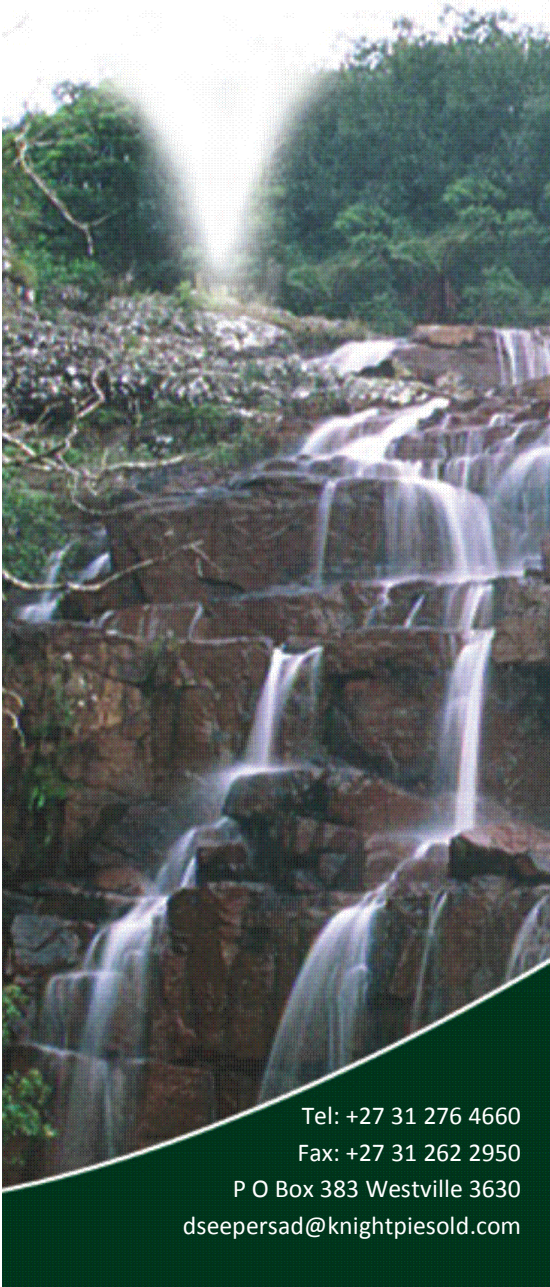
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## i. KEY TO ABBREVIATIONS & ACRONYMS

Amafa	Amafa aKwaZulu-Natali (KwaZulu-Natal Heritage Regulating Authority)
ASDS	Ancillary Spoil Disposal Sites
BA	Basic Assessment
BAR	Basic Assessment Report
CP	Communications Plan
DAEARD	Department of Agriculture, Environmental Affairs and Rural Development (Provincial)
DEAT	National Department of Environmental Affairs and Tourism
DMR	Department of Minerals Resources
DoA	Department of Agriculture
DTLGA	Department of Traditional and Local Government Affairs
DWA	Department of Water Affairs
DAFF	Department of Agriculture Forestry and Fisheries
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (No. 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIRF	Environmental Incident Report File
KZNW	KZN Wildlife (KwaZulu-Natal Conservation Regulating Authority)
EMP	Environmental Management Plan
EPCPD	Environmental Planning and Climate Protection Department (eThekweni Municipality)
ESR	Environmental Scoping Report
EWS	eThekweni (Municipality) Water and Sanitation
HMP	Heritage Resource Management Plan
IAPs	Interested and Affected Parties
INR	Institute of Natural Resources (Specialist)
ITB	Ingonyama Trust Board
KP	<i>Knight Piésold</i> Consulting (with reference to the Environmental Consultants)
KZN	KwaZulu-Natal
KZNHA	KwaZulu-Natal Heritage Act No. 4 of 2008 (replacing KZNHA No. 10 of 1997)
MPRDA	Mineral and Petroleum Resource Development Act (No. of 2004)
NAA	Northern Aqueduct Augmentation
NEMA	National Environmental Management Act (No. 107 of 1998)
NGO	Non Governmental Organisation
NHCA	National Heritage Council Act (No. 11 of 1999)
NHRA	National Heritage Resources Act (No.25 of 1999)
PPP	Public Participation Process
RoD	Record of Decision
RRP	Rescue & Rehabilitation Plan also, R&R = Rescue and Rehabilitation.
SANRAL	South African National Roads Authority
SDMP	Spoil Disposal Management Plan
UKZN	University of KwaZulu-Natal
WA	Western Aqueduct (with reference to the eThekweni Municipality pipeline)
WESSA	Wildlife and Environment Society of SA

## ii. GLOSSARY OF TERMS & ABBREVIATIONS

### a. Parties Involved

**All staff:** The entire workforce and project team appointed by the Developer to implement the project. Sub-contractors, service or product providers / suppliers, artisans and workers employed by the Contractor, Consulting Engineers or Environmental Consultants, and persons visiting or making deliveries to the site.

**Amafa:** Refer 'Abbreviations / Acronyms' above and 'Heritage Regulating Authority' below. For the purposes of this document, 'Amafa' refers to representatives of Amafa aKwaZulu-Natali or the KwaZulu-Natal Heritage Regulating Authority.

**Applicant** in terms of the National Environmental Management Act (No. 107 of 1998) means a person who has submitted, or intends to submit, an application for environmental authorisation. For the purposes of this document 'Applicant' refers to eThekweni (Municipality) Water and Sanitation (EWS).

**Community Liaison Officer:** For the purpose of this document, the term 'CLO' refers to the Municipal Representative tasked with assisting in community communication and notification procedures.

**Biodiversity Specialist:** For the purposes of this document, the term 'Biodiversity Specialist' refers to a qualified member of the Environmental Consulting team who will oversee the implementation and management of rescue and rehabilitation activities associated with plant, insect, reptile, fish, bird and animal species.

**Consulting Engineer / Engineer:** Refers to the Engineer appointed by the Applicant, who is responsible for the pipeline design and/or implementation of the project.

**Contractor:** For the purposes of this document, the term 'Contractor' refers to the main contractor(s) appointed to undertake the construction of the project, or portion of the construction of the project. The Contractor(s) are required to adhere to the Environmental Management Plan (EMP) and are responsible for ensuring that all Sub-Contractors, suppliers and staff appointed by them also adhere to the conditions of the EMP.

**DAEARD:** Refer 'Abbreviations / Acronyms' above. For the purposes of this document, 'DAEARD' refers to representatives of the KZN Department of Agriculture, Environmental Affairs and Rural Development.

**Developer (or Proponent):** The client (an individual or group), whom is responsible for the planning, funding and development of the project. In this case, eThekweni Municipality Water and Sanitation.

**Engineer's Representative (ER):** For the purposes of this document, the 'ER' refers to the individual appointed by the Consulting Engineers to oversee the implementation of the construction phase of the project, including the rescue and rehabilitation phases.

**Environmental Consultant (or EAP - Environmental Assessment Practitioner):** The individual or company responsible for the development of the Environmental Management Plan (EMP) which includes the Plant Rescue and Rehabilitation Plan, Communications Plan, Spoil Disposal Management Plan and Heritage Management Plan. The Environmental Consultant can also fulfil a role in the monitoring and auditing of the implementation of the EMP and Rescue and Rehabilitation Plan. For the purposes of this document, the term 'Environmental Consultant' refers to *Knight Piésold Consulting*.

**Environmental Control Officer (ECO):** For the purposes of this document, the 'ECO' refers to the individual appointed by the Developer to oversee the implementation of the Environmental Management Plan (EMP) on site by the various Contractors (refer above). The ECO is to be qualified in the environmental sciences, understand the detailed environmental issues associated with the development, and is to be well versed in the contents of the EMP and its associated reports. The ECO will be the liaison person between the Environmental Site Officers (ESOs, refer below) of the contracting teams, and the Developer (refer above), the Consulting Engineers (refer above), the Rehabilitation Specialist (refer below), the Biodiversity Specialist (refer above) and the Environmental Consultant (refer above).

**Environmental Site Officer (ESO):** For the purposes of this document, the ESO is an individual appointed by the Contractor to represent the contracting team, and is to be responsible for ensuring the day-to-day implementation of the EMP on the site by the team in



question. The ESO is to be qualified in the environmental sciences, informed of the contents of the Environmental Management Plan (EMP) relevant to the activities of the construction team in question, and is to understand the basic environmental issues associated with the development. The ESO is to report to the ECO (refer above) with regards to any environmental issues.

**Heritage Regulating Authority:** Refers to Amafa aKwaZulu-Natali (Amafa - see Acronyms / Abbreviations above) in the context of KwaZulu-Natal heritage resources, and the South African Heritage Resources Agency (SAHRA - see Acronyms / Abbreviations above) in the context of national heritage resources.

**Heritage Specialist:** For the purposes of this document, the term 'Heritage Specialist' refers to the main specialist appointed by the Environmental Consultants to undertake any investigations or research activities associated with the heritage resources identified in the vicinity of or within the working corridor. The Heritage Specialist is required to adhere to the Environmental Management Plan (EMP) and associated Heritage Resource Management Plan (HMP) and is responsible for ensuring all sub-specialists, sub-consultants, suppliers and staff appointed by them also adhere to the conditions of the EMP.

**Interested & Affected Parties (IAPs):** Any individual or group of individuals concerned with, interested in, or affected by the project and its consequences, including (but not restricted to) the local community and general public, government and local authorities, stakeholders, landowners, tribal authorities and public interest groups.

**Project Manager:** The person responsible for coordinating and integrating activities across multiple, functional lines. This person may also fulfil other roles, such as 'Engineer'.

**Rehabilitation Specialist:** For the purposes of this document, the term 'Rehabilitation Specialist' refers to the main specialist appointed as a Sub-Consultant (nominated sub-contractor) to the Contractor to undertake the rescue and rehabilitation activities associated with the reinstatement of the working corridor following the installation of the pipeline. The Rehabilitation Specialist is required to adhere to the Environmental Management Plan (EMP) and associated Rescue and Rehabilitation Plan (RRP) and is responsible for ensuring all sub-specialists, sub-consultants, suppliers and staff appointed by them also adhere to the conditions of the EMP.

## **b. About the Construction Activities**

**Builders rubble:** Any material (for example: wooden planks, waste concrete, cardboard, used bricks, unused subsoil, and metal scraps) utilised in the construction activities, or resulting from the demolition of existing structures on site, that will not serve a purpose in the final structural support, and will require removal from site prior to project hand-over.

**Barricades:** These are grouped into 6 categories:

**-Barrier Fences** – shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres. Red and white danger tape shall be woven through the fence in order to increase visibility and the tape shall be secured in order to prevent loose ends from flapping in the wind or lying on the ground. Barrier fences shall typically be required in areas where work fronts are situated in farm land, small holdings and other areas where agricultural activities are prevalent, or in the event that heritage or biodiversity resources are to be cordoned off and preserved. Red and white danger tape will be removed (separated) from the Bonox wire fencing prior to the removal, disposal or long term storage of the wire fencing.

**-Rigid Barricades for noise reduction** – shall consist of 1.8m high barricading constructed out of smooth solid material, which will bounce off noise waves as well as disabling seeing into the area being barricaded. The Barricade structure shall be rigidly fixed to the ground to prevent access and it being blown over by wind. Rigid Barricades for noise reduction shall typically be required in areas where construction noise poses an annoyance in built up areas

**-Rigid Barricades for preventing access** – shall be of interlocking modular type, 1.8m high, with a barricade face of at least a Bonox type or similar approved fence type. The barricade shall be capable of being secured to the ground to prevent it from falling over, being bumped over or blown over by the wind. The bottom section of the fence type shall be such that animals cannot get through. Red and white danger tape shall be woven through the fence in order to increase visibility and the tape shall be secured in order to prevent loose ends from flapping in the wind or lying on the ground. Rigid Barricades for preventing access shall typically be required around excavations in road reserves where there is no danger of passing traffic driving into such excavations.



**-Rigid Barricades for preventing access and visibility** – shall be of the same construction as the Rigid Barricades for preventing access, with the provision that 80% density black shade cloth which is well secured to the fence, shall block out visibility into work areas where same is required.

**-Barricades of Armco type, fitted onto Tarmac surfaces** – This type barricade shall consist of 10mm steel base plates (300mm by 300mm), fitted with a 800mm high, 200mm by 100mm I profile, onto which Armco barriers are bolted. The uprights are to be spaced at 3m centres and secure bolting into the tarmac surface will be required.

**-New Jersey type barriers** – This type of barrier shall be typical of the standard New Jersey concrete barrier and shall be erected as instructed by the Engineer.

**Clearing / Cleared surface:** The natural surface of the ground after clearing of surface vegetation has been completed.

**Cleared and grubbed:** Portions of the site on which excavations are to be carried out, or embankments and structures construction are to be cleared or grubbed, or both, but the contractor shall not commence clearing or grubbing until the engineer has designated, in writing and in detail, the exact areas to be cleared or grubbed and the time at which the work is to be started. The contractor shall ensure that the general shape, profile, and levels of the area are not materially altered during the clearing and grubbing operations. In order to avoid re-clearing or to control dust and erosion the contractor may have to clear and grub at the latest practicable stage of construction. All topsoil removed during clearing must be set aside and stockpiled in a designated topsoil stockpile area. This topsoil must be re-used during rehabilitation.

**Clearing and grubbing** refers the removal of all woody vegetation (including shrubs), but excludes the removal of grass and groundcover vegetation. The Contractor shall not commence clearing or grubbing until the Engineer has designated, in writing and in detail, the exact areas to be cleared or grubbed and the time at which the work is to be started. The Contractor shall ensure that the general shape, profile, and levels of the area are not materially altered during the clearing and grubbing operations.

**Construction camp / site office:** This refers to the areas/containers utilised for on-site staff offices as well as to store materials, plant, equipment and ablution facilities (the location of which is agreed to by the Applicant and Environmental Consultants. In this document construction camp / site office will be used interchangeably, but '*site office*' will be the preferred nomenclature.

**Layout plan:** A plan indicating the layout of an area of the development. For example, where the term follows the phrase 'site office / camp', it refers to the layout of the office / camp area that is to be used by the Contractor, including all buildings, storage areas and proposed locations of any facilities to be housed in such an area.

**Legal action:** Financial penalties / fines, time penalties (suspension of work) and other legal action as may be imposed by the DAEARD / DEAT or any other action taken against the contractor or developer responsible for an incident of non-compliance with the EMP or RoD. The legal action will be determined according to the nature of the non-compliance or crime.

**Relevant steps:** *Can include but will not be limited to: Site Instruction being issued by the Engineer to rectify, Site Instruction being issued by the Engineer to suspend the Works until rectification of matters, Depending on the severity of the contravention, the raising of fines by the relevant authority (DAEARD)*

**Minor repair:** For the purposes of this document, the term 'minor repair' refers to vehicle/ machinery/ plant repair that is not potentially polluting to the environment. For example, a tyre change is considered to be 'minor repair', however an oil change is considered to be potentially polluting to the environment.

**Open trench:** This refers to the area within the Working Front where trench excavation and pipe laying activities are occurring. Open trench is be deemed to include: trenching, placing of bedding, pipe laying, placing of selected fill and backfilling to ground level. Backfilling constitutes reinstatement of earth fill material, and does not include rehabilitation measures.

**Progressive Reinstatement:** This refers to the reinstatement of disturbed areas to topsoil profile on an ongoing basis, immediately after selected construction activities (e.g. backfilling of a trench) are completed. This allows for passive rehabilitation (i.e. natural re-colonisation by vegetation) and active rehabilitation in accordance with the Rescue and Rehabilitation Plan to commence.

**Site:** This refers to the working corridor, site office, stockpile areas, pipe yards, pipe fabrication yards, storage facilities and site access roads. The working corridor shall have a maximum width of 30 metres and a maximum length of 350 metres, but shall be less than this in sensitive areas. The construction site shall be demarcated and signposted by the Contractor. All construction activities shall remain within the confines of the working corridor, construction camp and pipe yards.

**Timeous/ly:** At least 7 working days prior to an activity, or after an instruction or request.

**Registered servitude:** For the purposes of this document, the (registered) servitude will refer to the area of the working corridor that will be registered as a permanent servitude (and may be narrower than the working corridor width) for the operational phase of the project for the purposes of maintenance and pipe access, giving the owner of the servitude right of way at all times. The servitude will be reinstated and rehabilitated, but both plant species choices and landuses will be limited along this corridor

**Relevant steps:** Can include but will not be limited to: Site Instruction being issued by the Engineer to rectify, Site Instruction being issued by the Engineer to suspend the Works until rectification of matters, Depending on the severity of the contravention, the raising of fines by the relevant authority (DAEARD)

**Working Corridor:** this refers to the Temporary Working Space, as agreed to by the affected landowners together with the Registered Servitude. The Working Corridor is the corridor within which work will take place (a maximum width of 30 metres) for the entire length of the pipeline. The entire working corridor, which includes the registered servitude and the temporary working space, shall be rehabilitated.

**Working Front:** The working front is the area of the working corridor where work is actively taking place such as clearing activities, excavations, trench activities, reinstatement activities and rehabilitation activities. More than one working front may be operative along the route. The working fronts are to be temporarily fenced, and all construction and rehabilitation related activities are to remain within the confines of the temporary boundary, and are to make use of access routes as determined for each active site. The working front length is split into 3 sections:

**-Advance work front** – the area which is cleared and grubbed and where proving for services takes place. This section length is limited to 250m to 300m.

**-Construction work front** – is the area where pipe laying activities take place and is limited to 200m (in built up areas) although it can be longer in agricultural areas (up to 500m) and shorter in restricted areas.

**-Reinstatement work front** – is the area usually no longer than 200m where reinstatement and rehabilitation takes place and lags behind the construction work front.

**(Temporary) Working Space:** This refers to the area of working corridor that will be used for construction purposes but will not be registered as part of the registered servitude during the operational phase of the project. For example, the working corridor may be 30m wide in some instances, and will comprise 12m of the registered servitude, and 18m of temporary working space. The working space is temporary, and permission to occupy this land shall be obtained from the relevant landowners prior to construction on their land. This servitude is to be reinstated and rehabilitated after construction.

## **c. About the Environment**

**Alter:** In the context of the HMP means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or other decoration or any other means.

**Archaeological:** For the purpose of this document, 'Archaeological' refers to material resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures; or features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

**'Back-up' material:** refers to plants which have been propagated from adult plants growing in and/or rescued from the working corridor. 'Back-up material' may be used to replace the adult plants that are destroyed or are unsuccessfully rescued as a result of the construction activities, or may be used to supplement the returned plants during the rehabilitation phase of the project.

**Bushveld/Veld:** Area dominated by Valley Bushveld type plant species.

**Cultural significance:** For the purpose of this document, 'Cultural Significance' refers to the aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

**Ecofact:** Non-artifactual organic or environmental remains that may reveal aspects of past human activity.

**Environmental audit and monitoring:** Structured observation, measurement and evaluation of environmental data over a period of time to assess the efficiency of environmental mitigation and rehabilitation measures. The auditing and monitoring of the site will commence at intervals to be determined by the DAEARD and Environmental Consultant, and will involve a site inspection of the construction activities and the environmental management compliance. A report of the findings at each visit will be compiled and submitted to the Developer and/or DAEARD as necessary.

**Environmental incident:** An accident or unexpected occurrence related to the Project, including fire, spills, pollution events, explosions, major emissions, flood events, or bank collapse leading to serious or potentially serious negative environmental impacts.

**Environmental Incident Report File (EIRF):** A file provided at the Site Office for the recording all environmental incidents and including a complaints register for the recording of general public concerns.

**Environmental Management Plan (EMP):** A detailed plan of action prepared to organise and co-ordinate environmental mitigation, rehabilitation and monitoring so that positive impacts are enhanced and negative impacts are avoided/minimised. The EMP is a legally binding document and is to be adhered to by 'all staff' (refer above) at all times.

**Fauna and Flora:** Any individual or group of microorganisms, insects, plants and animals.

**Flagged Resource/s:** A 'Flagged Resource' refers specifically to a resource or area identified along the pipeline route by specialists during the environmental investigations. These Flagged Resources require specific care and management.

**Forest:** Area dominated by herbaceous vegetation, scrub, thicket, and riparian forest species.

**Grassland:** Area dominated by grassland type species, including species associated with bush clumps and termitaria.

**Grave:** A place of interment and includes the contents, headstone or other markers of and any other structures on or associated with such place. An unmarked grave will not have any headstone or markers identifying the deceased.

**Hazardous substances:** Substances including chemicals, solvents, fuels, oils, and lubricants as liquids, solids or gases that are harmful or potentially dangerous to human and/or environmental health. 'Harmful/dangerous' refers to the substances' inherent chemical and physical composition that could be toxic, poisonous, explosive, carcinogenic, flammable or radioactive. Used hazardous substances should be disposed of as 'hazardous waste' if no longer needed.

**Heritage Resource:** Any place or object of cultural significance (refer above) i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

**Intangible (Living) Heritage:** The intangible aspects of inherited culture, and may include cultural tradition, oral history, performance, ritual, popular memory, skills and technique, indigenous knowledge systems, and the holistic approach to nature, society and social relationships.

**Invasive Alien (vegetation):** an undesirable plant growth which shall include, but not be limited to, all declared Category 1 & 2 listed invader species as set out in regulations pursuant to the Conservation of Agricultural Resources Act No. 43 of 1983 (CARA). Other vegetation deemed to be invasive alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.

**Minimize:** For the purposes of this document: to do all that is possible to lessen the impact.

**Mitigation:** For the purposes of this document: measures of environmental management designed to reduce, avoid or remedy undesirable environmental impacts.

**Object:** For the purpose of the HMP, 'Object' refers to any movable property of cultural significance (refer above) which may be protected in terms of any provisions of the NHRA or the KZNHA, including any archaeological artefact, palaeontological and rare geological specimens, and meteorites.

**Paleontological:** For the purpose of the HMP, 'Palaeontological' refers to any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains and trace.

**Pollution:** Contamination of air, water, soil or environment by a foreign substance or matter.

**Preservation of trees:** no trees shall be cut down until the engineer has given written authorisation for such work to commence. Where the tree to be removed is within a forest or is a protected species, then a permit must be sought and written authorisation obtained from DWA / DAFF. Individual trees indicated and marked by the engineer or ECO as trees to be preserved shall be left standing and uninjured. The amount stated in the project specification shall be deducted from the monies due to the contractor as penalty in respect of every tree that is damaged or removed unnecessarily.

**Rehabilitation:** Measures implemented to reinstate an area/site to a status of good environmental health, better than its former status, and striving towards its natural status. Rehabilitation in this EMP is mainly aimed at post-reinstatement re-vegetation of a disturbed area and ensuring a stable land surface. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment, but discourage alien encroachment. This is to be undertaken in accordance with the RRP.

**Riparian vegetation:** Vegetation occurring on the banks of a river or stream (i.e. vegetation fringing a water body). In this EMP, riparian vegetation in terms of removal, storage and replacement is only applied to sedge, grass, ground-cover, reed, bulrush, or herbaceous component of riparian vegetation and excludes the woody component (trees).

**Sedges:** Grass-like plants growing in wetland/marshy areas or adjacent to a waterbody.

**Spoil:** any 'overburden', soil, topsoil, subsoil, rock or the like which is removed/excavated from the trenches for the purposes of installing the pipeline, which is in excess and cannot be later replaced into the trench due to the presence of the pipe, its associated structures and bedding material, and which will require suitable 'disposal' or end use.

**\*Spoil - Contaminated:** is polluted spoil containing builder's rubble or 'hazardous substances' (see above) and is to be considered as 'general' waste (see below) or 'hazardous' waste (see below) and is therefore to be disposed of in accordance with these classifications.

**\*Spoil - Uncontaminated:** is potentially useful as fill or overburden, and may therefore be considered for use by third parties in other development projects or activities in accordance with the recommendations of the SDMP.

**Spoil Disposal Management Plan (SDMP):** A detailed plan of action prepared to organise and coordinate the disposal of spoil in an environmentally conscientious way, providing environmentally sustainable alternatives to typical landfill disposal options for uncontaminated spoil given its usefulness. The SDMP forms part of the EMP which is a legally binding document and is to be adhered to by 'all staff' (refer above) at all times.

**Structure:** For the purpose of the HMP, 'Structure' refers to any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

**Subsoil:** The soil horizons between the topsoil horizon and the underlying parent rock. Subsoil often has more clay-like material than the topsoil. Subsoil is of less value to plants, in terms of nutrient (food) and oxygen supply, than topsoil. When subsoil is exposed it tends to erode fairly easily.

**Surface vegetation:** Will be deemed to be any woody or herbaceous vegetation, but will exclude grasses, sedges, rushes and reeds.

**Topsoil:** This is defined as the A horizon of the soil profile. Topsoil is the upper layer of soil from which plants obtain their nutrients for growth. It is often darker in colour, due to the organic (humic) fraction. Where topsoil is referred to, it is deemed to be both soil and grass / ground cover fraction.

**Tree:** For the purposes of this document ‘tree’ includes any tree seedling, sapling, transplant or coppice shoot of any age and any root, branch or other part of it. A ‘Protected Tree’ is any tree declared to be protected, or belonging to a group of trees, woodland or species declared to be protected, under section 12(1) or 14(2) of the National Forests Act No. 84 of 1998.

**Waste:** means any matter, whether gaseous, liquid or solid or any combination thereof, which is an undesirable or superfluous by-product, emission, residue or remainder of any process or activity (Environment Conservation Act 73 of 1989). In terms of the Waste Management Bill (B39 of 2007) waste means any substance whether or not that substance can be reduced, reused, recycled and recovered – (a) that is surplus, unwanted, rejected, discarded, abandoned, disposed of; (b) where the generator has no further use of for the purposes of production, reprocessing or consumption; (c) that must be treated or disposed of; or, (d) that is identified as a waste by the Minister, but – (i) a by-product is not considered waste; and (ii) any portion of waste once re-used, recycled and recovered ceases to be waste.

**\*Waste - General:** is a generic term for waste that because of its composition and characteristics does not pose a significant threat to public health or the environment if properly managed. Examples include domestic, commercial, certain industrial wastes and builders’ rubble. General waste may have insignificant quantities of hazardous substances dispersed within it, for e.g. batteries, insecticides, weed killers and medical waste discarded on domestic and commercial properties. General waste may be disposed of on any permitted landfill, (as listed in the Minimum Requirements for Waste Disposal).

**\*Waste - Hazardous:** is waste which can, even in low concentrations, have a significant adverse effect on public health and or the environment. This would be because of its inherent chemical and physical characteristics such as toxic, ignitable, corrosive, carcinogenic or other properties. Hazardous waste may only be disposed of at a permitted facility for the hazardous waste category in question.

**Wastewater:** Water containing pollutants, including chemicals, oils, fuels, soaps, sewerage, or contaminated sediment.

**Water body/course:** Any open body of water including streams (<2m channel width and either perennial or non-perennial), dams (man-made impoundments), rivers (2-10m channel width), major rivers (>10m channel width), estuaries, and the sea.

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

**Wetland Vegetation:** Vegetation which is indicative of a wetland environment and typically adapted to life in saturated soils, for example: sedges, rushes, reeds, hydrophilic grasses and ground-covers.

### iii. LIST OF SUPPORTING DOCUMENTATION

The information contained in this Environmental Management Plan (EMP) for the Northern Aqueduct Augmentation (NAA) Project Phase 4, is derived from the Basic Environmental Assessment Report (BAR) as well as the specialist investigations that were commissioned during the Basic Assessment Process. The EMP reflects the standard and specific conditions of the Record of Decision, and includes four Annexure reports: A: Spoil Disposal Management Plan, B: Rescue and Rehabilitation Plan, C: Communications Plan and D: Heritage Management Plan. This report is derived from information in the following reports:

- Environmental Basic Environmental Assessment Report: Northern Aqueduct Augmentation Project; Phase 4 *Knight Piésold* 2013.
- A Basic Assessment of the Plant Communities Intersected by Phase 4 of the Northern Aqueduct Augmentation (Phase 4) and a Brief Account of their possible roles in determining Biodiversity.
- Frog Specialist Report for Wetland Areas adjacent to Eastbury Drive and possible impact of Phase 4 on the Northern Aqueduct Augmentation (NAA Ph4) Determining the presence of the critically endangered Pickersgill's Reed Frog, *Hyperolius pickersgilli*.
- Desktop Survey of the Proposed Northern Aqueduct Augmentation, Phase 4, KwaZulu-Natal.
- Northern Aqueduct Augmentation Phase 4: Report on the Public Participation for the Basic Assessment Study.

### iv. FOREWORD

This EMP for the NAA Phase 4 and its four Annexure reports: A: Spoil Disposal Management Plan, B: Rescue and Rehabilitation Plan, C: Communications Plan and D: Heritage Management Plan enable the activities and processes necessary to ensure best environmental practice through the design phases, construction phases, rehabilitation phases and operational phases of the project. These reports are legally binding documents, and their implementation is to be both monitored and audited.

## 1. INTRODUCTION

### 1.1 Project Context

In June 2012, the *Knight Piésold* Environmental Division was appointed to undertake the necessary environmental investigations associated with the eThekweni Municipality Water and Sanitation (EWS) proposal to construct a ~5km bulk water pipeline to be known as Phase 4 of the Northern Aqueduct Augmentation (NAA) Project.

Because the construction of the WA (Phase 2) has been put on hold, an alternative link (NAA Phase 4 (or the Engineers Phase 3) is currently being proposed. This is to provide water from the EXISTING NAX into NAA Phase 1, so that Cornubia and other developments in the north of Durban, can be provided with water within the next 18 months, as the construction of the WA Ph2 will only reach the starting point of the NAA Ph2 (at Emachobeni) in five years time (optimistically).

It is thus proposed that a new 1.2m pipe be laid in parallel with the existing pipelines (to remove the bottleneck in the system) **between Duffs Road and Phoenix 2 Reservoir**. This pipeline forms Phase 4 of the NAA and is required to be commissioned at the same time as NAA Ph 1, i.e. 2014.

The existing two pipes within the servitude will continue to be used (current daily volume approximately 50,000m<sup>3</sup>). The new bigger pipe will merely augment the existing pipelines which are presently a bottleneck in the system. The old pipes are much smaller (450 – 500mm) in diameter, and as such when the new pipe is tied into the system, the water will prefer the path of least resistance, and thus most of it, will 'choose' the bigger pipe. The ultimate 30-year demand in the system will result in a total flow of about 120,000 m<sup>3</sup> per day, of which 100,000 m<sup>3</sup> per day will flow in the new (bigger) pipe as a result of its lower friction loss.

The project was registered with the Department of Agriculture, Environmental Affairs and Rural Development (DAEARD) as EIA No: DM/0065/2012 as per the requirements of the governing environmental legislation at the time: Regulations pursuant to the National Environmental Management Act of 1998 (as amended in July 2010).

The Environmental Basic Assessment Report for the NAA Phase 4 Project was prepared by *Knight Piésold* and will be submitted to the DAEARD in April .

The final EMP will reflect the specific and standard conditions of the Record of Decision (RoD) once obtained from the DAEARD when authorising this project. The EMP defines the specific site care, management, mitigation and rehabilitation methods required for Flagged Resources (refer to the Glossary) along the route as identified by the specialist teams during the environmental investigations.

The EMP includes the Rescue and Rehabilitation Plan (RRP), the Communications Plan (CP), the Spoil Disposal Management Plan (SDMP) and the Heritage Resource Management Plan (HMP).

This EMP is to be implemented by the Developer eThekweni Municipality Water and Sanitation, their Engineers and by extension, their Contractors. The duty of implementation lies with the proponent (EWS).

### 1.2 Legal Context

This newly proposed project constitutes a listed activity in terms of the National Environmental Management Act (No. 107 of 1998, revised June 2010) – Regulation No. R 544 (Listing Notice 1, Activities 9, 11, 18 and 37) and Regulation No R 545 (Listing Notice 2, Activity 10), and will therefore have to undergo environmental assessment. Knight Piésold Consulting have been appointed as the independent environmental consultants to apply for the necessary environmental approvals, commencing with a basic assessment report with the potential for conversion into a full Environmental Impact Assessment (EIA) Study. We have been granted authorisation to proceed with a basic assessment, even though a full EIA is triggered. The BA report has identified and described potential issues and



impacts the proposed project may have on the surrounding environment. A Basic Assessment and Environmental Management Plan in support of the proposed project will be submitted to the Department of Agriculture, Environmental Affairs and Rural Development (DAEARD).

### 1.3 Project Overview

EThekweni Water and Sanitation (EWS) is currently in the process of constructing a new bulk water pipeline from Cato Ridge to Inchanga, Pinetown, Tshelimnyama and Ntuzuma (and surrounds) with gravity-fed potable water (The Western Aqueduct (WA)). The pipeline ties into Umgeni Water's existing bulk water infrastructure beyond the municipal boundary, which receives potable water from the Midmar Dam system. The pipeline currently under construction consists of a steel pipe of varying diameters (1.6m – 0.6m). Construction of Phase 1 of the WA has been completed, but construction of Ph2 of the WA is on hold.

Application was made to the Department of Environmental Affairs, and a positive Record of Decision received, for the NAA which will inject water from the WA into the NAA system via an off-take at KwaDabeka. This will involve the construction of a new bulk water pipeline from Emachobeni to Umhlanga via the proposed Blackburn Reservoir, supplying areas north of the Umgeni River, south of the Ohlanga River and east of Ntuzuma (and surrounds) with gravity-fed potable water. The 50km pipeline recently authorised, will consist of a steel pipe of varying diameters, and will be named the 'Northern Aqueduct Augmentation'.

Phase 4, which is now being proposed, is named NAA Phase 3 by the engineers (for reasons unnecessary to describe here). There is an existing Northern Aqueduct (NAX), which will be augmented by the NAA. Once completed, Phase 1 of the NAA project will provide an important link between the existing NAX and the new developments in the north including Cornubia, Umhlanga, Waterloo and Nyaninga. The NAX however is presently operating very close to its maximum capacity and does not have spare capacity to supply the new developments such as Cornubia. The problem when the new demands are tagged onto the end of the system is the high velocities that will occur in the trunk mains running from Durban Heights to Phoenix 2 Reservoir via Duffs Road. This in turn results in high friction losses and inadequate flow through the system.

The most severe bottleneck in the existing NAX occurs in the section of trunk mains between Duffs Road and Phoenix 2 (linking the NAX to the NAA Phase1). This section of the existing system consists of a 525mm diameter pipe in parallel with a 450mm pipe between Duffs Road and the Phoenix 1 off-take and thereafter, a 450mm pipe in parallel with a 375mm pipe up to Phoenix 2 Reservoir. These pipelines are completely inadequate for the purposes of providing a water supply into the NA Phase 1.

Because the construction of the WA (Phase 2) has been put on hold, an alternative link (NAA Phase 4 (or the Engineers Phase 3) is currently being proposed. This is to provide water from the EXISTING NAX into NAA Phase 1, so that Cornubia and other developments in the north of Durban, can be provided with water within the next 18 months, as the construction of the WA Ph2 will only reach the starting point of the NAA Ph2 (at Emachobeni) in five years time (optimistically).

It is thus proposed that a new 1.2m pipe be laid in parallel with the existing pipelines (to remove the bottleneck in the system) **between Duffs Road and Phoenix 2 Reservoir**. This pipeline forms Phase 4 (See Diagram below) (in the Environmental Report) of the NAA and is required to be commissioned at the same time as NAA Ph 1, i.e. 2014.

The existing two pipes within the servitude will continue to be used (current daily volume approximately 50,000m<sup>3</sup>). The new bigger pipe will merely augment the existing pipelines which are presently a bottleneck in the system. The old pipes are much smaller (450 – 500mm) in diameter, and as such when the new pipe is tied into the system, the water will prefer the path of least resistance, and thus most of it, will 'choose' the bigger pipe. The ultimate 30-year demand in the system will result in a total flow of about 120,000 m<sup>3</sup> per day, of which 100,000 m<sup>3</sup> per day will flow in the new (bigger) pipe as a result of its lower friction loss.

This large volume of water triggers a full EIA, however, considering the short length of the pipeline (5.5km), the fact that it is within an existing servitude, the few number of directly impacted IAPs and, by all appearances, few areas of extreme environmental (or biodiversity) concern, the environmental assessment would be well served in a basic assessment; a full EIA is not necessary. A full EIA for the NAA has also recently been conducted in very close proximity to this area, and did not reveal many significant issues or comments from IAPs. Nevertheless the Department of Environmental Affairs may request a full EIA at any interval, should they decide that the project is not being effectively served by the Basis Assessment.

The DAEARD has agreed to this course of action Knight Piésold Consulting will undertake the environmental application process to determine any possible biophysical or socio-economic impacts or issues, which will include a brief Public Participation Process (as this has been previously undertaken already). The PPP has been undertaken by separate specialists, Duyaze Environmental Consulting.

## 1.4 Project Detail

PROJECT: EIA No.: DM/0065/2012	Northern Aqueduct Augmentation Phase 4
APPLICANTS	EThekweni Water and Sanitation (EWS)
CONTACT PERSON (APPLICANT)	Monte Montemerano Tel: 031 311 8742, Fax: 031 311 8545 <a href="mailto:MontyMo@dmws.durban.gov.za">MontyMo@dmws.durban.gov.za</a>
NATURE OF THE DEVELOPMENT	Steel gravity-fed potable water pipeline project
PIPELINE LENGTH	5 linear kilometres
JURISDICTION	EThekweni Municipality
CURRENT LAND USES	Predominantly road reserve, existing electrical servitude, open space
LISTED ACTIVITY IN TERMS OF THE NEMA (No. 107 of 1998, revised June 2010)	Regulation No. R 544 (Listing Notice 1, Activities 9, 11, 18 & 37) Regulation No R 545 (Listing Notice 2, Activity 10)
INDEPENDENT ENVIRONMENTAL CONSULTANTS	Knight Piésold (Pty) Ltd. Contact: Deepa Seepersad Tel: 031 276 4660, Fax: 031 262 2950 <a href="mailto:dseepersad@knightpiesold.com">dseepersad@knightpiesold.com</a> PO Box 383, Westville 3630

## 2. ENVIRONMENTAL INVESTIGATION CONCLUSIONS

The gravity-fed potable water pipeline will be buried during operation, and will follow existing servitudes for the most part (even within the road surface for much of the route) and it is anticipated that there will be limited long term impacts on existing resources, landuses or activities. The most significant impacts are likely to arise out of the construction process, but many of these should remain temporary, and with careful management can be reduced or resolved. Certain environmentally sensitive portions of the route will require more careful environmental management and rehabilitation work. Environmentally sensitive resources include wetlands, water course crossings, grasslands, veld, forests, nuisance sensitive nodes (such as residential and business areas) and resources of cultural (heritage) significance as identified by the BAR (**Table 2.1**).

Table 2.1 Key Resources and Impacts	
Subterranean Environment	<p>The proposed pipeline will not have a significant impact on the subterranean environment. Important geotechnical issues or impacts addressed in this EMP result from blasting activities, drainage crossing methodologies, slope destabilisation activities (cut/fill operations), unstable trench sidewalls due to soft / loose alluvial soils and shale areas</p> <p>The majority of the pipeline route will be following existing servitude.</p>
Aquatic & Wetland Environments	<p>There will be a single major river crossing along the Umhlangane River. Method statements proposed for the river crossing will be provided.</p> <p>The proposed project will also traverse various smaller watercourses and wetlands en-route. A large trench will be required to bury the 1.2m diameter pipe below water level. The wetland and stream which occurs just north of Eastbury Drive is of concern because it is considered possible that one or both of these habitats may be found to support Pickergill's Reed Frog which is a Red Data species.</p> <p>General environmental management along with construction control and rehabilitation methodologies are described for the affected aquatic environments in the EMP – (Section E1 Wetlands, Drainage Lines, Streams, Rivers and Major River under Flagged Resources). The crossing of the Umhlangane River must be undertaken with extreme caution with all mitigation measures provided in this EMP, adhered too.</p>
Biodiversity	<p>Most of the vegetation which occurs in the 40m-wide corridor which was assessed for this report has been highly to moderately transformed.</p> <p>The most severe transformation has been caused through human settlement that includes subsistence cultivation. Human settlement and its associated subsistence cultivation has not simply replaced areas of natural vegetation but the currently utilized areas of subsistence cultivation, together with others which have been abandoned, support a wide variety of alien problem-plant species which have invaded other areas which have not been developed or cultivated.</p> <p>Periodic mowing and cutting has also contributed to a decline in the conservation quality of areas of natural vegetation that occur in the corridor. In some instances, especially in woody communities which are crossed by the existing servitude and in which the vegetation appears to be controlled less frequently than the areas dominated by grasses, invasion by alien problem-plant species is more pronounced.</p> <p>Approximately 23% of the corridor comprises areas which form part of usually much larger areas which have been designated by KZN Wildlife as Priority 1 areas. However, the fieldwork and mapping which was undertaken for this report indicates that approximately 84% of the Priority 1 areas which occur within the corridor comprise vegetation which has been transformed to some degree.</p> <p>No rare or endangered vegetation was encountered, but rare fauna may be present by virtue of some of the vegetation types (mostly referring to the wetland off Eastbury Drive) present on site.</p> <p>The wetland and stream which occurs just north of Eastbury Drive is of concern because it is considered possible that one or both of these habitats may be found to support Pickergill's Reed Frog which is a Red Data species.</p> <p>A Frog study was undertaken by Jeanne Tarrant on the 06/02/2013. The study was undertaken at the wetland near Eastbury Drive to determine if concerns surrounding the existence of Pickersgill's Reed Frog along the pipeline route were founded. The findings of the herpetology study revealed that as a result of high levels of habitat transformation over the past three decades, ideal habitat for Pickersgill's Reed Frog is no longer present in the area. Pickersgill's Reed Frog was not detected during the survey, however it is important to consider that the breeding season for this species is almost over at this time of year and it may be that none were calling at the time of the assessment. A total of 10 other frog species (Least concern) were detected in the area during the survey. It was recommended that despite Pickersgill's Reed Frog not being detected during the survey, that wetland areas as described in the vegetation report are not impacted on by the proposed construction activities given their Endangered status and support of a high diversity of frog species in general.</p>
Noise & Dust	<p>Noise and dust impacts will be monitored as per the EMP. Sensitive areas will require more attention in terms of construction scheduling and methodologies, and the appropriate dust mitigation options are included in the EMP. Most significant areas are near schools, libraries, clinics, and other social facilities.</p>
Culture and Heritage	<p>The desktop study suggested that a full HIA survey was not necessary, as most of the route had been damaged due to housing and/or agriculture. In accordance to the heritage study, the only portion of the proposed route that could have Stone Age, Late Iron Age, and/or Historical Period remnants is the hill on the Erf Moriah 16743FU. This is a small area of land that has had some form of agriculture for at least 80 years, and any archaeological site would have been completely damaged. It is necessary that this section of the line undergo careful monitoring during the construction phase of the NAA Phase 4 project. The palaeontological sensitive area occurs from S29°44'11.23" E31° 1'18.27"E to S29°43'57.83" E31° 1'16.90" (See Heritage Management Plan for more information)</p>

Table 2.1 Key Resources and Impacts	
	". General Environmental Management measures for this area are proposed in the HMP.
Social Environment	The Social Investigation revealed that there are numerous positive benefits of the project in terms of long term water security. Negative issues of a social nature are largely associated with the construction phase of the project and will remain temporary. There are aspects of the construction, operation and maintenance phases that will require strict management to minimise the negative disturbances, inconveniences and impacts. Some of the social aspects that are addressed EMP include the disruption to services, the security risk to properties, traffic disruptions, safety hazards and potential pipe rupture.
Traffic Impact	The construction of the NAA Phase 4 will have an adverse impact on certain roads along the route. Trenching will result in road closures, in part or in total. Although these closures will last short periods, they will be disruptive to traffic. During construction, large abnormal load vehicles will be used to deliver the pipe, and other heavy vehicle traffic will also result from construction activities, deliveries and removals. The large dimensions of these vehicles and their slow operating speed will further exacerbate the congestion. Detours will have to be planned where possible. Some lower category roads, especially in residential areas, were not designed to convey heavy vehicles. It is therefore anticipated that, in addition to the congestion created by the construction vehicles, numerous roads will be damaged as a result of the repetitive movement of heavy vehicles. The Contractor will therefore have to implement strategies to mitigate traffic congestion, inconvenience to road users and to maintain haulage routes and leave these routes in a condition similar to what they were in before construction commenced. A <b>SEPARATE Transport Management Plan</b> has been devised to assist in this regard, and is included as an Appendix to the EIA.

## 2.1 Conditions of the Record of Decision

The RoD typically includes both standard and specific conditions associated with an activity of this nature, and the conditions are associated with the key environmental impacts or resources identified during the environmental investigations. *The standard and specific conditions specified in the RoD **will be** tabulated below once / if received (if and when the project is authorised).* The table will list the project specific conditions as well as general conditions for all phases, and will also indicate where the responsibility for implementation lies.

## 3. LEGAL FRAMEWORK

### 3.1 Compliance with the NEMA

The National Environmental Management Act (107 of 1998) (NEMA) makes reference to EIA follow-up and EMP requirements in Section 24 (1). This section imposes the obligation to undertake an assessment of environmental and social impacts, taking into accordance Section 24(4) (b) which requires an:

- (ii) "Investigation of mitigation measures to keep adverse impacts to a minimum, as well as the option of not implementing the activity..."
- (v) "Investigation and formulation of arrangements for the monitoring and management of impacts, and the assessment of the effectiveness of such arrangements after their implementation."

The content of this EMP has therefore been designed to incorporate these requirements. The document provides a brief background to the project, summarizes positive and negative issues and impacts identified during scoping, formulates mitigation measures as actions and responsibilities, and details a means of evaluation and monitoring.

### 3.2 Compliance with Relevant Legislation

The supreme law of the land is 'The Constitution of the Republic of South Africa', which states that "Every person shall have the right to an environment which is not detrimental to his or her health or well being". Laws applicable to protection of the environment in terms of Environmental Management (and relating to construction activities) include (but are not restricted to):

- Animals Protection Act, Act No 71 of 1962
- Atmospheric Pollution Prevention Act, No 45 of 1965
- Conservation of Agricultural Resources Act, No 43 of 1983
- Environment Conservation Act, No 73 of 1989

- Environmental Planning Act, Act No 88 of 1967
- Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947
- Forest Act, No 122 of 1984
- Hazardous Substances Act, No 15 of 1973
- KwaZulu-Natal Heritage Act, No 10 of 1997
- Land Survey Act, No 9 of 1921
- Minerals Act, No 50 of 1991
- National Environmental Management Act, 107 of 1998
- National Monuments Act, No 28 of 1969
- National Parks Act, No 57 of 1976
- National Resources Development Act, No 51 of 1947
- National Veld and Forest Fire Act, No 101 of 1998
- Occupational Health and Safety Act, No 85 of 1993
- Soil Conservation Act, Act No 76 of 1969
- Water Act, No 54 of 1956
- Water Services Act No 108 of 1997
- And all regulations framed there under and amendments there to.

## 4. IMPLEMENTING THE EMP

The Environmental Management Plan (EMP) for the Northern Aqueduct Augmentation (NAA) Phase 4 Project is to be read in conjunction with standard site management practices, such as technical, construction, health and safety plans. This document provides the general framework for environmental management in as much detail as possible, where the issues, actions and responsibilities associated with the general environmental management of the property are described. The EMP includes the Rescue and Rehabilitation Plan (RRP), the Communications Plan (CP), the Spoil Disposal Management Plan (SDMP) and the Heritage Resources Management Plan (HRMP). A Rehabilitation Specification is a separate document which will be compiled for use by the contractor during construction – and will list specific actions, items and quantities required for the contractor to price for the construction and rehabilitation works associated with this project. The Rehabilitation Specification is a technical document and a component of the Tender Specifications; it draws on the information listed in this EMP, but is not a part of the EMP documentation.

### 4.1 Auditing and Monitoring

The development of an EMP for a project is an important and necessary task that is aimed at assigning responsibilities and mitigation options to a variety of activities. However, it can be an ineffective tool in the absence of auditing or monitoring activities. Auditing or monitoring activities involve the structured observation, measurement, and evaluation of environmental data over a period of time. *The overall responsibility to ensure that the EMP is implemented rests with the Developer, who is to appoint appropriate engineering, environmental and contracting teams.* The overall responsibility to ensure **compliance** with the EMP rests with **the DAEARD**, and an independent environmental consultant will undertake weekly monitoring activities and the monthly auditing process (refer to **Table A** below) to ensure design and construction compliance with the environmental requirements. The Schedule of this EMP in which the issues, actions and responsibilities are described is tabulated in a way that allows for a cross-referenced audit checklist for consistency and thoroughness.

### 4.2 Ensuring Compliance

The EMP is a legally binding document. Non-compliance with the EMP will result in [‘legal action’](#) or **relevant steps** (see definitions above) being levied by the DAEARD (or the Engineer, as may be applicable) against the contractor / developer. Such action may take the form of (but is not limited to) fines, time penalties (work stoppages), and culminating in legal action. A variety of legislation dictates behaviour/action associated with environmental

management, and identifies suitable action in the event of non-compliance. That, which is to be considered in the event of non-compliance or contravention of the EMP includes:

- The National Environmental Management Act, No.107 of 1998
- The Environment Conservation Act, No. 73 of 1989
- The Occupational Health and Safety Act, No. 85 of 1993
- The National Water Act, No. 36 of 1998

The Contractor is deemed not to have complied with the EMP if:

- within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the EMP and its associated reports,
- environmental damage ensues due to negligence,
- the Contractor fails to comply with corrective or other instructions issued by the Project Manager or Engineer within a specified time (a maximum two weeks is usually prescribed by the DAEARD),
- the Contractor fails to respond adequately to complaints from the public.

The 'relevant steps' will be determined according to the nature of the non-compliance or crime. Application of a penalty clause will apply for incidents of non-compliance, and the penalty to be imposed per incident/non compliance are at the discretion of the DAEARD according to the severity of the incident. Relevant steps could also include, but would not be limited to:

- Site Instruction being issued by the Engineer to rectify,
- Site Instruction being issued by the Engineer to suspend the Works until rectification of matters,
- Depending on the severity of the contravention, the raising of fines by the relevant authority (DAEARD)

### **Non-Compliances:**

Non compliances will be noted and reported on by the ECO during monitoring. The ECO will inform the contractor & Engineer of the non compliant incidences. If corrective actions are not undertaken within the specified timeframe, the ECO will communicate with the Engineer who will then hand over a site instruction to the contractor detailing the corrective actions that must be undertaken.

- Minor non compliant incidences must be rectified within one week.
- Major non complaint incidents must be rectified within 2 days of notification.
- Further to this the Contractor is responsible for rehabilitating the environment to the ECO's requirements (EMP) (under the instruction of the Engineer) following an environmental incident.
- Major non compliances or repetitive offences (three repeats of the same offence) will be reported to the DAEARD for further action.

### **4.3 Safety Practices**

The EMP is to be used in conjunction with standard construction and operational site safety and health practices (and according to the Occupational Health and Safety Act, No 85 of 1993). Emergency procedures for potential situations are to be established at the onset of the project, and the contractors are to appoint responsible people for the prevention, reporting, and management of emergency situations as described in the EMP schedule. Guidelines regarding specific procedures for responding to and reporting emergencies have been identified in the EMP schedule (**Table C1**).

Incident reporting procedures are to be established at the onset of the project. An Environmental Incident Report File (EIRF) is to document any environmental incidents (accidents, complaints or events) associated with the pipeline project. The Environmental Site Officers (ESOs) are responsible for ensuring that the environmental incidents are recorded in the EIRF, and the Environmental Control Officer (ECO) is responsible for ensuring that all public issues and environmental incidents are brought to the attention of the relevant authorities or management committees, and appropriately addressed. The EIRF is to be made available to the Developer, ECO, DAEARD and any other authority at any time as requested.



## **4.4 Duties**

The developer is to appoint an Environmental Control Officer (ECO) to oversee the environmental management of the site. The ECO is to be independent of the contracting team/s. In turn, the Contractor is to assign a senior member of staff to the duties of an Environmental Site Officer (ESO), who will oversee day to day environmental site management. The qualifications and requirements for each of these posts are described in the Glossary.

### **4.4.1 Environmental Responsibilities of the Engineer**

The engineer is responsible for:

- Enforcing the environmental specifications of the site.
- Monitoring compliance with the requirements of the specification.
- Assessing the Contractor's environmental performance in consultation with the ECO from which a brief monthly statement of environmental performance is drawn up for record purposes.
- Documenting, in conjunction with the Contractor, the state of the site prior to construction activities commencing. This documentation will be in the form of photographs or video record.

### **4.4.2 Environmental Responsibilities of the Contractor**

The Contractor is required to:

- Provide information on previous environmental management experience and company environmental policy.
- Supply method statements for any activities requiring special attention as specified and/or requested by the Project manager, ECO and/or Engineer for the duration of the Contract.
- Be conversant with the requirements of this EMP.
- Ensure his staff are adequately informed of the requirements of the EMP pertaining to their site role, and have attended the necessary environmental induction training sessions as detailed in this EMP.
- Comply with the requirements of the ECO in terms of the duties specified by this EMP, and within the timeframes specified.
- Ensure that any subcontractors (including Rescue and Rehabilitation sub-contractor/s) that are utilized within the context of the contract are conversant with the EMP or relevant sections of the EMP pertaining to their role on site.
- Bear the costs of any damages/compensation resulting from non-compliance with the EMP.
- Ensure that the Engineer is informed of any foreseeable activities that will require input from the ECO.
- Appoint a suitably experienced and qualified person to fulfil a role as the ESO as detailed in this EMP.
- Conduct all activities in a manner that minimizes/avoids disturbance to affected residents and the public in general, and foreseeable impacts on the environment.

### **4.4.3 Duties of the Environmental Control Officer (ECO)**

The ECO is to be qualified in the field of environmental science, is to understand the basic environmental issues associated with the aqueduct construction, and is to be well versed in the contents of this EMP. The ECO will be the liaison person between the Environmental Site Officer of the contracting team, and the Developer. The ECO will conduct monthly site meetings / inspections with the ESO regarding compliance with the EMP, keep a record of and inform the Contractors of deviations from the EMP, and report findings to the DAEARD. The ECO is responsible for the monthly audit procedures, which are to be designed specifically around this EMP and submitted to the DAEARD (address and more tabulated: **Table A1**).

Issues not accounted for by this EMP may arise. New instructions (not covered by this EMP) will be forwarded to the project engineer *first* for verification and then forwarded onto the contractor and any affected sub-contractors for their action.



#### **4.4.4 Duties of the Environmental Site Officer (ESO)**

The ESO is to be qualified in the field of environmental management, understand the environmental responsibilities and tasks of the contracting team, and is to ensure that all members of the team operate on site in an environmentally considerate manner, as described by the EMP. The ESO is to be available on site on a daily basis, and is to ensure that the activities of the contracting team remain in compliance with the Code of Conduct and site-specific protection measures identified by the EMP. The ESO is to be fully versed in the contents of the EMP, and is to be responsible for ensuring that the activities and conduct of their team are in keeping with the EMP contents. The ESO is to report to the ECO (refer above) with regards to any environmental issues.

## 5. ENVIRONMENTAL MANAGEMENT PLAN

<b>A. DESIGN PHASE</b>				
<b>A1. Key Environmental Roles &amp; Responsibilities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>A1.1 Developer</b>	A1.1.1 eThekweni Municipality Water and Sanitation (EWS) is responsible for the planning, funding and development of the project.	At the onset of the project	Developer	DAEARD
	A1.1.2 The Developer must ensure that the Conditions of the RoD (as amended) are met, through the inclusion of these conditions in the EMP (and associated reports <b>Heritage Management Plan (HMP)</b> , <b>Spoil Disposal Management Plan (SDMP)</b> , <b>Rescue and Rehabilitation Plan (RRP)</b> , <b>Rehabilitation Specification (RS)</b> & <b>Communications Plan (CP)</b> ).			
	A1.1.3 The Developer must ensure that information in this EMP is included in the tender documentation so that the Contractor is aware of their responsibilities and requirements.			
	A1.1.4 The Developer is responsible for making the necessary appointments to the project team to ensure the requirements of the RoD and EMP are met.			
	A.1.1.5 The Developer will engage the Consulting Engineers who will oversee the Contractors.			
<b>A1.2 Consulting Engineers</b>	A1.2.1 The Northern Aqueduct Consortium (NAC) will provide consulting engineering services including advice and engineering guidance on site in order to ensure adherence to all design and engineering specifications.	At the onset of the project	Consulting Engineers	Developer
	A1.2.2 The Consulting Engineers must ensure that the design and routing of the pipeline accommodate the environmental resources (wherever required and whenever possible).			
	A1.2.3 The Consulting Engineers must ensure that the Contractor meets the engineering design specifications through construction methods that are in accordance with the conditions of the EMP.			
<b>A1.3 Contractor</b>	A1.3.1 The main Contractor(s) will undertake the construction of the project, or portion of the construction of the project.	At the onset of the project	Contractor	Developer
	A1.3.2 The Contractor must ensure that the construction methodologies, schedules, safety requirements and emergency procedures are in accordance with the conditions of the EMP.			
	A1.3.3 The Contractor must appoint a responsible member of the management staff, <b>who is suitably experienced and qualified</b> to fulfil a role as the ESO.			

<b>A. DESIGN PHASE</b>				
<b>A1. Key Environmental Roles &amp; Responsibilities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	A1.3.4 The Contractor must ensure that all staff have been inducted through environmental training and that they remain in compliance with the conditions of the EMP.			
<b>A1.4 Environmental Consultants</b>	A1.4.1 The <i>Knight Piésold</i> Environmental Assessment Practitioners (EAPs) will oversee and manage the necessary environmental assessment, monitoring and auditing processes (ECO) of the project.	At the onset of the project	EAPs	Developer
	A1.4.2 The EAPs must prepare an EMP (this document), and ensure that the conditions of the RoD are reflected in the EMP (and its associated reports – the <b>HMP, SDMP, RRP</b> and <b>CP</b> ).			
	A1.4.3 The EAPs must ensure that the EIR / specialist findings are communicated to the Consulting Engineers such that they can be included / considered during the design and routing of the pipeline, and that the management and mitigation measures are reflected in the EMP.			
	A1.4.4 The EAPs must guide the Developer's appointment of an Environmental Control Officer (ECO), who is to be suitably qualified and experienced for the project.			
	A1.4.5 The EAPs must guide the Contractor's choice of Rehabilitation Specialist, whose team is to be suitably qualified and experienced for the project (refer to the <b>RRP</b> ).			
<b>A1.5 Environmental Control Officer</b>	A1.5.1 The Developer is to appoint an Environmental Control Officer (ECO) who will be responsible for overseeing the implementation of the EMP by the Contractor/s.	At the onset of the project	ECO	Developer
	A1.5.2 The ECO is to be qualified in the field of environmental science with suitable experience, professionally registered and is to fully understand the environmental issues associated with the pipeline project, and is to be well versed in the contents of this EMP.			
	A1.5.3 The ECO will be the liaison person between the EAPs, the Environmental Site Officer (ESO, refer below) of the contracting team, and the Developer.			
	A1.5.4 The ECO will as a minimum, conduct weekly site visits, bi-monthly site inspections with the ESO, monthly meetings with the project team as deemed necessary, and keep a record of and inform the Contractors and Consulting Engineers of deviations from the EMP.			
	A1.5.5 The ECO is responsible for the monthly audit procedures, which are to be designed specifically around this EMP, these Audit Reports are to be submitted to the DAEARD: The Compliance, Enforcement Monitoring Component, Private Bag X006, Bishopsgate, 4008.			
	A1.5.6 The DAEARD (in consultation with the ECO if necessary), will determine suitable legal action for non-compliances in accordance with this EMP.			

## A. DESIGN PHASE

### A1. Key Environmental Roles & Responsibilities

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>A1.6 Environmental Site Officer</b>	A1.6.1 The Contractor is to appoint an Environmental Site Officer (ESO) who will be responsible for daily monitoring of the implementation of the EMP and environmental guidance on site in order to ensure adherence to the EMP and general project environmental sustainability.	At the onset of the project	ESO	Developer
	A1.6.2 The ESO is to have a qualification in the field of environmental management with suitable experience, and should understand the basic environmental issues associated with the pipeline project relevant to the contracting team in question.			
	A1.6.3 The ESO is to be fully informed of the contents of the EMP, and is to be responsible for ensuring that the activities and conduct of their team are in keeping with the Code of Conduct, site-specific protection measures, and the EMP contents.			
	A1.6.4 The ESO is to report to the ECO (refer above) with regards to any environmental issues or queries, EMP non-compliances or environmental emergencies.			
	A1.6.5 The ESO is to keep an Environmental Issues Report File (EIRF) for the purpose of recording events, emergencies or non-compliances and the reporting / closing out of these.			
	A1.6.6 The ESO is to keep an Environmental Complaints Register for the recording of all public complaints, and the reporting / closing out of these.			
<b>A1.7 Rehabilitation Specialist</b>	A1.7.1 The Contractor is to appoint a suitably qualified (in terms of the <b>RRP</b> ) Rehabilitation Specialist or team of specialists to undertake the plant species rescue / recovery exercises as identified in the <b>RRP</b> , and to rehabilitate the working corridor in accordance with the <b>RRP</b> . This Specialist or team should have a record of at least 5 successful rehabilitation projects completed, together with referees and contact numbers.	At the onset of the project	Rehabilitation Specialist	Developer
	A1.7.2 The Rehabilitation Specialist is responsible for any permitting procedures that are required for these recovery exercises for the rescue and relocation of Red Data, rare, endangered or protected / listed plant species. The Rehabilitation Specialist may seek the help of an EAP if required for this process.			
	A1.7.3 The Rehabilitation Specialist is responsible for the storage and propagation of plant species required in the rehabilitation phase of the project, and must therefore have access to suitable facilities as described in the <b>RRP</b> .			
	A1.7.4 The Rehabilitation Specialist is responsible for rehabilitating the working corridor to a status of good environmental health, better than its former status, and striving towards its natural status (in accordance with the <b>RRP</b> ), and is to remain in compliance with the EMP.			

## A. DESIGN PHASE

### A2. Construction Phase Preparation

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>A2.1 EMP Inclusion</b>	A2.1.1 This EMP (including its associated reports: <b>HMP, SDMP, RRP &amp; CP</b> ) is an extension of the conditions of the RoD and is binding on all parties involved in this project.	EMP compliance for the duration of construction & operation.	Developer	DAEARD
	A2.1.2 This EMP is to form part of the contract documentation for tender such that the Contractor is aware of its conditions and associated pricing requirements.			
	A2.1.3 This EMP will advise the design phase of the project in terms of providing the environmental requirements with regards to routing options ( <b>Traffic Management Plan (TMP)</b> ), construction methodologies, access choices and mitigation / management options.			
	A2.1.4 The appointments associated with the project team required to implement this EMP will be made prior to the Construction Phase of the project.			
<b>A2.2 Land Legal</b>	A2.2.1 Permission to occupy any private land is required. Should the relocation of people or the expropriation of land become necessary, this is to be undertaken in accordance with the standard legal procedures. All land negotiations are to be resolved prior to any construction commencing.	Prior to construction	Developer	DAEARD & DTLGA
<b>A2.3 Plans / Permits / Licenses / Applications / PTOs and Local Labour</b>	A2.3.1 A Traffic Management Plan is to be developed by suitable Engineers, identifying haulage roads / construction access. Alternatives to popular routes affected by construction are to be found, and construction schedule conditions are to be set to minimise peak traffic disturbances.	Prior to construction	Consulting Engineers	DoT
	A2.3.2 Material availability is to be considered when determining the design specifications, and potential sources should be identified as soon as possible. <b>Similarly, spoil sites should be found.</b>	Prior to construction or activity commencing	Consulting Engineers	Developer
	A2.3.3 Should any permits / licences be required for proposed quarries, borrowpits, or sandwinning operations these are to be obtained prior to such activities commencing.	Prior to construction or activity commencing	Consulting Engineers & EAPs (through Heritage and Biodiversity Specialists)	DAEARD
	A2.3.4 Should any permits for the rescue and relocation of whole plants, seeds or plant material be required, these are to be obtained prior to the Rescue / Rehabilitation activities commencing.			
	A2.3.5 Should any permits for the disturbance, damage, destruction or alteration of any heritage resources be required, these are to be obtained prior to such activities taking place.			
	A2.3.6 Should any Water Use permits/ licenses be required, these are to be obtained prior to any water use activities occurring.			
	A2.3.7 The land owner negotiations for the working corridor and servitude are to be concluded and the PTO agreements in place prior to any activities occurring on the land in question. Adequate notification and			

<b>A. DESIGN PHASE</b>				
<b>A2. Construction Phase Preparation</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	agreements be made prior to construction activities commencing in the vicinity of the affected property. Existing fences on the boundary of the servitude that require temporary or permanent relocation will be done so at eThekweni Municipality's expense.			
	A2.3.8 Any future realignments of the current route proposal are to follow existing cadastral boundaries, servitudes or infrastructure where possible. Route realignments will have to undergo a DAEARD amendment application.	Prior to any commencement	Consulting Engineers	Developer
	A2.3.9 The contractor is to consider the appointment of local labour (excluding skilled personnel) where possible. This will minimize risks associated with crime and community safety as most workers will be known by the local residents.	Prior to any commencement	Contractor	Developer
<b>A2.4 Construction Plans &amp; Schedules</b>	A2.4.1 The Contractor is to provide the scheduling for construction that takes into account the mitigation measures of the EMP which affect the timing of the construction activities, such as scheduling the river crossing work during the dry season, utilising school holidays for work in the vicinity of places of learning, and working in dust prone areas during the rainy season.			
	A2.4.2 Appropriate locations for pipe and fabrication yards, site offices and construction camps are to be determined and approved prior to activities occurring (see also <b>Table B3</b> ).	Prior to site establishment	Developer / Contractor	Consulting Engineers & EAPs
	A2.4.3 Appropriate access and haulage routes to pipe and fabrication yards, site offices and construction camps, and the working corridor are to be determined and approved prior to activities occurring, in accordance with the Engineer's Traffic Management Plan (see also <b>Table B4</b> )	Prior to site establishment	Contractor / Consulting Engineers	Consulting Engineers & EAPs
<b>A2.6 Materials Sourcing &amp; Method Statements</b>	A2.6.1 Contractors shall prepare a <b>Materials Source Method Statement</b> indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners etc.) and submit these to the Engineers for approval prior to commencement of any work.	Prior to construction.	Contractor	Consulting Engineers
	A2.6.2 A signed document from the supplier of natural materials should be obtained confirming that they have been obtained in a legal and sustainable manner and in compliance with the relevant legislation.			
	A2.6.3 Where materials are borrowed (mined) proof must be provided of authorisation to utilise these materials from the landowner / mineral rights owner and the Department of Minerals Resources.			
	A2.6.4 Contractors shall submit a Method Statement and plans for the Storage of Hazardous Materials, Refuelling and Emergency Procedures.			

A. DESIGN PHASE				
A2. Construction Phase Preparation				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	A2.6.5 Contractors shall submit a Method Statement and plans for the Working in Wetland and River Environments.			

A. DESIGN PHASE				
A3. Environmental Awareness				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>A3.1 EMP Familiarisation</b>	A3.1.1 It is the duty of the EAPs to ensure that the conditions of the EMP that relate to the routing and design of the pipeline are communicated to the Consulting Engineers.	Prior to construction.	EAPs, Consulting Engineers, Contractor, ESO & ECO, Rehabilitation Specialist	DAEARD
	A3.1.2 It is the duty of the Consulting Engineers to ensure that the conditions of the EMP are considered and included where required in the routing and design of the pipeline.			
	A3.1.3 It is the duty of the Contractor and the ESO to familiarise themselves with the EMP, and to understand the nature of the possible impacts associated with this project, as well as the practical mitigation options available.			
	A3.1.4 It is the duty of the ECO to fully comprehend the conditions of the EMP as they relate to the construction activities proposed.			
	A3.1.5 It is the duty of the Rehabilitation Specialist to familiarise themselves with the EMP, and to understand the conditions associated with the Rescue and Rehabilitation Phase of the project.			
<b>A3.2 Environmental Induction Training</b>  <i>These points need to be made clear to staff on site prior to project commencement.</i>	A3.2.1 The Contractor is to ensure that all site workers, sub contractors, artisans and anyone under their employ receive an induction training course which is to include good environmental practice, safety and other relevant issues. Relevant sections of the EMP are to be presented in order to facilitate compliance. The Contractor is to keep their staff fully aware of environmental aspects of the Contract for the duration of construction.	Prior to site work.	Contractor & ECO	DAEARD
	A3.2.2 The ECO is to develop an induction training programme and appropriate material that will address, but not be limited to basic environmental awareness, basic health and safety awareness, identification of sensitive areas, identification of potential archaeological artefacts and graves, prevention of water, soil, and air pollution, prevention of soil erosion and sedimentation, basic principles of materials handling and storage, fire risks, protection of fauna and flora, emergencies and incident responses, spill response provisions, social responsibility, administrative and reporting procedures.	Prior to site work.	ECO	DAEARD, Contractor



<b>A. DESIGN PHASE</b>				
<b>A3. Environmental Awareness</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	A3.2.3 It is the Contractors' responsibility to provide the various site foremen with no less than 1 hour's environmental training and to ensure that the foremen have sufficient understanding to pass this information onto the construction staff. Translators are to be used where necessary.	Ongoing.	ESO	ECO / ESO
	A3.2.4 The ECO should be on hand to explain more difficult / technical issues and to answer questions.	Ongoing.	ESO	ECO / ESO
	A3.2.5 The use of pictures and real-life examples is encouraged as these tend to be more easily remembered.	Ongoing.	ESO	ECO / ESO
	A3.2.6 Use should be made of environmental awareness posters on site.	Ongoing.	ESO	ECO / ESO
	A3.2.7 Construction workers should be made aware of the Code of Conduct on site and should understand the penalties for non-compliance.	Ongoing.	ESO	ECO / ESO
	A3.2.8 The need for a 'clean site' policy and basic housekeeping also needs to be explained to the construction workers.	Ongoing.	ESO	ECO / ESO
<b>A3.3 Resource Familiarisation &amp; Method Statement</b>	A3.3.1 The Contractor is to become familiar with the location and issues relating to Flagged Resources identified during the environmental investigations (refer <b>Table E</b> ), and together with the Ecologist and Rehabilitation Specialist, is to develop method statements for activities that will affect wetlands, watercourses, dams, access roads, steep slopes ( $\geq 1:3$ v:h), grasslands, veld, forests, indigenous bush, cultural heritage sites, and sites less than 50m from residential dwellings where blasting is required. The ESO is to be informed of the resource significance and care requirements.	Prior to construction activities occurring.	Contractor, ESO, Ecologist and Rehabilitation Specialist	ECO

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B1. Code of Conduct</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>B1.1 Adherence to Environmental &amp; Safety Regulations</b>	B1.1.1 The Code of Conduct and the conditions of the EMP apply to all staff involved in the project, including (but not limited to) the Consulting Engineers, Contractor(s) and staff (including Sub Contractors and staff, and the Rehabilitation Specialist and staff), EAPs, Public Relations & Media Team Personal, Environmental Specialists, and other service / product providers (including the survey teams, pipe material delivery teams, geotechnical or other specialist teams) appointed by the Developer or Consulting Engineers.	From the onset of the project, for the duration of the project.	Developer	DAEARD

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B1. Code of Conduct</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	B1.1.2 All site staff are to be inducted through the environmental training programme, and are to fully understand the Code of Conduct and the conditions of the EMP of relevance to their activity before commencing with any site activity related to the project.	Prior to relevant site activity of team in question commencing.	Developer, Consulting Engineers, Contractor, ECO	EAPs
	B1.1.3 The Contractor must monitor the performance of the construction workers to ensure that the points relayed during their induction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear.	For the duration of the site activity / construction.	Contractor	ECO
	B1.1.4 All staff employed on site are to adhere to the Occupational Health and Safety Act, 181 of 1993 and any other relevant safety legislation.	At all times.	Contractor	Developer
<b>B1.2 Biodiversity Care</b>	B1.2.1 Unauthorised disturbance or damage to open space areas or flora and fauna outside of the working servitude by the construction team or anyone involved in the project is prohibited and will be subject to reinstatement or rehabilitation to the Contractor's cost. Further such disturbances (after the second infringement) will be reported to the DAEARD for action.	From the onset of the project, for the duration of the project.	Developer	DAEARD
	B1.2.2 Hunting, snaring, capturing, or otherwise disturbing any animal (mammal, reptile, amphibian, bird, insect or fish) is prohibited and any person caught doing so will be reported to the Engineer for appropriate action. Further such activities (after the first infringement) will be reported to the DAEARD for action. Local fauna, such troops of monkeys, that frequent the project area must not interfered with. Violations of this particular clause of the EMP will have severe consequences.		Developer / Contractor	ESO / ECO
	B1.2.3 Collecting, cutting, clearing, burning or otherwise disturbing plant material not designated for clearing or rescue is prohibited, and any person caught doing so will be reported to the Engineer for appropriate action. Further such activities (after the first infringement) will be reported to the DAEARD for action.			
	B1.2.4 Deliberate or negligent polluting of any part of the working corridor, construction site, camp, or adjacent areas by the construction team is prohibited and will be reported to the Engineer for appropriate action. Further such activities (after the first infringement) will be reported to the DAEARD for action.			
	B1.2.5 The unauthorised abstraction / use of water from any water sources / bodies on the site are prohibited.		Developer / Contractor / ECO	ECO / DWA
	B1.2.6 The harvesting of firewood or any other natural resources from the site, working corridor or adjacent areas is prohibited.			

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B1. Code of Conduct</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	<p>B1.2.7 In order to protect the remaining species of conservation concern which may occur along the construction corridor (i.e. KwaZulu –Natal (Black-headed) Dwarf Chameleon) it is recommended that the ECO provide the Contractor and labour force with a training programme regarding Black headed Dwarf Chameleons. The ECO should be the first person to be contacted should any other person involved in the construction of Phase 4 of the NAA encounter this species (please see Appendix B for more information)</p> <p>The ECO is to also familiarise his or herself with others species of conservation concern that exist along the construction corridor. Training programmes and posters (as in the case of Dwarf Chameleons) must be undertaken with the labour force and installed around the site.</p> <p>The ECO and ESO must also be familiar with any practical measures which can be taken to minimise the impact of construction on any of this species should representatives be encountered.</p> <p>B1.2.8 <i>Anthropodes paradisea</i> (Blue Crane): The ECO must be able to identify this species and if it is encountered all construction activities in the vegetation type in which the bird has been seen / found must stop immediately and the advice of a suitably qualified specialist sought.</p> <p><i>Durbania amakosa</i> (Amakosa Rocksitter Butterfly): The ECO must be competent to identify this species Construction activities in vegetation type where this species is to be encountered is to cease immediately and guidance of appropriate specialist to be sought.</p> <p>B1.2.9 The removal of boulders, rocks, pebbles, gravel, sand or any other material not designated for removal is prohibited (see also <b>SDMP</b>).</p> <p>B1.2.10 The ECO is to monitor the species presence and composition prior to construction with the assistance of the Specialist report compiled by Dr Edmund Granger against the actual changes caused by the project. Areas along the proposed pipeline route following electrical servitude which are not cut/mown frequently must be monitored closely as they may form corridors which local fauna frequent.</p>	From the onset of the project, for the duration of the project.	Developer / Contractor / ECO	ECO
<b>B1.3 Cultural Heritage Care</b>	<p>B1.3.1 Deliberate or negligent defacing, damaging, painting or marking natural features such as rock formations (with the exception of approved marking exercises during rescue operations), is prohibited and any person caught doing so will be reported to the Engineer for appropriate action. Further such negligence (after the first infringement) will be reported to the DAEARD/Amafa for action. Restoration to the satisfaction of the ECO / Heritage Specialist is mandatory.</p>	From the onset of the project, for the duration of the project.	Developer	ECO / Amafa

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B1. Code of Conduct</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	<p>B1.3.2 Any persons found to be deliberately or negligently defacing, damaging, destroying or altering a heritage resource as identified in the <b>HMP</b> will reported to the Engineer, and restoration or compensation as determined by Amafa may apply.</p> <p>B1.3.3 Discoveries of any artefacts / sites thought to be of cultural / archaeological or heritage significance are to be dealt with in accordance with the HMP. These are to be cordoned off by the Contractor and brought to the attention of the ECO. The ECO is to bring the discovery to the attention of Amafa and relevant specialists, call for a site inspection, and notify the Developer of the discovery for further planning, remedial action or decision making.</p>			
	B1.3.4 In accordance to the heritage study, the only portion of the proposed route that could have Stone Age, Late Iron Age, and/or Historical Period remnants is the hill on the Erf Moriah 16743FU. This is a small area of land that has had some form of agriculture for at least 80 years, and any archaeological site would have been completely damaged. It is necessary that this section of the line undergo careful monitoring during the construction phase of the NAA Phase 4 project. The palaeontological sensitive area occurs from S29°44'11.23" E31° 1'18.27"E to S29°43'57.83" E31° 1'16.90" (See Heritage Management Plan for more information)	During construction in this area	Developer/ECO	ECO
<b>B1.4 Safety Conduct</b>	B1.4.1 All staff must wear the appropriate safety gear (Personal Protective Equipment), utilize the appropriate safety equipment, and adhere to the appropriate safety standards at all times.	From the onset of the project, for the duration of the project.	Developer/ Contractor/ service & product providers/ geotechnical & soil sample teams/ survey teams/ EAPs/ Rehabilitation Specialist etc.	ECO
	B1.4.2 Teams working outside of the working corridor, or requiring access to private properties are to carry identification on their persons that includes their name, position, company of employ, and reference to the NAA project. Similarly, such information should be displayed on vehicle dashboards / exteriors.			
	B1.4.3 No firearms or weapons of any description are to be used on site, unless required by security personnel.			
	B1.4.4 The construction site and trench is to be adequately secured to prevent accidental falls or drowning, especially where children and animals are concerned. Watchmen should be employed to ensure that the safety barricades around trenches are erect and effective at all times.	At all times.	Contractor	Developer
	B1.4.5 Dangerous construction activities such as blasting require experienced teams under strict control of Health and Safety legislation, and site safety standards.	At all times.	Contractor	Developer

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B1. Code of Conduct</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	B1.4.6 Nearby infrastructure is to be inspected and the status captured on film. Following blast events these are to be re-inspected and remedial action or restoration determined where necessary.	At all times.	Contractor	Developer
	B1.4.7 Early notification systems and educational information are essential in reducing the safety risks.	At all times.	Contractor	Developer
<b>B1.5 Personal Conduct</b>	B1.5.1 Private property access is only permitted on previous agreement with the affected landowner, or will be considered trespassing.	At any time.	Developer/ Contractor/ service & product providers/ geotechnical & soil sample teams/ survey teams/ EAPs/ Rehabilitation Specialist etc.	ECO
	B1.5.2 Trespassing on adjacent properties is prohibited, and legal action (from land owners) is possible.			
	B1.5.3 No swimming, bathing, or washing activities may occur in any water source / body on or adjacent to the working corridor, other than those supplied specifically for such use.			
	B1.5.4 No ablution activities may occur in any area other than the allocated ablution facilities.			
	B1.5.5 Noise is to be prevented, and loud music or unnecessary vocal noise by all staff is prohibited.			
	B1.5.6 The consumption of alcohol and other drugs by working staff is prohibited on site. Driving under the influence of either drugs or alcohol is subject to legal action.			
	B1.5.7 All staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives, (e.g. fires for cooking, use of the surrounding areas / bush as a toilet).			
	B1.5.8 No-one is permitted to live or be housed on site. Security staff may be on site over night provided that they are working.			

<b>B. PRE-CONSTRUCTION PHASE – <u>**PIPEYARDS ASSESSED AND APPROVED IN THE NORTHERN AQUEDUCT AUGMENTATION (PHASES 1, 2 &amp; 3) RoD WILL BE USED FOR PHASE 4. THESE PIPEYARDS WILL BE MANAGED VIA THE EMP COMPILED AND APPROVED FOR NAA (PHASE 1, 2 &amp; 3).</u></b>				
<b>B2. Pipe &amp; Fabrication Yard Establishment</b>				

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B3. Site Office Set-up &amp; Establishment</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>B3.1 Site Office /</b>	B3.1.1 The Contractor is to determine appropriate locations for the Contractors Site Office/s for	Prior to site office /	Contractor	Consulting

## B. PRE-CONSTRUCTION PHASE

### B3. Site Office Set-up & Establishment

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>Camp Location &amp; Layout</b>	the portion of work in progress.	camp establishment		Engineers / ECO
	B3.1.2 The Contractors Site Office should be easily accessible from existing road infrastructure where possible and within or in close vicinity to the working corridor, and may not in any way negatively impact on flagged resources.	During surveys and preliminary investigations.	Contractor / Consulting Engineers	ECO
	B3.1.3 Site offices may not be situated on flood plains or wetlands, within the 1:100 year floodline of a river environment, or on slopes with a gradient of greater than 1:3.			
	B3.1.4 The location of these site offices should be such that visual, dust and noise impacts on adjacent residents / businesses / activities are minimized.			
	B3.1.5 .If the Contractor chooses to locate the site office on private land, prior written permission from the land owner (e.g. a signed 'Permission to Occupy' document (PTO)) is required.	Prior to site office / camp establishment	Consulting Engineers	ECO
	B3.1.6 Site camp/office location choices are to be approved by the Engineers.	Prior to site establishment	Contractor	CE
	B3.1.7 A site layout plan for each site office / camp must be submitted to the Engineers and ECO for approval. Any changes to this layout will require review. The site office layouts will make provision for (where applicable): <ul style="list-style-type: none"> <li>• Access off the road network and visitor / staff parking facilities</li> <li>• Office facilities and a structure to shelter security staff</li> <li>• Ablution facilities and a potable water source</li> <li>• Hazardous fuel / chemical storage area and a waste storage area</li> <li>• Plant parking facilities and a vehicle maintenance area</li> <li>• Emergency equipment storage areas including fire extinguishers and first aid kits</li> <li>• Storm-water control</li> <li>• The facilities of the site office that require slabbed or bunded surfaces are to be designed to engineering standards.</li> <li>• The layout design should be considerate of noise / dust / visual impacts of each activity area within the camp on neighbouring residents and landuses.</li> </ul>	Site office layout plan to be determined and approved prior to the establishment of the site office area.	Contractor	Consulting Engineers
	B3.1.8 Adequate ablution and wash up facilities to be provided. Facilities to be easily accessible to all workers. The provision of ablution and wash-up facilities must not create a health nuisance	Site establishment	Contractor	Engineers

B. PRE-CONSTRUCTION PHASE				
B3. Site Office Set-up & Establishment				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	to the surrounding neighbourhood and environment.			
	B3.1.9 The storm-water drainage network system must be kept separate from the waste water system.	Site establishment	Contractor	Engineers
B3.2 Access Requirements	B3.2.1 Proposed roads and routes to access site offices / camps are to be approved by the Engineers, and may require public notification as described by the CP.	Prior to site office / camp establishment	Contractor / Media team	EAPs
	B3.2.2 The access intersections and routes of the site offices /camps are to meet the KwaZulu-Natal Department of Transport safety and visibility requirements (even if only temporary), and the relevant section of this EMP.	Prior to site office / camp establishment	Contractor	Department of Transport / EAP
B3.3 Site Office Infrastructure Requirements <i>Careful planning of the site office and construction camp can ensure that time and costs associated with environmental management and rehabilitation are reduced.</i>	B3.3.1 Site office yards may only be occupied and prepared once all land legal negotiations are successfully concluded and relevant land owners consent is obtained.	Site office establishment	Contractor	Engineers
	B3.3.2 Site office facilities and infrastructure is to meet the necessary health and safety requirements.			
	B3.3.3 Storm-water runoff from the site office footprint should be channelled to the municipal drainage system.			
	B3.3.4 Any additional telephone lines, electricity lines, sewer and / or water supply networks are to be approved by the relevant authorities prior to installation, even if temporary.			
	B3.3.5 The disturbance to topsoil should be minimised, and compaction or removal of topsoil should be restricted to access routes and parking areas, and activity areas.			
	Environmental requirements for access and parking facilities			
	B3.3.6 Driveway access and vehicle routes / turning circles on the site offices are to be clearly demarcated and all vehicle movement is to be confined to these routes and turning circles.	Site office establishment	Contractor	ECO
	B3.3.7 Vehicle access / turning circles and staff / visitor parking facilities are to be hardened off to prevent soil contamination from hydrocarbons (oil / fuel) leaks. Storm-water from these areas should be suitably catered for.			
	Environmental requirements for office and security facilities			



## B. PRE-CONSTRUCTION PHASE

### B3. Site Office Set-up & Establishment

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	B3.3.8 Paved / hardened pathways are to be provided between office facilities / security facilities or high pedestrian traffic areas to reduce soil erosion.	Site establishment	office Contractor	ECO
	Environmental requirements for ablution facilities and water supply			
	B3.3.9 Ablution facilities are to be provided within the site office area and maintained in a hygienic condition by all users. All ablution facilities are to be signposted for their intended use.	Site establishment	office Contractor	ECO
	B3.3.10 Long drops are forbidden. Septic tank systems (if required) are to be designed by qualified engineers. Chemical toilets are to be hygienically maintained.			
	B3.3.11 Any staff wash-up areas or bathing facilities are to drain into the municipal drainage system / septic tank system, or alternative arrangements are to be made for the collection and disposal of runoff from these areas at a suitable facility.			
	B3.3.12 A potable water supply / container must be provided within the site office area. Any potable water storage facility is to be animal and weather proof, and sealed / fenced to prevent potential contamination / drowning.			
	Environmental requirements for hazardous materials and waste storage facilities			
	B3.3.13 Separate areas for the storage of hazardous or potentially polluting fuels / chemicals and hazardous waste should be allocated. These areas are to be hardened off with an impermeable surface and bunded to accommodate 150% of the volume of the containers that will be stored within them. These areas are to be suitably signposted, and secured to prevent unauthorised use / access.	Site establishment	office Contractor	ECO / Safety Officer
	B3.3.14 Hazardous substance storage areas are to be located so that the least danger or nuisances are placed on neighbouring residents, who are to be notified of such storage (CP).			
	B3.3.15 A secure waste facility is to be provided away from neighbours for the overnight storage of domestic waste. The facility is to be animal and weather proof, and fenced / locked / sealed.			
	B3.3.16 Animal proof rubbish bins with lids are to be strategically placed around the site office areas but are to be emptied into the overnight waste facility so as to be left empty overnight.			
	Environmental requirements for plant / vehicle storage facilities			

B. PRE-CONSTRUCTION PHASE				
B3. Site Office Set-up & Establishment				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	B3.3.17 A secure area of the site office is to be provided for the storage of plant / machinery. The area is to be paved / hardened to prevent soil contamination from hydrocarbon (oil / fuel) leaks.	Site office establishment	Contractor	ECO
	B3.3.18 It is recommended that vehicle / plant refuelling or maintenance be dedicated to an appropriate service centre. However, should this not be possible, a secure area of the Site office / camp is to be provided for such use. These areas are to be hardened off with an impermeable surface and bunded to allow for the collection and disposal of contaminated runoff, and are to house a sand oil trap, appropriate safety equipment and emergency spill equipment.	Site office establishment	Contractor	ECO
	B3.3.19 Fuel tanks must conform to the relevant statutory requirements, and must be housed within designated areas, elevated so that leaks can be easily detected.			
	Environmental requirements for emergency equipment storage facilities			
	B3.3.20 Fire extinguishers, first aid kits and emergency equipment are to be strategically housed in the site office areas, in terms of statutory requirements and their locations are to be appropriately signposted, easily accessible, and the instructions for use clearly displayed.	Site office establishment	Contractor	ECO
B3.4 Safety & Security Requirements	B3.4.1 The burning of firebreaks around the perimeter of the site office / camp areas should be undertaken in consultation with the relevant authorities at the DAEARD, and at an appropriate time of year. The local fire station is to be informed of the proposed activity.	Site office establishment	Contractor	ECO
	B3.4.2 Security lighting is to be angled inwards on the site office / camps to reduce nuisances to neighbouring residents.			
	B3.4.3 The site office perimeters are to be fenced and secured, and activity areas within the site office areas are also to be secured if potentially dangerous or hazardous in nature.			
B3.5 Notice Board Requirements and Photographs	B3.5.1 The site offices are to be clearly signposted as such and that no unauthorised access is permitted.	Site Office establishment	Contractor	ECO
	B3.5.2 Within the site office areas there are to be signs indicating the activity areas assigned to the storage of hazardous material, machinery and emergency equipment.			
	B3.5.3 Health and Safety information and signs are to be displayed as required.			
	B3.5.4 Relevant contact details are to be made easily visible and available to the public for the purposes of complaints / concerns or emergencies.			

## B. PRE-CONSTRUCTION PHASE

### B3. Site Office Set-up & Establishment

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	B3.5.5 Photographs of the condition of the site must be taken prior to site set up and construction.	Site establishment Office	Contractor	ECO

## B. PRE-CONSTRUCTION PHASE

### B4. Site, Haul Roads & Access Route Establishment

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>B4.1 Site, Haul Road &amp; Access Approvals</b>	Approvals for existing road network use			
	B4.1.1 Site office and site access routes should utilise existing road infrastructure where possible, and require consent / approval from the local municipality.	Prior to road use	Consulting Engineers	Municipality
	B4.1.2 Site office and site access routes utilising existing road networks must be planned and require approval from the Engineer. These routes are to take into consideration the requirements of an Engineer's <b>Traffic Management Plan</b> and the EIR.	Prior to road use	Contractor	Consulting Engineers
	Approvals for new haul road construction			
	B4.1.3 The creation of temporary (new) haul roads may require environmental approval if listed in the NEMA Regulations. Temporary roads impacting on a Flagged Resource, within 30m of a water body, or on a floodplain cannot be considered unless authorization from DWA, DAEARD and / or other relevant authorities is obtained.	Prior to road creation	Consulting Engineers	DAEARD
	B4.1.4 Temporary routes to access pipe yards, site offices or site must be planned and haul roads require approval from the Engineers and the Environmental Consultants. These routes are to take into consideration any environmental and social concerns as determined by the EIR, and any requirements of an Engineer's <b>TMP</b> . Temporary roads may not be created on an <i>ad hoc</i> basis.	Prior to road creation	Contractor	Consulting Engineers / EAPs
	B4.1.5 New haul roads and access routes through private property will require written permission from the relevant landowners (Permission to Occupy process).	Prior to road creation	Consulting Engineers / Contractor	Developer
<b>B4.2 Status Assessment</b>	Existing road network			
	B4.2.1 Should the existing municipal or private road network be used as haulage routes, their current status is to be defined by agreement prior to utilisation for construction purposes, such that the roads can be maintained in a condition similar to their former status, and reinstated after construction use.	Prior to road use	Contractor	Consulting Engineers

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B4. Site, Haul Roads &amp; Access Route Establishment</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	B4.2.2 Photographic and / or video evidence of the roads must be taken prior to construction use to support the defined status.	Prior to road use	Contractor	Consulting Engineers
	Temporary (new) roads			
	B4.2.3 The current land / landuse status is to be defined by agreement prior to road creation.	Prior to road creation	Contractor	CE / EAPs
<b>B4.3 Creating New Roads</b> <i>Sound environmental principles must be followed whilst establishing access to the site.</i>	B4.3.1 New haul roads and access routes may only be created once all land legal negotiations are successfully concluded and the relevant land owners consent is obtained, and once environmental approval (if required) is obtained.	Prior to road creation	Contractor	Consulting Engineers
	B4.3.2 Any new intersections of haul roads are to meet the KwaZulu-Natal Department of Transport safety and visibility requirements (even if only temporary).	Prior to road creation	Consulting Engineers	KZN DoT
	B4.3.3 Roads should be routed to follow natural contours to reduce storm-water erosion.	Road creation	Contractor	ECO
	B4.3.4 The removal of trees is to be avoided, and if tree removal becomes necessary then permission from the landowner, EAPs and Consulting Engineers is necessary.	Road creation	Contractor / Consulting Engineers	EAPs
	B4.3.5 The location of all underground services and servitudes must be identified and confirmed, and service providers are to be notified of any potential service clashes. These providers may have additional requirements.	Prior to road creation	Contractor	Consulting Engineers
	B4.3.6 Choice of access routes should take into account minimum disturbance to residents.	Road creation	Contractor	ECO
	B4.3.7 Temporary haul roads are to be constructed to engineering standards, and should minimise the need for cut and fill activities, topsoil stripping/ compaction, and avoid land use fragmentation or security risk to the occupiers of the land in question.	Road creation	Contractor	Consulting Engineers
	B4.3.8 All temporary haulage roads shall have formal drainage systems to engineering standards such as side drains and mitre drains to prevent erosion and sedimentation.			
	B4.3.9 All temporary roads must allow for the natural flow of water where required.			
	B4.3.10 Road widths and radii of curves are to be reduced to minimum required.			
	B4.3.11 Security of adjacent or traversed properties is to be retained at all times, and temporary fences are to be erected along the access routes if necessary.			
	B4.3.12 New roads that dissect a property are to allow for land owner crossing points.			
	B4.3.13 Vehicle access / turning circles and plant parking areas are to be hardened off to prevent soil contamination from oil / fuel leaks. No turning manoeuvres other than at designated places shall be permitted.			

<b>B. PRE-CONSTRUCTION PHASE</b>				
<b>B4. Site, Haul Roads &amp; Access Route Establishment</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	B4.3.14 Wherever possible, temporary access routes are not to be stripped of topsoil and confined to a two wheel track (single).			
<b>B4.4 Notice Board Requirements and Photographs</b>	B4.4.1 Project notice boards naming the project team, and describing the nature and duration of activities are to be strategically placed along construction access routes.	Road & route establishment	Contractor	ECO
	B4.4.2 Appropriate construction and warning signboards are to be strategically placed along the construction access routes.			
	B4.4.3 These boards are not to obstruct visibility on the public roads, or driveway access to private properties.			
	B4.4.4 Photographs of the condition of the site must be taken prior to road and route establishment and construction. Photographs of private residential properties bordering the project site must be taken before the commencement of construction so that potential damage during construction can be determined. Photographs of fences and walls of private properties must be taken before any proceeding with any blasting activities – See Communications Plan.	Road & route establishment	Contractor	ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C1. Health, safety and awareness practices</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>C1.1 General Awareness</b> <i>All contractors are to be familiar with the OHS Act, and the local authority bylaws regarding health and safety.</i>	C1.1.1 All activities undertaken on this project are to be in compliance with the general Code of Conduct (refer <b>Table B1</b> ) and the relevant legislation. All Contractors are to be familiar with the Occupational Health and Safety Act, Act No 85 of 1993 (OHSA).	Legislation/Code to be consulted prior to the onset of the project.	Contractor	ECO
	C1.1.2 The Developer is to ensure that suitable appointments are made to fulfil the roles required by the CP, and that the general public and IAPs remained informed of the project status and progress, and its possible impacts on properties or transport routes.	Prior to construction	Developer	ECO
	C1.1.3 The Contractor is responsible for on-going communication with those people that are interested / affected by the project with regards to construction fronts affecting their properties, planned service / access disruptions, road deviations, and blasting or other dangerous activities.	For the duration of the activity	Contractor/Developer	ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C1. Health, safety and awareness practices</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	Communication strategies are dealt with in the Communications Plan.			
	C1.1.4 IAPs need to be made aware of the existence of the complaints book and the methods of communication available to them ( <b>Communications Plan</b> ).	Prior to construction in their area	Developer	ECO
<b>C1.2 Record Procedures</b>	C1.2.1 An Environmental Incident Report File (EIRF) and a Complaints Register are to be provided at all site office(s) for the recording of all environmental incidents / complaints (refer to the Glossary). These should be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. All new incidents are to be tabled during monthly site meetings.	At the onset of construction	Contractor	ECO
	C1.2.2 The EIRF is for the recording of all environmental incidents (refer Glossary) encountered on site, and is to document the exact nature of the environmental incident, the management team or contractor responsible for the activity, the timing and duration of the event, witnesses to the event, and the exact response action applied, including a list of those notified of the problem. The EIRF is also to be made available to the DAEARD and ECO on request.			
	C1.2.3 The Complaints Register is to be made available for the general public to record any concerns or complaints made regarding the construction activities, and is to document the nature of the complaint, the duration and timing of the problem, and the contact details of the complainant. It is also to include a section for the documentation of the action taken to address the complaint.			
<b>C1.3 Reporting Procedures</b> <i>This section does not exempt anyone from the Occupational Health and Safety Act, Act No. 85 of 1993 (OHSA), or any other legislation regarding health and safety during</i>	Environmental incidents and emergencies on site			
	C1.3.1 The EIRF is to be completed by the Contractor (ESO) in the event of an environmental incident or accident. The ESO is to immediately inform the ECO and RE of any environmental incident and request remedial advice.	Immediately	Contractor	ECO
	C1.3.2 The ECO is to immediately communicate any site incidents or accidents requiring further action to the responsible parties and relevant authorities, and is to follow up on any actions required.	Immediately	ECO	DAEARD
	C1.3.3 Once an incident or accident has been addressed, the ESO is to close out the entry in the EIRF.	On addressing the problem	Contractor	ECO
	C1.3.4 The ECO is to document any incidents / emergencies in the monthly audit, together with the remedial action taken, as described in the EIRF.	Monthly	ECO	DAEARD
	I&AP complaints			

<b>C. CONSTRUCTION PHASE</b>				
<b>C1. Health, safety and awareness practices</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<i>any of the construction activities.</i>	C1.3.5 Queries and complaints are to be handled by: documenting details of such communication in the Complaints Register; bringing issues to the Contractor's and Engineer's attention immediately; detailing the management team or contractor responsible for the activity, the timing and duration of the event, witnesses to the event, taking remedial action as per Engineer's instruction; including a list of those notified of the problem.	Launch investigations immediately and provide a response to the complainant within 7 days of first recording the incident.	Contractor/Consulting Engineers	ECO
	C1.3.6 All complaints are to be investigated and a response given to the complainant within 7 days. The ECO must follow up to ensure that the complaints have been attended to.			
<b>C1.4 Emergency Equipment</b>	C1.4.1 Emergency contact details for the local hospital, fire brigade, and police department are to be posted in the site office near a telephone. A list of contact details for the ECO, RE and relevant authorities must be made available at the site office for the ESO.	From the onset of construction	Contractor	ECO
	C1.4.2 Fire extinguishers and safety equipment (in terms of the OSH Act) are to be strategically placed at the site office / camp, pipe yards, and on site where required. All staff must be aware of their locations and purposes, and trained in their basic use.			
	C1.4.3 First Aid Kits are to be strategically placed at the site office / camp, pipe yards, and on site where required. All staff must be aware of their locations and purposes, and trained in their basic use.	From the onset of construction	Contractor	ECO
	C1.4.4 Material Safety Data Sheets (MSDSs) must be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.			
<b>C1.5 Emergency Plans</b>	C1.5.1 Evacuation Plans are to be determined by the Contractor and explained to all staff at the site office / camp, working at the pipe yards, or working on site. These plans are to be appropriately displayed showing evacuation routes and assembly points.			
	C1.5.2 Contingency Plans for the evacuation of severely injured staff to designated medical facilities are to be determined.			
	C1.5.3 Emergency procedures for fuel / oil / hazardous waste spills, or environmental pollutants are to be determined. Spills are to be cleaned immediately and the contaminated soils disposed of in accordance with legislation at a licensed hazardous waste disposal facility. Any soil that cannot be removed is to be treated <i>in situ</i> as determined by the ECO. Any spills in excess of 200 litres are to be reported to the DAEARD oil spills response unit, DWA, and the Developer.			

<b>C. CONSTRUCTION PHASE</b>				
<b>C1. Health, safety and awareness practices</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>C1.6 Cathodic Protection</b>	C1.6.1 All necessary and adequate electrical shock prevention and protection mechanisms (such as cathodic protection) must be installed during construction of the pipeline, and must take into consideration nearby power lines and other sources of electricity.			
	C1.6.2 All contractors working on or near the pipe to be made aware of the potential for electrical shock under certain conditions, and the precautions to be taken.			

<b>C. CONSTRUCTION PHASE</b>				
<b>C2. Vehicle / Plant &amp; Materials Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>C2.1 Vehicles / Plant</b>	Vehicle and plant storage			
	C2.1.1 All plant is to be stored within the designated secure area of the site office when not in use. No unauthorised access to the machinery is permitted. Signs are to warn of the penalties of trespassing.	From the onset of the activity for the duration of the activity.	Contractor	ECO
	Vehicle and plant use			
	C2.1.2 If any vehicles / machinery are refuelled on site, then refuelling is to be undertaken utilising suitable spill trays, functional dispensing equipment and staff trained in the proper handling on the dispensing equipment. All pre-cautions shall be taken to not pollute the surrounding environment. Refuelling shall not occur within 32 metres of a bank of a drainage line, stream or river, nor shall refuelling occur within the 1:100 year flood plain of an identified wetland.	From the onset of the activity for the duration of the activity.	Contractor	ECO
	C2.1.3 All vehicle / plant shall be maintained in good working order and vehicle service histories are to be kept up to date to reduce potential noise and air pollution from vehicle emissions. All vehicles and plant are to be provided with a service pan/spill tray which must be used to trap fuel leaks in the event of a breakdown.	From the onset of the activity for the duration of the activity.	Contractor	ECO
	C2.1.4 No washing of vehicles / plant is permitted in any area other than the area of the site office designated for minor vehicle maintenance and refuelling.	At any time.	Contractor	ECO



C. CONSTRUCTION PHASE				
C2. Vehicle / Plant & Materials Management				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C2.1.5 Only very limited vehicle / plant maintenance and basic repair is permitted on site. This is to occur only in the designated area of the site office / camp, unless not practically possible. Should minor repair work occur <i>in situ</i> , it is to be conducted over a spill trays / service pans to prevent soil contamination and pollution of the surrounding environment.	From the onset of the activity for the duration of the activity.	Contractor	ECO
	C2.1.6 All spare parts for machines / vehicles are to be stored in a manner preventing soil / water contamination.	At all times.	Contractor	ECO
	C2.1.7 Vehicles transporting overburden spoil or any extraneous material such as rock mixed with sand or fine grained materials must have covered loads to prevent dangers to other road users (dust, falling sand / rocks). Rocks transported alone will not require cover.	From the onset of the activity for the duration of the activity.	Contractor	ECO
	C2.1.8 Vehicles shall adhere to demarcated access routes, and shall not traverse veld, grasslands, wetlands, water courses or forests.	At all times.	Contractor	ECO
	C2.1.9 Vehicles / plant may not park along the roadside in such a way that they obscure visibility to road users or anyone wishing to leave or enter the site office or working corridor.	At any time.	Contractor	ECO
	C2.1.10 Vehicles travelling along dirt roads must reduce speed to avoid creating excessive dust.	Ongoing.	Contractor Consulting Engineers	ECO
<b>C2.2 Hazardous Substances</b>	Emergency events			
	C2.2.1 The emergency numbers in <b>Section C1</b> should be consulted should any accidents / spillages of hazardous substances and / or materials take place. The Contractor is to submit a <b>Method Statement</b> for the dealing of <b>Accidents / Spillages of Hazardous Materials</b> . This statement must be submitted to the Engineer as well as to DWA.	Emergency situations, Spills	Contractor	ECO
	C2.2.2 All emergencies or incidents regarding the transport, storage or handling of fuels, oils, and hazardous substances are to be dealt with as described in <b>Section C1</b> . Emergency equipment / supplies are to be available as detailed in <b>Section C1</b> .	In any emergency.	Contractor	ECO
	Hazardous substance transport & dispensing			
	C2.2.3 Contractors and delivery drivers concerned with all hazardous or potentially polluting material are to be registered and authorised in the handling of such material and in the emergency procedures outlined in <b>Section C1</b> . Substances are to be appropriately packaged for transport.	Prior to site access.	Contractor	ECO

## C. CONSTRUCTION PHASE

### C2. Vehicle / Plant & Materials Management

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C2.2.4 The ESO is to request notification in advance of delivery dates, and is to be available in the event of an incident.	Prior to delivery.	Contractor	ECO
	C2.2.5 Under no circumstance will any vehicle transporting or working with hazardous substances, concrete, asphalt or any other bituminous product be permitted to be washed on site.	At any time.	Contractor	ECO
	C2.2.6 All products to be dispensed from large drums shall be done so using appropriate equipment and not by tipping the drum.			
	C2.2.7 Dispensing of hazardous substances shall only occur utilising suitable spill trays, functional dispensing equipment and staff trained in the proper handling on the dispensing equipment. All pre-cautions shall be taken to not pollute the surrounding environment. Dispensing shall not occur within 32 metres of a bank of a drainage line, stream or river, nor shall dispensing occur within the 1:100 year flood plain of an identified wetland.			
	Hazardous substance storage			
	C2.2.8 Hazardous substances shall be stored on an impermeable surface with a bunding wall in a secure (locked) facility. Chemicals defined in the Regulations for Hazardous Chemical Substances in the OHS Act, Annexure A shall be stored in secondary containers in such facilities.	For the duration of site activities.	Contractor	ECO
	C2.2.9 <b>Material Safety Data Sheets</b> (MSDS) for all hazardous substances shall be available on site. Procedures detailed in the MSDSs shall be followed in the event of an emergency.			
	C2.2.10 Should hazardous substances be stored on site, an adequate quantity of materials capable of encapsulating / absorbing a fuel or oil spill (spill kits) is to be provided at the storage and dispensing areas. The material should be capable of handling a spill of at least 200 litres. Oil absorbent fibres are to be stocked for containing oil spills in water.			
	Hazardous substance use			
	C2.2.11 The Contractor shall comply with all relevant national, regional and local legislation with regards to the transport, use and disposal of hazardous substances.	At all times.	Contractor	ECO
C2.2.12 The Contractor is responsible for training personnel on site (who shall be handling hazardous substances) about their proper use, handling and disposal, and shall provide the necessary safety gear and equipment. Hazardous substances are to be kept under lock and key.	At all times.	Contractor	ECO	

## C. CONSTRUCTION PHASE

### C2. Vehicle / Plant & Materials Management

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C2.2.13 Hazardous substances are to be handled and used in accordance with the manufacturer's recommendations and the OHS Act. Operators must wear suitable safety clothing.	At all times.	Contractor	ECO
	C2.2.14 All concrete mixing must take place on a designated, impermeable surface (hardened surface, liners or mixing trays). All concrete spilled outside this area must be promptly removed. All concrete waste must be removed from site and disposed of at an appropriate waste disposal facility.			
	C2.2.15 Storm water must not be allowed to flow through the concrete batching/mixing area. Water laden with cement must be collected in a retention area for evaporation and not allowed to escape the batching area (no contaminated water is to be allowed to enter the environment). Cement waste and washings shall not enter any drainage line, stream, river or wetland.			
	C2.2.16 No hazardous substance (or concrete) mixing tools are to be washed in any area other than the specified hazardous substance area, where the contaminated water must be appropriately disposed of.	At all times.	Contractor	ECO
	C2.2.17 Lime and other powders must not be mixed during excessively windy conditions.	Windy conditions.	Contractor	CE / ECO
	C2.2.18 Spraying of herbicides / pesticides shall not take place under windy conditions and must comply with OHSA specs and other chemical handling laws.	Windy conditions.	Contractor	ECO
	Hazardous substance disposal			
	C2.2.19 Hazardous substances are to be disposed of as hazardous waste (see below) in accordance with the relevant legislation.	At all times.	Contractor	ECO
<b>C2.3 Pipe, Bedding Materials, Fabrication Materials, Soil, Sand, Rock &amp; Spoil</b> <i>Materials must be sourced in a legally compliant</i>	Materials transport			
	C2.3.1 Appropriate vehicles are to be used for the transport of materials to or around site. These are to comply with Section C2.1. All loads are to be secured and covered when necessary.	At all times.	Contractor	ECO
	C2.3.2 Drivers and material handlers are to be appropriately clothed, trained and equipped for dealing with the material in question.			
	Stockpile location restrictions			
	C2.3.3 Stockpiles of any kind are restricted to the pipe yards, site office / camp areas and the working corridor. Stockpile locations must be considerate of environmental concerns such as proximity to	At all times.	Contractor	CE / ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C2. Vehicle / Plant &amp; Materials Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<i>and sustainable manner to prevent off-site environmental degradation.</i>	water bodies, and social concerns such as visibility requirements or dust issues.			
	C2.3.4 Stockpiles shall not be placed in a manner that obstructs vehicle visibility or drivers' line of site, especially when working near intersections and sharp corners.			
	C2.3.5 Stockpiles shall not be placed in a manner that is visually displeasing. Where possible, stockpiles should be created in areas out of view of neighbouring residents or passing traffic. Where this is not possible, unsightly stockpiles should be screened.			
	C2.3.6 Stockpiles shall not be situated such that they obstruct natural water pathways, in the direct flow path of surface water, near streams, rivers or wetlands, or immediately adjacent to dust hotspots. Materials must not be stored in unstable/high risk areas e.g. floodplains or on steep slopes. Specific stockpile controls apply to Flagged Resource areas.	At all times.	Contractor	CE / ECO
	C2.3.7 Stockpiles must not be placed in road or municipal drainage systems.			
	C2.3.8 When working in or around drainage lines and seepage areas, excavated soils must be placed on the upslope of the trench to avoid any possible transport of soils into adjacent wetland areas.	When working near drainage lines.	Contractor	ECO
	C2.3.9 When working in any wetland areas, stockpile activities are to comply with the specifications of the wetland in question (usually top-side of the trench adjacent to a wetland environment, and always outside of the delineated seasonal and permanent wetland areas).	When working in wetland areas.	Contractor	ECO
	Stockpile management			
	C2.3.10 Topsoil, subsoil, rocky material, bedding material and spoil, are all to be stockpiled separately, and topsoil stockpiles are to comply with the requirements below ( <b>Section C.4</b> )	At all times.	Contractor	ECO
	C2.3.11 Material stockpiles or stacks, such as pipes must be stable and well secured to avoid collapse and possible injury to site workers / local residents. These should always be within a barricaded area.			
	C2.3.12 Soil stockpiles must not exceed 2m in height, and topsoil stockpiles must not exceed 1.5m in height.			
	C2.3.13 If loose material stockpiles are likely to be exposed to extended periods of windy conditions or heavy rain, they should be vegetated. Stockpiled soil should also be protected using erosion-control berms / bunds if exposed for more than 14 days during the wet season.	As this becomes necessary.	Contractor	ECO

## C. CONSTRUCTION PHASE

### C2. Vehicle / Plant & Materials Management

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C2.3.15 Stockpiles should be kept clear of weeds and alien invasive vegetation growth by regular weeding, or herbicides if permitted (restrictions on herbicide use for topsoil stockpiles is to the discretion of the ECO with advice from the biodiversity specialist).	At all times, with greater controls in Spring / Summer.	Contractor	ECO
	C2.3.16 Stockpiled soil must allow for adequate drainage. The soil stockpile gradients are not to exceed the soils natural angle of repose, and no hazardous slopes are to be created.	At all times.	Contractor	ECO
	Materials disposal			
	C2.3.17 Spoil is to be handled and disposed of as indicated in the <b>SDMP</b> . Hard Plinthite or Ferricrete is to be disposed to landfill sites, and should be covered by a minimum of 50cm of subsoil or similar covering material. Ferricrete may also be used to reinstate areas previously occupied by said Ferricrete, but only at the appropriate depth and thickness at which it was found.	At all times.	Contractor	ECO
	C2.3.18 Builder’s rubble, contaminated soil / sand and unwanted materials are to be disposed of in accordance with the waste disposal requirements below (refer to <b>Section C2.5</b> ).			
<b>C2.4 Topsoil</b>	Topsoil stockpiling			
	C2.4.1 Topsoil must be stockpiled separately from subsoil and rocky material in accordance with Section C2.3. Topsoil stockpiles must not be contaminated with subsoil or any waste material or pollutants. If mixed with subsoil, the topsoil may lose its usefulness in site rehabilitation.	At all times.	Contractor	ECO
	C2.4.2 Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. Topsoil obtained from different sites of different soil types must not be mixed.			
	C2.4.3 Stockpiled topsoil must not be compacted, and therefore may not exceed 1.5 metres in stockpile height.			
	C2.4.4 Vehicles / plant are to be prohibited from driving across or onto topsoil stockpiles, as this will result in compaction and damage to the soil structure.			
	C2.4.5 Topsoil stockpiles that may be exposed for more than 2 months are to be seeded with indigenous grasses, or covered with a suitable fabric to reduce erosion, as approved by the ECO.			
	C2.4.6 Topsoil is to be maintained in a weed free condition, and alien invasive plants colonising the stockpiles are to be removed immediately. Herbicides and poisons may not be used on stockpiled materials unless otherwise stated by the ECO with advice from the Biodiversity Specialist.	At all times, with greater controls in Spring / Summer	Contractor	ECO

## C. CONSTRUCTION PHASE

### C2. Vehicle / Plant & Materials Management

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	Topsoil handling	At all times.	Contractor	ECO
	C2.4.7 Topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.			
	C2.4.8 Topsoil is to be placed loosely as the final soil layer in site reinstatement.			
	C2.4.9 Topsoil is to be replaced by direct return (replaced immediately on the same area from which it was sourced following reinstatement of the trench / site / yard) along the contour.			
<b>C2.5 Waste</b>	Waste facilities	At the onset of construction.	Contractor	ECO
	C2.5.1 Designated facilities for builder's rubble, hazardous waste, and general waste as provided for in the site office areas (refer to <b>Table B3</b> ) are to be used for the storage of the appropriate waste products. These areas are to meet the requirements in <b>Table B3</b> .			
	C2.5.2 In addition to the waste areas required at the site offices, provision must be made for waste receptacles to be placed at intervals along the working corridor at the active fronts.			
	C2.5.3 Animal- and weather-proof bins designed to prevent re-dispersal of collected waste are to be strategically placed on site.	At all times.	Contractor	ECO
	C2.5.4 Recycling is to be encouraged by providing separate receptacles for different types of waste wherever possible and making sure that staff are aware of their uses.			
	C2.5.5 The site offices, working corridor or any other area associated with this project are to be kept free of litter - the site shall be cleared of litter at the end of each working day.			
	C2.5.6 Bins are to be emptied into skips in the designated waste storage areas every night.	At all times.	Contractor	ECO
	C2.5.7 The refuse in the skips housed within the waste storage areas is to be regularly disposed of at appropriate waste disposal and recycling facilities (landfill sites are listed in <b>Section F</b> ). Where possible, refuse removal should be negotiated with the municipal refuse service. The recycling of waste material is encouraged.			
	C2.5.8 Burying or burning of general waste is prohibited.	At all times.	Contractor	ECO

## C. CONSTRUCTION PHASE

### C2. Vehicle / Plant & Materials Management

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C2.5.9 Waybills or certificates proving disposal at approved facilities shall be retained for record purposes and audit inspections.			
	C2.5.10 All waste material prior to being collected for safe disposal, must be stored under cover within a designated waste collection/storage area	At all times.	Contractor	ECO
	C2.5.11 Storage of material, chemicals, fuels etc must not pose a risk to the surrounding environment and this includes surface and groundwater. Such storage areas must be located outside the 1:00 year floodline of any watercourse and must be fenced to prevent unauthorised access into the area.	At all times.	Contractor	ECO
	Builder’s rubble practices and disposal			
	C2.5.12 The entire works area must be cleared of all pieces of wire, metal, wood, concrete fragments or other matter foreign to the natural environment before rehabilitation commences.	Prior to rehabilitation of a section.	Contractor	ECO
	C2.5.13 Builder’s rubble is to be regularly removed from the working corridor, and stored in the appropriate location of the site office / camp until it is disposed of at a suitable waste disposal facility specifically for this purpose.	At all times.	Contractor	ECO
	C2.5.14 Burying or burning of builder’s rubble is prohibited.	At all times.	Contractor	ECO
	C2.5.15 Waybills or certificates proving disposal at approved facilities shall be retained for record purposes and audit inspections.			
	C2.5.16 Spoil is to be handled, reused and disposed of in accordance with the <b>SDMP</b> .			
	Hazardous waste practices and disposal			
	C2.5.17 All concrete waste is to be removed to a facility approved by Durban Solid Waste or listed in <b>Section F</b> .	At all times.	Contractor	ECO
	C2.5.18 Contaminated soil must be treated as hazardous waste and must be stored in sealed bags / containers in the hazardous waste areas, and disposed of at a permitted hazardous waste disposal site, and the area rehabilitated immediately.	Disposed of as required.	Contractor	ECO

## C. CONSTRUCTION PHASE

### C2. Vehicle / Plant & Materials Management

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C2.5.19 Hazardous waste is to be contained and transported as required by the relevant legislation, and is to be labelled and stored in sealed drums or approved containers in the designated hazardous waste areas of the site offices until it is disposed of at a licensed hazardous waste facility. The hazardous waste area is to be kept under lock and key.			
	C2.5.20 Burying or burning of hazardous waste is strictly prohibited.	At all times.	Contractor	ECO
	C2.5.21 Waybills or certificates proving disposal at permitted hazardous waste disposal facilities are to be retained for record purposes and audit inspections ( <b>Section F</b> ).			
	C2.5.22 Septic tank systems and chemical toilets are to be hygienically serviced and maintained, and waste is to be collected and disposed of by an appropriate service provider.			
	C2.5.23 Contaminated/hazardous materials are to be disposed off at a permitted hazardous landfill site that is authorised to accept such waste material so not to cause any surface and groundwater pollution or health hazard.	At all times.	Contractor	ECO
	C2.5.24 Temporary bunds must also be constructed around chemical or fuel storage areas to contain possible spillages.	At all times.	Contractor	ECO
	Liquid Waste			
	C2.5.25 All chemical / fuel / oil spills must be contained and cleaned up by the supplier or professional pollution control unit. All spills to be dealt with as stipulated in <b>Table C1</b> .			
	C2.5.26 All liquid waste (spent oils, fuels, hazardous chemicals, and domestic liquid wastes) is to be stored in sealed and labelled drums or approved containers in the designated hazardous waste area of the construction camp until it is disposed of at the appropriate waste disposal facilities (refer <b>Section F</b> ).	Disposed of as required.	Contractor	ECO
	C2.5.27 Contaminated sand and water from wash slab drainage and repair areas, work-rags and waste fuel / oil is to be disposed of at an appropriate wastewater or hazardous waste facility. Water containing waste must not be discharged into the natural environment.			
	C2.5.28 All vehicles / plant must be parked or serviced in the designated area of the site office. All vehicles are to be equipped with pans / drip trays for emergency repair on site, the contents of which are to be treated as liquid waste.	At all times.	Contractor	ECO



<b>C. CONSTRUCTION PHASE</b>				
<b>C2. Vehicle / Plant &amp; Materials Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C2.5.29 Waybills or certificates proving disposal at permitted wastewater or hazardous waste disposal facilities are to be retained for audit inspections ( <b>Section F</b> ).	At all times.	Contractor	ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C3. Infrastructure / Facility Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>C3.1 Roads &amp; Site Access</b>	Haulage Roads			
	C3.1.1 Contractors shall ensure that all side and mitre drains and scour check walls on access and haul roads are functioning properly and are well maintained.	Weekly and after heavy rains	Contractor	CE
	Access Roads			
	C3.1.2 Contractors should ensure that access roads are maintained and in good condition by attending to potholes, corrugations and storm-water damage as soon as these develop.	Weekly inspection.	Contractor	CE
	C3.1.3 If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have been spilt or dislodged from tyres.	When necessary.	Contractor	ECO
	C3.1.4 Unnecessary compaction of soils by heavy vehicles must be avoided; construction vehicles must be restricted to demarcated areas, haulage routes and turning areas.	Ongoing.	Contractor	ECO
	C3.1.5 Cognisance of vehicle weight / dimensions must be taken when using access constructed out of certain materials (e.g. paved surfaces / cobbled entranceways).	Ongoing.	Contractor	CE
	C3.1.6 Gravel or dirt access roads, or routes across site where the vegetation has been cleared must be dampened periodically or covered in cut vegetation to avoid excessive dust.	Twice daily in dry weather (min).	Contractor	ECO
<b>C3.2 Pipe yards &amp; Site Office / Camp</b>	Perimeter controls			
	C3.2.1 Should a firebreak around the perimeter of the yards or sites be necessary (firebreaks are recommended for the pipe yards), then approvals from KZN Wildlife / eThekweni municipality and other subsequent authorities are required, and the local fire department is to be notified of the intentions.	Prior to burning.	CE / Contractor	ECO

## C. CONSTRUCTION PHASE

### C3. Infrastructure / Facility Management

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C3.2.2 Burning is to be undertaken under the supervision of experienced professionals and in consultation with the relevant authorities at an appropriate time of year, and during appropriate climatic conditions.	Appropriate season and weather.	CE / Contractor	ECO
	C3.2.3 During spring and summer any firebreaks must be maintained by mowing and removing all mown material from within the break. During Autumn, as soon as conditions become favourable to create a clean burn, the firebreak must be burnt.	Season dependent.	CE / Contractor	ECO
	C3.2.4 In an event that a clean burn is not achieved the break must be mown and all cut material removed.	Firebreak maintenance	CE / Contractor	ECO
	C3.2.5 Landowners and neighbours are to be notified of such activities well in advance, as required by the CP.	Timeously (at least 7 days)	CE / Contractor	ECO
	Security			
	C3.2.6 Construction site security is the responsibility of the Contractor. In the absence of a guard during working hours, the contractor will be responsible for controlling pipe yard, site office and site access.	Ongoing.	Contractor	CE / ECO
	C3.2.7 Site Offices should be fenced, gated and manned to control the access of persons to the site.			
	C3.2.8 Lighting on site is to be set to provide maximum security and to enable policing of the site without creating a visual nuisance to local residents or businesses.			
	Activities			
	C3.2.9 Access routes and haul roads to pipe yards and site offices are to comply with the relevant sections of this EMP.	At all times.	Contractor	ECO
	C3.2.10 Layout and facilities of pipe yards and site offices are to comply with the relevant sections of this EMP.			
	C3.2.11 Storm-water and erosion control measures as described in the relevant sections of this EMP are to be applied to site offices.			
	C3.2.12 Materials storage and waste management at site offices are to comply with the relevant sections of this EMP.			

<b>C. CONSTRUCTION PHASE</b>				
<b>C3. Infrastructure / Facility Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C3.2.13 Anybody (all staff) involved in this project is required to adhere to the Code of Conduct, and visitors to facilities or site are to be inducted and escorted, and must wear safety gear.			
	Eating areas			
	C3.2.14 All litter should be picked up and placed in the bins provided.	Daily.	Contractor	ECO
	C3.2.15 Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.	Daily.	Contractor	ECO
	C3.2.16 No open fires are permitted in the site office area unless an equipped area has been allocated for such use. Provision for any cooking areas and open fires must be made away from fuel / chemical storage areas, and are to be kept free of rubbish and scraps that may attract pests to the area. All food scraps are to be stored in animal proof containers, and removed to an appropriate waste disposal facility.	At all times.	Contractor	ECO
	C3.2.17 The Contractor should make alternative arrangements (other than fires) for cooking and / or heating requirements. LPG gas cookers may be used provided that all safety regulations are followed.			
	Housekeeping			
	C3.2.18 The site office / camp and working areas are to be kept clean and tidy at all times.	At all times.	Contractor	ECO
	C3.2.19 An accessible area of the camp is to be designated for the reception of material deliveries. Signboards are to identify the delivery activity area, and warn of any dangers.	At onset of construction	Contractor	ECO
	C3.2.20 Storage facilities are to be kept tidy, be well sign posted, and are to house the necessary emergency / fire fighting equipment.	At all times.	Contractor	ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>C4.1 Soil</b>	Conservation of valuable soil resources			

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>Erosion</b> <i>The stripping of vegetation greatly increases the risk of soil erosion. Soil erosion not only reduces the potential of successful on site rehabilitation, but also causes sedimentation of water bodies with resulting impacts to offsite environmental assets.</i>	C4.1.1 Conservation of soil resources applies to the entire lifecycle of the project from site set up, to construction and rehabilitation, and it applies to any activity that requires the disturbance to soil, including access road, site office establishment, and activities in the working corridor.	Lifecycle and all activities	Contractor	ECO
	C4.1.2 Vegetation clearing shall only commence on the active fronts or at the site office sites immediately prior to works. The full length of the works shall not be stripped of vegetation, but rather smaller portions immediately ahead of progress.	Immediately prior to works.	CE / Contractor	ECO
	C4.1.3 The time that stripped areas are left open to exposure should be minimised wherever possible. Care should be taken to ensure that lead times are not excessive, and clearing activities should not occur immediately prior to long weekends or holidays unless soil erosion control measures will be applied prior to shutdown periods.	Clearing activities to be scheduled.	Contractor	ECO
	C4.1.4 Wind screening and erosion controls should be applied to prevent soil loss from the site areas, stockpiles and access roads.	Whenever necessary.	Contractor	ECO
	C4.1.5 Storm-water controls and erosion control mechanisms should be applied where necessary to prevent soil loss from site areas, stockpiles and access roads.			
	C4.1.6 Once an area has been cleared of vegetation, the top layer (nominally 150mm) of soil (topsoil) should be removed and stockpiled separately for reuse in rehabilitation.			
	C4.1.7 Material considered as "Spoil" (not reused on site during rehabilitation) but suitable for reuse in other projects is to be stockpiled separately and used in accordance with the <b>SDMP</b> .			
	C4.1.8 Top-soiling and re-vegetation of all areas of site shall commence immediately after the completion of an activity.	Immediately after reinstatement.	Contractor & Rehab Specialist	ECO
	C4.1.9 Cut and fill embankments must not be steeper than previous natural slopes unless otherwise permitted by the Engineer. Cut and fill embankments steeper than previous ground levels shall be protected against erosion using stabilisation measures.	Immediately.	Contractor	ECO
<b>C4.2 Storm Water</b> <i>Serious financial and environmental impacts can be</i>	Storm Water systems design			
	C4.2.1 Storm-water systems are to be designed for all areas of site: site office and the working corridor.	At any time.	Contractor	CE
	C4.2.2 The use of high velocity storm water pipelines should be avoided in favour of open, high friction, semi-permeable channels wherever feasible.			

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<i>caused by unmanaged storm water. Construction activities frequently result in diversions of natural water flow resulting in concentration of flow and an increase in the erosive potential of the water. Measures in this section are aimed at reducing the erosive potential of storm water.</i>	C4.2.3 A number of smaller storm water outfall points should be constructed rather than a few large outfall points.			
	C4.2.4 Storm water outfalls should be designed to reduce flow velocity and avoid stream bank and soil erosion, or wetland siltation.			
	C4.2.5 All embankments, unless otherwise directed by the Engineer, shall be protected by a cut off drain to prevent water from cascading down the face of the embankment and causing erosion.			
	Storm Water systems management			
	C4.2.6 During site establishment, storm water culverts and drains are to be located and covered with metal grids to prevent blockages if deemed necessary by the Engineer (e.g. due to demolition work).	Site establishment.	Contractor	CE / ECO
	C4.2.7 There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.	Ongoing.	Contractor	CE / ECO
	C4.2.8 Stockpiles of earth, stone and rubble may not obstruct natural pathways over the site. i.e. these materials must not be placed in storm water channels, drainage lines or rivers.	At any time.	Contractor	CE / ECO
	Storm water detention ponds			
	C4.2.9 Peak storm water discharge should not be increased with development of the site / area. Storm water should be detained on site through the use of storm water detention ponds wherever possible. A series of detention ponds may be required where flow volumes are high.	Ongoing.	Contractor	CE / ECO
	C4.2.10 The detention ponds must not block the water flow, but should encourage spreading of the flow over a wider area to reduce velocity and encourage filtration.	Ongoing.	Contractor	CE / ECO
	Flow controls			
	C4.2.11 Un-channelled flow (sheet flow) must be controlled using erosion control techniques. For example, rows of straw / hay or bundles of cut vegetation can be installed along the contours at predetermined intervals to slow surface wash and capture eroded soil. The spacing between rows will be dependent on slope.	As required.	Contractor	CE / ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C4.2.12 Where surface runoff is concentrated (e.g. along exposed tracks), flow should be slowed using various engineering means, such as mitre drains, or by inserting water directing 'speed' humps (or berms) along the track to channel water into small detention ponds or areas protected with hay bales for flow reduction and sediment capture.	As required.	Contractor	CE / ECO
	C4.2.13 Cofferdams will be created when construction is taking place within riparian area. All work will be confined within the coffer dam. There will be no stockpiling of material out of the working space.	Ongoing.	Contractor	CE / ECO
<b>C4.3 Water Quality</b> <i>Incorrect handling of substances can lead to pollution that has serious negative effects on surface and groundwater quality. Mismanagement of polluted run-off from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to water quality.</i>	Pollution prevention			
	C4.3.1 Site staff shall not be permitted to use any water-course or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction related activities. Municipal water (or another source approved by the Engineer) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.	Regular monitoring.	Contractor	ECO
	C4.3.2 Storage areas that contain potential pollutants, waste or hazardous substances must be bunded with an approved impermeable liner, and capacity to contain 150% of the stored material.	From the onset.	Contractor	ECO
	C4.3.3 Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area immediately to minimise pollution risk and reduced bunding capacity. Emergency contact numbers are provided in <b>Section F</b> to deal with spillages / contamination. Incidental spills must be recorded.	Immediately.	Contractor	ECO
	C4.3.4 Spill Contingency or Emergency Response Plan must be drawn up and should include the following actions that need to be taken into account in the event of a spill: 6.7.1) Stop the source of the spill 6.7.2) Contain the spill 6.7.3) All significant spills must be reported to DWA and other relevant authorities.	Prior to construction.	Contractor	ECO
	C4.3.5 Every effort should be made to ensure that any chemicals, hazardous substances or liquid waste do not contaminate the soils or ground water on site.	At all times.	Contractor	ECO
	C4.3.6 Activities and vehicles / plant are to be managed to reduce possible pollutants from entering surface or ground water resources.	At all times.	Contractor	ECO
	C4.3.7 Provision should be made for all polluted runoff to be treated to the Engineers approval before	Prior to construction.	Contractor	ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	being discharged into the storm-water system.			
<b>C4.4</b> <b>Conservation of the Natural Environment</b> <i>Alien plant encroachment is particularly damaging to natural habitats and is often associated with disturbance to the soil during construction activities. Care must be taken to conserve existing plant and animal life on and surrounding the site.</i>	Fauna and Flora			
	C4.4.1 Vegetation that is not to be cleared should be marked beforehand with danger tape. The Rehabilitation Specialist / ECO must be given a chance to mark vegetation that is to be conserved or removed for replanting later before the Contractor begins clearing the site.	Prior to clearing.	Rehabilitation Specialist	ECO / Rehab Specialist
	C4.4.2 Only vegetation that has <b>not</b> been marked beforehand may be removed. This may only occur once permission from the ECO / Engineer is obtained. As the work front progresses the Contractor is to check that vegetation clearing has the prior permission of the Engineer.	Following permission from the CE	Contractor	ECO / Rehab Specialist
	C4.4.3 Gathering of firewood, fruit, muthi plants or any other natural material on site or in adjacent areas is prohibited.	At all times.	All staff	CE / ECO
	C4.4.4 Disturbance to birds, animals and reptiles and their habitats should be minimised wherever possible. The hunting of birds and animals in any manner or form on site and in surrounding areas is forbidden. Local fauna such as troops of monkeys must not be interfered with.	At all times.	Contractor and All Staff	CE / ECO
	C4.4.5 Should the capture and relocation of faunal species be necessary, the ECO and Biodiversity Specialist is to be informed, and a professional organisation such as FreeME KZN Wildlife Rehabilitation Centre (Tel No: 033 330 3036) is to be contacted to assist.	When required.	Contractor	CE/ ECO
	C4.4.6 Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas.	At all times.	Contractor	ECO
	C4.4.7 Alien vegetation encroachment onto the pipe yards, site offices and working corridor must be controlled and prevented.	At all times.	Contractor / Rehab Specialist	ECO
	C4.4.8 Rescued indigenous vegetation should be kept in a nursery for use at a later stage in the site rehabilitation process as required by the <b>RRP</b> .	As the work front progresses.	Rehabilitation Specialist	ECO
	Sensitive Habitats			
	C4.4.9 Areas identified by the EIA or ECO as being ecologically sensitive within or adjacent to any portion of the project are to be demarcated and barricaded for total protection.	Prior to any activity occurring.	Contractor	CE / ECO
	C4.4.10 The Contractor shall not in any way modify nor damage the banks or beds of streams, rivers, wetlands, other open water bodies and drainage lines adjacent to or within the designated area,	At all times.	Contractor	CE / ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	unless required as part of the construction project specification. Where such disturbance is unavoidable, modification of water bodies should be kept to a minimum in terms of: removal of riparian vegetation; and opening of the stream channel.			
<b>C4.5 Social Considerations</b> <i>It is important to take notice of the needs and wishes of those living of working adjacent to the site. Failure to do so can cause disruption to work and increase costs in the form of delays.</i>	Public Participation			
	C4.5.1 The general public are to be notified of the overall project, and the immediately affected parties are to be notified and informed of the activities that will directly affect them, their properties or their livelihoods in a manner as described by the CP.	Throughout project lifecycle, prior to each new phase.	Contractor / Engineer / Media Team	ECO / EAPs
	C4.5.2 Appropriate sign boards and notices are to be displayed where required in all areas of the project activities. Health and Safety notices are mandatory.	Prior to works.	Contractor / Engineer	ECO
	C4.5.3 Permission to occupy private land must be obtained before any works commence on the properties in question. Similarly, authorisation is required from landowners prior to accessing properties for any scoping activities, preliminary geotechnical or survey work, or feasibility work.	Prior to access or works.	Contractor	ECO / CE
	C4.5.4 All IAPs must be informed in advance of any known potential social, health or environmental risks associated with the project or activity areas. Warnings regarding dangerous activities must be issued timeously, especially with activities such as blasting (refer CP)	Prior to activity.	Contractor	ECO
	C4.5.5 Selection of new servitude proposals will warrant further negotiations and agreements between all parties (affected IAPs) and the relevant authorities.	Prior to activity.	Contractor	ECO
	General noise controls (see <b>Table E</b> )			
	C4.5.6 Construction vehicles are to be fitted with standard silencers prior to use, i.e. they should be roadworthy.	Prior to moving onto site.	Contractor	ECO
	C4.5.7 Equipment / vehicles / plant must be used as per operating instructions and maintained / serviced during site operations.	Ongoing	Contractor	ECO
	C4.5.8 All staff are to adhere to the Code of Conduct, and shall prevent unnecessary vocal or other noise (loud music) wherever possible.	At all times.	Contractor	ECO
	C4.5.9 All works shall comply with the official working hours and days assigned to the project (Project Specification or General Conditions of Contract).	At all times.	Contractor	ECO
	C4.5.10 All employees must be given the necessary safety ear protection gear when utilising noise-	As required.	Contractor	ECO



<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	generating plant.			
	C4.5.11 Notice of particularly noisy activities must be given to residents / businesses adjacent to the construction site. Examples of these include: noise generated by jackhammers, blasting, drilling, dewatering pumps.	At least 24 hrs prior to the activity taking place.	Contractor	CE / ECO
	C4.5.12 Acoustic barriers are to be utilised in the vicinity of schools, hospitals, residential complexes and Flagged Resources (refer <b>Table E</b> ) that are sensitive to noise nuisances.	At any time.	Contractor	ECO / CE
	Visual Impacts			
	C4.5.13 The choice of location for site offices / camps should consider the visual impacts on neighbouring residents / activities, and the layout of these sites should be mindful of the visual impacts to the surrounding areas.	During site establishment	Contractor	EAPs
	C4.5.14 Storage facilities, stockpiles, elevated tanks and other temporary structures on site should be located such that they have as little visual impact on local residents and passing traffic as possible.	At all times.	Contractor	CE / ECO
	C4.5.15 Some activities may require visual screening in the form of shade cloth or other suitable materials. Similarly active fronts must be screened when the working corridor is immediately adjacent to residences or visually sensitive activities.	When visually displeasing.	Contractor	CE / ECO
	C4.5.16 Special attention should be given to the screening of highly reflective materials on site	During site set up.	Contractor	CE / ECO
	C4.5.17 Lighting should be angled downwards and inwards (focussed in on the site activity) to avoid disturbance to immediate neighbours and passing traffic.	At all times.	Contractor	CE / ECO
	C4.5.18 The site and site offices must be kept clean to minimise visual impacts.	At all times.	Contractor	ECO
	C4.5.19 All construction activities must be confined to within the demarcated working front, as this will confine the visual impacts of the project.	At all times.	Contractor	ECO
	C4.5.20 All above-ground infrastructure associated with the pipeline must not be visually displeasing.	On completion.	CE / Contractor	ECO
	Air Pollution & dust			
	C4.5.20 Vehicles travelling to and from the construction site must adhere to the speed limits so as to avoid producing excessive dust.	Ongoing.	Contractor	CE

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C4.5.21 A speed limit of 30km/hr must be adhered to on all dirt roads.	Ongoing.	Contractor	CE
	C4.5.22 Access and other cleared surfaces must be dampened whenever possible and especially in dry and windy conditions to avoid excessive dust. Dust must be suppressed during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water (of suitable quality) used for this purpose must be used in quantities that will not result in runoff and erosion, or muddied areas.	Ongoing.	Contractor	CE / ECO
	C4.5.23 If dust is unavoidable, screening will be required utilising wooden supports and shade cloth.	As directed by Engineer.	Contractor	CE / ECO
	C4.5.24 Vehicles and machinery are to be kept in good working order and to meet manufacturers specifications for safety, fuel consumption etc.	Ongoing.	Contractor	CE
	C4.5.25 Should excessive emissions be observed; the Contractor is to have the equipment seen to as soon as possible.	As directed by Engineer.	Contractor	CE
	C4.5.26 No fires allowed on site except for the burning of firebreaks.	Ongoing.	Contractor	CE / ECO
	C4.5.27 Stockpiles may cause dust and so must be managed in accordance with the guidelines in Materials Management ( <b>Section C2 - Stockpile Management</b> )	Ongoing.	Contractor	CE / ECO
	C4.5.28 Vehicle and plant tyres are to be washed prior to leaving the site, and prohibited from transporting excess mud onto roads. Asphalt road access points near construction roads to be regularly swept free of dust or hosed down.	At all times.	Contractor	ECO
	C4.5.29 Clearing activities must only commence immediately prior to works to reduce the exposure of soils to wind / water, thereby reducing dust. Areas must be rehabilitated immediately after works.	Clearing & Rehabilitation	Contractor / Rehabilitation Specialist	ECO
	Disruption of Infrastructure and Services			
	C4.5.30 'As Built' for existing services and infrastructure are to be used in determining the route and working corridor requirements, thereby reducing service conflicts.	Design Phase	CE	Developer
	C4.5.31 Existing services and infrastructure are to be traced and proven prior to any works commencing, thereby reducing potential accidental disruptions.	Design & Construction Phase	CE / Contractor	Service providers
	C4.5.32 Contractors activities and staff are to be restricted to designated construction areas.	At all times.	Contractor / PRO	ECO

<b>C. CONSTRUCTION PHASE</b>				
<b>C4. General Environmental Management</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C4.5.33 Should the construction staff be approached by members of the public or other stakeholders, they should assist them in locating the Engineer or Contractor, or provide a number on which they may contact the Engineer or Contractor. In addition, a Public Relations Officer will be on site at all times to deal with PR.			
	C4.5.34 The conduct of the construction staff when dealing with the public or stakeholders shall be in a manner that is polite and courteous at all times.			
	C4.5.35 The Contractor is to manage any unplanned disruptions in accordance with the emergency procedures of this EMP, and the <b>CP</b> .	Emergencies	Contractor	CE
	C4.5.36 The Contractor is to inform affected parties in writing of planned disruptions at least 24 hrs beforehand, as required by the <b>CP</b> .	At least 24 hrs prior to the activity taking place.	Contractor	CE / ECO
	C4.5.37 Property access restrictions as a result of the project are to be communicated to the affected parties timeously, and alternative access arrangements made and agreed to.	At least 7 days prior to disruption.	Contractor	ECO
	C4.5.38 A Traffic Management Plan is to be prepared by suitable Engineers to manage the traffic implications of the works, and to determine suitable alternative routes. These deviations are to be communicated to the general public as required by the <b>CP</b> .	Prior to construction	CE	Developer
<b>C4.6 Cultural Environment</b>	Protection of Cultural Environment			
	C4.6.1 Prior to the commencement of construction, all staff need to know what possible archaeological or historical objective of value may look like, and to notify the Engineer / Contractor should such an item be uncovered (see the <b>Heritage Management Plan</b> ). The Engineer must in turn notify the ECO who will contact Amafa or the Heritage Specialist.	During site set up and ongoing.	Contractor / ECO	ECO
	C4.6.2 Heritage Resources are further described in the Heritage Management Plan, which is to be consulted in the event of new discoveries, or when working in close proximity to known Heritage Resources.	When working near: Discoveries Known Resources	Contractor / CE	ECO
	C4.6.3 Care needs to be taken to avoid NAA Phase 4 construction when passing by any existing Shembe worship sites, especially on days of worship. No construction is planned 'through' these sites.	At all times.	Contractor	ECO
	C4.6.4 A cultural specialist should be employed to communicate with traditional and religious groups where necessary to avoid conflict from the outset.	At all times.	Contractor, Cultural Specialist	ECO

## C. CONSTRUCTION ACTIVITIES

### C5. Pipe Installation Activities

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>C5.1 Demarcation of Site</b>	C5.1.1 A maximum working servitude of 30m will apply for machine excavation unless otherwise indicated in the project specification, and with the exception of identified sensitive areas, where restricted working servitude conditions apply as specified.	For the duration of construction	Contractor	ECO
	C5.1.2 The working corridor of the active construction site is to be demarcated with barricades. Barricades are grouped into six categories (see 'Glossary' above). All construction activities are to remain within the demarcated area. In sensitive areas fencing or additional resource boundary demarcations may be required, and sensitive areas may have restrictions on permissible activities within the working servitude, refer to <b>Table E</b> .	Demarcation prior to construction, compliance for the duration of construction.	Contractor	ECO
	C5.1.3 No access into any barricaded area shall be allowed to anybody other than construction workers and members of the project team who have undergone a site induction course. The Contractor shall ensure that access at ends where vehicles have to enter and exit, are controlled. Bridges for vehicles and/or pedestrians shall be provided along the route of the work as and where may be considered necessary by the Engineer. Where construction is in, or across, public roads, barricades or barriers and temporary road signs shall be erected. All such signs and positioning thereof shall comply with the requirements of the local roads authority.	Duration of construction.	Contractor	ECO
	C5.1.4 Routes for temporary access and haul roads are to be located within the approved demarcated areas and vehicle movement is to be confined to these roads, unless otherwise approved by the Engineer and ECO.	For the duration of construction.	Contractor	ECO
	C5.1.5 Avoid damaging any areas outside of the construction corridor, and minimise damage within the corridor.	For the duration of construction.	Contractor	ECO
<b>C5.2 Security of Adjacent Properties</b>	C5.2.1 Should (home owners) security fences of adjacent properties require temporary relocation during construction, the landowner is to be notified. Should relocation practically be an inappropriate option, suitable temporary fencing or alternative equivalent security as agreed with the landowner is to be supplied.	Prior to construction commencing in that area.	Contractor	ECO
<b>C5.3 Site Preparation &amp; Clearing Activities</b>	C5.3.1 Should certain grassland and veld areas require burning in an appropriate season to allow for dormant species of conservation value to be located. This activity will require permission from and consultation with the landowners, relevant authorities, KZN Wildlife, and the ecologist ( <b>A1.5</b> ). All relevant legislation applies.	At least six months prior to plant rescue.	Contractor Ecologist &	KZNW

<b>C. CONSTRUCTION ACTIVITIES</b>				
<b>C5. Pipe Installation Activities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C5.3.2 The Contractor (assisted by a qualified ecologist) is to undertake the plant / species recovery exercises for certain riparian areas. These recovery exercises are to be aimed at rescuing and relocating protected, endangered or listed species. A method statement is to be provided. Suitable sites and/or nurseries are to be identified for the relocation of these plants in consultation with KZN Wildlife and the relevant conservancies. Any permitting procedures are to be identified and undertaken prior to rescue.	Post site demarcation and prior to construction activities commencing.	Contractor & Ecologist	KZNW
	C5.3.3 Wetland vegetation in the identified wetlands for the route must be appropriately rescued by the Contractor (assisted by a qualified ecologist) in accordance with the RRP. The plants that are to be stockpiled on site are to be placed in a nearby shady area and covered in damp hessian, and then appropriately replanted in the servitude immediately after trench reinstatement, as directed by the Biodiversity Specialist.	Immediately prior to site/servitude occupation and immediately after reinstatement.	Contractor & Ecologist	ECO
	C5.3.4 Any uncovered heritage items are to be demarcated as prohibited areas. These items may not be damaged, destroyed, or in any way interfered with. Any sites discovered during clearing/construction and thought to be of cultural/archaeological significance are to be demarcated, and all activities are to cease within these areas until such time as the relevant authorities have been notified, as required by Amafa.	N/A	Contractor/ESO	ECO
	C5.3.5 Soil should be exposed for the minimum time possible once cleared, such that the timing of clearance is coordinated with the onset of construction. This will prevent wind and water erosion.	For the duration of the activity.	Contractor	ECO
	C5.3.6 Vegetation to be cleared along steep banks should only be removed at the onset of the construction of that area, or immediately prior to landscaping, to reduce soil erosion to the site.	N/A	Contractor	ECO
	C5.3.7 The time that stripped areas are exposed shall be minimised wherever possible. Stripping of new portions of the route may only commence in terms of the approved programme and method statements. The length of the 'advance work front' should not be less than 250m or more than 300m. The length of the 'construction work front' is limited to 200m. The length of the rehabilitation or 'reinstatement work front' is limited to 200m. See Glossary above for more detail.	Immediately prior to activity commencing	Contractor	ECO
	C5.3.8 No trees are to be cut solely for the purpose of providing firewood. Any tree branches which require removal are to be properly pruned and sealant applied to the cut surface if required. Any trees which require removal are to be timeously brought to the attention of the ECO prior to any clearing activities.	Notification prior to site clearing activities for the duration of site activities.	Contractor	ECO, DWA, KZNW

<b>C. CONSTRUCTION ACTIVITIES</b>				
<b>C5. Pipe Installation Activities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C5.3.9 The removal of any indigenous trees would need to be authorised by the ECO. Please contact the Forestry dept on (033) 342 8101.	For the duration of site activities.	Contractor	ECO, KZNW
	C5.3.10 Disturbance to any fauna is prohibited. No animals or their nests should be approached, disturbed, injured or killed. Any animals / birds / reptiles nesting in the direct path of the construction activities are to be brought to the attention of the ECO. local fauna is not to be interfered with during construction.	For the duration of site activities.	Contractor	ECO, KZNW
<b>C5.4 Soil &amp; Bedding Material Management</b>	C5.4.1 Topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.	For the duration of the activity.	Contractor	ECO
	C5.4.2 Topsoil should be temporarily stockpiled separately from subsoil and rocky material, when areas are cleared. Topsoil stockpiles may not be contaminated with subsoil or any waste material or pollutants. If mixed with clay subsoil, the topsoil will lose its usefulness in site rehabilitation.	For the duration of the activity.	Contractor	ECO
	C5.4.3 Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. Topsoil obtained from different sites of different soil types must not be mixed.	For the duration of the activity.	Contractor	ECO
	C5.4.4 Stockpiled topsoil should not be compacted, and therefore may not exceed 1.5 metres in stockpile height. Topsoil from stockpiles should be replaced loosely as the final soil layer in site reinstatement. No vehicles are to be allowed access onto the stockpiled areas or rehabilitated sites.	For the duration of the activity.	Contractor	ECO
	C5.4.5 Stockpiled soil must allow for adequate drainage. The soil stockpile gradients are not to exceed the soils natural angle of repose, and no hazardous slopes are to be created. Stockpiled soil should be protected using erosion-control berms / bunds / cover if exposed for more than 14 days during the wet season. It is recommended that topsoil stockpiles that may be exposed for more than 2 months be seeded with indigenous grasses, or covered with a suitable fabric to reduce erosion as approved by the ECO.	For the duration of the activity.	Contractor	ECO

<b>C. CONSTRUCTION ACTIVITIES</b>				
<b>C5. Pipe Installation Activities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C5.4.6 Soil stockpiles are not to be placed in road or municipal drainage systems. When working in or around drainage lines and seepage areas, soils excavated are to be placed on the upslope of the excavation to avoid any possible transport of soils into adjacent wetland areas. When working in any of the special wetland areas as identified in <b>Table D</b> , stockpile activities are to comply with the specifications of the wetland in question (usually top-side of the trench adjacent to a wetland environment, and always outside of the delineated seasonal and permanent wetland areas).	For the duration of the activities	Contractor	ECO
	C5.4.7 Topsoil is to be maintained in a weed free condition, and alien invasive plants colonising the stockpiles are to be manually removed immediately. Herbicides and poisons may not be used on stockpiled materials unless otherwise stated by the ECO.	For the duration of the activities	Contractor	ECO
	C5.4.8 Topsoil is to be replaced by direct return (replaced immediately on the same area from which it was sourced following reinstatement of the trench) along the contour. Immediate replacement is feasible for progressive construction (pipelines) but not necessarily so for reservoirs and site establishments. Topsoil removed from these other areas must be protected as above until such time as replacement is possible.	For the duration of the activities	Contractor	ECO
	C5.4.9 Soil which will not be replaced into the pipeline trench, i.e. overburden or spoil, must be handled according to the <b>Spoil Disposal Management Plan (SDMP)</b> .	For the duration of the activities	Contractor	ECO
	C5.4.10 Alternative bedding sources and materials must be actively sought (such as crushed glass, concrete and other 'recycled' building materials).	For the duration of the activities	Contractor	ECO
<b>C5.5 Earthworks &amp; Site Activities</b>	C5.5.1 The process of excavation and backfilling must be carried out as a sequential process following one another as quickly as possible for progressive construction. Excavations must only remain open for a minimum period of time, and during this time they must be clearly demarcated. If excavations will place the public or livestock at risk, these sites are to be fenced. Given that the impact of the project is unavoidable when the new pipeline is constructed along existing servitude, it is a critical that the contractor rehabilitates the impacted areas appropriately as soon as the trench is backfilled. Progressive Rehabilitation along this pipeline route is of critical importance.	Excavations to be exposed for the minimum possible time.	Contractor	ECO
	C5.5.2 The trench size is to be restricted to the project specification and flagged resources. Residents directly affected by open trenches must be notified of the dangers and the duration of the activity.	During construction	Contractor	ECO

<b>C. CONSTRUCTION ACTIVITIES</b>				
<b>C5. Pipe Installation Activities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C5.5.3 The regulations of the Occupational Health and Safety Act, Act No 85 of 1993 are to be complied with at all times. Safety clothing and equipment must be utilised when necessary.	At all times.	Contractor	ESO
	C5.5.4 Measures must be taken to prevent any interference that could result in flashover of power lines due to breaching of clearances or the collapse of power lines due to collisions by vehicles and equipment.	During work in the vicinity of power lines.	Contractor	ESO
	C5.5.5 All tall structures must be properly earthed and protected against lightning strikes. Measures must be taken during thunder storms to protect workers and equipment against lightening strikes.	During thunder storms.	Contractor	ECO
	C5.5.6 Hard engineering techniques (gabion retention walls and concrete cross walls), bioengineering techniques (combination of live plantings and geo-textiles) and vegetative techniques (hydro seeding, planting) must all be employed.	During construction	Contractor	ECO
	C5.5.7 Ensure adequate bank protection (hard engineering or soft (planting)) upstream and downstream of the entry point.	During construction	Contractor	ECO
	C5.5.8 Clearly demarcate the construction zone (e.g. with bunting) to raise awareness amongst contractor workers.	During construction	Contractor	ECO
	<p>C5.5.9 Monitoring of <b>slip prone and/or geo-technically unstable areas</b> to occur prior to and during construction and operation. It is of extreme importance that material removed from the trenches during excavation operations are stockpiled away from the crest and toe of embankments. All heavy machinery such as cranes and excavators should be operated in such a manner to ensure that the loads imposed on the embankment are minimized. Safety barriers must be erected to prevent unauthorised access.</p> <p><b>Unstable Trench Sidewalls – Shale Areas</b></p> <p>The pipeline is predominantly underlain by a soil mantle up to about 1.5 metres thick in places, overlying weathered shale of the Pietermaritzburg Formation. The soil mantle may range from fill materials which are loose/ unconsolidated to fairly competent without the need to support excavation sides. As a general indication the soil mantle above the shale bedrock should be battered at a safe angle not steeper than 1V:1H should the excavations need to remain open for more than 24 hours. Incidence of rain or groundwater may require that this temporary batter slope should be flattened to promote stability, at the</p>	During construction	Contractor, Resident Engineer	ECO



<b>C. CONSTRUCTION ACTIVITIES</b>				
<b>C5. Pipe Installation Activities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	request of the Engineer. Generally the underlying shales are flatly or horizontally bedded and it is not anticipated that these will result in trench failure even where a near vertical excavation wall is formed. However, care must be taken to ensure that where trenches are cut through shale bedrock and there is evidence of steeply dipping shales which result in the daylighting of bedding or other joint planes into the excavation that a potentially unstable trench sidewall does not occur. It will thus be important that during construction Moore Spence Jones / the geotechnical engineers are requested to confirm the safe angle of batter where such conditions manifest themselves.			
	<p><b>Unstable Trench Sidewall – Soft / Loose Alluvial Soils</b></p> <p>Soft and very loose soil conditions will be encountered where the pipeline crosses the flat, alluvial section of the Piesang River valley at Duffs Road. The alluvial soils can be expected to have very shallow groundwater conditions with associated sidewall collapse at or below the groundwater seepage. In this area it is thus anticipated that it will be necessary to allow for lateral support in form of sheet piles or trench sheeters. Dewatering of groundwater should also be allowed for.</p>			
	C5.5.10 The safety issues regarding excavation and working in open, unsupported trenches should fall in line with the requirements of the General Safety Regulations promulgated by Government Notice No. R1031 of 30 May 1986 as amended. It is generally required that trenches deeper than 1.5m must be adequately shored where there is a possibility of collapse.	During construction	Contractor	ECO
	C5.5.11 There must be provision for safe access not more than every 20m along the trench length.	During construction	Contractor	ECO
	C5.5.12 Surcharge in the form of stockpiling of backfill, or trenching machinery, must be placed well away from the edge of the trench.	During construction	Contractor	ECO
	C5.5.13 Soft soils and groundwater ingress must fall under daily audits by professionals well experienced in these matters, otherwise shoring must be introduced.	During construction	Contractor	ECO
<b>C5.6 Blasting &amp; Drilling Activities</b>	C5.6.1 Blasting activities are to be conducted in accordance with the Explosives Act No. 15 of 2003, the Minerals act, Act No. 50 of 1991 and Regulation 4 of the Explosives Regulations of the Occupational Health and Safety Act No. 85 of 1993). Emergency procedures as discussed in B3 are to be adhered to.	For the duration of the activity.	Contractor and Blast Specialists	ECO

<b>C. CONSTRUCTION ACTIVITIES</b>				
<b>C5. Pipe Installation Activities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C5.6.2 Prior to any blasting, the Contractor is to document the status of nearby structures, infrastructure or buildings through photographs or video footage.	Prior to blasting.	Contractor	ECO
	C5.6.3 Prevent fly rock and unnecessary noise/dust.	During blast events.	Contractor and Blast Specialists	ECO
	C5.6.4 All immediate and affected neighbours / landowners are to be notified of the blasting activity schedule, with sufficient warning to secure livestock and pets (refer Communications Plan).	At least 7 days prior to blast events.	Contractor	ECO
<b>C5.7 Service Disruptions</b>	C5.7.1 The contractor is to notify the public of any planned disruptions to water, electricity, road thoroughfare, or telecommunications at least 7 days in advance.	7 days prior to the disruption.	Contractor	ECO
	C5.7.2 In the event of accidental disruptions, the Contractor is to warn I&AP's as soon as practicably possible, and advise them of when the problem is likely to be addressed.	Immediately	Contractor	ECO
	C5.7.3 All reasonable precautions must be taken during construction to avoid severely interrupting water and electricity supply during peak periods.	N/A	Contractor	ECO
	C5.7.4 The integrity of private property fences/security must be maintained.	At all times.	Contractor	ECO
	C5.7.5 No telephone lines must be dropped during construction operations, except where prior agreement by relevant parties is obtained. All crossings must be protected, raised or relocated as necessary.	At all times.	Contractor	ECO
	C5.7.6 Schedule the construction phase appropriately: where the pipeline route is in the vicinity of schools or centres for learning, construction activities can be scheduled during the school holidays, or when road usage is reduced.	During construction	Contractor	ECO
	C5.7.7 Construction practices should include keeping one lane of traffic open where no reasonable detours are feasible or where construction takes place during peak traffic hours/periods.	During construction	Contractor	ECO
<b>C5.8 Traffic Disruptions &amp; Access Requirements</b>	C5.8.1 The construction activities are to be undertaken in such a way as to minimise disruption to traffic flow. If road or property access will be restricted by construction activities, a suitable solution is to be negotiated with the relevant authorities or residents. A <b>Traffic Management Plan (TMP)</b> has been designed by an engineering team and must adhered to by the Contractor.	For the duration of the activity.	Contractor	ECO
	C5.8.2 Predetermined detour routes are to be selected to reduce traffic disruptions during construction near/within roadways, and disruptions should be planned at off-peak times, as determined by the <b>TMP</b> .	During construction	Contractor	ECO

<b>C. CONSTRUCTION ACTIVITIES</b>				
<b>C5. Pipe Installation Activities</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	C5.8.3 The construction activities should be scheduled in such a way that access to properties is not impeded for lengthy periods of time. Property accesses that are likely to be affected should be identified in a <b>TMP</b> and the affected residents notified of any disruptions well in advance. Driveway accesses are not to be blocked over night or over weekends/public holidays unless in agreement with the property owner.	Notification of IAPs at least 7 days prior to access restrictions.	Contractor	ECO
	C5.8.4 Construction activities in the vicinity of schools are to be scheduled during school holidays when road usage is reduced.	During school holidays	Contractor	ECO
	C5.8.5 Where necessary, traffic should be controlled by a flagman, and with the use of stop/go signs. Adequate warning through signage and media, and adequate safety methods such as barriers and caution lights should be used when necessary to improve awareness (refer to the <b>Communications Plan</b> ).	During lane / road restrictions	Contractor	ECO
<b>C5.9 Backfilling &amp; Reinstatement</b>	C5.9.1 Where backfill material is deficient, or additional material is necessary, it is to be imported from an approved borrow pit (one which operates within the ambit of an EMPR).	During construction	Contractor	ECO
	C5.9.2 The Contractor will backfill in accordance with the requirements of progressive reinstatement, and the technical specification.	During construction	Contractor	ECO
	C5.9.3 Excavated topsoil and subsoils to be excavated separately. Once reinstatement occurs, soils are to be replaced in the same sequence as removed, and preferably be replaced by direct return (replaced immediately on the same area from which it was sourced) along the contour.	During construction	Contractor	ECO
	C5.9.4 All sites disturbed by construction should be monitored for colonisation by invasive alien plant species, and cleared of invasive alien plant species where necessary.	At all times.	Contractor	ECO
	C5.9.5 All cut and fill surfaces need to be stabilised with appropriate material or measures when major civil works are complete.	At work completion.	Contractor.	ECO
	C5.9.6 The site is to be cleared of waste materials as described in <b>Table C</b> .	At work completion	Contractor	ECO
	C5.9.7 All sites are to be reinstated to a state equivalent to before construction, in accordance with <b>Table C</b> , and flagged resources are to be reinstated in accordance with <b>Table D</b> , as well as the <b>Rescue and Rehabilitation Plan and Specification</b> .	Following construction	Contractor	ECO
<b>C5.10 Spoil Management</b>	C5.10.1 Surplus excavated soft, intermediate and hard rock material shall not be disposed of along the pipeline trench, but should be moved to a spoil site designated or indicated by the engineer in conjunction with the ECO, and in accordance with the <b>SDMP</b> .	Following construction	Contractor	ECO

<b>D. POST CONSTRUCTION ACTIVITIES</b>				
<b>D1. Site Rehabilitation</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>D1.1 Site Closure</b>	D1.1.1 All builder's / domestic waste, temporary infrastructure, machinery, plant, equipment, materials and temporary signage are to be removed from the site prior to site handover. Any areas affected by construction activities or storage are to be reinstated to a status equivalent to before construction (refer to Engineers Specifications).	Prior to site handover	Contractor	ECO
	D1.1.2 On closure the site office area must be rehabilitated to a state equivalent to before construction (refer to Engineers Specifications). All debris, builder's rubble, waste, pollutants or other materials associated with the construction activities are to be removed to suitable facilities. The ECO is to inspect site office area upon closure. The site is to be rehabilitated in accordance with the <b>Rescue and Rehabilitation Plan (RRP), or Rehabilitation Specification (RS)</b> (as the case may be).	At the closure of site office or completion of all construction activities.	Contractor	ECO
	D1.1.3 The entire works area must be swept, and all pieces of wire, metal, wood or other foreign matter to the natural environment must be removed and disposed of appropriately.	Prior to site handover	Contractor	ECO
	D1.1.4 All access roads through open veld shall be scarified to a depth of 150mm and re-vegetated with indigenous plant species suited to that particular habitat (as per <b>RRP/RS</b> ).	Prior to site handover	Contractor	ECO
	D1.1.5 All waste and spoil is to be removed from site to appropriately permitted waste disposal facilities or approved spoil sites, and any certificates are to be retained.	Prior to site handover	Contractor	ECO
<b>D1.2 Reinstatement &amp; Stabilisation of Work front</b>	D1.2.1 Reinstatement will be required for all areas disturbed by the project. Reinstatement will ensure that all areas disturbed by the project are returned, within reason, to a state not worse than before the project commenced (refer to <a href="#">Table A1.7.4</a> ). Any banks are to be suitably stabilised.	Prior to site handover	Contractor	ECO
	D1.2.2 Subsoil and topsoil shall be replaced in the correct sequence and at suitable depths, and scarified to a depth of 50mm.	Following construction	Contractor	ECO
	D1.2.3 It is recommended that all areas which have been mapped as comprising indigenous woody vegetation (See Figure A2 Appendix A) – irrespective of the extent to which it may be disturbed – be rehabilitated as soon as possible after the trench has been backfilled using methods which are aimed at re-establishing the same or better category of natural vegetation.	Following construction – as soon as possible after the trench has been backfilled.	Contractor	ECO

## D. POST CONSTRUCTION ACTIVITIES

### D1. Site Rehabilitation

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>D1.3 Rehabilitation &amp; Alien Plant Control</b>	D1.3.1 Should any trees be planted, suitable indigenous species are recommended. Species should not have root systems that interfere with buried infrastructure and paving (refer <b>RRP/RS</b> ).	During rehabilitation	Contractor	ECO
	D1.3.2 Rescue and Rehabilitation is to be undertaken by a suitably qualified professional appointed by the Contractor. Specific rescue & rehabilitation activities apply for Flagged resources as described in <b>Table E</b> and the RRP/RS.	During rehabilitation	Contractor	ECO
	D1.3.3 All herbicides must be selective and non-residual in nature and applied only by a licensed operator as per the legal requirements of the Conservation of Agriculture Resources Act, No 43 of 1983 and the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947. Use of herbicides is restricted / prohibited in certain instances (refer <b>Table E</b> and <b>RRP /RS</b> ).	During alien plant control	Contractor	ECO
	D1.3.4 An integrated alien plant control programme targeting invasive species is to be implemented throughout the construction and retention periods. Herbicides are considered to be the most effective means of implementing alien plant control. However, especially in sectors where invasions of alien problem species such as wattle and gum exist, removal of the present crop by mechanical means is recommended (refer <b>RRP / RS</b> ).	During construction and retention periods	Contractor	ECO
	D1.3.5 Any impact on surrounding or riparian vegetation must be rehabilitated. Where riparian vegetation is expected to be affected, ecologically significant plant material should be rescued from the site prior to construction beginning, to be utilised during rehabilitation.	During construction and retention periods	Contractor	ECO
<b>D1.4 Surface Water &amp; Drainage</b>	D1.4.1 All road drains are to be cleared of any construction debris and surface water is to be channelled into the appropriate drainage systems, as by design.	Prior to site handover	Contractor	ECO

## D. POST CONSTRUCTION ACTIVITIES

### D2. Pipeline Monitoring

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>D2.1 Pipeline Operation</b>	D2.1.1 The pipeline will be constantly monitored using pressure gauges, and any leaks reported will be repaired immediately.	At intervals determined by the engineers	EThekweni Municipality	DAEARD

## D. POST CONSTRUCTION ACTIVITIES

### D2. Pipeline Monitoring

	D2.1.2 The servitude will be maintained in a manner that permits easy access to the pipeline. However, specific management and maintenance controls for the servitude will apply for Flagged Resource areas, as described by the Flagged Resource Manual. For example, site clearing / mowing in wetland and riparian areas will be restricted.	For the lifetime of the project	EThekweni Municipality	DAEARD
	D2.1.3 Maintenance vehicles will adhere to established site roads.	At all times	EThekweni Municipality	DAEARD
	D2.1.4 The removal of tree species for maintenance purposes shall be undertaken in accordance with specialist consultation.	Prior to removal	EThekweni Municipality	DAEARD
	D2.1.5 Emergency procedures are to be determined. EThekweni Municipality has trained staff to respond to any pipe ruptures. Trained response teams operate 24 hours 365 days of a year that are able to come onto site to assess and solve any issues involving leakages and possible rupture.	Immediately on incident	EThekweni Municipality	DAEARD
	D2.1.6. In the event of a rupture, residents in the near vicinity of the pipeline can report the problem to a toll free call centre which is available 24 hours a day. The number of the toll free hotline is 080 1313013.	Immediately on incident	EThekweni Municipality	DAEARD
	D2.1.7 In agricultural areas where visual detection may be limited, and a pipe rupture has occurred, this will be identified through a loss of pressure on the pipeline. EThekweni's engineering staff must then follow protocol and undertake a fly over of the aqueduct to detect the fault. In agricultural areas, fault and possible rupture detection can be identified through runoff onto neighbouring highways and road when the ground has become over saturated.	For the lifetime of the project	EThekweni Municipality	DAEARD
	D2.1.7 Pipe maintenance and quality management is to conform to local and international best practice and ISO standards.	At all times	EThekweni Municipality	DAEARD

## D. DECOMMISSIONING ACTIVITIES

### D3. Decommissioning of Pipeline

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>D3.1 Pipeline Decommissioning</b>	D3.1.1 Aqueducts are expected to have a design life of 50 years; it is however expected to be operational for at least 75 years. A steel pipeline will eventually corrode, and the trench will collapse. Forward planning will be required to ensure that an alternative water supply is provided before such time. The new pipeline (in 75 years time) will need to be installed in parallel or along an entirely new route.	Decommissioning	EThekweni Municipality	DAEARD
	D3.1.2 When the use of the NAA pipeline is no longer feasible, appropriate decommissioning measures must be undertaken in accordance with governmental and environmental standards at the time.	Decommissioning	EThekweni Municipality	DAEARD
	D3.1.3 The removal of the 75 year old pipeline must be undertaken with caution and safety to the surrounding environment and to the workers removing the pipe from the trench. The handling, transport and disposal of aged pipe can be a hazardous process and appropriate safety gear and measures must be utilised.	Decommissioning	EThekweni Municipality	DAEARD
	D3.1.4 There may be more development in close proximity to the pipeline servitude in 75 years, than there is now, therefore, residents will need to be informed of the decision to remove the aged pipe. Notifications (dependent on the environmental regulations at that point in time) will have to be given to all interested and affected parties.	Decommissioning	EThekweni Municipality	DAEARD

## E. FLAGGED RESOURCES

### E1. WETLANDS, DRAINAGE LINES, STREAMS, RIVERS AND MAJOR RIVERS

Relevant conditions of all previous Tables apply. This section provides the more specific conditions for general activities in and around Flagged Resources for the project as identified by the specialists. The Flagged Resources that require specific care, management and rehabilitation and are highlighted in Appendix A. The rehabilitation of these environments is catered for in the Rescue and Rehabilitation Plan (RRP).

E. FLAGGED RESOURCES				
<i>E1. Wetlands, Drainage Lines, Streams, Rivers and Major Rivers</i>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>E1.1 Construction Methods for Wetland / Aquatic Environments</b>	E1.1.1 The Contractor shall submit a <b>Method Statement</b> for review in terms of the Conditions of Contract and technical specifications, prior to commencing <b>Construction in or near a Wetland, Stream or River</b> . Work within a wetland or stream is to be scheduled for the dry season. The method statement should highlight (but not be confined to) the following issues: <ul style="list-style-type: none"> <li>detailed plan of stream crossing including pipe protection works,</li> <li>how water flow will be diverted during construction (if applicable),</li> <li>containment of contaminated runoff and waste water,</li> <li>width of working servitude (if not already detailed in project specification),</li> <li>final expected profile of wetland / river / stream banks,</li> <li>Reinstatement and rehabilitation of wetland / river / stream banks.</li> </ul> Extreme care will be required when traversing this wetland system.	14 days prior to commencing	Contractor	ECO & Biodiversity Specialist
	E1.1.2 The working corridor is to be reduced from 30m to 15m in width when working in or adjacent to wetland or riparian areas. The trench excavations are to be significantly reduced in length when working in or near a wetland. The working corridor is to be fenced (e.g. two-strand wire and zig-zagging barrier tape), and wetland access outside of the working corridor is strictly prohibited. Machinery must utilise the same route through the system at all times so as to avoid unnecessary disturbance.	For the duration of the activities	Contractor	ECO
	E1.1.3 When working through a wetland area, soil and material stockpiles are to be placed outside of the wetland temporary zone. When working in or around drainage lines and seepage areas, or adjacent to a wetland area, excavated soil is to be placed on the upslope of the excavation to avoid any possible transport of soils into adjacent wetland or riparian areas.	For the duration of the activities	Contractor	ECO



<b>E. FLAGGED RESOURCES</b>				
<b>E1. Wetlands, Drainage Lines, Streams, Rivers and Major Rivers</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	E1.1.4 When working within a delineated wetland area along the working corridor, plant, vehicles and machinery should only be used when absolutely necessary (manual labour preferred), to prevent soil compaction which would contribute to run off.	For the duration of the activities	Contractor & Rehab Specialist	ECO
	E1.1.5 Construction undertaken in riparian and wetland habitats must be undertaken in as short a time period as possible, during the dry season (preferably in winter), and must be rehabilitated and re-vegetated as soon as construction is complete.	For the duration of the activities	Contractor	ECO
	E1.1.6 On steep slopes draining towards the identified freshwater ecosystems, small-scale diversion berms should be constructed on the surface of the pipeline alignment to reduce the risk of the pipeline becoming a preferred surface flow path leading to erosion.	For the duration of the activities	Contractor	ECO
	E1.1.7 'Trench-breakers', which are in-trench barriers, should be installed along the length of the pipeline to minimise the interception and accumulation of water from the adjacent hillslope within the in-filled trench.	For the duration of the activities	Contractor	ECO
	E1.1.8 Sediment traps should be used to trap excessive sediment within the watercourses near construction activities.	For the duration of the activities	Contractor	ECO
	E1.1.9 At least 50cm of the top of wetland/riparian topsoil should be removed and stockpiled during the construction period, to be replaced once activities have been completed.	For the duration of the activities	Contractor	ECO
	E1.1.10 The crossings of the "B section" riparian channels (B Section = where two or more channels converge) should be perpendicular to the direction of flow for each channel.	For the duration of the activities	Contractor	ECO
	E1.1.11 The crossings should be designed to ensure that flow patterns along the stream/river channel are not altered or diverted, potentially resulting in stream bank erosion.	For the duration of the activities	Contractor	ECO
	E1.1.12 If pollution of any surface or groundwater occurs, it must be immediately reported to DWA and the appropriate mitigation measures must be employed.	For the duration of the activities	Contractor	ECO
	E1.1.13 The banks adjacent to the construction site must be stabilised to prevent collapse and erosion.	For the duration of the activities	Contractor	ECO
	E1.1.14 There should be a 20m buffer from the edge of a temporary wet zone of the wetland to the edge of any structural development.	For the duration of the activities	Contractor	ECO
<b>E1.2 Wetland Care</b>	E1.2.1 Construction activities must avoid permanently altering the surface or subsurface flow of water through the wetland.	At all times	Contractor	DAEARD, ECO
	E1.2.2 Wetland vegetation must be appropriately rescued by a qualified ecologist prior to work commencing in the wetland area in accordance with the RRP.	Rescued immediately prior to wetland occupation.	Contractor & Rehabilitation Specialist	ECO

<b>E. FLAGGED RESOURCES</b>				
<b><i>E1. Wetlands, Drainage Lines, Streams, Rivers and Major Rivers</i></b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	E1.2.3 Where possible, cut rather than totally remove indigenous vegetation in the wetland zones to facilitate more rapid re-colonization of disturbed areas.	For the duration of the activities	Contractor & Rehab Specialist	ECO
	E1.2.4 The code of conduct (see <b>Section B1.</b> above) will be enforced when working in the working corridor, with special care regarding fauna and flora in Red Flag Areas.	For the duration of the activities	Contractor & Rehab Specialist	ECO
	E1.2.5 No ancillary construction activities may occur within the temporary, seasonal or permanent zones of a wetland area, or within a riparian area, unless the area is traversed by the working corridor – which is to be restricted in width.	For the duration of the activities	Contractor	ECO
	E1.2.6 The pipeline trench shall be constructed in manner that prevents the pipeline from becoming a water conduit for subsurface flow, as this may drain the surrounding wetland areas. Suitable engineered techniques to prevent this are required (clay plugs used as subsoil coffer dams within the trench are a possibility).	At all times.	Contractor/Design team	ECO
	E1.2.7 If possible, subsurface material rather than river sand is to be used as bedding material in wetland areas.	During construction	Engineer / Contractor	ECO
	E1.2.8 Care should be taken during the construction phase to not impact on the wetland areas. wetland areas that face possible impact should be rehabilitated according to historical knowledge of the area	During construction	Engineer / Contractor/ Rehabilitation Specialist	ECO
	E1.2.9 A minimum of 30m buffers (Boyd 2001) of grassland fringe should be left intact surrounding wetland areas to provide terrestrial habitat for foraging and dispersal	During construction	Engineer / Contractor	ECO
<b><i>E1.3 Stream / River Care</i></b>	E1.3.1 The Contractor shall not modify the banks or bed of a water course unless specified in the project specification. Existing watercourse crossings are to be used where possible and care is to be taken to reduce disturbance and pollution to wetland and riparian vegetation.	For the duration of the activities	Contractor	ECO
	E1.3.2 Rocks for use in gabion baskets/ reno mattresses are to be sourced from suitably authorized suppliers (not from local water courses or sites).	For the duration of the activities	Contractor	ECO
	E1.3.3 Water quality monitoring activities for open water bodies within the working corridor should be undertaken by suitably trained people before, during and after construction to determine pollutant and sediment loads.	Before, during and after construction	Contractor	ECO
	E1.3.4 The Contractor shall not cause any physical damage to any aspects of a water course, other than those necessary to complete the works as specified and in accordance with the accepted method statement.	For the duration of the activities	Contractor	ECO

## E. FLAGGED RESOURCES

### E1. *Wetlands, Drainage Lines, Streams, Rivers and Major Rivers*

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	E1.3.5 Where a stream or river crossing requires the diversion of water, a method statement is to be provided to the Engineer and ECO in this regard for review.	14 days prior	Contractor	ECO
	E1.3.6 Silt curtains (for e.g.) are to be placed across existing downstream culverts during construction to reduce sedimentation. Silt and sediment traps should be placed across preferential flow paths on site to reduce sedimentation to adjacent watercourses / wetland systems.	During construction	Contractor	ECO
	E1.3.7 For small stream crossings, a temporary impoundment / coffer dam should be constructed upstream using sandbags / similar engineered techniques, to isolate the water from the construction zone. Water is to be piped from the impoundment to below the construction zone to reduce water movement across the disturbed area. At no time should water flow be totally inhibited through the stream system or uninhibited across any disturbed area.	During crossing activities	Contractor	ECO
	E1.3.8 Original stream beds may not be lowered as this may result in scouring in an upstream direction and further alteration of stream bed conditions.	Following reinstatement	Contractor	ECO
	E1.3.9 Surface beds should be restored as far as possible to their original condition. This may involve using concrete to secure rocks and boulders on the stream bed to improve surface resistance and habitat potential.	Following reinstatement	Contractor	ECO
	E1.3.10 Stream banks should be restored as far as possible to their original condition and contours, and banks of any diversions are to be protected from erosion / scour and reinstated on completion of works.	Following reinstatement	Contractor	ECO
	E1.3.11 Where trenches fill with water, water is to be pumped onto a well vegetated area upstream of and adjacent to the stream to facilitate sediment trapping and water quality amelioration.	During construction	Contractor	ECO
	E1.3.12 Flow deflectors are to be used at river crossings to deflect flow away from obstructions, especially during flood events.	During construction	Contractor	ECO
	E1.3.13 The crossings should be designed to ensure that flow patterns along the stream/river channel are not altered or diverted, potentially resulting in stream bank erosion. The crossings should be perpendicular to the direction of flow.	During construction	Contractor	ECO
	E1.3.14 An ECO would need to be on site full time to oversee operations in those red flag sections where species conservation significance may occur.	During construction	Contractor	ECO

## E. FLAGGED RESOURCES

### E1. *Wetlands, Drainage Lines, Streams, Rivers and Major Rivers*

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	<p><b>Method Statement for Buried Crossings</b></p> <p>This method statement sets out a general approach that may be used to cross rivers. This may change depending on the magnitude of the river to be crossed, i.e. smaller streams may require a simpler solution. It is important to note that the purpose of this method statement is to provide only a guideline to the appointed contractor. In practice, it is the responsibility of the appointed contractor to provide the Engineer with a proposed method statement for crossing the river. Once the Engineer has approved such a method statement, construction may commence.</p> <p><b>Timing of Construction</b></p> <p>Construction across rivers need, for practical purposes, to be undertaken in times of low flow. This would be the typically drier winter months in KZN. The timing of construction may however be influenced by the date of authorisation of a project.</p> <p><b>Method of Construction</b></p> <p>The open-trench approach of laying a pipeline under a river bed involves constructing a temporary coffer dam across approximately half of the width of the river channel using for example, a double row of sand bags. The opposite river embankment will be protected by means of sand bags to limit the potential for erosion as a result of water being channel passed the coffer dam. The coffer dam would be pumped dry and an open trench would be excavated within the drained coffer dam to the required depth to provide sufficient cover for the pipe. The pipe would then be laid within the de-watered trench in accordance with typical pipe-laying principles. Should the trench occur within bedrock, it will be concrete encased and backfilled. If the trench occurs in sandy material or silt, the trench will be backfilled with the same material removed during the excavation process. The process would then be repeated for the portion of the river that remains to be crossed. The entire trench across the river will receive erosion protection in the form of a Reno Mattress to prevent scouring or erosion over the pipeline trench. Where applicable, naturally occurring boulders will be placed over the Reno mattress to further protect the trench against erosion.</p> <p><b>Constraints</b></p> <p>The flow of the river would be contained within the existing river channel at all times and under no circumstance would consideration be given to the excavation of an alternative channel or the damming of the river in such a manner as to totally restrict the flow.</p>	During construction	Contractor	ECO
	<p>ement Plan: Northern Aqueduct Augmentation: Phase 4 EIA No.: DM/0065/2012</p>	80		

## E. FLAGGED RESOURCES

### E1. Wetlands, Drainage Lines, Streams, Rivers and Major Rivers

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>E1.4 Wetland / Riparian Zone Reinstatement &amp; Rehabilitation</b>	E1.4.1 The pre-construction profile of the wetland shall be returned to one similar as before construction, with no created “ridge or channel” features present. The pre-construction cross-profiles of riparian zones, streams and rivers are to be reinstated to those similar to pre-construction.	During construction	Contractor	ECO
	E1.4.2 The pipeline alignment should be rehabilitated to near-natural conditions. This should be done as soon as possible after the pipeline has been laid.	Immediately following construction	Contractor & Rehab Specialist	ECO
	E1.4.3 Methodologies for soil preparation and wetland rehabilitation are to be undertaken in accordance with the <b>RRP</b> .	Rehabilitation	Contractor & Rehab Specialist	ECO
	E1.4.4 Indigenous grasses and wetland species are to be introduced to facilitate vegetation recovery, in accordance with planting lists of the <b>RRP</b> .	Rehabilitation	Contractor & Rehab Specialist	ECO
	E1.4.5 An integrated alien plant control programme targeting invasive species is to be implemented throughout the construction and retention periods, in accordance with the <b>RRP</b> .	Immediately following construction	Contractor & Rehab Specialist	ECO
	E1.4.6 Stream channels are to be reinstated to their original course. Stream banks are to be stabilized and vegetated. Concrete structures are to be properly cured before being exposed to river flow. The crossings should be rehabilitated to ensure that no barriers exist within the stream and that in-stream habitat is similar to the previous natural situation.	Immediately following construction	Contractor	ECO
	E1.4.7 Pipes are to be buried below the elevation of the active channel. Scour of the pipeline encasement and stream banks near pipeline crossings is to be prevented using suitable engineering techniques.	Immediately following construction	Contractor	ECO
	E1.4.8 Ensure that the trench is adequately covered and soil pushed down to natural ground level to limit the potential of soil loss from the trench line once construction is complete.	Immediately following construction	Contractor	ECO

## E2. GRASSLANDS, VELD AND FORESTS

Relevant conditions of all previous Tables apply. This section provides more specific conditions for general activities in and around Flagged Resources for the project as identified by the biodiversity specialist. The Flagged Resources that require specific care, management and rehabilitation are featured in Appendix A. The rehabilitation of these areas is addressed in the Rescue and Rehabilitation Plan (**RRP**).

<b>E. FLAGGED RESOURCES</b>				
<b>E2. Grasslands, Veld and Forests</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>E2.1 Construction Methods for Grassland / Veld / Forest Environments</b>	E2.1.1 The Contractor shall submit a method statement for review timeously, prior to commencing construction in or near a Flagged Resource grassland, veld or forest.	14 days prior to commencing	Contractor	ECO
	E2.1.2 The working corridor is to be reduced to no more than 15m in width when working in or adjacent to Red Flag grasslands / veld / forest. The trench excavations are to be significantly reduced in length when working in or near these environments. The working corridor is to be fenced, and no activities are permitted outside of the demarcated working corridor.	For the duration of the activities	Contractor	ECO
<b>E2.2 Site Preparation</b>	E2.2.1 Certain grassland and veld areas identified as Red Flag Resources may require burning in an appropriate season (mid-May to mid-September) to allow for dormant species of conservation value to be located. This activity will require permission from and consultation with the relevant landowners, authorities, KZN Wildlife, and the Ecologist. Burning methods to comply with relevant legislation and should be undertaken by specialists. It is acknowledged that burning will only be possible at certain times of the year, and where possible should be accommodated in order facilitate rehabilitation. The Contractor (in association with a qualified Ecologist) must make every effort to note, and remove (for replanting, or in the case of seed, germinating) specimens as and when available.	Prior to construction	Contractor & Rehabilitation Specialist, Ecologist	ECO, KZNW
	E2.2.2 A qualified Ecologist is to Assist the Contractor to undertake the plant / species recovery exercises for Red Flag Sites. The R&R is to be undertaken by an ecologically qualified (or assisted) contractor, and must be according to the <b>Rescue and Rehabilitation Plan</b> . These recovery exercises are to be aimed at rescuing and relocating protected, endangered or listed plants and animal species, and the method statement is to include any specifications of the <b>RRP</b> . Further detail may be provided in the <b>Rehabilitation Specification</b> .	Prior to construction	Contractor & Rehabilitation Specialist	ECO, KZNW

## E. FLAGGED RESOURCES

### E2. Grasslands, Veld and Forests

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	<p>E2.2.3 Suitable sites and / or nurseries are to be identified for the relocation of these plants in consultation with DWA, KZN Wildlife, EMD and the relevant conservancies. Any permitting procedures are to be identified and undertaken prior to rescue. The Contractor / R&amp;R specialist should be well versed in the permitting requirements, which are also stipulated in the <b>RRP</b>.</p> <p>DWA permits will be required for:</p> <ul style="list-style-type: none"> <li>the removal of protected species,</li> <li>the removal of trees in a forest,</li> <li>impeding or diverting the flow of a river;</li> <li>altering the banks of a watercourse,</li> <li>and taking water from a water resource.</li> </ul> <p>KZNW permits will be required for:</p> <ul style="list-style-type: none"> <li>the collection of rare and endangered plant species (such as cycads for replanting),</li> <li>the removal of rare and endangered fauna (such as chameleon).</li> </ul> <p>FreeME KZN Wildlife Rehabilitation Centre is to be contacted should capture and relocation of faunal species be necessary. (Tel No: 033 330 3036).</p>	Prior to construction	Contractor & Rehabilitation Specialist	ECO, KZNW
	E2.2.4 Trees to be conserved are to be identified using barrier tape.	Prior to construction	Contractor	ECO
	E2.2.5 During the construction phase individual plants of significance may be relocated or set aside for use during rehabilitation. Rare, endangered or protected plant and animal species encountered, which occur in the direct path of the construction route must be relocated or rescued.	Prior to construction	Contractor, Ecologist	ECO
	E2.2.6 The working servitude across sensitive areas must be as narrow as practically possible. i.e. machinery must utilise the same route through the systems at all times so as to avoid unnecessary disturbance.	Prior to construction	Contractor	ECO
	E2.2.7 Burning regimes of natural grasslands may be complicated by the season and the existing management practices of the land in question. In such situations it would be necessary for grasslands to be burnt during winter and assessed in the following spring, summer and autumn in order to identify the locations of any such rare, endangered or protected species. Careful planning will be required.	Prior to construction	Contractor, Ecologist, Rehabilitation Specialist	ECO

<b>E. FLAGGED RESOURCES</b>				
<b>E2. Grasslands, Veld and Forests</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	E2.2.8 Access to natural areas containing rare, threatened or desirable species must be prevented through implementing hard engineering mechanisms, such as barriers across access roads, as well as the fencing off of areas adjacent to the pipeline servitude during construction. Workers are to be informed that they are not allowed access in any form into areas adjacent to the pipeline servitude.	Prior to construction	Contractor	ECO
	E2.2.9 The addition of materials such as lime (in cement) which can change the soil pH may result in the loss of certain species previously found in these areas, and must be avoided, especially on or near Natal Group Sandstone. Avoidance of soil contamination requires careful management, and rehabilitation strategies must consider the effects of certain fertilizers to the area in question.	Prior to construction	Contractor	ECO
	E2.2.10 The removal of large trees and deep rooted vegetation is undesirable in most flagged resources. It is important that mitigation measures related to the removal of tree species for maintenance purposes are in accordance with specialist consultation.	Prior to construction	Contractor, Ecologist	ECO
	E2.2.11 Licence application forms for cutting/trimming of trees in a natural forest and any protected trees should be forwarded to the forestry department in Pietermaritzburg for approval.	During construction	Contractor	ECO
	E2.2.12 A program should be in place to control alien plants along construction sites.	During construction	Contractor	ECO
<b>E2.3 Grassland / Veld / Forest Care</b>	E2.3.1 Excavated topsoil and sub-soils to be excavated separately. Once reinstatement occurs, soils are to be replaced in the sequence as removed, and preferably be replaced by direct return (replaced immediately on the same area from which it was sourced) along the contour.	During construction	Contractor	ECO
	E2.3.2 During construction, the working servitude across the sensitive environs (including watercourses) and erodible soils must be as narrow as practically possible, i.e. machinery must utilise the same route through the systems at all times to avoid unnecessary disturbance.	During construction	Contractor	ECO
	E2.3.3 All vehicle activity along spurs and steep slopes must be reduced to a minimum after construction has been completed. Management during construction can also reduce this impact, and vehicular access may only take place along a designated access road, which will be ripped up and rehabilitated after construction has been completed.	During construction	Contractor	ECO



<b>E. FLAGGED RESOURCES</b>				
<b>E2. Grasslands, Veld and Forests</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	E2.3.4 Alien invasive plants must be removed from the construction servitude on a regular basis and should not be allowed to become established nor especially allowed to set seed. This removal may be done mechanically or chemically.	During construction	Contractor	ECO
	E2.3.5 Topsoil brought in from other areas must be sprayed to kill all possible alien vegetation seed within the soil particles.	During construction	Contractor	ECO
	E2.3.6 Under no circumstances may anyone drive over or break any termite mounds or other micro habitats (such as rocks and logs) that exist outside the working corridor.	At any time.	Contractor	ECO
	E2.3.7 Plundering of the outcrops of Natal Group Sandstone is strictly prohibited. If the outcrops occur along the working corridor then they should be removed and reinstated next to the servitude. This is to be done in consultation with the ECO.	At any time.	Contractor	ECO
	E2.3.8 When dealing with steep rocky areas, care is to be taken to prevent large boulders from being dislodged as the potential resulting rock fall could be dangerous and cause damage to plants etc.	At any time during construction and reinstatement	Contractor	ECO
	E2.3.9 Indigenous trees may not be removed or pruned without permission from the ECO. No vegetation may be removed for the sole purpose of using for firewood.	At any time	Contractor	ECO
	E2.3.10 The code of conduct is to be enforced when working in the working corridor, with special care regarding fauna and flora on Red Flag Sites. Hunting, collecting, harvesting, snaring, or any other activity disturbing local fauna or flora that is unrelated to the construction work is strictly prohibited.	At all times	Contractor	ECO
	E2.3.11 Turning circles and delivery sites are not to be situated in any Red Flag sites. All activities including stockpiles, pipes, machinery and materials are to remain within the working corridor.	At any time	Contractor	ECO
<b>E2.4 Grassland / Veld / Forest Reinstatement &amp; Rehabilitation</b>  <i>The Rehabilitation Specification provides more in-</i>	E2.4.1 No fertilizers or soil ameliorants should be added to either the topsoil or subsoil which will be used to refill the trench or reinstate the site in any of the Flagged Resource areas identified as “RED” sectors (refer to the <b>RRP – however, the Rehabilitation SPECIFICATION document provides in-depth detail on the rehabilitation procedures required for each section of the proposed route).</b>	At any time	Contractor & Rehabilitation Specialist	ECO
	E2.4.2 Sensitive grassland and veld sectors that have been identified as “RED” are to be rehabilitated to their previous condition in accordance with the RRP plant lists and methodologies.	Rehabilitation	Contractor & Rehabilitation Specialist	ECO

## E. FLAGGED RESOURCES

### E2. Grasslands, Veld and Forests

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>depth detail.</b>	E2.4.3 Areas of low biodiversity concern or those referred to as “ORANGE and GREEN” are to be re-vegetated to previous condition by using either Couch Grass, Bahia Grass, LM Grass, Kikuyu or other locally suitable lawn grasses or Weeping Love Grass, <i>Digitaria eriantha</i> , <i>Hyparrhenia hirta</i> , <i>H. dregeana</i> and <i>Aristida junciformi</i> (refer to the <b>RRP</b> ). Use of fertilizers and ameliorants such as lime are permissible in these areas.	Rehabilitation	Contractor & Rehabilitation Specialist	ECO
	E2.4.4 An integrated alien plant control programme targeting invasive species is to be implemented throughout the construction and retention periods (refer RRP).	Immediately following construction	Contractor	ECO
	E2.4.5 Herbicides are considered to be the most effective means of implementing alien plant control. However, especially in sectors where invasions of alien problem species such as wattle and gum exist, removal of the present crop by mechanical means is recommended. Furthermore, The risk of herbicide drift in certain areas must be carefully considered as this may cause damage to crops, market gardens or other important agricultural activities, and/or watercourses.	At all times	Contractor & Rehabilitation Specialist	ECO
	E2.4.6 Where herbicides are used, the manufacturer’s instructions are to be followed. Only people that are trained and qualified in this use are permitted to administer the chemicals.	At all times	Contractor & Rehabilitation Specialist	ECO
	E2.4.7 No herbicides are to be administered in close proximity to streams or any other water bodies unless approved by the ECO. Alternative measures of alien plant control are to be used in these areas.	At any time	Contractor & Rehabilitation Specialist	ECO
	E2.4.8 All eradicated plant material to be disposed of at an approved solid waste disposal site.	Immediately following plant control	Contractor & Rehabilitation Specialist	ECO
	E2.4.9 Rehabilitated areas are to be monitored for the establishment of alien invasive plants. Follow-up treatments to all disturbed sites must be undertaken to remove all invasive species as this will reduce the overall cost of rehabilitation. This is to be undertaken until 80% rehabilitated coverage is achieved (refer to the <b>RRP</b> ).	For the retention period and until approval obtained	Contractor & Rehabilitation Specialist	ECO
	E2.4.10 The rehabilitation strategies, servitude maintenance regimes and management programmes must address alien invasive plant management.	Rehabilitation	Contractor & Rehabilitation Specialist	ECO
	E2.4.11 Careful consideration must be given to the selection of plant species which are used to rehabilitate areas of KZN Sandstone Sourveld grassland. A possible best compromise might be to rehabilitate these areas with only a small variety of typical indigenous species which can be propagated in large quantities at low cost and have a potentially high level of survivorship.	Rehabilitation	Contractor & Rehabilitation Specialist	ECO

<b>E. FLAGGED RESOURCES</b>				
<b><i>E2. Grasslands, Veld and Forests</i></b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	E2.4.12 The potential risk associated with soil additives and the distributional ranges of certain species must also be considered: on areas occupied by KZN Sandstone Sourveld, fertilizers and soil ameliorants, such as lime, cannot be used to assist with rehabilitation as the species which occur here are adapted to the acidic and nutritionally depauperate soils of such areas.	Rehabilitation	Contractor & Rehabilitation Specialist	ECO
	E2.4.13 Sensitive areas will be rehabilitated back to a condition approaching or equal to the current natural condition. Where possible rocks and logs 'rescued' from the servitude should be set aside for the reestablishment of micro habitats. The pipeline alignment should be rehabilitated to near-natural conditions. This should be done as soon as possible after the pipeline has <b>been</b> laid.	Rehabilitation	Contractor & Rehabilitation Specialist	ECO

## F. OTHER SENSITIVE ENVIRONMENTS

### F1. NOISE AND DUST HOTSPOTS

Relevant conditions of all previous Tables apply. The Communications Plan (CP) also makes reference to public consultation with regards to noise and dust.

<b>F. OTHER SENSITIVE ENVIRONMENTS</b>				
<b>F1. Noise and Dust</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>F1.1 Noise and Dust Receptors</b>	F1.1.1 Public notification of upcoming loud events needs to be used as a form of mitigation, as people are less likely to get upset if they know of an upcoming event and know that it will be temporary.	Prior to event	Contractor	ECO
	F1.1.2 Sites deemed <b>sensitive</b> are: preschools, primary schools, high schools, hospitals, residencies and libraries. Where possible construction in these areas is to be scheduled during school holidays. Adequate measures need to be taken to prevent any noise nuisance that may arise.	Construction during school holidays	Contractor	ECO
	F1.1.3 Noise sensitive sites require the erection of acoustic screens to lessen the noise impacts on these receptors. The acoustic screens are normally in the form of timber shutter boards erected as a fence screen between the construction site and the receptor (i.e. school).	Construction	Contractor	ECO
	F1.1.4 All areas are sensitive to <b>dust</b> , but especially schools, animal farms, urban centres, recreational and tourism facilities, residences and businesses. Construction near these areas should be scheduled outside of windy / dryer months when dust generation is more likely, and dust management and amelioration is essential at all times.	Construction	Contractor	ECO
<b>F1.2 Care to Minimise Noise</b>	F1.2.1 The Contractor is to ensure that construction noise is kept to a minimum by ensuring proper worker conduct, that there is no excessive revving of vehicles, no unnecessary hooting and proper use of equipment as specified in previous tables.	Construction	Contractor	ECO
	F1.2.2 Construction activities must be limited to normal working hours (8am – 5pm, weekdays only) so as to minimize the impact on sleep disturbance and annoyance. No machinery/equipment which may lend itself to creating a noise nuisance, to be utilised on Sundays and public holidays.	Construction	Contractor	ECO
	F1.2.3 The routes of construction vehicles between depots and sites should, where possible be directed away from quieter roads and residential areas so as to prevent unnecessary noise impact on these areas.	Construction	Contractor	ECO
	F1.2.4 The contractor is to ensure that all construction vehicles adhere to the legal speed limit and are properly maintained to limit excessive noise.	Construction	Contractor	ECO

## F. OTHER SENSITIVE ENVIRONMENTS

### F1. Noise and Dust

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	F1.2.5 A noise incident reporting mechanism needs to be established and publicized so that members of the public can log complaints. A register of such complaints needs to be kept at the site office, indicating investigation of such complaints and remedial steps that were taken (refer to <a href="#">Table C1</a> above and <b>Communications Plan</b> ).	Construction	Contractor	ECO
	F1.2.6 Areas where blasting is to take place need to be identified timeously and residents of the area need to be notified of the expected date and time of the blast (see <b>CP</b> ). This will be particularly important in agricultural areas where livestock is kept. Timeous notification of landowners will allow for animals to be secured or moved to areas away from the planned blast.	Construction	Contractor	ECO
	F1.2.7 Blasting activities and blast design need to comply with all relevant policies and regulations. Where possible, weather conditions need to be considered as inversion conditions will increase the impact of the blast.	Construction	Contractor	DAEARD, ECO
	F1.2.8 Machinery and methods of operation should be selected on the basis of the quietest available within the constraints of reasonable cost. When the noise cannot be adequately controlled at source by the appropriate selection of plant, equipment and work methods, the use of enclosures and barriers should be considered.	At any time during construction and reinstatement	Contractor	ECO
	F1.2.9 Regular and effective plant / equipment maintenance needs to be carried out and documented throughout the project period. Documentation will be maintained on site demonstrating completion of maintenance logs. Construction machinery needs to be audited with associated checked in order to ensure all machinery is in good working order and use does not generate excess noise/vibration.		Contractor	ECO
	F1.2.10 Plant, equipment and vehicles will not be operated in the event that excessive noise is produced at start up as a result of maintenance being required.		Contractor	ECO
	F1.2.11 The condition of the machinery to be used, e.g. efficient engines, silencers and covers and compliance with manufacturer's maintenance requirements needs to be adhered to.		Contractor	ECO
	F1.2.12 The citing of machinery, e.g. the use of available shielding such as walls or buildings, the placing of material stores and distance from noise sensitive premises needs to be considered and noisier operations need to be limited to normal work day hours.		Contractor	ECO

## F. OTHER SENSITIVE ENVIRONMENTS

### F1. Noise and Dust

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	F1.2.13 Care should be taken to ensure materials and pipes are loaded (both by machinery and by workers) into skips / haulage vehicles in a way that minimises noise. Avoid throwing or dropping materials.	At any time during construction and reinstatement	Contractor	ECO
	F1.2.14 Vehicles will not be left turned on or idling at the site for longer than minimum amount of time required to complete site activities. In addition, machines / equipment used intermittently during construction activities (i.e. cranes, excavators, TLB's, lifting equipment, etc.) will be shut down, as practicably achievable, in the period between works activities rather than allowed to idle.	At any time during construction and reinstatement	Contractor	ECO
	F1.2.15 Noise awareness training should be undertaken for all site staff (including subcontractors) as part of general site induction and tool-box talk activities.	Prior to demolition	Contractor	ECO
	F1.2.16 The daily site diary will be used to record any auditory observations during site works. Notes relating to community complaints will also be recorded in the daily site diary in addition to resulting actions.	Daily basis	Contractor	ECO
	F1.2.17 Driver practices when approaching and leaving the site should minimise noise emissions created through activities such as unnecessary acceleration and breaking squeal.	At any time during construction and reinstatement	Contractor	ECO
	F1.2.18 Minimise reversing of equipment to prevent nuisance caused by reversing alarms.		Contractor	ECO
	F1.2.19 In the event of receipt of a complaint the following timeframes for response will be provided: <ul style="list-style-type: none"> <li>The site diary or complaints register will be updated within the same work day with timeframe for response/action noted.</li> <li>Responses to resident complaints will be completed within 2 business days.</li> <li>The complaints register will be updated within 2 working days of complaint indicating the nature of the response and, where required, details of implementation of mitigation measures to address the complaint.</li> </ul>	On receipt of complaint	Contractor	ECO
<b>F1.3 Care to Minimise Dust</b>	F1.3.1 Record keeping: The purpose of record keeping is to provide a consistent reasonable process for documenting air quality incidents, notifying alleged violators, and initiating enforcement action to ensure that violations are addressed in a timely and appropriate manner. Contractor to keep records as part of the daily site diary.	At any time during construction and reinstatement	Contractor	ECO
	F1.3.2 Site inspection and monitoring: This activity includes general observations of dust generating activities and undesirable weather conditions. An inspector can use photography to document compliance with air quality objectives.	At any time during construction and reinstatement	Contractor	ECO

## F. OTHER SENSITIVE ENVIRONMENTS

### F1. Noise and Dust

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	F1.3.3 Action Plan: Once dust nuisance has been identified on site, an action plan needs to be implemented as soon as possible in order to reduce the impacts. The correct process would be for the Site Agent (or Engineer) to contact the ECO and then for the ECO to prescribe corrective measure.	At any time during construction and reinstatement	Contractor	ECO
	F1.3.4 Where possible, vehicle access routes via unpaved road surfaces should be limited. Unpaved roads must be watered during dry periods to reduce dust emissions. The frequency of watering of unpaved roads and the volume of water to be used will vary, depending on climatic conditions and will have to be monitored. Care is to be taken to prevent muddy conditions during watering, as mud can be transported off-site on vehicle tyres, becoming a dust problem elsewhere.	Construction	Contractor	ECO
	F1.3.5 Speed limits must be implemented to reduce the entrainment of dust from the road surface, and vehicle movement confined to approved routes.	Construction	Contractor	ECO
	F1.3.6 Vehicles transporting finer grained materials are to have covered loads to prevent dangers to other road users (dust, falling debris/material).	Construction	Contractor	ECO
	F1.3.7 Whenever possible, tyres should be washed / brushed before leaving muddy sites onto paved roads.	Construction	Contractor	ECO
	F1.3.8 Material and soil stockpiles should be kept moist, or covered with a suitable geofabric / equivalent to suppress dust.	Construction	Contractor	ECO
	F1.3.9 The height of stockpiles should be limited to 2m (and 1.5m in topsoil) so as to reduce exposure to wind, and where possible, stockpiles should be screened from wind erosion. Stockpiles should be located away from sensitive dust receptors.	Construction	Contractor	ECO
	F1.3.10 Where blasting is required, residents must be notified of blasts timeously. Controlling the size of the blast and the use of dampening mechanisms (such as blast mats) can help to reduce dust emissions.	Construction	Contractor	ECO
	F1.3.11 Where possible haulage routes must be planned away from residents and other sensitive receptors.	Prior to construction	Contractor	ECO
	F1.3.12 Where unpaved road dust becomes an issue, use water cart (or similar device) to spray roads in order to maintain surface moisture.	At any time during construction and reinstatement	Contractor	ECO
	F1.3.13 General site traffic must be restricted to watered or treated haul roads.	At any time during	Contractor	ECO

## F. OTHER SENSITIVE ENVIRONMENTS

### F1. Noise and Dust

ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
	F1.3.14 The number of handling operations should be kept to a minimum by ensuring that dusty material isn't moved or handled unnecessarily.	construction and reinstatement	Contractor	ECO
	F1.3.15 Use material handling methods that minimise the generation of airborne dust. For example, loading and unloading can be confined to leeward (downwind) side of the pile. This statement also applies to areas around the pile as well as the pile itself.	At any time during construction and reinstatement	Contractor	ECO
	F1.3.16 When loading materials onto / off vehicles drop heights must be kept to a minimum, where necessary damp down with water.		Contractor	ECO
	F1.3.17 Where dust becomes an issue at fence line (over the site boundary), use static sprinklers, bowsers, hand held hoses and other watering methods as necessary.		Contractor	ECO
	F1.3.18 Stockpiles should be located as far away from sensitive receptors as possible e.g. residential, commercial and educational buildings, places of public access or other features.	At any time during construction & reinstatement	Contractor	ECO
	F1.3.19 Ensure slopes of stockpiles, tips and mounds are at an angle not greater than the natural angle of repose of the material. Avoid sharp changes of stockpile shape.		Contractor	ECO
	F1.3.20 Earthworks, excavation and digging activities should be kept damp and, if possible, be avoided during exceptionally dry and windy weather periods.		Contractor	ECO
	F1.3.21 Stabilise surfaces and/or re-vegetate as soon as possible.		Contractor	ECO
	F1.3.22 Construction vehicles travelling along the access roads must adhere to speed limits to avoid creating excessive dust, especially during dry and windy conditions. In close proximity to sensitive receptors, this should ideally be reduced to 10km/h.		Contractor	ECO
	F1.3.23 Where dust cannot be avoided, screening is to be provided.		Contractor	ECO



## F2. CULTURAL HERITAGE PRESERVATION

Relevant conditions of all previous Tables apply. This section provides more specific conditions for general activities in and around Flagged Resources for this project as identified by the specialists. The Flagged Resources that require specific care, management and rehabilitation are featured in the Appendix A attached. The Heritage Management Plan details management of these features.

<b>F. OTHER SENSITIVE ENVIRONMENTS</b>				
<b>F2. Cultural Heritage Preservation</b>				
ISSUE	ACTION	TIMING	RESPONSIBILITY	MONITORING
<b>F2.1 Heritage Items</b>	F2.1.1 Wetting down of dusty surfaces near sites of worship or buildings of cultural significance is required should any be encountered along the route.	Construction	Contractor	ECO
	F2.1.2 Construction phasing / timing must occur so that no construction (noisy and dusty) occurs on days of worship.	Construction	Contractor	ECO
	F2.1.3 Amafa should be contacted if any heritage objects are identified during earth moving activities and all development should cease until further notice. Amafa should also be contacted if any graves are identified during construction and the following procedure is to be followed: <ul style="list-style-type: none"> <li>• stop construction,</li> <li>• report finding to a local police station,</li> <li>• report to Amafa to investigate.</li> </ul>	Construction	Contractor	ECO
	F2.1.4 No activities area allowed within 50m of a site which contains rock art (if uncovered)	Construction	Contractor	ECO
	F2.1.5 In accordance to the heritage study, the only portion of the proposed route that could have Stone Age, Late Iron Age, and/or Historical Period remnants is the hill on the Erf Moriah 16743FU. This is a small area of land that has had some form of agriculture for at least 80 years, and any archaeological site would have been completely damaged. It is necessary that this section of the line undergo careful monitoring during the construction phase of the NAA Phase 4 project. The palaeontological sensitive area occurs from S29°44'11.23" E31° 1'18.27"E to S29°43'57.83" E31° 1'16.90" (See Heritage Management Plan for more information)	During construction in this area	Contractor/ECO	ECO
<b>F2.2 Discoveries</b>	F2.2.1 Any sites discovered during clearing / construction and thought to be of cultural / archaeological / paleontological significance are to be demarcated, and all activities are to cease within these areas until such time as the relevant authorities have been notified, as required by Amafa. The ESO is to be trained in recognising significant sites such as graves.	Construction	Contractor	ECO, Amafa

## Section F: Contact Numbers

<b>F.1 General Numbers</b>	Telephone or Fax Numbers
eThekwini Police	031 361 0000 (Emergencies) 031 311 1111 (General Enquiries)
eThekwini Fire Department	031 361 0000 (Emergencies)
eThekwini Electricity	0801 313 111 (Help Line)
eThekwini Water	0801 313 013 (Help Line)
eThekwini Waste Water	0801 313 013 (Help Line)
eThekwini Environmental Management Branch	031 311 7919 (Kuben Samie)
Abzorbit (24 hour response for oil and chemical spills on land or water, bioremediation, distributors of PEAT SORB)	0800 147 112 (24 hr emergency response) 083 269 8790 (Doug) 083 253 6618 (Gerald)
FFS Refiners (for the free collection of used lubricating oil)	031 465 1466
Oil Col (for the free collection of used lubricating oil)	0861 101 961
FreeME KZN Wildlife Rehabilitation Centre (To be contacted should capture and relocation of faunal species be necessary).	033 330 3036
DWAF	033 341 2600 / 033 342 8101 / 031 336 2742
KZNW	033 845 1999 / 033 845 1349
DAEARD	033 343 8428 / 031 302 2872

<b>F.2 Waste Management Contact Details</b>	
Durban Solid Waste (DSW) Disposal Branch – Help Line (Contact for locations and facilities offered at refuse sites within the eThekwini Municipality)	031 263 1371 031 263 1310 (Fax)
DSW Business Branch (Contact for arranging refuse collection from the construction site)	031 311 8821 031 263 1122 (Fax)

<b>F.3 Permitted Hazardous Waste Sites &amp; Hazardous Waste Contractors</b>	
Bulbul Drive, Chatsworth (Waste Services) This site handles general and low hazardous waste.	031 460 4600 (Tel: Waste Services)
Shongweni (Enviroserv Waste Management) This site handles general and low hazardous waste.	031 769 1134 (Site – Clive Kidd) 031 902 1526 (Enviroserv)

<b>F.4 DSW Permitted General Waste Sites (for all Non-Hazardous Waste)</b>	
Bisasar Road (Springfield)	031 263 1371
Verulam (Buffelsdraai)	0733226505 Bonga / 071 115 7440 (Mpfundo)
Mariannhill	031 700 8929

<b>F.5 DSW Non-Managed Disposal Sites (for building rubble, spoil material, garden refuse)</b>	
Shallcross (near Chatsworth)	071 850 7183 (Melvin Govender)
Wyebank (Kloof)	071 850 7183 (Melvin Govender)

<b>F.6 Garden Refuse Sites</b>	
Bellair Road (this is a full recycling facility and accepts materials such as glass, plastic used appliances, steel and copper.)	
Canehaven Drive (Phoenix)	
Chatsworth (Aggitarius Street)	
Glanville Road (Woodlands)	
Malacca Road (Durban North / Effingham)	
Merebank (Travencore Road)	
Durban North (Riverside Road)	
Bluff (Tara Road)	

## APPENDIX A

### FLAGGED RESOURCES

#### Methodology

The flag system proposed includes three colour- coded situations:

- **Green Flag:** Given the status of the receiving environment within a segment and/or the nature or proximity of the proposed activity, the potential impacts on the specialist-specific environment are negligible.
- **Orange Flag:** Given the status of the receiving environment within a segment and/or the nature or proximity of the proposed activity, the potential impacts on the specialist-specific environment are possible, and with the implementation of known mitigation measures/alternatives it is unlikely to have any significant impact.
- **Red Flag:** Given the status of the receiving environment within a segment and/or the nature or proximity of the proposed activity, the potential impacts on the specialist-specific environment are possible and probable, and highly significant – possibly even a no-go area. Further detailed specialist investigation will be required to determine the exact nature of these impacts, possible alternatives and options for mitigation.

#### Results:

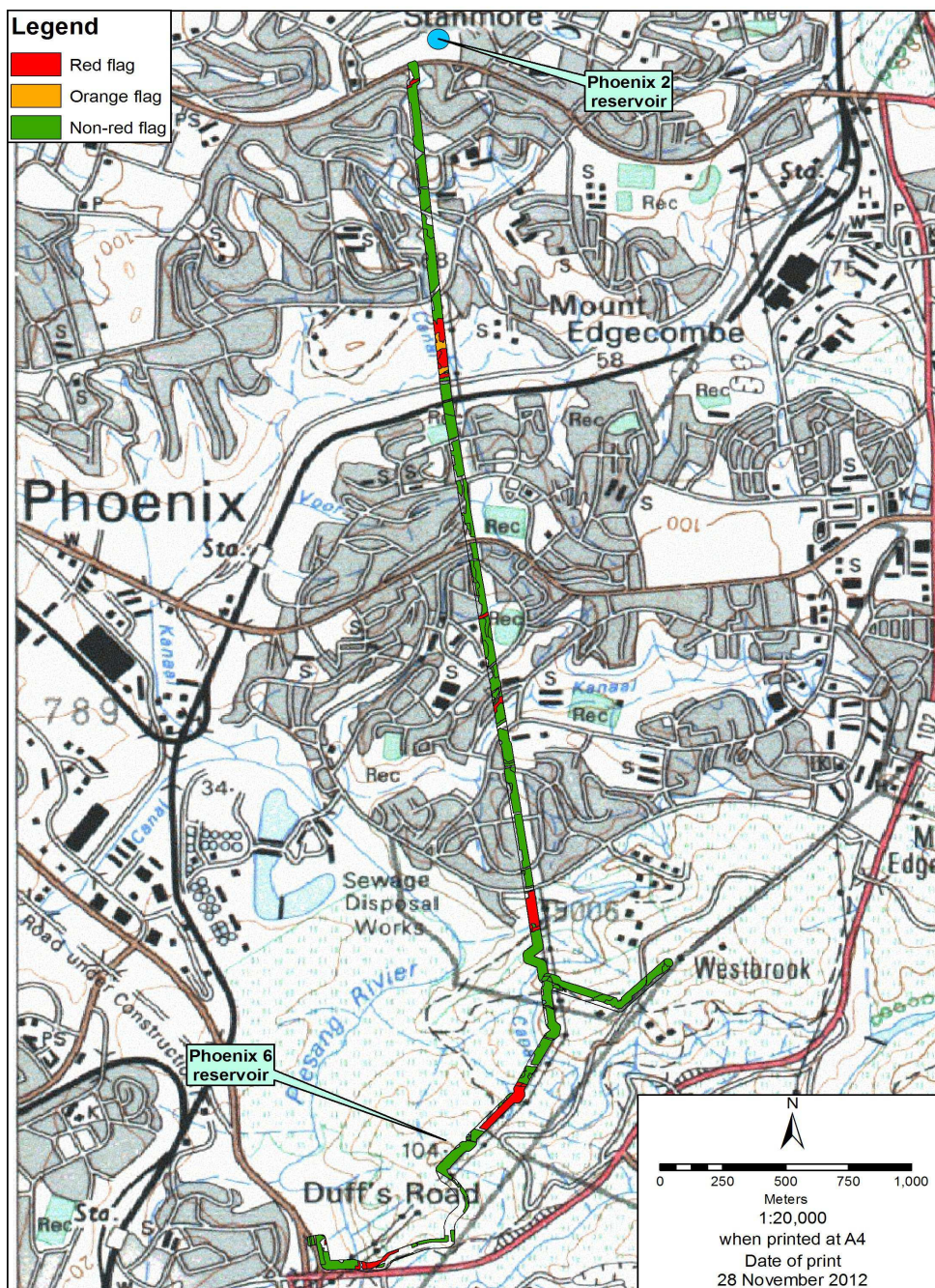
**Red-flag areas:** All polygons which were mapped as any type of wetland are recognised as Red-flag polygons by the Biodiversity Specialist because, being wetland habitats, it is considered inevitable that in creating a corridor approximately 30m-wide, which is necessary in order to be able to lay pipes which are 1.2m in diameter, the potential impacts which will be caused to these habitats – even temporarily – will be severe. Furthermore, in the case of some of these wetland areas it is considered possible that they may support at least one Red-data species namely Pickersgill's Reed Frog. An alternative route around this wetland has been proposed.

Although, areas which were mapped as forest or thicket or shrubland or indigenous grassland may provide habitat for one or more species of conservation concern most of these areas have not been classified as Red-flag polygons because of the extent to which they have been disturbed and are invaded with alien problem-plant species.

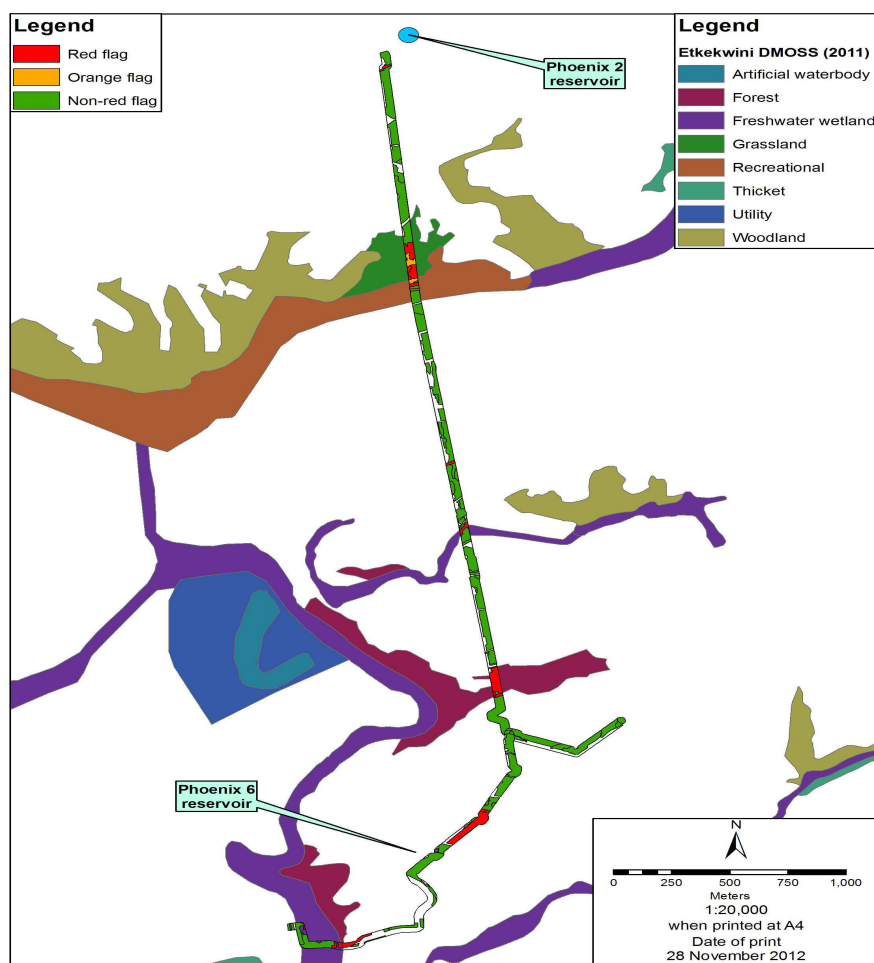
**Orange-flag areas:** Three polygons which were mapped as Short Dense Grassland have been designated as Orange-flag polygons. This flag-status was allocated because: (a) these polygons have been disturbed and are invaded to varying degrees by alien problem-plant species but, (b) they may provide habitat for at least one species of conservation concern namely KwaZulu-Natal Dwarf Chameleon. However, sufficient knowledge and expertise has been gained by a number of biodiversity specialists that if this species is found to be present, individuals can either be captured and relocated or captured and returned to the area in which they were found once the corridor has been rehabilitated. A third reason for allocating an Orange-flag status to these polygons is that relatively similar habitat occurs adjacent to them, in which case it is possible that any chameleons which may be present will simply relocate themselves when they perceive disturbance commencing in the vicinity of their habitat within the corridor.

**Green-flag areas:** Polygons which were designated as Green-flag areas support habitat which has been markedly or entirely transformed. These areas comprise most of the corridor.

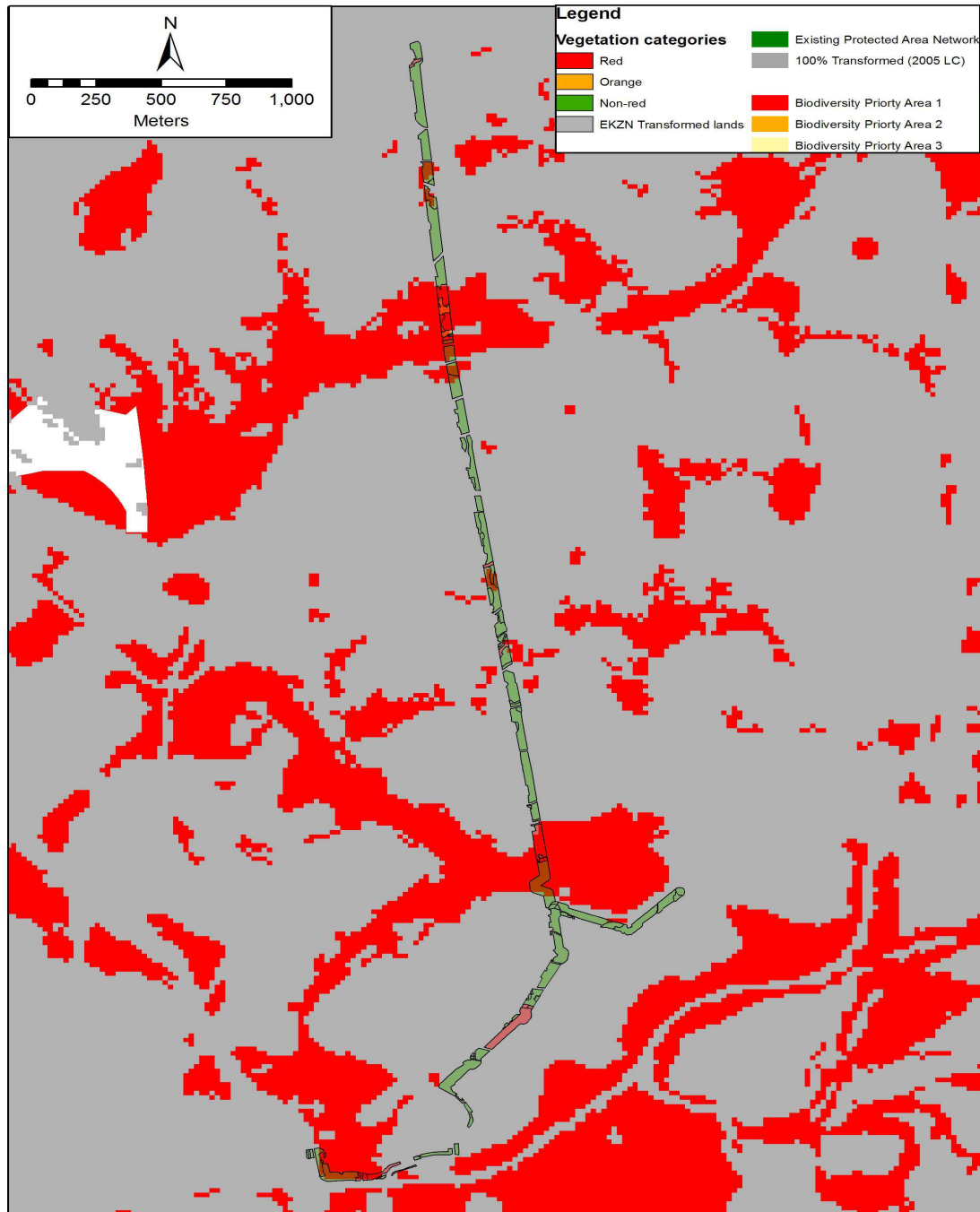




**Figure A 1.** The 40m-wide corridor assessed for Phase 4 of the NAA superimposed on an enlarged portion of the 1:50 000 topocadastral map of Durban.



**Figure A 2.** The 40m-wide corridor assessed for Phase 4 of the NAA superimposed on the D'MOSS categories it crosses.



**Figure A 3.** The 40m-wide corridor assessed for Phase 4 of the NAA superimposed on the relevant portion of the Ezemvelo KZN Wildlife map of Biodiversity Priority Areas in KwaZulu-Natal. The coloured portions of the corridor reflect the flag categories described in the Terms of Reference for this report and referred to in the legend of this figure as Vegetation Categories.

## APPENDIX B

### KWAZULU-NATAL DWARF CHAMELEONS

The environmental awareness training session for all construction workers to be undertaken by the ECO must include a section on KwaZulu-Natal Black headed Chameleon awareness and mitigation. Not only should the training impart valuable information to the workforce, but in the interests of cost efficiency, this training should empower workers to play a role in the relocation of the species, where appropriate. The objective of the training exercise must ideally achieve the issues listed below:

- To make the workforce aware of the fact that chameleons are of high conservation priority and have been found to occur on pipeline route and hence the need to avoid injury to chameleons (and other forms of animal life);
- To hopefully overcome superstition and fear around chameleons and address ways in which to deal with these fears;
- How to carefully cut vegetation for the erection of the chameleon-proof fence and carefully remove any chameleons for relocation found thereon;
- Provide the workforce with a strategy as to what should be done if a chameleon is located within the construction area once construction has started, i.e. operations must be stopped immediately and the ECO informed; and
- To alert the staff that killing of these species is strictly prohibited, and that penalties will be put in place for killing or harming any *B. melanocephalum* species.
- An example Poster has been provided below which should be copied to A2 and put up at the Construction Camp. The assumption is that the Contractor will provide translation to the workforce during the training discussion.




**BLACK HEADED-DWARF CHAMELEON**

**IZINWABU EZINAMAKHANDA AMNYAMA EZINCANE**

**CONSTRUCTION ACTIVITIES CAN HARM CHAMELEON POPULATIONS THAT  
OCCUR ON SITE**

**Identification:**

- Length = ±11 cm
- Bumps on the sides of bodies
- Found in evening / at night
- Pale in colour (darker during the day)
- Sleeps exposed on leaves/branches on warm, calm evenings



**Protection**

- Clear vegetation carefully by hand along fence route, checking for chameleons
- Leave cut plants spread out on the ground for a day
- Put up chameleon-proof fencing – check construction area daily, am & pm

**Relocation**

- If a chameleon is found, stop work immediately and place carefully in bucket
- Report to site manager
- Move chameleons outside of the construction area to neighbouring bush

**CHAMELEONS ARE A PRIORITY SPECIES FOR CONSERVATION ACTION -  
DO NOT HARM, TRAP or KILL! Chameleons are very important.**

**Figure B 1.** Example of a Chameleon Awareness Poster