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Flora Assessment

of

MOKOLO – CROCODILE RIVER WATER PIPELINE PHASE 1

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1. INTRODUCTION

Galago Environmental CC was appointed to undertake a botanical study along the proposed route for the Mokolo-Crocodile river pipeline phase 1. The objective of the study was to delimit and map plant communities along the proposed pipeline route and to list the plant species occurring in each community. Special attention was paid to the presence or possible presence of Red Data species, Orange Listed species, alien species and medicinal species. The current ecological status and the conservation priority of the vegetation on the site were assessed.

2. OBJECTIVES OF THE STUDY

- To assess the current habitat and conservation status on the study site.
- To list the species on the site and to recommend necessary actions in case of occurrence of endangered, vulnerable or rare species.
- To highlight potential impacts of the development on the vegetation of the pipeline route.
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

3. SCOPE OF STUDY

- All plant species discernable at the date of the survey are listed.
- Medicinal and alien species are indicated with symbols in the tables.
- The ecological sensitivity and conservation priority of the vegetation are evaluated.
- Measures to minimize the negative impact of development on the vegetation are suggested.

4. STUDY AREA

The pipeline route is located in several quarter degree grid squares ranging from Steenbokpan in the west to Lephalale in the east and then south to Mokolo dam (Figure 1; Annexure A). It extends from west to east over the Limpopo Sweet Bushveld and Waterberg Mountain Bushveld to the south. In the area of waypoint 031 some elements of Central Sandy Bushveld such as *Acacia burkei, Combretum zeyheri* and *Terminalia sericea* occur but the vegetation still closely resembles Waterberg Mountain Bushveld.

The Limpopo Sweet Bushveld extends from the Crocodile and Marico rivers down the Limpopo river valley into the tropics past Tom Burke. The landscape features plains, some areas undulating or irregular with thickets of *Acacia erubescens, Acacia mellifera* and *Dichrostachys cinerea* in disturbed areas. The vegetation unit is considered least threatened. Less than 1% is statutorily conserved and about 5% transformed, mainly by cultivation (Mucina & Rutherford, 2006).

Waterberg Mountain Bushveld is located in the Waterberg Mountains, including the foothills, escarpment and tablelands south of the line between Lephalale and Marken. The landscape consists of rugged mountains with vegetation grading from

Faurea saligna-Protea caffra bushveld on higher slopes to *Burkea africana-Terminalia sericea savanna* in the lower-lying valleys. The grass layer is moderately developed. The conservation status is regarded least threatened. About 9% is statutorily conserved mainly in the Marakele National Park and Moepel Nature Reserve. More than 3% is transformed by cultivation (Mucina & Rutherford, 2006).

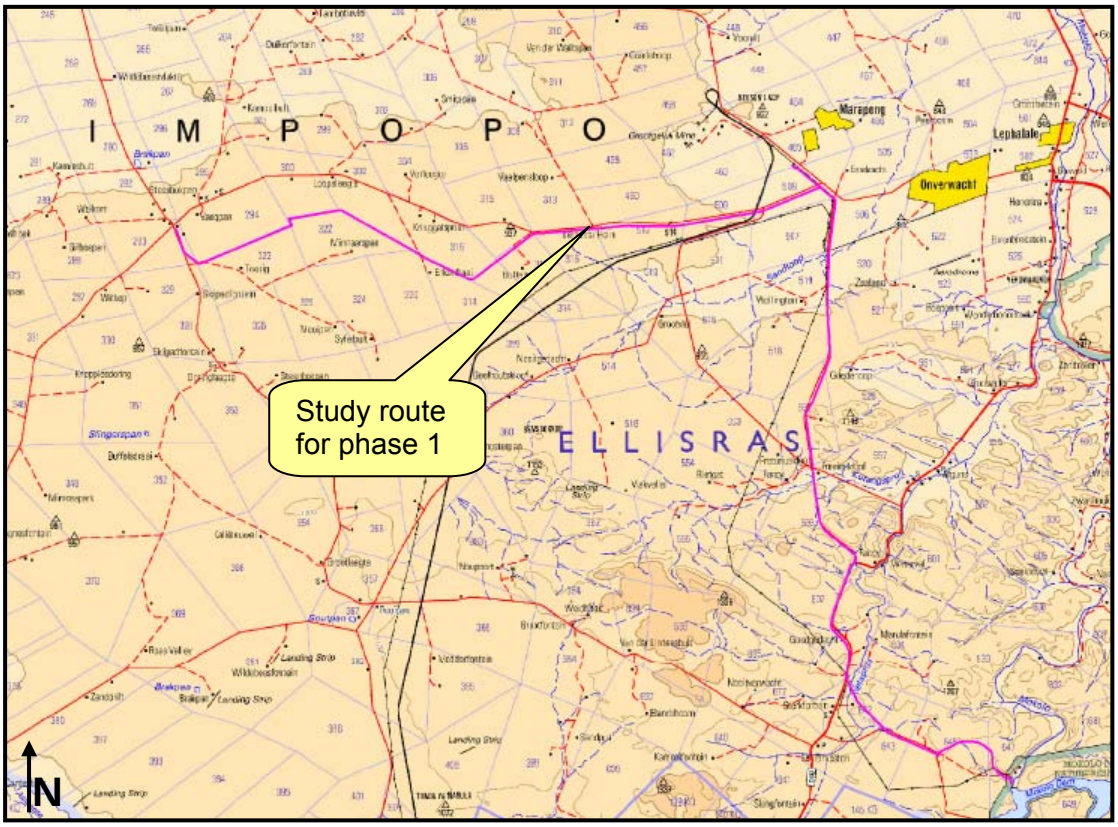

Figure 1: Locality map of the study site.

5. METHODS

The survey was carried out on 25 and 26 March 2009. Eleven waypoints were randomly chosen along the Phase 1 pipeline route and the plants in a strip plot 100m long and 50m wide were identified at each waypoint (Figure 2). The locations of waypoints were precisely determined with GPS and plotted on the pipeline route with GIS. The delimitation of vegetation units is indicated on the satellite maps provided in Annexure A.

The site was scrutinised for Red Data and Orange Listed species that might occur in this habitat. Attention was also paid to the occurrence of alien species and declared weeds.

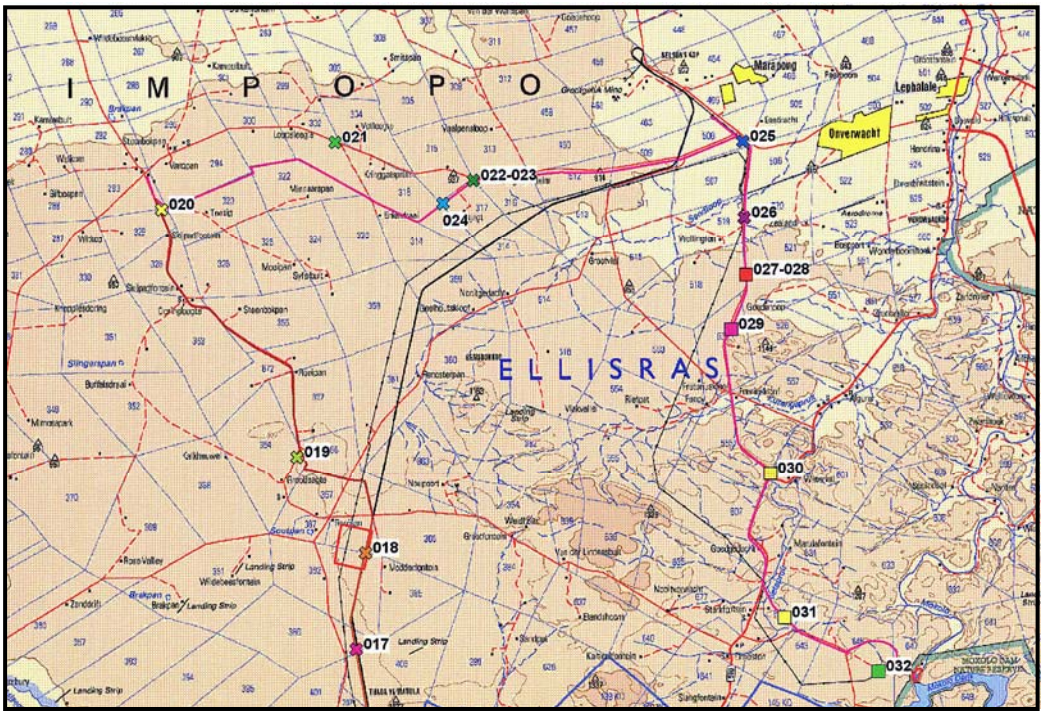

Figure 2: The Phase 1 pipeline route indicating the location of waypoints 020 to 032.

6. RESULTS

6.1 Plant communities

It was not attempted to delimit communities in a study area of such vast extent. However, the different vegetation units were mapped and the variation in species composition as a result of differences in edaphic factors, moisture and altitude in each unit discussed.

6.2 Medicinal species

Medicinal plant species are indicated in tables 1 and 2. Of the 166 plant species recorded on the pipeline route, 10 species were reported to have medicinal properties (Van Wyk *et al.* 2002; Van Wyk & Wink, 2004).

6.3 Alien species

The alien plant species are indicated in the tables with an asterisk. The diversity of alien species is low because of the natural condition of the vegetation. The names of Category 1 Declared weeds are printed in bold and the removal of these plants is compulsory by law.

6.4 Orange listed species

No Orange Listed species were found on the study site.

6.5 Red listed species

No Red Data species were found on the study site.

6.6 Limpopo Sweet Bushveld (Annexure A)

The soil is predominantly sandy loam with dominant tree species *Combretum apiculatum, Acacia erubescens, Acacia nigrescens and Commiphora* species; dominant shrub species are *Grewia monticola, Grewia bicolor, Grewia flava* and *Euclea undulata. Eragrostis rigidior, Urochloa mosambicensis* and *Eragrostis congesta* are the most abundant grass species (Figure 3). In disturbed areas and low -lying clayey areas thickets of *Acacia erubescens, Acacia mellifera, Dichrostachys cinerea* and *Spirostachys africana* are dominant (Figure 4).

Of the 117 species recorded, nine species are known to have medicinal properties. Only four alien species were recorded of which *Cereus jamacaru* is a Category 1 Declared weed and must be eradicated. No Red Data or Orange Listed species were found.

Except for the zone running through the town of Steenbokspan and the developed areas near Lephalale, the vegetation along the pipeline route can be regarded as sensitive and has a high conservation priority. The occurrence of protected trees such as *Sclerocarya birrea* is of importance.

Figure 3: Trees and shrubs growing on sandy loam.

Figure 4: *Acacia* species and *Spirostachys africana* growing on clayey soils.

Table 1: Plant species recorded in the Limpopo Sweet Bushveld.
Alien species are indicated by * and medicinal species by ♥.

SCIENTIFIC NAME	COMMON NAME
Acacia burkei	Black monkey thorn
Acacia caffra	Common hook-thorn
Acacia erioloba	Camel thorn
Acacia erubescens	Blue thorn
Acacia karroo♥	Sweet thorn
Acacia mellifera subsp. *detinens*	Black thorn
Acacia nigrescens	Knob-thorn
Acacia nilotica	Scented pod
Acacia robusta subsp. *rubusta*	Broad-pod robust thorn
Acacia tortilis subsp. *heteracantha*	Umbrella thorn
Achyranthes aspera var. *aspera**	Burweed
Albizia anthelmintica♥	Worm-bark false-thorn
Albizia harveyi	Bushveld false-thorn
Aloe chabaudii	
Ammocharis coranica	Seeroogblom
Aristida adscensionis	Annual three-awn
Aristida congesta subsp. *barbicollis*	Spreading three-awn
Aristida congesta subsp. *congesta*	Tassel three awn
Aristida stipitata	Long-awned grass
Asparagus sp.	Wild asparagus
Bauhinia petersiana subsp. *macrantha*	Kalahari bauhinia
Blepharis integrifolia var. *integrifolia*	
Boscia albitrunca	Shepherd tree
Boscia foetida subsp. *rehmanniana*	Foetid shepherd tree
Bothriochloa insculpta	Pinhole grass
Burkea africana	Wild seringa
Carissa bispinosa	Forest num-num
Cenchrus ciliaris	Foxtail buffalo grass

SCIENTIFIC NAME	COMMON NAME
Cereus jamacaru*	Queen of the night
Chamaecrista capensis var. *capensis*	
Chloris virgata	Feather-top chloris
Clerodendrum ternatum	
Combretum apiculatum	Red bush-willow
Combretum hereroense	Russet bush-willow
Combretum zeyheri	Large-fruited bush-willow
Commelina africana	
Commelina benghalensis	
Commelina sp.	
Commiphora angolensis	Sand corkwood
Commiphora mollis	Velvet-leaved corkwood
Commiphora pyracanthoides	Common corkwood
Crotalaria eremicola subsp. *eremicola*	
Cucumis zeyheri	Wild cucumber
Cyperus margaritaceus var *margaritaceus*	
Dicerocaryum eriocarpum	Devil's thorn
Dichrostachys cinerea subsp. *africana* var. *africana*	Small-leaved sickle bush
Dicoma tomentosa	
Digitaria eriantha	Common finger grass
Diheteropogon amplectens	Broad-leaved bluestem
Dombeya rotundifolia var. *rotundifolia*♥	Wild pear
Ehretia rigida	Puzzle bush
Elephantorrhiza elephantina♥	Elephant's root
Enneapogon cenchroides	Nine-awned grass
Eragrostis gummiflua	Gum grass
Eragrostis pallens	Broom love grass
Eragrostis rigidior	Curly leaf
Eragrostis superba	Saw-tooth love grass
Eragrostis trichophora	Hairy love grass
Euclea natalensis subsp. *angustifolia*	Natal guarri
Euclea undulata♥	Small-leaved guarri
Evolvulus alsinoides	
Gardenia volkensii subsp. *spathulifolia*	Bushveld gardenia
Grewia bicolor	White raisin
Grewia flava	Velvet raisin
Grewia flavescens	Sandpaper raisin
Grewia monticola	Grey raisin
Gymnosporia buxifolia	Spike-thorn
Harpagophytum zeyheri subsp. *zeyheri*♥	
Hermbsteadtia odorata var. *odorata*	Rooiaarbossie
Heteropogon contortus	Spear grass
Heteropogon melanocarpus	
*Hibiscus cannabinus**	Wild stockrose
Indigofera daleoides var. *daleoides*	
Ipomoea magnusiana	
Ipomoea obscura var. *obscura*	Wild petunia
Justicia flava	
Kyphocarpa angustifolia	

SCIENTIFIC NAME	COMMON NAME
Lannea discolor	Live-long
Lantana rugosa	Bird's brandy
Maerua angolensis	Bead-bean
Melhania forbesii	
Melinis repens subsp. *grandiflora*	Natal red top
Monsonia angustifolia	Crane's bill
Ocimum americanum subsp. *americanum*	
Ozoroa paniculosa var. *paniculosa*	Resin tree
Panicum maximum	Guinea grass
Pavetta lanceolata	Bridal bush
Perotis patens	Cat's tail
Phyllanthus parvulus	Dye bush
Pogonarthria squarrosa	Herringbone grass
Portulaca kermesina	
*Portulaca quadrifida**	Wild purslane
Rhoicissus revoilii	Bushveld grape
Rhynchosia totta	
Sarcostemma viminale subsp. *viminale*	Melktou
Schmidtia pappophoroides	Sand quick
Sclerocarya birrea subsp. *caffra*♥	Marula
Setaria ustilata	
Sida alba	Spiny sida
Sida dregei	Spider-leg
Solanum panduriforme	Poison apple
Solanum tettense var. *renschii*	
Spirostachys africana	Tamboti
Sterculia rogersii	Star chestnut
Stipagrostis uniplumis var. *uniplumis*	Silky bushman grass
Tephrosia rhodesica var. *rhodesica*	
Terminalia sericea♥	Silver cluster-leaf
Tragia rupestris	
Tylosema esculentum	
Urochloa mosambicensis	Bushveld signal grass
Vernonia poskeana subsp. *botswanica*	
Waltheria indica	
Xenostegia tridentata subsp. *angustifolia*	
Ximenia americana var. *microphylla*	Blue sourplum
Ximenia caffra var. *caffra*	Sourplum
Ziziphus mucronata♥	Buffalo thorn
Zornia milneana	

6.7 Waterberg Mountain Bushveld (Annexure A)

The soil is mainly coarse-grained shallow and sandy, alternated by outcrops of sandstone and conglomerate. *Diplorhynchus condylocarpon, Bridelia mollis, Pseudolachnostylis maprouneifolia* and *Albizia brevifolia* are common tree species on rocky, shallow-soiled areas (Figure 5). In low-lying areas deep, fine-grained sandy soil is the preferred substrate for *Terminalia sericea, Peltophorum africanum, Combretum zeyheri* and *Dombeya rotundifolia* which are common for Sandy Bushveld (Figure 6). An interesting phenomenon is the occurrence of *Kirkia acuminata* which is common in the Mopane Bushveld (Figure 7).

Seven of the 112 species recorded are known to have medicinal value and three alien species were found. No Red Data or Orange Listed species occur in this vegetation unit.

The zone along the existing pipeline is already transformed; therefore it is not sensitive. The vegetation either side of the route and that of the section between Steenbokpan and Lephalale is natural primary savannah and are considered ecologically sensitive.

Figure 5: Vegetation on rocky, shallow sandy soil.

Figure 6: Vegetation on low-lying, deep sandy soil. Note the abundance of Silver cluster-leaf.

Figure 7: *Kirkia accuminata* growing at the margin of Waterberg Mountain Bushveld.

Table 2: Plant species recorded in the Waterberg Mountain Bushveld. Alien species are indicated by * and medicinal species by ♥.

SCIENTIFIC NAME	COMMON NAME
Acacia burkei	Black monkey thorn
Acacia erubescens	Blue thorn
Acacia mellifera subsp. *detinens*	Black thorn
Acacia nigrescens	Knob-thorn
Acacia nilotica	Scented pod
Acacia robusta subsp. *robusta*	Broad-pod robust thorn
Acacia senegal var. *rostrata*	Bushy three-hook thorn
Acalypha indica	
Achyranthes aspera var. *aspera**	Burweed
Albizia brevifolia	Rock false-thorn
Albizia tanganyicensis	Paper-barked false-thorn
Aloe marlothii subsp. *marlothii*	Mountain aloe
Aristida congesta subsp. *barbicollis*	Spreading three-awn
Aristida congesta subsp. *congesta*	Tassel three-awn
Aristida stipitata	Long-awned grass
Boscia albitrunca	Shepherd tree
Brachiaria nigropedata	Black-footed grass
Bridelia mollis	Velvet sweet-berry
Chamaecrista capensis var. *capensis*	
Chloris virgata	Feather-top chloris
Chrysopogon serrulatus	Golden beard grass
Combretum apiculatum	Red bush-willow
Combretum imberbe	Leadwood
Combretum molle	Velvet bush-willow
Combretum zeyheri	Large-fruited bush-willow
Commelina sp.	
Commiphora mollis	Velvet-leaved corkwood
Corchorus kirkii	

SCIENTIFIC NAME	COMMON NAME
Corchorus longipedunculatus	
Croton gratissimus var. *gratissimus*	Lavender fever-berry
Dicerocaryum eriocarpum	Devil's thorn
Dichrostachys cinerea subsp. *africana* var. *africana*	Small-leaved sickle bush
Digitaria eriantha	Common finger grass
Diplorhynchus condylocarpon	Horn-pod tree
Dombeya rotundifolia var. *rotundifolia*♥	Wild pear
Elephantorrhiza elephantina♥	Elephant's root
Englerophytum magalismontanum	Stem-fruit
Eragrostis aspera	Rough love grass
Eragrostis pallens	Broom love grass
Eragrostis rigidior	Curly leaf
Eragrostis trichophora	Hairy love grass
Euclea natalensis subsp. *angustifolia*	Natal guarri
Euclea undulata♥	Small-leaved guarri
Euphorbia neopolycnemoides	
Ficus abutilifolia	Large-leaved rock fig
Flueggea virosa subsp. *virosa*	White-berry bush
Gardenia volkensi subsp. *spathulifolia*	Bushveld gardenia
Gomphocarpus fruticosus♥	Milkweed
*Gomphrena celosioides**	Bachelor's button
Grewia bicolor	White raisin
Grewia flava	Velvet raisin
Grewia flavescens	Sandpaper raisin
Grewia monticola	Grey raisin
Gymnosporia buxifolia	Spike-thorn
Gymnosporia tenuispina	Bell spike-thorn
Hermannia grisea	
Heteropogon contortus	Spear grass
Hexalobus monopetalus var. *monopetalus*	Shakama plum
Hibiscus trionum	Bladderweed
Indigofera daleoides var. *daleoides*	
Indigofera oxytropis	
Justicia flava	
Kirkia acuminata	White seringa
Kyphocarpa angustifolia	
Lannea discolor	Live-long
Limeum sp.	
Melhania burchellii	
Melhania forbesii	
Melinis repens subsp. *grandiflora*	Natal red top
Mimusops zeyheri	Moepel
Mundulea sericea	Cork bush
Ochna inermis	Stunted plane
Ozoroa paniculosa var. *paniculosa*	Resin tree
Panicum maximum	Guinea grass
Pappea capensis	Jacket-plum
Pavetta lanceolata	Bridal bush
Pellaea calomelanos var. *calomelanos*	

SCIENTIFIC NAME	COMMON NAME
Peltophorum africanum	African wattle
Perotis patens	Cat's tail
Phyllanthus parvulus	Dye bush
*Plumbago zeylanica**	Wild white plumbago
Pogonarthria squarrosa	Herringbone grass
Portulaca kermesina	
Pseudolachnostylis maprouneifolia var. *maprouneifolia*	Kudu-berry
Pterocarpus rotundifolius subsp. *rotundifolius*	Round-leaved bloodwood
Pupalia lappacea var. *lappacea*	
Rhoicissus revoilii	Bushveld grape
Rhynchosia totta	
Sarcostemma viminale subsp. *viminale*	Melktou
Schotia bracypetala	Weeping boer-bean
Sclerocarya birea subsp. *caffra*♥	Marula
Setaria ustilata	
Sida cordifolia	Flannel weed
Sida dregei	Spider-leg
Solanum panduriforme	Poison apple
Spermacoce senensis	
Spirostachys africana	Tamboti
Strychnos madagascariensis	Black monkey orange
Tephrosia longipes subsp. *longipes*	
Terminalia sericea♥	Silver cluster-leaf
Tragia rupestris	
Tricholaena monachne	Blue-seed grass
Trichoneura grandiglumis	Small rolling grass
Triumfetta rhomboidea var. *rhomboidea*	
Vernonia poskeana subsp. *botswanica*	
Vigna vexillata	
Waltheria indica	
Ximenia americana var. *microphylla*	Blue sourplum
Ximenia caffra var. *caffra*	Sourplum
Ziziphus mucronata♥	Buffalo thorn
Zornia linearis	
Zornia milneana	

7. FINDINGS AND POTENTIAL IMPLICATIONS

The vegetation along the Phase 1 route, outside the pipe reserve has a high conservation priority. Land use is aimed mainly on game farming which is not a degrading practice. Most of the areas adjacent to the pipeline zone are primary natural vegetation; consequently ample connectivity with natural vegetation exists. Protected trees occurring in the study area are *Acacia erioloba, Boscia albitrunca, Combretum imberbe* and *Sclerocarya birrea* subsp. *africana.* These species may not be harmed in any way or, if this is unavoidable, the necessary permit must be obtained from the Department of Forestry to remove some of the mentioned trees.

8. RECOMMENDED MITIGATION MEASSURES

- An Ecological Management Plan (to be included in the Environmental Management Plan (EMP) must be developed for the construction and operational phase of the development and should:
    - include an ongoing monitoring and eradication programme for all non-indigenous species, with specific emphasis on invasive and weedy species
    - ensure the persistence of all Red and Orange List species
    - minimize artificial edge effects (e.g. water runoff from developed areas and application of chemicals)
    - result in a report back to the Directorate of Nature Conservation on an annual basis.

- Where possible, trees naturally growing on the site should be retained as part of the landscaping, with specific emphasis on the following species: *Acacia erioloba*, *Boscia albitrunca*, *Combretum imberbe*, *Sclerocarya birrea* subsp. *caffra*. Measures to ensure that these trees survive the physical disturbance from the development should be implemented. A tree surgeon should be consulted in this regard. A qualified botanist must mark trees when the route is pegged and permits obtained from DWAF before any protected trees are removed.
- The crossing of natural drainage systems should be minimized and only constructed at the shortest possible route, perpendicular to the natural drainage system. Where possible, bridge crossings should span the entire stretch of the buffer zone.

Pipelines

- The appropriate agency should implement an ongoing monitoring and eradication program for all invasive and weedy plant species growing within the servitude.
- Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a specialist registered in terms of the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science.
- Any post-development re-vegetation should use species indigenous to South Africa. Plant species locally indigenous to the area are preferred. As far as possible, indigenous plants naturally growing along the route, but would otherwise be destroyed during construction, should be used for re-vegetation.
- Where a pipeline is to traverse a wetland, measures are required to ensure that the pipeline has minimal effect on the flow of water through the wetland, e.g. by using a high level clear span bridge or box culverts rather than pipes.
- Disturbance to any wetlands during construction should be minimized. A plan for the immediate rehabilitation of damage caused to wetlands should be compiled by a specialist registered in accordance with the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science. This rehabilitation plan should form part of the EMP and a record book should be maintained on site to monitor and report on the implementation of the plan.

9. CONCLUSION

The vegetation on the pipeline route is considered sensitive and precautions should be taken to inflict as little damage as possible during the construction phase. Spilling of oil and fuel, dumping of rubble and water pollution must be strictly monitored. All Category 1 Declared weeds must be eradicated and protected trees should be left intact as far as possible.

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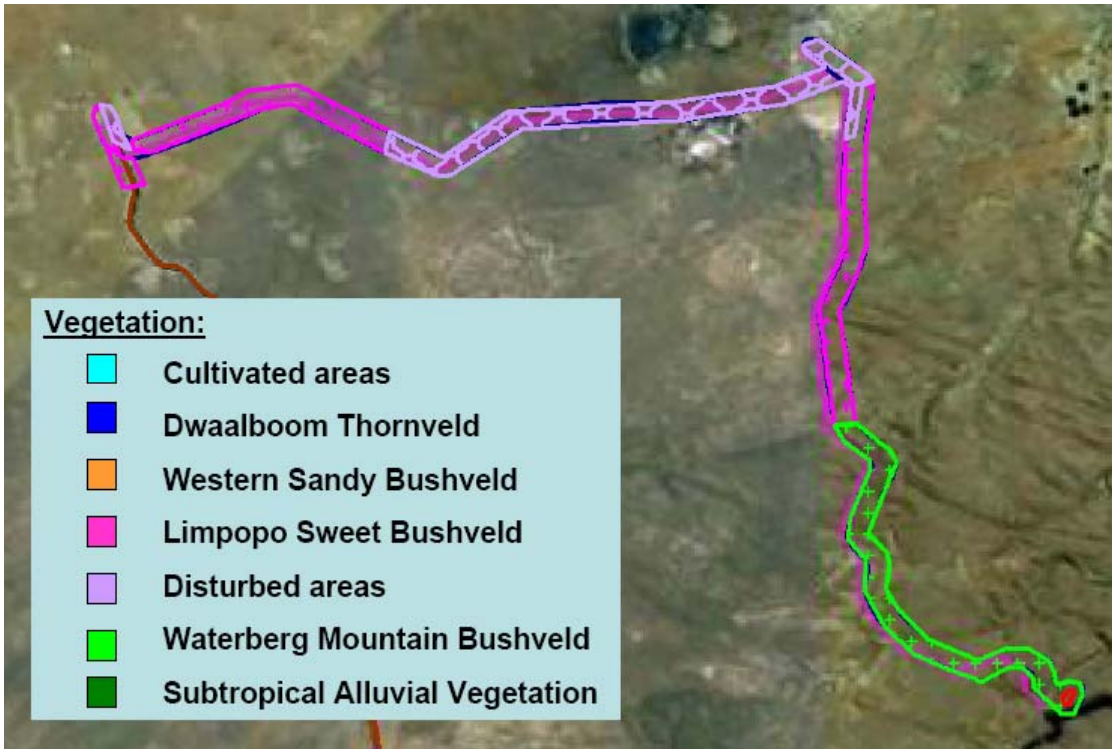
ANNEXURE A: VEGETATION MAP OF THE STUDY ROUTE



ANNEXURE B: PLANT SPECIES RECORDED ON PROPOSED PHASE 1 PIPELINE ROUTE

ACANTHACEAE
Blepharis integrifolia
Justicia flava

AMARANTHACEAE
Achyranthes aspera
Gomphrena celosioides
Hermbstaedtia odorata
Kyphocarpa angustifolia
Pupalia lappacea

AMARYLLIDACEAE
Ammocharis coranica

ANACARDIACEAE
Lannea discolor
Ozoroa paniculosa
Sclerocarya birrea

ANNONACEAE
Hexalobus monopetalus

APOCYNACEAE
Carissa bispinosa
Diplorhynchus condylocarpon
Gomphocarpus fruticosus
Sarcostemma viminale

ASTERACEAE
Dicoma tomentosa
Vernonia poskeana

BURSERACEAE
Commiphora angolensis
Commiphora mollis
Commiphora pyracanthoides

CACTACEAE
Cereus jamacaru

CAESALPINIACEAE
Bauhinia petersiana
Burkea africana
Chamaecrista capensis
Peltophorum africanum
Schotia brachypetala
Tylosema esculentum

CAPPARACEAE
Boscia albitrunca
Boscia foetida
Maerua angolensis

CELASTRACEAE
Gymnosporia buxifolia
Gymnosporia tenuispina

COMBRETACEAE
Combretum apiculatum
Combretum hereroense
Combretum imberbe
Combretum molle
Combretum zeyheri
Terminalia sericea

COMMELINACEAE
Commelina africana
Commelina benghalensis

CONVOLVULACEAE
Evolvulus alsinoides
Ipomoea magnusiana
Ipomoea obscura
Xenostegia tridentata

CUCURBITACEAE
Cucumis zeyheri

CYPERACEAE
Cyperus margaritaceus

EBENACEAE
Euclea natalensis
Euclea undulata

EHRETIACEAE
Ehretia rigida

EUPHORBIACEAE
Acalypha indica
Croton gratissimus
Euphorbia neopolycnemoides
Spirostachys africana
Tragia rupestris

FABACEAE
Crotalaria eremicola
Indigofera daleoides
Indigofera oxytropis
Mundulea sericea
Pterocarpus rotundifolius
Rhynchosia totta
Tephrosia longipes
Tephrosia rhodesica
Vigna vexillata
Zornia milneana
Zornia linearis

GERANIACEAE
Monsonia angustifolia

KIRKIACEAE
Kirkia acuminata

LAMIACEAE
Clerodendendrum ternatum
Ocimum americanum

LILIACEAE
Aloe chabaudii
Aloe marlothii
Asparagus sp.

LIMEACEAE
Limeum sp.

MALVACEAE
Hibiscus cannabinus
Hibiscus trionum
Melhania burchellii
Melhania forbesii
Sida alba
Sida cordifolia
Sida dregei

MIMOSACEAE
Acacia burkei
Acacia caffra
Acacia erioloba
Acacia erubescens
Acacia karroo
Acacia mellifera
Acacia nigrescens
Acacia nilotica
Acacia robusta
Acacia senegal var. *rostrata*
Acacia tortilis
Albizia anthelmintica
Albizia brevifolia
Albizia harvei
Albizia tanganyicensis
Dichrostachys cinerea
Elephantorrhiza elephantina

MORACEAE
Ficus abutilifolia

OCHNACEAE
Ochna inermis

OLACACEAE
Ximenia americana
Ximenia caffra

PEDALIACEAE
Dicerocaryum eriocarpum
Harpagophytum zeyheri

PHYLLANTACEAE
Bridelia mollis
Flueggea virosa
Phyllanthus parvulus
Pseudolachnostylis maprouneifolia

POACEAE
Aristida adscensionis
Aristida congesta subsp. *barbicollis*
Aristida congesta subsp. *congesta*
Aristida diffusa
Aristida stipitata
Bothriochloa insculpta
Brachiaria nigropedata
Cenchrus ciliaris
Chloris virgata
Chrysopogon serrulatus
Digitaria eriantha
Diheteropogon amplectens
Enneapogon cenchroides
Eragrostis aspera
Eragrostis gummiflua
Eragrostis pallens
Eragrostis rigidior
Eragrostis superba
Eragrostis trichophora
Heteropogon contortus
Heteropogon melanocarpus
Melinis repens
Panicum maximum
Perotis patens
Pogonarthria squarrosa
Schmidtia pappophoroides
Setaria ustilata
Stipagrostis uniplumis
Tragus berteronianus
Tricholaena monachne

Trichoneura grandiglumis *Urochloa mosambicensis* PORTULACACEAE *Portulaca kermesina* *Portulaca quadrifida* PTERIDACEAE *Pellaea calomelanos* RHAMNACEAE *Ziziphus mucronata* RUBIACEAE *Gardenia volkensii* *Pavetta lanceolata* *Spermacoce senensis* SAPINDACEAE *Pappea capensis* SAPOTACEAE *Englerophytum magalismontanum* *Mimusops zeyheri*	SOLANACEAE *Solanum panduriforme* *Solanum tettense* STERCULIACEAE *Dombeya rotundifolia* *Hermannia grisea* *Sterculia rogersii* *Waltheria indica* STRYCHNACEAE *Strychnos madagascariensis* TILIACEAE *Corchorus kirkii* *Corchorus longipendunculatus* *Grewia bicolor* *Grewia flava* *Grewia flavescens* *Grewia monticola* *Triumphetta rhomboidea* VERBENACEAE *Lantana rugosa* VITACEAE *Rhoicissus revoilii*