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Pri.Sci.Nat # 400045/08

BOTANICAL ASSESSMENT OF PROPOSED SFF LPG PIPELINE AND HANDLING FACILITY, SALDANHA, WESTERN CAPE.

Compiled for: EcoImpact Legal Consulting (Pty) Ltd

Client: SFF

24 October 2018

DECLARATION OF INDEPENDENCE

In terms of Chapter 5 of the National Environmental Management Act of 1998 specialists involved in Impact Assessment processes must declare their independence and include an abbreviated Curriculum Vitae.

I, N.A. Helme, do hereby declare that I am financially and otherwise independent of the client and their consultants, and that all opinions expressed in this document are substantially my own, notwithstanding the fact that I have received fair remuneration from the client for preparation of this report.

NA Helme

Abridged CV:

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BEE Level Four Contributor BE # 1915.

Since 1997 I have been based in Cape Town, and have been working as a specialist botanical consultant, specialising in the diverse flora of the south-western Cape. Since the end of 2001 I have been working on my own and trade as Nick Helme Botanical Surveys, and have undertaken at least 900 site assessments during this period.

A selection of relevant work undertaken over the last few years is as follows:

- Botanical and ecological overview of Bokbaai farm (The Mapula Trust 2017)
- Ecological assessment of proposed new KIPTS and decommissioning of existing KIPTS, Koeberg Nuclear Power Station (Landscape Dynamics 2017)
- Botanical assessment of MOGS HDPE oil pipeline, Saldanha (WorleyParsons 2017)
- Botanical assessment of SAS Saldanha (Footprint Environmental 2017)
- Botanical site screening for proposed Sasol power station, Saldanha (ERM 2015)

- Botanical site screening for proposed Globeleq power station, Saldanha (ERM 2015)
- Botanical site screening for proposed Arcelor Mittal power station, Saldanha (ERM 2015)
- Botanical assessment of Langebaan transfer station and landfill area (AECOM 2015)
- Botanical assessment of proposed overnight facilities at Klein Mooimaak, West Coast National Park (SANParks 2015)
- Ecological Assessment for proposed Frontier Minerals Separation Plant, Saldanha (Sedex 2014)
- Botanical assessment of proposed Elandsfontein phosphate mine east of Langebaan (Braaf Environmental 2014)
- Botanical assessment for proposed LNG terminal, Saldanha (PetroSA 2014)
- Botanical Scoping study for proposed Saldanha Municipality Desalination Project (CSIR 2012)
- Botanical inputs into proposed Saldanha IDZ (MEGA 2011)
- Fatal Flaw Analysis of Ptn of Ptn 16 of Pienaarspoort 197, Saldanha (MOGS 2011)
- Scoping study of proposed Wind Energy Facility near Britannia Bay (Savannah Environmental 2010)
- Scoping and Impact Assessment study of proposed Wind Energy Facility near Vredenburg (Savannah Environmental 2010)
- Botanical Scoping and Impact Assessment of proposed St Helena Hills development (DJ Environmental 2009)
- Botanical Impact Assessment of Portion 4 of Farm 560, Yzerfontein (EnviroLogic 2009)
- Botanical Impact Assessment of Portion 9 of Farm 957, Saldanha (EnviroLogic 2008)
- Botanical Sensitivity study of Portion 4 of Farm Yzerfontein 560 (De Villiers family 2008)
- Botanical Scoping and Impact Assessment of proposed overnight sites in the West Coast National Park (SANParks 2008 & 2010)
- Botanical Impact Assessment of proposed development on Portion 87 of the Farm Witteklip 123, Vredenburg (CCA Environmental 2008)
- Fine Scale Vegetation Mapping and Conservation Planning for Saldanha Municipality (CapeNature & SANBI, 2006 - 2007)

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1. INTRODUCTION

This botanical assessment was commissioned in order to inform the planning and environmental authorisation process being undertaken for a proposed LPG pipeline and handling facility in the Saldanha area, in the Western Cape. The pipeline would connect the existing offloading (iron ore) jetty to a new handling facility adjacent to the current SFF facility.

A newly constructed dedicated LPG product line (pipeline) will deliver product from the existing oil/iron ore jetty to the new LPG terminal. The LPG line from the jetty is to be located within the existing crude oil pipeline servitudes which connects the jetty to the oil terminal (see blue line in **Figure 1** below for the current pipeline servitude).

Figure 1: Map showing the three alternative pipeline routes assessed, plus the facility location.

The construction will therefore open up the current pipeline servitude to lay the new pipeline and construct a new pipeline from the SFF/OTMS transfer station across the road from the SFF facility main entrance. The pipeline will run from here along the road to the OTMS Oil facility road entrance and next to the road to the facility. The exact route has not yet been finalized. The pipeline is expected to be a 12-inch pipeline that will require approximately 5m cross section for construction. The pipeline will be buried up to the SFF/OTMS transfer station but

will have to be routed around this. The route will follow closely the route of the OTMS crude oil pipeline, which would have been constructed by end 2018. The pipeline is approximately 10 km in length.

2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- Describe the vegetation in the study area, and note the presence or likelihood of any plant Species of Conservation Concern (SCC; previously known as Red Data Book species).
- Provide a botanical constraints map for the project area, identifying any No Go areas.
- Assess the local (Saldanha) and regional (West Coast) conservation value of the study area, referring to specialist knowledge and to the National Spatial Biodiversity Assessment (NSBA, Rouget *et al* 2004) and to CapeNature's Spatial Biodiversity Plan (Pence 2017).
- Identify the likely botanical impacts associated with the proposed pipeline route alternatives and the proposed handling facility.
- Identify the preferred route alternative from a botanical perspective.
- Recommend any other feasible mitigation that can be used to reduce or avoid the identified impacts, including rehabilitation recommendations for the operational phase of the pipeline project (EMP).

3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

Fieldwork was undertaken for this study on 12 October 2018, and also drew on extensive fieldwork in the exact project area over the last few years for various other projects (e.g. Helme 2011, Helme 2015), much of it within the peak spring flowering period in this winter rainfall region. Some seasonal constraints on the comprehensiveness of the botanical findings were thus present, but were minimised (although they are never entirely absent, as some species flower outside of spring), and confidence levels in the botanical findings are high. In addition, the available Google Earth imagery (the most recent being February 2018) is of a high resolution and is quite accurately interpreted.

Conservation worthy habitats are those with high species diversity; those that support rare, threatened or localised plant species (plant Species of Conservation Concern); those that are rare in a regional context, and those areas where ecological processes are deemed to be important and vulnerable to disturbance. Sufficient detail was evident in the aerial images and on site to be able to assess

the overall conservation value and botanical sensitivity of the area, and confidence in the accuracy of the botanical findings is high.

The development footprint is assumed to be within the areas shown as alternatives in Figure 1, and no additional associated infrastructure is assessed as part of this study. It is assumed that the actual development footprint will be largely (>98%) within the areas shown. Total terrestrial pipeline length for the preferred alternative (the proposal) is about 5.8km, with another 4.4km being essentially marine or on manmade jetty, and hence with no terrestrial vegetation. The likely width of the pipeline servitude during construction is assumed to be between 5m and 7m. The 4.4km pipeline portion below the HWM and along the Sishen iron oil loading jetty is not here assessed, as there is no terrestrial vegetation in this artificial area.

The proposed facility area was not accessible, due to locked gates between the various SFF security fences, and I thus has to walk the perimeter of the area and extrapolate my findings from what was visible on the accessible sides of the fences, and the findings were also informed by what I could see from various elevated viewpoints and on Google Earth imagery.

Reference was made to the GIS based database of rare plant localities maintained by CREW (Custodians of Rare and Endangered Wildflowers, based at Kirstenbosch, updated to March 2015), to the Red List of South African plants (Raimondo *et al* 2009, and it annual online updates at sanbi.redlist.org), to the Fine Scale Vegetation map of the Saldanha Municipality (Helme & Koopman 2007), and to CapeNature's Spatial Biodiversity Plan (Pence 2017).

4. STUDY AREA AND REGIONAL CONTEXT

The study area is part of the Fynbos biome, located within what is now known as the Core Region of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The GCFR is one of only six Floristic Regions in the world, and is the only one largely confined to a single country (the Succulent Karoo component extends into southern Namibia). It is also by far the smallest floristic region, occupying only 0.2% of the world's land surface, and supporting about 11500 plant species, over half of all the plant species in South Africa (on 12% of the land area). At least 70% of all the species in the Cape region do not occur elsewhere, and many have very small home ranges (these are known as narrow endemics). Many of

the lowland habitats are under pressure from agriculture, urbanisation and alien plants, and thus many of the range restricted species are also under severe threat of extinction, as habitat is reduced to extremely small fragments. Data from the nationwide plant Red Listing project indicate that 67% of the threatened plant species in the country occur only in the southwestern Cape, and these total over 1800 species (Raimondo *et al* 2009)! It should thus be clear that the southwestern Cape is a major national and global conservation priority, and is quite unlike anywhere else in the country in terms of the number of threatened plant species.

The study area is part of the greater West Coast region, and lies within what has been termed the West Strandveld bioregion (Mucina & Rutherford 2006). This bioregion has a fairly distinct flora, and the Saldanha Peninsula is particularly rich in locally and regionally endemic plant species, as well as plant Species of Conservation Concern (Helme & Koopman 2007).

The CapeNature Spatial Biodiversity Plan (Pence 2017) indicates that most of the study area that is not already developed and that is above the HWM is a terrestrial Critical Biodiversity Area (CBA), as shown in Figure 2. The Handling Facility is not mapped as a CBA, and this is deemed to be a mapping error, and at least the southern portion of it should be a CBA. Critical Biodiversity Areas are regarded as essential areas for the achievement of regional conservation targets, and are designed to ensure minimum land take for maximum result (Maree & Vromans 2010). It should be noted that the CBA mapping process in this area unfortunately suffered from a lack of groundtruthing and misinterpretation of the satellite imagery, and is therefore not considered particularly accurate or useful for planning purposes, and has very recently been redone for the IDZ area (Pence – pers. comm.), but this updated mapping is not yet available. All ecological assessments in this area should thus be based on detailed groundtruthing, as has been the case for the current study.

Figure 2: Extract of the CapeNature Spatial Biodiversity Plan (Pence 2017), showing the project area in relation to the identified terrestrial Critical Biodiversity Areas (CBA1; green shading).

5. OVERVIEW OF THE VEGETATION

There are four underlying vegetation types in the study area (see Figure 3) - Saldanha Limestone Strandveld, Saldanha Flats Strandveld, Langebaan Dune Strandveld and Cape Seashore Vegetation.

Saldanha Limestone Strandveld is listed as **Least Threatened** in terms of the national list of Threatened Terrestrial Ecosystems (DEA 2011), with 59% of its original extent remaining, and the unit has a national conservation target of 24% of its original extent, with only 1% formally protected (Rouget *et al* 2004). The vegetation type is thus very poorly conserved and is vulnerable to further loss, usually to agriculture, quarrying, and urban development (Rouget *et al* 2004). It should be noted that this vegetation type was **previously listed as Endangered** prior to the 2011 DEA update, based on the number of rare and range restricted species found within this habitat, and this original classification is strongly supported, particularly as the remaining total extent of this habitat is very small on a national basis (less than 2100ha, versus more than 7000ha of Saldanha Granite Strandveld).

Langebaan Dune Strandveld is listed as **Least Threatened** on a national basis (DEA 2011) and is well conserved (27%) in the West Coast National Park, with a 24% conservation target and some 64% remaining (Mucina & Rutherford 2006).

Cape Seashore Vegetation is also listed as **Least Threatened** on a national basis (DEA 2011) and is well conserved (96%), with a 24% conservation target and over 94% of its original extent remaining (Mucina & Rutherford 2006).

Saldanha Flats Strandveld is listed as **Vulnerable** on a national basis (DEA 2011) but is now fairly well conserved (15%) in the West Coast National Park, with a 24% conservation target and some 34% remaining (Mucina & Rutherford 2006).

The study area is largely flat, except for the primary and coastal dunes, which rise quite rapidly to a height of about 20m. Most of the study area east of the dunes features shallow to moderately deep neutral sands overlying calcrete, which are seldom exposed at the surface, but which have been piled up into heaps in places. There are no wetlands. Large parts of the study area east of the dunes have been subject to disturbance, probably originally in the form of ripping (more than 40 years ago), but prior and subsequent disturbance may also have involved grazing and trampling by livestock.

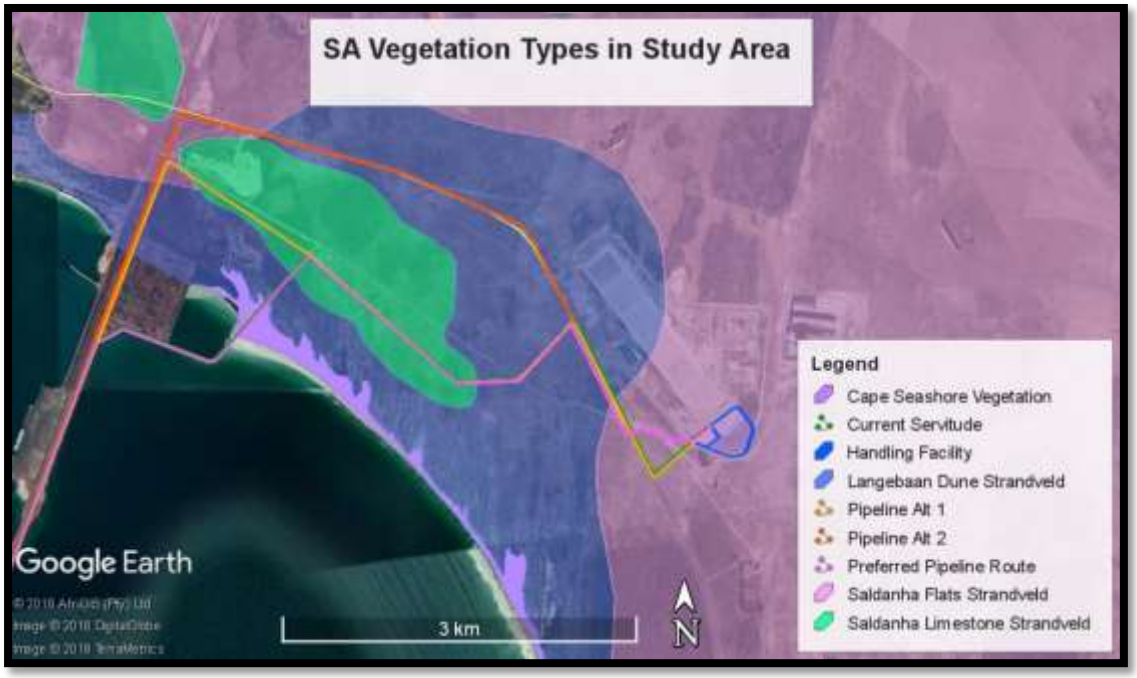

Figure 3: Extract of the SA Vegetation Map (Mucina & Rutherford 2012) showing the four vegetation types crossed by the various pipeline routes.

Indigenous plant species diversity is relatively low in most of the flats east of the dunes (Plates 1-3), due to previous disturbance (about 25% of what it would be in an undisturbed area), the vegetation here is best classified as Saldanha Flats Strandveld. Species include *Galenia fruticosa, Exomis microphylla* (brakbos), *Oncosiphon suffruticosum* (stinkkruid), *Arctotheca calendula* (Cape weed), *Osteospermum incanum* (dune bietou), *O. chrysanthemoides* (bietou),

Plate 1: View of the section just west of the Langebaan – Saldanha road, looking north. This area is of Low sensitivity and has been previously heavily disturbed. The preferred alternative (along existing servitude) and alternative 1 would pass through this area.

Plate 2: Another view of the section just west of the Langebaan – Saldanha road, looking northeast towards SFF tanks. The preferred alternative (along existing servitude) and alternative 1 would pass through this area.

Plate 3: View of the section just east of the dunes, looking north. This area is of Low sensitivity and has been previously heavily disturbed. The area is dominated by the shrub *Osteospermum moniliferum* (bietou). The preferred alternative (along existing servitude) and alternative 1 would pass through this area.

Plate 4: View of Langebaan Dune Strandveld (Medium – High sensitivity) in the area about 200m east of the coastal dunes. The preferred alternative (along existing servitude) would pass through this area.

Plate 5: View of the coastal dunes looking northwest towards the oyster pond. The area seaward of the toe of the dunes supports Cape Seashore Vegetation, and the dunes themselves support intact Langebaan Dune Strandveld. The preferred alternative (along existing servitude) would pass through this area.

Muraltia spinosa (tortoise berry), *Helichrysum niveum, Phyllobolus canaliculatus*, *Tetragonia fruticosa* (kinkelbos), *Stachys ballota, Mesembryanthemum crystallinum* (slaai), *Lycium ferocissimum, Oxalis pes-caprae* (geel suuring), *O. obtusa, Limeum aethiopicum* (koggelmandervoet), *Trachyandra divaricata* (duinekool), *Calobota sericea* (fluitjiesbos), *Felicia hyssopifolia, Ehrharta calycina* (polgras), *Cynodon dactylon* (fynkweek), *Conicosia pugioniformis, Hermannia prismatocarpa, Ehrharta villosa* (pypgras), *Pelargonium myrrhifolium, Aspalathus acuminata, Searsia glauca* (kunibush), *Searsia laevigata* (dune taaibos), *Melolobium adenodes, Cissampelos capensis, Asparagus africanus, A. capensis, Amellus* sp., *Gymnosporia buxifolia* (pendoring), *Oxalis luteola, Crassula expansa, C. vaillantii, Ornithogalum sp., Zygophyllum morgsana, Viscum capense* (voelent), *Trachyandra falcata* (veldkool) and *T. ciliata.* Various annual alien grasses are also present, including *Bromus pectinatus, Bromus diandrus* (ripgut brome), *Lolium sp.* (ryegrass), *Avena* sp. (wild oats) and *Vulpia myuros* (ratstail fescue), plus the alien herbs *Erodium moschatum* (cranesbill), *Echium plantagineum* (Pattersons's curse), *Raphanus rapistrum* (wildemostert) and *Brassica tournefortii*. No woody alien species are present, and none of the alien herbs or grasses is dominant. No plant Species of Conservation Concern occur in this area.

Some of the routes pass through, on existing disturbed servitudes, two sections (150m long and 240m long) of High sensitivity vegetation (see Figure 4) comprised of mixed Limestone Strandveld and Dune Strandveld. Typical species in these areas include *Thamnochortus spicigerus, Zygophyllum morgsana, Limonium capense, Senecio alooides, Pteronia divaricata, P. uncinata, Clutia daphnoides, Pelargonium gibbosum* (dikbeenmalva), *Euphorbia burmanii, Othonna cylindrica* and *Searsia glauca*.

At least four plant **Species of Conservation Concern** (SCC) were recorded in these mixed limestone and sand areas, and the likelihood that any others occur here in viable numbers is low to moderate. The recorded SSC include *Limonium capense* (Near Threatened), *Lampranthus vernalis* (NT), *Muraltia harveyana* (VU) and *Nenax hirta ssp calciphila* (Near Threatened).

The stable part of the coastal dunes support Langebaan Dune Strandveld in good condition (see Plates 4 & 5). Typical species include *Limonium peregrinum*, *Pteronia divaricata, P. uncinata, Clutia daphnoides, Pelargonium gibbosum* (dikbeenmalva), *Ruschia macowanii, Putterlickia pyracantha, Eriocephalus racemosus (kapok), Jordaaniella dubia, Euphorbia caput medusae, Euclea racemosa* (sea guarrie), *Thamnochortus spicigerus* (duinriet), *Osteospermum moniliferum, Searsia glauca* (blue kunibush), *Thesidium fragile, Muraltia spinosa* (tortoise berry), *Zygophyllum flexuosum, Z. morgsana* and *Pterocelastrus tricuspidatus* (kershout). No plant Species of Conservation Concern are likely to occur in this habitat in large numbers. Scattered patches of invasive alien *Acacia cyclops* (rooikrans) and *A. saligna* (Port Jackson) occur, but cover only a very small area.

The initial, coastal part of the preferred pipeline route (existing servitude) would cross partly stabilised coastal dunes such as those shown in Plate 6, which are typical of such habitats on the west coast, and are of Low botanical sensitivity, being high energy environments adapted to change and movement. Species diversity is fairly low and no threatened plant species were recorded here. Typical species include *Tetragonia decumbens, Hebenstretia cordata, Carpobrotus acinaciformis, Thinopyrum distichum, Ehrharta villosa, Senecio littoreus, S. elegans, Osteospermum moniliferum* and *Morella cordifolia*.

Plate 6: View of Low sensitivity partly stable coastal dunes just above the HWM, southeast of the oyster farm pond. The preferred pipeline route crosses this area.

Plate 7: View of proposed handling facility area from southern edge of current SFF berm, looking south. Note the sharp distinction between the previously disturbed area in the foreground (both side of fence; grassy, with scattered shrubs) and the darker, denser, undisturbed vegetation in the middle distance.

The proposed handling facility area is composed of two distinct areas (see Plate 7) - the northern half that has been previously disturbed and is now recovering, and the southern half (about 6ha) that has not been heavily disturbed and supports much denser, more diverse vegetation. Considerable calcrete is evident in both portions, and consequently the vegetation type in this area is best

described as Saldanha Limestone Strandveld. Indigenous plant diversity is much higher in the undisturbed, southern section, and it also supports a greater number of threatened plant species. Common species in the previously disturbed area include *Muraltia spinosa, Osteospermum moniliferum, Roepera morgsana, Oncosiphon suffruticosum, Amellus sp., Mesembryanthemum crystallinum, Galenia sarcophylla, G. fruticosa, Prenia pallens* and *Tetragonia fruticosa*. Additional species noted in the less disturbed areas include *Euclea racemosa, Gymnosporia buxifolia, Putterlickia pyracantha, Pteronia ciliata, P. divaricata, Nenax hirta ssp calciphila, Thamnochortus spicigerus, Muraltia harveyana, Ruschia langebaanensis* and *Limonium capense*.

A single plant Species of Conservation Concern (SoCC) was recorded in the proposed 2ha handling facility area, with a further four SoCC in the greater handling facility survey area, as outlined below. The only SoCC in the disturbed areas was *Limonium acuminatum* (Vulnerable), and this species was quite common here and in the undisturbed area. Additional SoCC recorded in the greater facility include *Muraltia harveyana* (Vulnerable), *Ruschia langebaanensis* (Vulnerable), *Limonium capense* (Near Threatened) *and Nenax hirta ssp calciphila* (Near Threatened). Whilst the populations of these species on site are not very large (generally less than 50 plants) they are still regionally significant.

5.1 Botanical Conservation Value / Sensitivity

The terms conservation value and sensitivity are often used interchangeably, but this is not strictly correct. The term "conservation value" refers to the value of the habitat in local and regional conservation terms (*i.e.* answering the question how important is it?), whilst "sensitivity" strictly means how resilient is the habitat to disturbance. In the case of urban or industrial development (although not buried pipelines) any natural or partly natural habitat would effectively be permanently lost in the development footprint, and thus technically sensitivity would be high, irrespective of the conservation value of the underlying habitat.

The conservation value of a habitat is a product of species diversity, rarity of habitat, rarity of species, ecological viability and connectivity, vulnerability to impacts, and reversibility of threats (ease of rehabilitation). Extensive previous work in the region has allowed the author to make conclusions regarding the overall and relative sensitivity of the vegetation in the study area (see Figure 4). Note that the groundtruthed botanical sensitivity map (Figure 4) is significantly different from the Critical Biodiversity Area map (Figure 3), which is largely due

to an unfortunate lack of groundtruthing of the latter product prior to publication, plus the identified need for an ecological corridor from Langebaan to Vredenburg (which incorporates habitat of lower sensitivity), and Figure 4 is regarded as a much more accurate representation of the true sensitivity of the vegetation on the ground.

Notwithstanding the above noted issues the term sensitivity is used in this report as it is still more widely understood and accepted than the term "conservation value".

Areas that have been cultivated or ripped (even more than 40 years ago) and have relatively low botanical diversity and no significant populations of plant Species of Conservation Concern (SCC) are considered to be of Low botanical sensitivity at a regional scale. The semi-stable coastal dunes are also considered to be of Low sensitivity, as they are adapted to regular disturbance (by wind), have a low diversity and few or no threatened plant species.

The Medium sensitivity areas have been previously disturbed, but they have rehabilitated naturally to some degree, and populations of plant SCC may be present, although in limited numbers.

The Spreeuwal dune area has been mapped as being of Medium to High sensitivity, even though it does not support many known populations of plant Species of Conservation Concern. This area is largely pristine, apart from some alien plant invasion, and has high plant diversity, and a high level of structural (growth form) diversity.

High sensitivity areas south of the coast road to Saldanha support relatively intact examples of the locally restricted vegetation type Saldanha Limestone Strandveld, with regionally significant populations of various plant Species of Conservation Concern. Also included in the High sensitivity areas in Figure 4 are the best portions of Langebaan Dune Strandveld. These areas are usually also designated CBAs (Critical Biodiversity Area). These areas are considered ecologically irreplaceable, on account of the presence of relatively intact examples (with both high species diversity and high structural heterogeneity) of two regionally restricted vegetation types (Saldanha Limestone Strandveld and Langebaan Dune Strandveld), and due to the presence of regionally endemic plant Species of Conservation Concern. Conservation of such areas would

contribute significantly to species and/or ecological process targets for the region, and should be avoided as far as possible.

The southern half of the proposed handling area is also of High botanical sensitivity, as it support at least four threatened plant species and is in good condition.

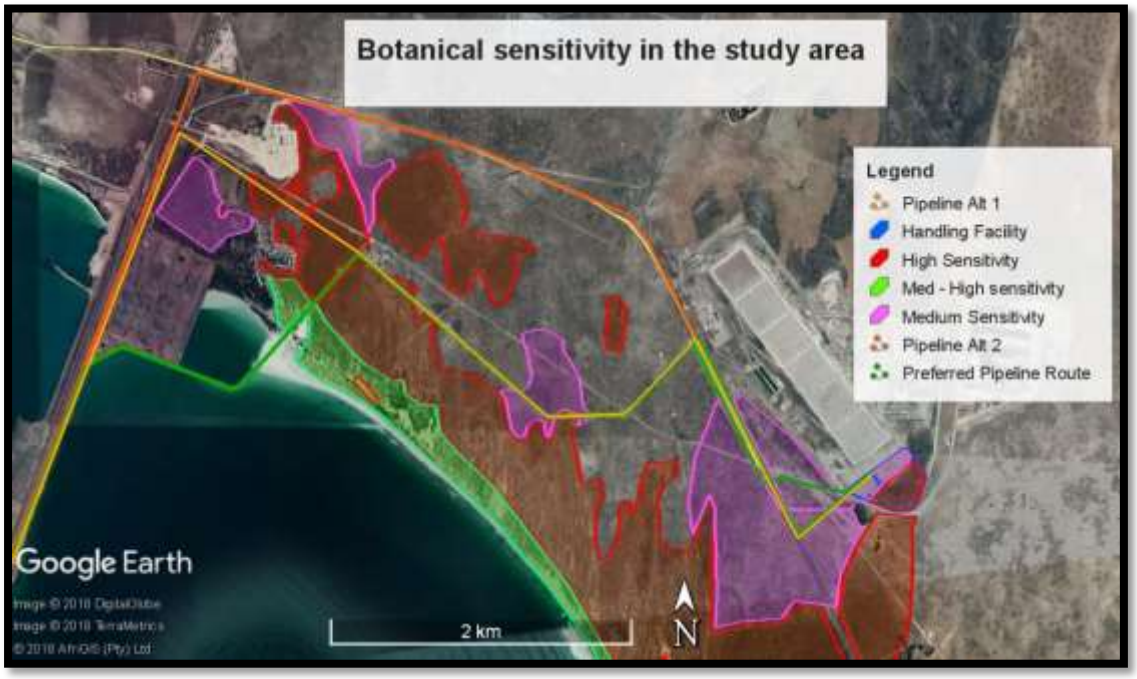

Figure 4: Map of the botanical sensitivity in the study area. Note that unshaded areas within the project area (within 50m of any infrastructure here assessed) are of Low sensitivity.

6. ISSUES IDENTIFIED

In terms of the construction of the proposed infrastructure the following ecological issues have been identified:

- Loss of portions of site populations of up to four plant Species of Conservation Concern (SoCC) within the preferred pipeline route is possible.
- Loss of portions of site populations of up to six plant SoCC within the Alternative 1 pipeline route is possible, and this route also crosses the largest extent of High sensitivity natural habitat of any of the route alternatives.
- Loss of portions of site populations of up to two plant SoCC within the Alternative 2 pipeline route is possible.

- Direct loss and degradation of areas of Medium – High and High sensitivity habitat during pipeline construction. This is likely to be of long term duration (5-19yrs), but some form of natural rehabilitation is likely to mitigate the impacts.
- Loss of the site population of a single plant SoCC in the proposed 2ha handling facility area is likely, with a further four SoCC in the greater handling facility survey area likely to be impacted should development take place in the greater area.
- Indirect, long term botanical impacts at the operational phase. One of the main impacts in this regard is likely to be facilitated spread of alien invasive vegetation as a result of the soil disturbance. This is not likely to be a significant impact for the pipeline route, and is fairly easily mitigated by ongoing alien invasive vegetation management. A second indirect impact would be loss of ecological connectivity and habitat fragmentation, which is significant only for the handling facility.

No potentially positive ecological impacts associated with this project have been identified.

7. IMPACT ASSESSMENT

7.1 Construction Phase Impacts

Although only about 5.8km long **(preferred alternative**), the pipeline construction may have a greater impact than one might imagine, as the disturbance corridor is likely to be at least 6m wide, which equates to about 3.48ha of disturbance, which is less than for the other two route alternatives.

For the applicant's **Preferred Pipeline route** about 53% of the route (3100m) passes through Low or Medium sensitivity habitat where this will have only a Low – Medium negative impact, but the remainder passes through an existing disturbed servitude within High (0.6km) and Medium – High (0.1km) sensitivity habitat, where at least five plant Species of Conservation concern may be present in varying abundance, and where species diversity is fairly high. The magnitude of the impact in this area is Medium, and most of the impact should be of a long term nature (5-19yrs) rather than a permanent impact, as the corridor should rehabilitate naturally (to some extent) over this period. Disturbance favours certain species, and the more sensitive ones are unlikely to return to the disturbed habitat. Search and Rescue from the Medium – High and High

sensitivity area prior to construction, and use of these plants in the active rehabilitation of the disturbed corridor will help speed up habitat recovery.

Pipeline Alternative 1 would impact on a total terrestrial area of partly natural vegetation of about 3.81ha. The route passes through Low and Medium sensitivity habitat for about 75% of its length, but this route also crosses more High sensitivity habitat than the two other routes (about 1.3km). The diversity and number of plant Species of Conservation Concern likely to be impacted are thus greater for this alternative than for the other two alternatives.

Pipeline Alternative 2 would impact on a total terrestrial area of partly natural vegetation of about 3.84ha (about the same as Alt 1, but more than for the Preferred At). The route passes through only Low and Medium sensitivity habitat and will not disturb any High sensitivity habitat. This alternative is not likely to impact on any plant Species of Conservation Concern.

	Proposed (Applicant's Preferred) Alternative	**Alternative 1**	**Alternative 2**
Nature of impact:	Loss and degradation of mostly Low and Medium sensitivity vegetation, but will traverse existing disturbed servitude through 600m of High and 120m of Medium – High sensitivity area; no significant populations of plant Species of Conservation Concern likely to be impacted, although at least 5 are nearby	Loss and degradation of mostly Low & Medium sensitivity vegetation, but will traverse 1300m of High sensitivity area, with significant populations of at least 5 plant Species of Conservation Concern likely to be impacted	Loss and degradation of only Low & Medium sensitivity vegetation; no plant Species of Conservation Concern likely to be impacted
Extent and duration of impact:	Site; mostly long term (partial natural rehabilitation of disturbed areas likely)	Site; mostly long term (partial natural rehabilitation of disturbed areas likely)	Site; mostly long term (partial natural rehabilitation of disturbed areas)
Magnitude of impact:	Low - Medium	Medium	Low
Probability of occurrence:	Certain	Certain	Certain
Degree to which the impact can be reversed:	Partly reversible	Partly reversible	Partly reversible
Degree to which the impact may cause irreplaceable loss of resources:	Not likely; habitat itself will rehabilitate to some extent; no critical populations of SCC likely to be lost	Very likely; habitat itself will rehabilitate to some extent; portions of populations of at least 5 SCC likely to be lost	Not likely; habitat itself will rehabilitate to some extent; no critical populations of SCC likely to be lost
Cumulative impact prior to mitigation:	Low – Medium negative	Medium negative	Low negative
Significance rating of impact prior to	Low – Medium negative	Medium negative	Low negative

mitigation:			
Degree to which the impact can be mitigated:	Minor mitigation possible	Minor mitigation possible	Minor mitigation possible
Proposed mitigation:	Minimise disturbance footprint through higher sensitivity areas; plant Search and Rescue in footprint areas and use of these species for rehabilitation.	Minimise disturbance footprint through higher sensitivity areas; plant Search and Rescue in footprint areas and use of these species for rehabilitation.	Plant Search and Rescue in footprint areas and use of these species for rehabilitation
Cumulative impact post mitigation:	Low Negative	Medium Negative	Low Negative
Significance rating of impact after mitigation:	Low Negative	Medium Negative	Low Negative

Table 1: Construction phase botanical impacts of the proposed pipeline component of the project.

The area selected for the **proposed Handling Facility** (2ha) is of Medium botanical sensitivity, with only one recorded plant SoCC. Loss of this area would be of Low- **Medium negative** significance, and cannot be easily mitigated.

The **greater Handling Facility area** is largely of High botanical sensitivity, with at least four recorded plant SoCC, and development of this entire area would have a **High negative** botanical impact, which cannot be easily mitigated.

7.2 Operational Phase Impacts

Operational phase botanical impacts of the pipeline and road components of this project are likely to be of minor significance. The primary operational phase impact of these components is the likely proliferation of invasive alien plants in the pipeline route, facilitated by the soil disturbance during construction. Loss of ecological connectivity and habitat fragmentation is not considered to be a significant impact as the vegetation in the disturbed pipeline areas will recover to some degree. There are not likely to be any significant differences between the route alternatives in terms of the operational phase botanical impacts, and thus Table 2 does not include the alternatives.

Operational phase botanical impacts of the Handling Facility (2ha) component of this project are likely to be of Medium negative significance. Loss of ecological connectivity and habitat fragmentation would be the main operational phase impact.

Potential impacts	Pipeline	2ha Handling Facility	Greater Handling Facility site
Nature of impact:	Accelerated alien plant invasion in disturbed areas of pipeline	Loss of ecological connectivity; habitat fragmentation	Loss of ecological connectivity; habitat fragmentation
Extent and duration of impact:	Site; temporary	Permanent, regional, but mostly site level	Permanent, regional
Magnitude of impact:	Low	Medium	High
Probability of occurrence:	Very likely	Definite	Definite
Degree to which the impact can be reversed:	Reversible	Not reversible	Not reversible
Degree to which the impact may cause irreplaceable loss of resources:	Not likely	Unlikely	Possible
Cumulative impact prior to mitigation:	Low negative	Low – Medium negative	Medium – High negative
Significance rating of impact prior to mitigation:	Low negative	Low – Medium negative	Medium – High negative
Degree to which the impact can be mitigated:	Alien plant invasion can be fully mitigated	Small degree	Not at all
Proposed mitigation:	Rehabilitation of servitude with rescued material; ongoing alien invasive plant removal within corridor	Conservation of adjacent High sensitivity area	Only a biodiversity offset would mitigate adequately
Cumulative impact post mitigation:	Low Negative	Low – Medium negative	Medium – High negative
Significance rating of impact after mitigation:	Low Negative	Low – Medium negative	Medium – High negative

Table 2: Operational phase botanical impacts of the proposed project components (no difference between pipeline alternatives, hence assessed as one component).

The alien invasive plant issue is one that will occur in all sections of the pipeline route. This impact could have a Low - Medium negative impact over time if not addressed, but it is easily mitigated, by means of ongoing alien invasive plant management in the pipeline servitude. After mitigation this could be reduced to a Low negative level.

8. REQUIRED MITIGATION AND EMP REQUIREMENTS

The following mitigation is considered reasonable, feasible and essential, and is factored into the assessment, and it assumes that only the applicant's preferred pipeline route will be authorised and that the 2ha Handling Facility (as indicated) will be authorised:

- The pipeline construction corridor in the area within and between the High, Medium and Medium – High sensitivity areas (as per Figure 4) should be minimised and kept as narrow as possible, and should ideally be less than 6m wide in this area. The approved development corridor in this area must be surveyed and clearly demarcated with wire or coloured rope, and strung with warning signs, prior to any construction.
- The ECO must ensure that no disturbance occurs outside the approved development footprint of the pipeline route during construction.
- Topsoil removed from the pipeline trench must be kept separate from other fill during the construction process, and must be replaced last, on the soil surface.
- Alien invasive annual species (such as ryegrass or oats), or straw containing any such species, should not be used for temporary soil stabilisation of the pipeline corridor, as these will then rapidly dominate these areas, to the exclusion of indigenous species.
- Plant Search and Rescue must be undertaken from the entire pipeline development corridor, with the exception of Low sensitivity areas (as per Figure 4), prior to any development. All translocatable plant species, but notably the succulents and geophytes, must be bagged up and stored in a nursery for later use, once construction of the pipeline has been completed and rehabilitation is required in this area south of the road. Replanting of these rescued specimens should be undertaken in the first autumn – winter (May – June) after construction has been completed, giving the plants maximum time to establish before the next summer dry period.
- Additional rehabilitation of the High and Medium – High sensitivity sections of the pipeline servitude (as per Figure 4) should be undertaken using locally indigenous Strandveld species that are additional to those used in the Search and Rescue process. This work should be undertaken by an experienced horticultural contractor who has access to suitable locally grown species. Key elements suggested include shrubs such as *Othonna cylindrica, Limonium peregrinum, Calobota sericea,*

Thamnochortus spicigerus, Searsia laevigata, Searsia glauca, Lycium ferocissimum, Euclea racemosa and *Putterlickia pyracantha*.

- Pipeline trenching should be undertaken in sections to minimise time that topsoil is exposed, and to minimise the chance of small animals such as tortoises becoming trapped in the trenches.
- The ECO or contractor must remove any trapped animals from the trenches every morning, and must not harm them.
- Ongoing alien invasive plant management must be undertaken on an annual or biannual basis within the full pipeline servitude, ideally in the month of October. No spraying of herbicide should be undertaken in these areas as this kills numerous non-target species, and no further soil disturbance should be allowed. The focus should be on removing (using CapeNature approved methodology) all alien invasive shrubs and large herbs (such as *Echium* species), although in some cases it may be possible and necessary to also remove invasive alien grasses such as kikuyu (*Pennisetum clandestinum*) or ryegrass (*Lolium* species).
- The approved handling facility development area must be fenced off and clearly demarcated throughout the construction period, so that no adjacent High sensitivity areas are damaged.
- The High sensitivity portion of the greater handling facility study area (6.6ha) must be managed as a conservation area, with no disturbance eof this area allowed.

9. CONCLUSIONS

- Although most of the area is a mapped Critical Biodiversity Area, the three alternative pipeline routes avoid the majority of the areas of High botanical sensitivity. The exception is Alternative 1, which crosses a significant area of undisturbed High sensitivity vegetation, and it is thus the least preferred alternative from a botanical perspective (Medium negative impact).
- Pipeline Alternative 2 is the most preferred development alternative from a botanical perspective, followed by the Proposal (applicant's proposed alternative). Both of these would have acceptable levels of botanical impact (Low negative).
- The primary construction phase impacts are long term loss and degradation of up to Medium – High and High sensitivity vegetation in the pipeline corridor, and permanent loss within the Handling Facility footprint. The 2ha footprint of the latter is likely to have an acceptable Medium

negative botanical impact, but development of the adjacent 6.6ha of High sensitivity vegetation would have an unncaeptable Medium – High negative botanical impact.

- Operational phase botanical impacts are likely to be relatively minor and of no regional significance, for all pipeline development alternatives, but are of significance for the handling facility, notably in terms of loss of ecological connectivity.
- The proposed road corridors are all of Low negative botanical significance, and mostly follow existing roads.
- Cumulative impacts are of some significance as there are likely to be other similar pipelines built in this area in the near future (e.g. Helme 2015), some of which are likely to be within the same corridors.
- All mitigation outlined in Section 8 is considered feasible, reasonable and essential, and should be included in any Environmental Authorisation.

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