WILMAR VEGETABLE OIL PIPELINE IN THE RICHARDS BAY AREA

KwaZulu-Natal Province

Wetland Delineation and Impact Assessment Report

May 2019

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EXECUTIVE SUMMARY

Wilmar Processing (Pty) Ltd (Wilmar) is proposing the development of a vegetable oil pipeline in the Richards Bay area, KwaZulu Natal Province (the "proposed development"). The proposed vegetable oil pipeline will be approximately 2.5km in length, and run from the Port of Richards Bay and connect to the proposed oil processing facility[1] planned on Lot 17442 (site) within Phase 1A of the IDZ. Following revision of the proposed pipeline route to avoid wetland features, the updated layout rerouted the proposed pipeline to pass approximately 15m west of the depression wetland identified, although ~8m of the depression wetland boundary still remained within the 50m pipeline servitude.

This wetland delineation and impact assessment report focused on providing an assessment of the wetlands to be affected along the proposed vegetable oil pipeline in Richards Bay, KwaZulu-Natal Province.

From a desktop perspective, the proposed pipeline appeared to affect an **estuarine wetland**, an **artificial channelled valley bottom wetland**, and an **un-channelled valley-bottom wetland**. It was also identified at a desktop level that **a CBA area (irreplaceable), covers approximately two-thirds of the proposed pipeline** in terms of the KZN Biodiversity Sector Plan database (2014). The in-field delineation assessment was undertaken to verify all the identified desktop wetlands, and undertake further assessments where required.

The in-field delineation assessment confirmed **one depression wetland** as well as the **unlined artificial drainage channel[2]**, along the proposed pipeline route. The depression wetland was not identified in the databases consulted at a desktop level. In the regulated area (<500m) of the depression wetland, the surrounding wetlands identified included the **estuarine wetland** to the south and north of the proposed pipeline route as per the NFEPA (2011) database, as well as the **unchanneled valley bottom wetland** as per the SiVEST (2016) assessment to the south. This assessment was however limited to inland freshwater systems however, and focused on the depression wetland, artificial drainage channel and un-channelled valley bottom wetland (where applicable) accordingly.

The present ecological state of the depression wetland was assessed to be a **Class D (largely modified) seasonal depression wetland system**. The wetland was found to be affected most by the change in surface roughness and excavation in the western area of the wetland. Overall, an impact score of 5,06 was assessed which resulted in the Class D rating. The Class D rating is expected to slowly deteriorate over time with increased transformation of the surrounding catchment and change in surface roughness. For the un-channelled valley bottom wetland, the present ecological state was assessed to be a **Class B (largely natural) seasonal un-channelled valley bottom wetland system**. The wetland was found to be minimally affected by a number of influences which included reduction of flows due to alien vegetation present in the wetland, an increase in flood peaks, increased run-off due to the increase of hardened surfaces in the catchment, deposition of materials (dumping) in the wetland and alien colonisation. Overall, an impact score of 1,54 was assessed which resulted in the Class B rating. The Class B rating for the wetland is expected to slowly deteriorate over time due to continued dumping and increased colonisation of alien vegetation.

[1] Note that the oil processing facility does not form part of this application for environmental authorisation. A separate environmental authorisation process has been undertaken for the oil processing facility.

[2] Note that no present ecological state or wetland ecosystem services assessments were applied to the artificial drainage channel as this is an artificial wetland system for which the aforementioned methodologies are not applicable, and no alternative methodologies may be applied in South Africa

The potential wetland ecosystem services assessed which scored highest for the depression wetland included **sediment trapping, erosion control and flood attenuation**. The depression wetland therefore offers good potential for stormwater management in the area. In general, the depression wetland was not found to offer a high number of potential ecosystem services to a significant degree, owing mainly to the limited extent and degraded current state of the wetland. The potential wetland ecosystem services assessed to be provided by the un-channelled valley bottom wetland which scored highest included **biogeochemical cycling (phosphate and nitrate / toxicant removal), sediment trapping, erosion control, streamflow regulation and flood attenuation**. The wetland therefore offers good potential for water purification and stormwater control in the area. Overall, the wetland has a significant ecological role within the surrounding landscape.

The most important determinant that the depression wetland scored highest, in terms of ecological importance and sensitivity, was for being ecologically sensitive to change in the natural regime of the hydrology of the wetland. Despite the diminutive extent of the wetland, the vegetation species present are fairly diverse and some species have a chance of occurrence when the wetland is inundated. Overall, the ecological importance and sensitivity of the **depression wetland was assessed to be a Class C system** which is considered to be moderately ecologically important and sensitive on a provincial or local scale. With regards to the un-channelled valley bottom wetland, a number of the determinants scored high. The wetland provides a relatively sizeable area for habitat and exclusivity to sensitive species, and therefore has a greater chance of occurrence for these sensitive species. Overall, the ecological importance and sensitivity of the **un-channelled valley bottom wetland was assessed to be a Class B system** which is considered to be highly ecologically important and sensitive.

No buffer zone was recommended since the proposed development will include the construction of linear feature that can avoid the wetland and span the artificial drainage channel. A buffer zone was therefore deemed to be impractical and ineffective as the proposed pipeline can avoid the wetlands and span the artificial drainage channel without affecting it directly.

An impact assessment was undertaken to identify potential impacts associated with the proposed development. It was determined that the potential impacts of the project were limited to impacts during the construction phase, **and limited only to the depression wetland and the artificial drainage channel**, and thus not the other wetlands identified. The potential impacts included impacts to hydrology and geomorphology (pre-mitigation significance rating – 21 (Low); **post-mitigation measure rating – 8 (Low)**) and water quality (pre-mitigation significance rating – 30 (Medium); **post-mitigation measure rating – 8 (Low)**). Cumulative impacts were also assessed which focused on the cumulative degradation and loss of wetlands as a result of development pressure in the region due to industrial and infrastructure projects earmarked for future development generally in the area. The impact rating for cumulative impacts was 33 (Medium) in conjunction with other projects in the broader study area, whilst the **impact rating in isolation was rated as 27 (Low)**.

Several specialist recommendations were proposed which include the following:

- Alien invasive eradication and control management plan is to be compiled for the construction and post-construction phases by a suitably qualified ecological specialist, or where an existing plan is available, that this is updated to include management of the wetland and artificial drainage channel;
- Construction phase monitoring must cover inspection of the depression wetland and the artificial drainage channel to monitor the general condition and to ensure that no direct impact occurs.

- Post-construction phase monitoring is to be undertaken as advised in **Section 6.1.1** and **Section 6.1.2** above.
- As the proposed pipeline will be within 32m of the wetlands, Listing Notice 1 Activity 12 must be applied for in order to obtain Environmental Authorisation from the KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) prior to construction. Where other similar listed activities are found to be triggered in terms of wetlands, these must also be included in the application for Environmental Authorisation.
- As the proposed pipeline will be within 500m of a wetland, a risk assessment is to be undertaken in accordance with Government Notice Regulation 509 of 2016 for the proposed pipeline to obtain the necessary authorisation from the Department of Water and Sanitation (DWS), prior to construction. This is to be undertaken to determine the need for appropriate water use authorisation in consultation with the DWS.

Ultimately, the proposed development was assessed to have a low negative impact on the identified affected wetlands and artificial drainage channel with the implementation of control / mitigation measures. **The proposed development is therefore supported, and should be allowed to proceed on condition of the implementation of the mitigation measures and recommendations proposed, and where the relevant environmental authorisation is obtained from KZN EDTEA and the relevant water use license or general authorisation is obtained from DWS.**

PROJECT DETAILS

Title	:	Wetland Delineation and Impact Assessment Report for the Proposed Wilmar Vegetable Oil Pipeline in the Richards Bay area, KwaZulu-Natal Province
Authors	:	Savannah Environmental (Pty) Ltd Shaun Taylor Gideon Raath
External Reviewer	:	Stephen Burton *Pr. Sci. Nat.* (Registration Number: 117474) – SiVEST Environmental (Pty) Ltd
Client	:	Wilmar Processing (Pty) Ltd
Report Revision	:	Revision 3
Date	:	May 2019

When used as a reference this report should be cited as: Savannah Environmental (2019). Wetland Delineation and Impact Assessment Report for the Proposed Wilmar Vegetable Oil Pipeline in the Richards Bay area, KwaZulu-Natal Province.

SPECIALIST DECLARATION OF INTEREST

I, Shaun Taylor, declare that –

- I act as the independent specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing – any decision to be taken with respect to the application by the competent authority; and – the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct.
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the Act.

Shaun Taylor
Name

Signature

May 2019
Date

I, Gideon Raath, declare that –

- I act as the independent specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing – any decision to be taken with respect to the application by the competent authority; and – the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct.
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the Act.

Gideon Raath	
Name	Signature
May 2019	

SHORT SUMMARY OF SPECIALISTS AND THEIR EXPERTISE

Shaun Taylor

Shaun's highest qualification is a Master of Science Degree in Aquatic Health. Shaun has an in-depth understanding of environmental and water related South African legislation. Applicable legislation includes the National Environmental Management Act, 1998 (Act No. 107 of 1998), the Environmental Impact Assessment (EIA) Regulations (2006, 2010 and 2014, as amended) and the National Water Act, 1998 (Act No. 36 of 1998). Within the water field, Shaun has undertaken and completed numerous Water Use License Applications (WULAs), General Authorisations (GAs), Risk Assessments and Water Use License (WUL) compliance monitoring for various developments. Shaun also specialises in wetland ecology and operates as a wetland specialist, having also undertaken and completed numerous wetland and riparian assessments for renewable energy developments, linear projects as well as site specific projects. Lastly, Shaun has undertaken several wetland rehabilitation plans for various developments and a wetland offset plan.

A selection of recent specialist studies undertaken, include the following:

- Proposed construction of the De Wildt Solar Photovoltaic Power Plant, Gauteng Province: Surface Water Assessment;
- Proposed construction of up to a 5MW Solar Photovoltaic (PV) Energy Facility on Portion 37 of the Farm Leeuwbosch No. 44 near Leeudoringstad, North West Province: Surface Water Assessment;
- Proposed construction of the Rietkuil Coal Railway Siding near Bronkhorstspruit, Gauteng Province: Surface Water Assessment;
- Proposed maintenance of the Water Pipeline in Parys, Ngwathe Local Municipality, Free State Province: Surface Water Assessment;
- Proposed construction of a 140MW Wind Farm and Associated Infrastructure near Hutchison, Northern Cape Province: Surface Water Assessment;
- Proposed construction of the SPAR Distribution Centre, Port Elizabeth, Eastern Cape Province: Surface Water Assessment;
- Proposed construction of the Xha! Boom Wind Farm, Northern Cape Province: Surface Water Assessment;
- Proposed construction of the Gras Koppies Wind Farm, Northern Cape Province: Surface Water Assessment;
- Proposed construction of the Ithemba Wind Farm, Northern Cape Province: Surface Water Assessment;
- Proposed construction of the Harte Beeste Leegte Wind Farm, Northern Cape Province;
- Proposed construction 132kV Power Lines and a Substation for Tsakane Ext 10 and 22, Gauteng Province: Surface Water Assessment;
- Proposed construction of a Linking Station, Power Lines and Substations for the Mainstream Wind Energy Facilities near Beaufort West, Western Cape Province; and
- Proposed expansion of the Mountain Valley "A" Grade Chicken Abattoir on the Remainder of Subdivision of Portion 17 (of 16) of the Farm Leeuw Poort 1120 FT, KwaZulu-Natal Province: Surface Water Assessment.

Gideon Raath

Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River, while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as an Environmental Consultant at EOH Coastal and Environmental Services (EOH CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS specialisation as well as Ecological and Wetland specialist studies. Previously, Gideon worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

A selection of recent specialist studies undertaken, include the following:

» City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng
» SANRAL Bierspruit R510 road upgrade Water Use Licence, Basic Assessment, Thabazimbi, Limpopo Province
» Kibler Park Church Development Ecological Assessment, Johannesburg, Gauteng
» SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Water Use Licence and Specialist reports, Caledon, Western Cape Province
» iGas integrated biodiversity screening, Saldanha, Western Cape
» Bloekombos (Kraaifontein) botanical baseline and impact assessment, Cape Town, Western Cape
» Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique
» Mayfield Quarry rehabilitation plan, Grahamstown, Eastern Cape
» Boshoek Loop Rail Upgrade BAR and Water Use Licence, Rustenburg, North-West Province
» Barberton IAPS Waste Water Treatment Works development BAR, water use licence and SASS 5 assessment, Barberton, Mpumalanga Province
» Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment, Greyton, Western Cape

Gideon Raath is the reviewer of this report.

Curriculum vitae's (CV's) for the above specialists are attached as **Appendix A**.

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ACRONYMS

CBA	Critical Biodiversity Areas
CSIR	Council for Scientific and Industrial Research
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EDTEA	Economic Development, Tourism and Environmental Affairs
ESA	Ecological Support Area
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
FEPAs	Freshwater Ecosystem Priority Areas
GA	General Authorisation
GPS	Global Positioning System
GN. R	Government Notice Regulation
HGM	Hydrogeomorphic
IDZ	Industrial Development Zone
km	Kilometre
KZNBSP	KwaZulu-Natal Biodiversity Sector Plan
LC	Least Concern
LM	Local Municipality
NWA	National Water Act, 1998 (Act No. 36 of 1998)
NEMA	National Environmental Management Act (No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
PES	Present Ecological State
RB	Richards Bay
SAIAB	South African Institute of Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
WRC	Water Research Commission
WUL	Water Use License
WWF	Worldwide Fund for Nature

1. INTRODUCTION

Wilmar Processing (Pty) Ltd (Wilmar) is proposing the development of a vegetable oil pipeline in the Richards Bay area, KwaZulu Natal Province (the "proposed development"). The proposed vegetable oil pipeline will be approximately 2.5km in length, and run from the Port of Richards Bay and connect to the proposed oil processing facility[3] planned on Lot 17442 (site) within Phase 1A of the Industrial Development Zone.

Wilmar has requested that a wetland delineation and impact assessment be undertaken to determine whether the proposed vegetable oil pipeline development will directly/indirectly affect any wetlands along the proposed pipeline route. Shaun Taylor of Savannah Environmental (Pty) Ltd has been appointed as the independent wetland consultant responsible for undertaking the wetland baseline assessment for the proposed development.

1.1. Project Description

The proposed pipeline will comprise of four (4) carbon steel pipes with a diameter of approximately 8 inches (216mm) each, which will extend from the Richards Bay Port to the plant site on Phase 1A of the IDZ. The proposed pipelines will be stacked vertically, in double rows, and on mounting structures above-ground for the majority of the route. The proposed pipes will pre-dominantly be constructed above ground at an elevation of 500mm. The typical mounting structures will be approximately 1.5m x 1.5m (~2.25m²) and 1.2m into the ground of which ~2.7m³ of soil will need to be excavated to construct the mounting structure. The proposed pipe plus support width, as well as support height will be 1 100mm, respectively.

For the section of the pipeline that will route through the Transnet Railyard North section, 4 x piles (approximately 12m in length) will be required to create a 12m high bridging structure and another 7 x piles will be required for a 5,5m bridge structure. The piles are to be driven into the ground by ramming precast concrete piles to a predetermined resistance such that it will support the imposed loads on the structures. The associated mountings will be 3m wide, 1,7m long, 0,7m below the ground surface and 0.5m above the ground surface. No trenching is required, with the only excavation conducted at the location of each of the mounting structures, greatly reducing the earthworks component of the construction methodology. The pipelines will run side by side as per **Figure 1.1** below. This will be to allow for maintenance purposes. However, some sections will be required to be routed underground by means of horizontal directional drilling to construct duct access shafts, mainly to avoid rail and road infrastructure.

[3] Note that the oil processing facility does not form part of this application for environmental authorisation. A separate environmental authorisation process has been undertaken for the oil processing facility.

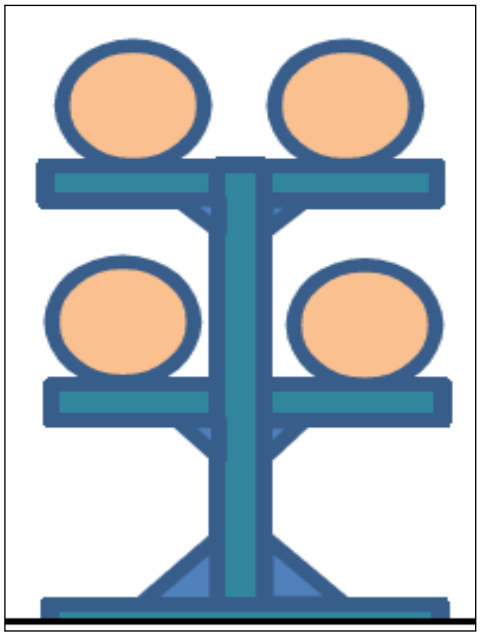

Figure 1.1: Conceptual illustration of the pipe configuration.

1.2. Project Location

The proposed oil pipeline is located ~2km from Arboretum, which is the nearest suburb within the Richards Bay area. The site can be accessed via Medway Road off the John Ross Highway (R34) Provincial Road. The site is situated within Ward 02 of the uMhlatuze Local Municipality (Category B municipality), which is located within the greater King Cetshwayo District Municipality.

A corridor is associated with the proposed pipeline for manoeuvrability purposes should there be any infrastructure that will need to be avoided. The proposed pipeline corridor is 50m in width (25m either side of the centre line) for the majority of the route.

The proposed pipeline (**Figure 1.2**) will traverse several properties including the following:

- Richards Bay Port (including Remainder of Lot 223 Umhlathuzi 16230; Erf 153 of 5333; Erf 21 of 5333; and Erf); and
- Lots 16182, 16856, 17422 and 1/17422 within Phase 1A of the Richards Bay IDZ.

1.3. Description of the Proposed Pipeline Route

A detailed description of the pipeline route is provided as **Appendix B** in the engineering report for visual conceptualisation of the pipeline route. For general information purposes, the proposed pipeline route is described here.

The proposed pipelines will route in a north easterly direction for approx. 500m from Berths 706, 707 and 708 Quayside at the Richards Bay Port, where a pipe manifold will be constructed into the concrete of the shipping dock for the pitch pipe connection to the proposed pipelines (refer to **Figure 1.2** below). The pipes will run through an underground concrete tunnel before surfacing at the end of the tunnel, where it then routes in a northwards direction above-ground until reaching the Southern Access Road to Dry Bulk Slab, where the pipes will be routed underground below road infrastructure before surfacing once again, and

routing above ground past the Asphalt surfaced parking area until it meets with the Northern Access Road to the Dry Bulk Slab. Here, it will route below ground through a duct access shaft, under the access road before surfacing once more. The approximate length of this section of the proposed pipeline from the end of the tunnel void to the Northern Access Road Dry Bulk Slab is approx. 300m. The pipeline then heads a short distance of approx. 50m in a north easterly direction once more, spanning an open drain channel as well as the single-track rail line further along the route. The pipes will then continue to route in an easterly direction for approx. 850m before making a 90° turn northwards through the Transnet North Railyard, firstly crossing below Newark Road and then surfacing once again to span the single-track railway line and an open unlined drainage channel.

The approximate length of this section of the proposed pipelines is ~ 300m. The pipeline will then take another 90° turn eastwards for a short distance (approx. 15m), before making a 90° turn once more northwards, routing below Silver Ocean Road, and then surfacing again for a further 400m within the RB IDZ area. At this point, the pipeline will take another 90° turn to the west and run for approx. 100m before making a final 90° turn northwards into the proposed oil facility site on Lot 17422 within Phase 1A of the Richards Bay IDZ.

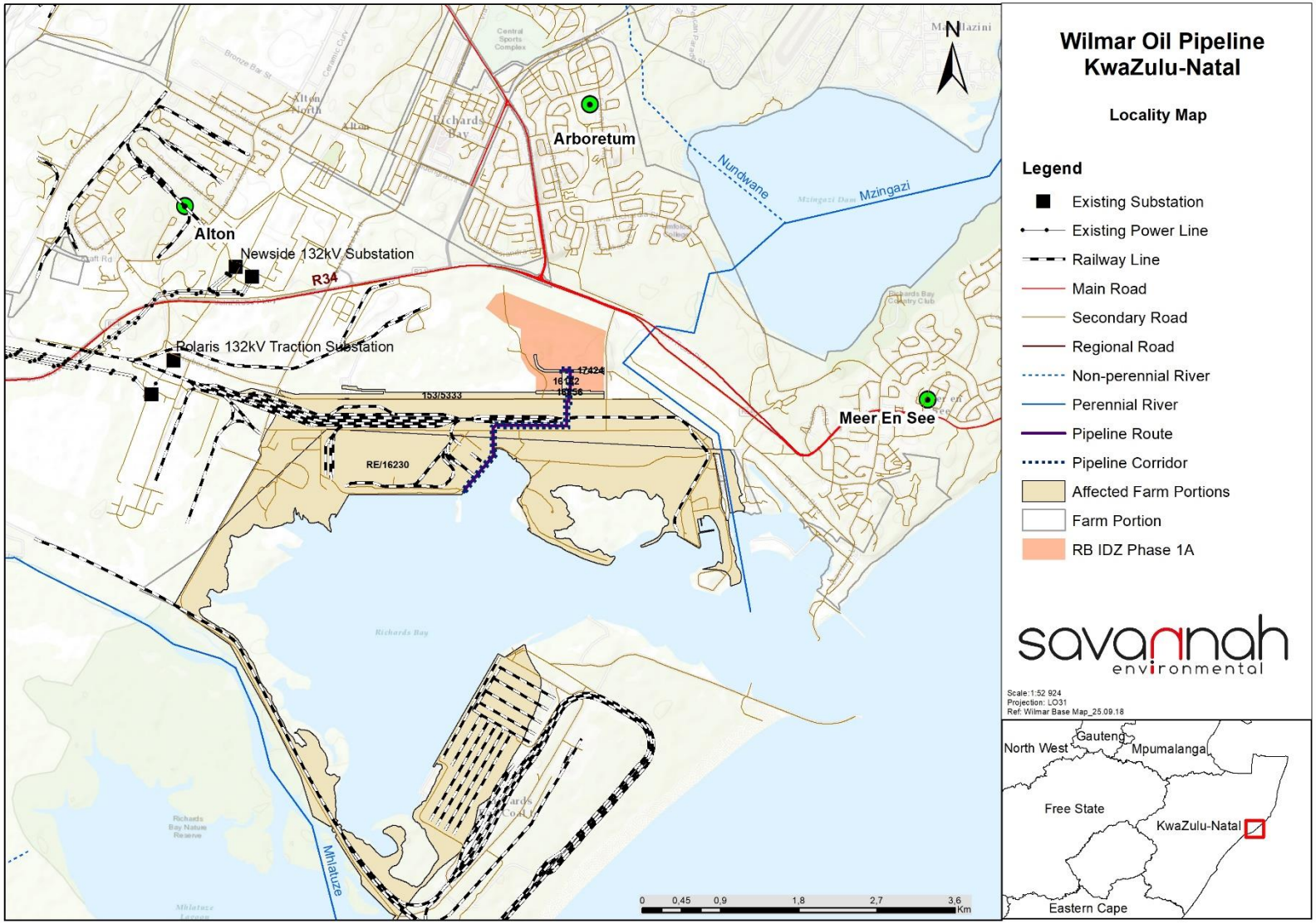

Figure 1.2: Locality map

1.4. Structure of this Wetland Baseline Report

This wetland baseline report has been structured as follows:

- **Chapter 2** provides an overview of the legislative framework applicable to the proposed development from a wetland perspective.
- **Chapter 3** provides an overview of the methodology and approach utilised in preparing this wetland delineation and impact report.
- **Chapter 4** provides the findings of the desktop assessment using the available database information.
- **Chapter 5** provides the findings of the site visit, wetland delineation results, and the various wetland assessments.
- **Chapter 6** provides the results of the impact assessment.
- **Chapter 7** provides the recommendations from a wetland specialist perspective. This includes activities according to the legislation that will need to be complied with in terms of the relevant environmental and water use authorisation processes, in addition to any further measures that need to be taken into consideration for design, mitigation and / or conditional requirements for inclusion into any authorisation and / or permit to be applied for.
- **Chapter 8** provides the conclusion of the wetland delineation and impact assessment report.

2. LEGISLATIVE FRAMEWORK

The applicable legislative framework plays an important role in contextualising the proposed development from a wetland perspective. In this regard, a key component of the wetland related legislative context is to assess the proposed development in terms of the suitability of the project in terms of the key legislation.

The following key pieces of legislation were reviewed as part of this review process:

National Legislative Context:

- Constitution of the Republic of South Africa (1996);
- National Environmental Management Act (No. 107 of 1998) (NEMA);
- Environmental Impact Assessment Regulations (2014), as amended; and
- National Water Act, 1998 (Act No. 36 of 1998) (NWA).

2.1. Constitution of the Republic of South Africa (1996)

The Constitution of the Republic of South Africa, 1996 is the supreme law of South Africa, and forms the foundations for a democratic society in which fundamental human rights are protected. The Bill of Rights contained in Chapter 2 of the Constitution enshrines the rights of all people in South Africa, and affirms the democratic values of human dignity, equality and freedom. Section 24 of the Constitution pertains specifically to the environment. It states that:

24. Everyone has the right –

(a) To an environment that is not harmful to their health or well - being; and

(b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

(i) Prevent pollution and ecological degradation.

(ii) Promote conservation.

(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The Constitution also however outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being and to have the environment protected. This is relevant with regards to wetland environments, which are protected under national legislation in South Africa (see section below).

2.2. National Environmental Management Act (No. 107 of 1998) (NEMA)

The National Environmental Management Act (No. 107 of 1998) (NEMA) is South Africa's key piece of environmental legislation, and sets the framework for environmental management in South Africa. It provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights. In accordance with this, it states that:

- *The State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities.*
- *Sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations.*
- *Everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

In addition, the National environmental management principles contained within NEMA state that:

- Development must be socially, environmentally and economically sustainable;
- Sustainable development requires the consideration of all relevant factors including the following:
    - That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
    - That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; and
    - That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.
- The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment; and
- Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Wetlands are specifically mentioned with regards to requiring specific attention in management and planning procedures, and therefore need to be identified when planning developments, such that adequate management procedures can be put in please to ensure negative impacts are avoided, minimised or remedied appropriately.

2.3. Environmental Impact Assessment Regulations (2014), as amended

The Environmental Impact Assessment Regulations (2014), as amended, were promulgated *inter alia* with the purpose of regulating the procedure and criteria relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts. The activities identified for which environmental authorisation is required are included in Government Notice Regulation (GN. R) 327 Listing Notice 1, GN. R 325 Listing Notice 2 and GN. R 324 Listing Notice 3. Included in the listing notices, are activities related specifically to wetlands. The relevant activities will be assessed and stipulated in **Section 7** where any wetlands are to be affected by the proposed development.

2.4. National Water Act, 1998 (Act No. 36 of 1998) (NWA)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) was developed in order to ensure the protection and sustainable use of water resources (including wetlands) in South Africa. The NWA recognises that the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users. In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all "water uses" must be licensed with the Competent Authority (i.e. the Regional Department of Water and Sanitation (DWS) or the relevant Catchment Management Agency (CMA) where applicable). At a general level, the DWS is ultimately responsible for the effective and efficient water resources management to ensure sustainable economic and social development in line with the NWA. DWS is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WULs) and / or registration of General Authorisations (GAs)) where this is applicable to developments.

"Water use" is defined in Section 21 of the NWA and includes for the following:

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a watercourse;
d) Engaging in stream flow reduction activity contemplated in Section 36 of the NWA;
e) Engaging in a controlled activity identified as such in Section 37 (1) or declared under Section 38(1) of the NWA;
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing of waste in a manner of water which contains waste from, or which has been heated in any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a watercourse;
j) Removing, discharging or disposing of water found underground if it is necessary for efficient continuation of an activity or for the safety of people; and
k) Using water for recreational purposes.

With the above in mind, should any water resource be affected by any proposed development, the necessary WUL application and / or registration of GA(s) will become relevant where applicable. Note that a WUL application is generally applied for where the above water uses are required as a result of direct impact to watercourses. However, it must be noted indirect impacts are also taken into consideration through the applicable Government Notices. In particular, Government Notice (GN) 509 of 2016, becomes relevant where a watercourse is affected and is within the "regulated area of a watercourse". The regulated area of a watercourse is defined as:

"a) The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
b) In the absence of a determined 1 in 100 year flood line or riparian area, the area within 100m from the edge of a watercourse where the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to Section 144 of the Act); or
c) A 500m radius from the delineated boundary (extent) of any wetland or pan".

As such, an assessment of any direct and indirect impacts to water resources must be assessed in terms of the Risk Assessment Protocol, where a proposed development affects a watercourse within the above-mentioned proximities, and when applying for authorisation from the DWS. The relevant activities will be assessed and stipulated in **Section 7** where any wetlands are to be affected by the proposed development.

3. METHOD AND APPROACH OF THE STUDY

3.1. Purpose and Objective of the Wetland Assessment

This wetland report has been prepared at the request of Wilmar for the purposes of establishing whether the proposed vegetable oil pipeline will affect any wetlands.

The objectives of the wetland report include:

» Desktop identification of wetland sensitivities along the proposed vegetable oil pipeline route through the review of existing desktop and database information.
» Site visit, including delineation of any wetlands along the proposed vegetable oil pipeline route.
» Mapping of the identified wetlands (from existing data and the site visit delineation exercise).

3.2. Approach to the Study

This freshwater report provides a snapshot of the environmental wetland setting within which the proposed vegetable oil pipeline is proposed. It provides an overview of the wetland environment, and to which extent the current status quo is likely to change as a result of the proposed vegetable oil pipeline. Available information was therefore consulted to determine the status quo, which was based on desktop sources as well as field investigation and verification.

The desktop wetland baseline was established using available database information, which comprised the following:

» Collection and review of existing database information, including:
  - South African Vegetation Types (Mucina & Rutherford, 2012);
  - National Freshwater Ecosystems Priority Areas (NFEPA) database, 2011;
  - National Biodiversity Assessment database, 2012; and
  - KwaZulu-Natal Biodiversity Sector Plan (KZNBSP), 2014.
» Use of satellite imagery to identify any potential wetland areas (Google Earth™); and
» Review of existing wetland and related ecological specialist and screening studies within the same and nearby study area. These included:
  - SiVEST, 2016: Railway North, Richards Bay Port Ecological, Richards Bay, KwaZulu Natal – Vegetation Report;
  - SiVEST, 2016: Richards Bay Port Ecological Assessment: Railway North – Wetland Delineation Report;
  - SiVEST, 2016: Richards Bay Port: Ecological Assessment: Cassaurina – Wetland Delineation Report; and
  - Savannah Environmental (2018) Desktop Screening Assessment for a Vegetable Oil Pipeline in Richards Bay, KwaZulu-Natal Province.

A site visit was then undertaken to investigate and verify the available desktop information. The site visit included the assessment of wetlands within the regulated area of a watercourse (see **Section 2.3**) as well as those directly along the proposed vegetable oil pipeline route.

The delineation of wetlands was undertaken in accordance with the DWAF (2005) guidelines, "A practical field procedure for the identification and delineation of wetlands and riparian areas". The draft DWAF (2008) guidelines, "Update Manual for the Identification and Delineation of Wetlands and Riparian Areas" was also consulted as a supplementary guideline.

3.3. Freshwater Definition and Classification

For the purposes of this assessment, the classification of wetlands was undertaken applying the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis *et al*., 2013). This classification system applies to inland freshwater resources or systems, which are defined as, "an aquatic ecosystem with no existing connection to the ocean". Three broad types of inland systems exist that are dealt with by the classification system including the following:

- Rivers, which are 'lotic' aquatic ecosystems with flowing water concentrated within a distinct channel, either permanently or periodically;
- Open waterbodies, which are permanently inundated 'lentic' aquatic ecosystems where standing water is the principal medium within which the dominant biota live. In the Classification System, open waterbodies with a maximum depth greater than 2 m are called limnetic (lake-like) systems; and
- Wetlands, which are transitional between aquatic and terrestrial systems, and are generally characterised by (permanently to temporarily) saturated soils and hydrophytic vegetation. These areas are, in some cases, periodically covered by shallow water and/or may lack vegetation.

The inland system classification works on a six-tiered structure (**Table 3.1**). The tiered structure progresses from Systems at the broadest spatial scale (Level 1), through Regional Setting (Level 2) and Landscape Units (Level 3), to Hydrogeomorphic (HGM) Units at the finest spatial scale (Level 4). At Level 5, Inland Systems are distinguished from each other based on the hydrological regime and, in the case of open waterbodies, the inundation depth class. At Level 6, six 'descriptors' have been incorporated into the Classification System. These descriptors allow for distinguishing between aquatic ecosystems with different structural, chemical, and/or biological characteristics. For the purposes of this assessment, a Level 4 classification was undertaken. The Level 4 classification is shown in **Table 3.2**. below.

Table 3.1: Inland System Classification (adapted from Ollis *et al*., 2013).

Distinguishing between Marine, Estuarine and Inland Systems	**Wetland/Aquatic Ecosystem Context**		**Functional Unit**		**Wetland/Aquatic Ecosystem Characteristics**
Level 1: Type of System	**Level 2: Regional Setting**	**Level 3: Landscape Unit**	**Level 4: Hydrogeomorphic (HGM) Unit**	**Level 5: Hydrological Regime**	**Level 6: Descriptors**
» Marine » Estuarine » Inland System	» Department of Water Affairs (DWA) Ecoregions » NFEPA WetVeg Groups » Other Spatial Framework	» Valley Floor » Slope » Plain » Bench	River Floodplain Wetland Channelled Valley Bottom Wetland Depression Seep Wetland Flat	Perenniality » Period and Depth of Inundation » Period of Saturation	» Natural vs Artificial » Salinity » pH » Substratum Type » Vegetation Cover Type » Geology

Table 3.2: Hydrogeomorphic Units for Inland Systems (taken from Ollis *et al*., 2013)

Level 4: Hydrogeomorphic (HGM) Unit		
HGM Type	**Longitudinal Zonation/Landform/Outflow Drainage**	**Landform/Inflow Drainage**
A	**B**	**C**
River	Mountain Headwater Stream	Active Channel
		Riparian Zone
	Mountain Stream	Active Channel
		Riparian Zone
	Transitional	Active Channel
		Riparian Zone
	Upper Foothills	Active Channel
		Riparian Zone
	Lower Foothills	Active Channel
		Riparian Zone
	Lowland River	Active Channel
		Riparian Zone
	Rejuvenated Bedrock Fall	Active Channel
		Riparian Zone
	Rejuvenated Foothills	Active Channel
		Riparian Zone
	Upland Floodplain	Active Channel
		Riparian Zone
Channelled Valley Bottom Wetland	Not Applicable	Not Applicable
	Not Applicable	Not Applicable
Unchannelled Valley Bottom Wetland	Not Applicable	Not Applicable
	Not Applicable	Not Applicable
Floodplain Wetland	Floodplain Depression	Not Applicable
	Floodplain Flat	Not Applicable
Depression	Exorheic	With Channelled Flow
		Without Channelled Flow
	Endorheic	With Channelled Flow
		Without Channelled Flow
	Dammed	With Channelled Flow
		Without Channelled Flow
Seep	With Channelled Flow	Not Applicable
	Without Channelled Flow	Not Applicable
Wetland Flat	Not Applicable	Not Applicable

3.4. Wetland Definition, Classification & Delineation

The lawfully accepted definition of a wetland, in South Africa, is that within the NWA. Accordingly, the NWA defines a wetland as:

> "*land which is transitional between terrestrial and aquatic systems where the water table is usually 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 soil*".

However, for an area to be considered a wetland, the soil signatures (see Soil Wetness Indicator definition below) that are associated with wetlands must be present within the top 50cm of the soil profile (Collins, 2005). This understanding, and the above definition of a wetland, is applied in this report.

It must be noted that there are a number of wetland types in South Africa. Wetland types in South Africa have therefore been classified within a classification system as described in **Section 3.3** above. This classification system refers to inland wetlands which have been categorised into hydrogeomorphic (HGM) units. Ollis *et al*. (2013) defines the different wetland HGM units, as follows:

- *Channel* (river, including the banks): a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water. A river is taken to include both the active channel and the riparian zone as a unit;
- *Channelled valley-bottom wetland*: a valley-bottom wetland with a river channel running through it. Channelled valley-bottom wetlands must be considered as wetland ecosystems that are distinct from, but sometimes associated with, the adjacent river channel itself, which must be classified as a "river";
- *Un-channelled valley-bottom wetland*: a valley-bottom wetland without a river channel running through it;
- *Floodplain wetland*: a wetland area on the mostly flat or gently-sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by over-topping of the channel bank. Floodplain wetlands must be considered as wetland ecosystems that are distinct from but associated with the adjacent river channel itself, which must be classified as a "river";
- *Depression*: a wetland or aquatic ecosystem with closed (or near-closed) elevation contours, which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates;
- *Flat*: a level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench, closed elevation contours are not evident around the edge of a wetland flat; and
- *Hillslope seep*: a wetland area located on gently to steeply sloping land and dominated by colluvial (i.e. gravity-driven), unidirectional movement of water and material down-slope.

In terms of the delineation guidelines, four wetland indicators are used to determine the outer boundaries of a wetland.

These include:

- **Terrain Unit Indicator** – An important practical index for identifying those parts of the landscape where wetlands are likely to occur. Wetlands typically qualify as a valley bottom unit, occurring on the crest (i.e. in depressions) of the landscape, or the mid-slope and / or foot-slope;
- The **Soil Form Indicator** – Identifies the soil forms, as defined by the Soil Classification Working Group (1991 or latest version), which are associated with prolonged or frequent saturation;
- The **Soil Wetness Indicator** – Identifies the morphological "signatures" which have developed in the soil profile as a result of prolonged and frequent saturation. Soils which are saturated for prolonged periods can become depleted of oxygen when roots and / or microorganisms consume the oxygen present in soil between pore spaces. Once depleted, the soils are effectively anaerobic (little to no oxygen present). Under prolonged anaerobic conditions, a change in the chemical characteristics of soil minerals (such as iron and manganese) takes place, whereby the minerals become soluble and can leach out of the soils producing a leached soil matrix. Where most of the iron, being one of the most abundant minerals, is dissolved out of the soils, leaving a greyish, greenish, bluish soil matrix, the soils can be said to be "gleyed". However, under a fluctuating water table, where conditions in the soil change from anaerobic (under saturated conditions) to aerobic (where oxygen is present in soils, under dry conditions), dissolved minerals (typically, iron and manganese) return to an insoluble state forming

patches or mottles which represent distinct wetland soil signatures associated with wetlands. The soil signatures can include orange, yellow or black mottles or spots that have formed through the anaerobic and aerobic conditions associated with fluctuating water tables. Soils which display these unique characteristics are termed hydromorphic soils.

» The **Vegetation Indicator** – Identifies hydrophilic (water-loving) / hydrophytic (water plant) vegetation associated with frequently saturated soils. In identifying hydrophytic vegetation, it is important to distinguish between plant species that are (DWAF, 2005):
  - Obligate wetland species (ow): always grows in wetland - >99% chance of occurrence;
  - Facultative wetland species (fw): usually grow in wetlands – 67-99% chance of occurrence;
  - Facultative species (f): are equally likely to grow in wetlands and non-wetland areas – 34-66% chance of occurrence;
  - Facultative dry-land species (fd): usually grow in non-wetland areas but sometimes grow in wetland = 1-34% chance of occurrence.

3.5. Wetland Present Ecological State

To determine that ecological state that a wetland is in, the WET-Health tool was designed to provide a rapid assessment on the Present Ecological State (PES). This tool examines the deviation from the natural reference ecological condition of a wetland by analysing the hydrological, geomorphological and vegetation components of a wetland in a spreadsheet designed information sheet which assesses a wetland in terms of the extent, intensity and magnitude of an impact (Macfarlane *et al*., 2008). This is done by assigning a score on a scale of 1 to 10 which is classified into one of six health classes ranging from A to F, with A representing completely unmodified (natural) and F representing modifications that have reached a critical level (Macfarlane *et al*., 2008). The health classes are provided in **Table 3.3** below.

Table 3.3: WET-Health Impact Scores and Categories for the Wetland Present Ecological State (Macfarlane *et al*., 2008).

Impact Category	Description	Impact Score Range	Present State Category
None	Unmodified, natural.	0-0.9	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	2-3.9	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	E
Critical	Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8-10	F

The WET-Health tool includes for a Level 1 (desktop) and Level 2 (detailed field) PES assessment. This study included for a Level 1 desktop assessment for the unchanneled valley bottom wetland and a Level 2 detailed assessment for the depression wetland.

3.6. Wetland Ecosystem Services

Individual wetlands can supply different ecosystem services to society, as each system will have its own respective hydro-geomorphic characteristics. The wetland ecosystem services that were assessed in this study through the WET-EcoServices (Kotze *et al*., 2007) tool, are listed in **Table 3.4** below.

Table 3.4: WET-Ecoservices (Kotze *et al*., 2007).

Ecosystem services supplied by wetlands	Indirect benefits	Hydro-geochemical benefits	Flood attenuation	
			Streamflow regulation	
			Water quality enhancement benefits	Sediment trapping
				Phosphate assimilation
				Nitrate assimilation
				Toxicant assimilation
				Erosion control
			Carbon storage	
		Biodiversity maintenance		
	Direct benefits	*Provision of water for human use*		
		Provision of harvestable resources[2]		
		Provision of cultivated foods		
		Cultural significance		
		Tourism and recreation		
		Education and research		

3.7. Wetland Ecological Importance and Sensitivity

The ecological importance of a water resource is an expression of the importance of the wetland to the maintenance of ecological diversity and functioning on local and wider scales (**DWAF, 1999**). The ecological sensitivity refers to a system's ability to resist disturbance and the capability of the wetland to recover from disturbance once it has occurred (**DWAF, 1999**). The ecological importance and sensitivity (EIS) can be calculated according to the determinants listed in **Table 3.6** below and attributing a suitable score[4] to each determinant. Information, where relevant, was taken from the Wetland Present Ecological State and Ecosystem Services assessments (i.e. biodiversity maintenance information) and applied to this assessment. Additionally, information on the conservation planning importance of wetlands and rivers were also used. Wetlands and rivers are important in contributing to biodiversity targets which can be informed by the ecosystem threat status and protection level, the level of priority as assessed through the National Freshwater Ecosystem Priority Areas project (**Nel *et al*., 2011**), fine-scale biodiversity plans and in bioregional plans (**Macfarlane *et al*., 2016**). This information was therefore also used to inform the assessment. Once

[4]Score guideline Very high = 4; High = 3, Moderate = 2; Marginal/Low = 1; None = 0
Confidence rating Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1

calculated, the EIS category (EISC) was determined (**Table 3.7**). The category can range from an A to D with A being Very High and D being Low/Marginal.

Table 3.6: Environmental Importance and Sensitivity Biotic and Habitat Determinants (DWAF, 1999).

Determinant	Score	Confidence
Primary Determinants		
1. Rare & Endangered Species		
2. Populations of Unique Species		
3. Species/taxon Richness		
4. Diversity of Habitat Types or Features		
5. Migration route/breeding and feeding site for wetland and riparian species		
6. Sensitivity to Changes in the Natural Hydrological Regime		
7. Sensitivity to Water Quality Changes		
8. Flood Storage, Energy Dissipation & Particulate/Element Removal		
Modifying Determinants		
9. Protected Status		
10. Ecological Integrity		
TOTAL		
MEDIAN		
OVERALL ECOLOGICAL SENSITIVITY AND IMPORTANCE		

Table 3.7: Environmental Importance and Sensitivity Categories for Biotic and Habitat Determinants (DWAF, 1999).

Ecological Importance and Sensitivity Category (EIS)	Range of Median	Recommended Ecological Management Class
Very high Wetlands and riparian habitat that are considered ecologically important and sensitive on a national or even international level.	>3 and <=4	A
High Wetlands and riparian habitat that are considered to be ecologically important and sensitive.	>2 and <=3	B
Moderate Wetlands and riparian habitat that are considered to be ecologically important and sensitive on a provincial or local scale.	>1 and <=2	C
Low/marginal Wetlands and riparian habitat that are not ecologically important and sensitive at any scale.	>0 and <=1	D

3.8. Wetland Buffer Zones

An ecological resource buffer zone is typically an area of vegetated, un-developed land surrounding a resource that is maintained to protect, support and screen flora and fauna associated with a resource from the disturbances associated with neighbouring land uses and / or a proposed development. As wetlands are inherently regarded as ecologically sensitive habitat units, the designation of conservation buffers allows for the protection of these habitat units that could potentially emanate from terrestrial-based anthropogenic activities. Buffer zones are therefore, typically required to protect and minimise the edge impacts to the identified wetlands.

However, as the proposed development will include the construction of linear feature that can span wetlands, a buffer zone will be impractical and ineffective as the proposed pipeline can cross the relevant wetlands and watercourses where required without affecting the wetland directly. A buffer zone has therefore not been recommended for the watercourses that will be affected by the proposed pipeline.

3.9. Impact Assessment Method

The potential impacts were identified based on the proposed development and the potential impacts to wetlands that may result. Direct, indirect and cumulative potential impacts were identified and assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the degree to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

$S=(E+D+M)P$

S = Significance weighting
E = Extent
D = Duration
M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

3.10. Limitations and Assumptions

The following assumptions and limitations are applicable:

» Wetlands were initially identified and displayed at a desktop level using database information. A walk-down of the proposed vegetable oil pipeline was also undertaken to determine any wetlands that were not identified at a desktop level. Delineation of the wetlands was undertaken using the wetland indicators as per the DWAF 2005 guidelines and recorded using a Global Positioning System (GSP). The GPS used is expected to be accurate from 5m up to 15m depending on meteorological conditions.
» The site visit was undertaken on 30 November 2018. Due to seasonal vegetation growth preferences, different vegetation species can grow at different times / seasons of the year. As such, some hydrophytic (water-loving) vegetation species may not have been present at the time of the assessment. Seasonal vegetation variation and associated identification limitations therefore apply to this assessment given the short term once-off nature of the fieldwork component. Therefore, the assessment should not be taken to be a fully comprehensive study of hydrophytic vegetation species occurrence within the wetland(s) delineated. Rather, this study provides a snapshot of the hydrophytic vegetation occurrence observed at the time of the assessment.
» This study has focused on the delineation of wetlands that are likely to be directly affected by the proposed vegetable oil pipeline, as well as identification of wetlands that are within the regulated area of a watercourse (as defined in **Section 2.4** above). Identification and delineation of wetlands in the wider area outside the regulated area of a watercourse was not undertaken.
» This study is limited to providing a wetland delineation, present ecological state and environmental importance and sensitivity assessment of the wetland/s along the proposed pipeline route and those within the regulated area of any wetlands directly affected by the proposed pipeline route. No other assessments were undertaken or formed part of this study. Aquatic assessments (including fish, invertebrates, amphibians, water quality, hydrological, floodline or groundwater studies) have not been included. These are to be undertaken separately, if and where necessary for the project.
» Given the size of the surrounding wetlands, and the financial and time constraints of this wetland assessment, the delineation results of the un-channelled valley bottom wetland were taken from the SiVEST (2016) assessments and the estuarine wetland boundaries were used as per the NFEPA (2011) database.
» This study is limited to freshwater resources and does not include a delineation, functional and sensitivity assessment of estuarine systems.
» The WET Health methodology (Macfarlane *et al*., 2009) focuses on wetlands that are connected to the drainage network in some way, and it therefore excludes endorheic pans. The geomorphological component of any endorheic depression wetlands cannot be evaluated until a methodology exists for

this purpose. The geomorphological component of the Present Ecological State for any endorheic depression wetlands was therefore excluded.

- A WET-Health Level 2 assessment was undertaken for any wetlands directly affected by the proposed powerline route, whilst a Level 1 desktop assessment was undertaken for any wetlands within the regulated area of a watercourse (wetland) directly affected by the proposed pipeline route.
- The WET-Health assessment is limited to natural wetland systems. An assessment of the present ecological status of artificial systems was therefore not undertaken.
- The WET-EcoServices assessment is limited to natural inland palustrine wetland systems. An assessment of the wetland ecosystem services of artificial systems was therefore not undertaken.
- Use of database information for the desktop assessment included the National Freshwater Ecosystem Priority Areas (NFEPA, 2011) database. This database is a national scale database. Some smaller freshwater resources may therefore not be contained in the database. Furthermore, mainly permanently saturated wetlands and perennial rivers are included in the database. Therefore, wetlands with seasonal and temporary saturation cycles as well as ephemeral watercourses may not be included in the database. The fieldwork component was included in the assessment to identify any wetlands on the ground that may not be contained in the database information used, to address the aforementioned potential shortcomings where wetlands may not be included in the database information consulted.
- The delineation of any artificial drainage features was only undertaken for the parts of the network which are affected by the proposed pipeline. A full delineation of the drainage network is not included.

4. WETLAND DESKTOP ASSESSMENT

The results for the wetland desktop assessment are shown in **Figure 4.1** below. The findings are provided in the sections below.

4.1. National Level Database Information

4.1.1. National Freshwater Ecosystems Priority Areas (2011) Database

The National Freshwater Ecosystems Priority Areas (NFEPA) (2011) database is an outcome of a three-year partnership project between South African National Biodiversity Institute (SANBI), Council for Scientific and Industrial Research (CSIR), Water Research Commission (WRC), Department of Environmental Affairs (DEA), Department of Water Affairs (DWA), Worldwide Fund for Nature (WWF), South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks) (Nel *et al*. 2011). The NFEPA map products provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports sustainable use of water resources. The spatial priority areas are known as Freshwater Ecosystem Priority Areas (FEPAs).

FEPAs were identified based on:

- Representation of ecosystem types and flagship free-flowing rivers
- Maintenance of water supply areas in areas with high water yield
- Identification of connected ecosystems
- Representation of threatened and near-threatened fish species and associated migration corridors
- Preferential identification of FEPAs that overlapped with:
    - Any free-flowing river
    - Priority estuaries identified in the National Biodiversity Assessment 2011
    - Existing protected areas and focus areas for protected area expansion identified in the National Protected Area Expansion Strategy.

According to the NFEPA (2011) database, the proposed pipeline appears to route only through a singular wetland for the initial section of the pipeline at the Richards Bay Port Berths. This wetland is classified as an **Estuarine wetland** type, which is part of the same greater wetland system which extends all the way around the proposed pipeline area to the east and north west. The wetland is thus not considered a Wetland Freshwater Ecological Priority Area (FEPA). Wetland FEPAs are wetlands that are intended to stay in good condition to conserve freshwater ecosystems and protect water resources for human use. These are classified according to a number of criteria some of which include existing protected areas and focus areas for protected area expansions identified in the National Protected Areas Expansion Strategy (NPAES). As such, the wetland is not considered relevant in terms of the above NFEPA (2011) classification.

In terms of river ecosystems, the perennial **Mzingazi River can be found ~600 m to the east**, flowing in a southerly direction. The Mzingazi River, in terms of the present ecological state (PES) as of 1999, is a Class C: moderately modified system. There are **no rivers along the proposed pipeline route (as per NFEPA (2011) database)**. There are also **no rivers that are within the regulated area of a watercourse along the proposed pipeline (NFEPA, 2011)**, consequently all riverine assessments were excluded from the remainder of this report.

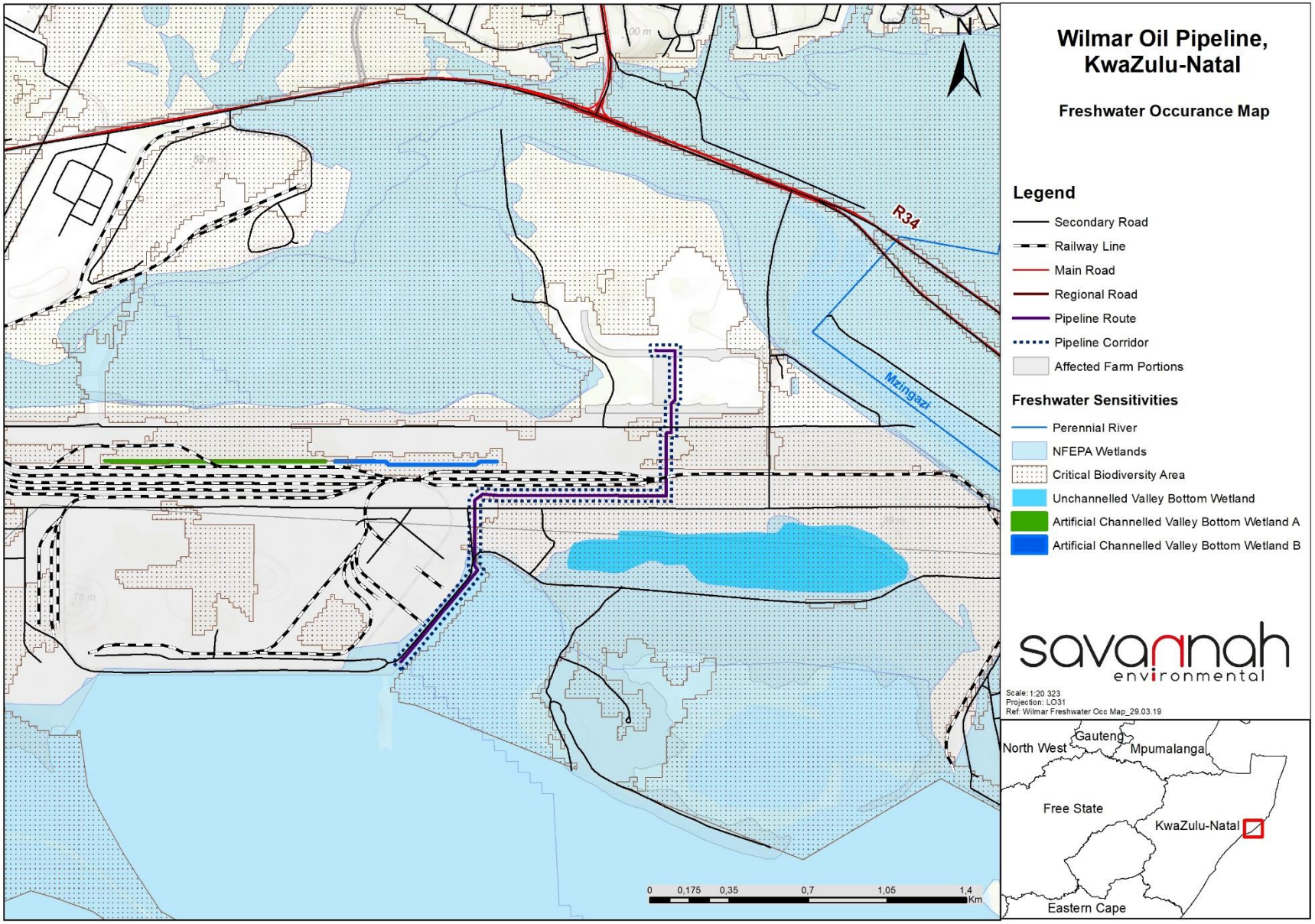

Figure 4.1: Wetland Desktop Occurrence Map

4.1.2. Vegetation Types (Mucina & Rutherford, 2006)

In terms of the vegetation characteristics, the site is within the Inland Azonal Biome according to Mucina & Rutherford, 2006. The specific vegetation type within this Biome is the Subtropical Freshwater Wetlands – AZf 6, which is described in detail below as adapted from Mucina and Rutherford (2006).

The distribution of this vegetation type can be found in the KwaZulu-Natal, Mpumalanga, Gauteng, North-West, Limpopo and Eastern Cape Provinces as well as in Swaziland. It includes wetlands embedded within the Albany Thicket Biome, the Coastal Belt from Transkei as far as Maputaland, as well as those of Lowveld and the Central Bushveld regions. This vegetation type occurs at altitudes ranging from 0–1 400 m (Mucina & Rutherford, 2006).

The landscape associated with this vegetation type can be described as flat topography, supporting low beds dominated by reeds, sedges and rushes, and waterlogged meadows dominated by grasses. The vegetation is found typically along edges of often seasonal pools in aeolian depressions, as well as fringing alluvial backwater pans or artificial dams (Mucina & Rutherford, 2006).

The soils are typically waterlogged, and clayey soils of Champagne and Arcadia forms, containing certain levels of decaying organic matter, especially in very productive reed beds. These wetlands are underlain mostly by Cenozoic alluvium, less so by Karoo Supergroup volcanic rocks and sediments, as well as by the Cretaceous (and younger coastal) sediments of the Zululand and Maputaland Groups. The waterlogged habitats with water, regularly form columns of variable depth. The highest water levels are found in summer, during periods of maximum seasonal rainfall (Mucina & Rutherford, 2006).

In terms of the conservation status of the vegetation type, it is Nationally listed as 'Least Threatened' (LC), with a conservation target of 24%. Some 40–50% is statutorily conserved in the Greater St Lucia Wetland Park (including RAMSAR sites such as St Lucia System, Kosi Bay System and Lake Sibaya), Kruger National Park, Ndumo Game Reserve, and Tembe Elephant Park as well as in Nhlabane, Nylsvley (RAMSAR site), Mkombo, Sileza and Richards Bay Nature Reserves. A further 10% enjoys protection in a number of private game farms and other reserves in the Limpopo, Mpumalanga and KwaZulu-Natal Provinces (Mucina & Rutherford, 2006).

4.1.3. National Biodiversity Assessment Database (2012)

No wetlands or rivers were identified along the proposed pipeline route, in terms of the National Biodiversity Assessment (2012) database.

4.2. Provincial Level Database Information

4.2.1. KwaZulu-Natal Biodiversity Sector Plan (2014)

The KwaZulu-Natal Biodiversity Sector Plan (KZNBSP) (2014) is a provincial level environmental database. The purpose of the KZNBSP (2014) is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. Therefore, at a regional level, the KZNBSP (2014) identifies Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) within the KwaZulu-Natal Province, based on a systematic biodiversity plan. The CBAs and ESAs encompass the terrestrial and aquatic features deemed critical for the conservation of biodiversity and ecosystem functioning.

According to the KZNBSP (2014), **a CBA area identified as irreplaceable, was identified covering approximately two-thirds of the proposed pipeline**. **No ESAs** were evident in terms of the database information.

The CBA area is defined as follows:

» Terrestrial Critical Biodiversity Area: Irreplaceable Area (Systematic Conservation Assessment – SCA) – the CBA is present over approximately half of the site. According to the KZNBSP (2014), this CBA represents the only locality for which conservation targets for one or more of the biodiversity features contained within can be achieved (i.e. there are no other alternative sites available).

4.3. Review of Existing Wetland Related Assessments

Two (2) wetland studies and one (1) ecological study have been undertaken fairly recently in the surrounding area (SiVEST, 2016). The wetland studies identified and delineated an **artificial channelled valley bottom wetland** (SiVEST, 2016) ~150m north of the proposed pipeline route, and an **un-channelled valley-bottom wetland** (SiVEST, 2016) ~150m further to the south of the proposed pipeline route (see Figure 4.1 above). The wetland areas are confirmed in the ecological study (SiVEST, 2016) which covers much of the Transnet National Port Authority associated with the Richards Bay harbour. The wetland delineation assessments and the ecological assessment do not however provide information on surrounding wetlands, and could not be used to confirm any other potential wetlands along the proposed pipeline route, despite the relatively close proximity of these sites to the proposed pipeline.

5. WETLAND DELINEATION AND ASSESSMENT FINDINGS

The wetland field investigation was undertaken on 18 September and 30 November 2018. Conditions were warm and sunny, with minimal cloud cover and little to no wind on both days. Surface water was visible within the artificial drainage channel at the time of the assessments. No other surface water was visible. The proposed pipeline route is predominantly transformed by the existence of the Richards Bay Port, roads and railway for approximately two-thirds of the length of the proposed pipeline. However, for the remaining section which routes through the Transnet Railyard North area and RB IDZ area, it is well vegetated but affected by roads, rail and stormwater drainage systems which intersect at right angles along the proposed pipeline at Newark Road, at the intersection of the single-track railway line, at an open un-lined artificial drainage channel, and finally at Silver Ocean Road.

The results of the wetland field investigation are shown in **Figure 5.1** and discussed in the sub-sections below.

5.1. Wetland Delineation Results

As several wetlands were identified directly along and within close proximity to the proposed pipeline route from a desktop level, a site investigation and delineation assessment was undertaken to visually inspect whether there were any additional possible wetlands not initially identified. The site investigation was also undertaken to confirm the type and extent of the wetlands identified at a desktop level that may be affected by the proposed pipeline route. The delineation assessment confirmed **one depression wetland** that was not identified in terms of the databases consulted at a desktop level, as well as an **unlined artificial drainage channel** as identified in the SiVEST (2016) studies, along the proposed pipeline route. The delineation results of the unlined artificial drainage channel by SiVEST (2016) were refined to cover the study area of this assessment more adequately.

In the regulated area of the watercourse (<500m) of the depression wetland to be directly affected by the proposed pipeline, the surrounding wetlands included the **estuarine wetland** to the south and north of the proposed pipeline route as per the NFEPA (2011) database, as well as the **unchanneled valley bottom wetland** as per the SiVEST (2016) assessment to the south of the proposed pipeline route. For a description and assessment of the indicators for the unchanneled valley bottom wetland, please refer to the SiVEST (2016) assessment. The field-verified wetland delineation results are shown in **Figure 5.1** below.

It must be noted however, that as the study area is fairly close to sea level, the groundwater level is relatively shallow. The soil assessment undertaken by Nhloso Land Resources (2019) states that the soils associated with a low water table and which are found along the proposed pipeline route can be classified as the Fernwood/Longlands soil forms. Furthermore, it is stated that the water table can be found at approximately 70cm depth (Nhloso Land Resources, 2019). The soils samples drawn from the Transnet Railyard North area around the proposed pipeline for the wetland delineation assessment, similarly revealed that wetland soils were close to the surface. However, the soils drawn from around the proposed pipeline within the corridor assessment area in the Railyard North area were not close enough to be defined as a wetland, as the necessary wetland mottling signatures were deeper than 50cm from the surface.

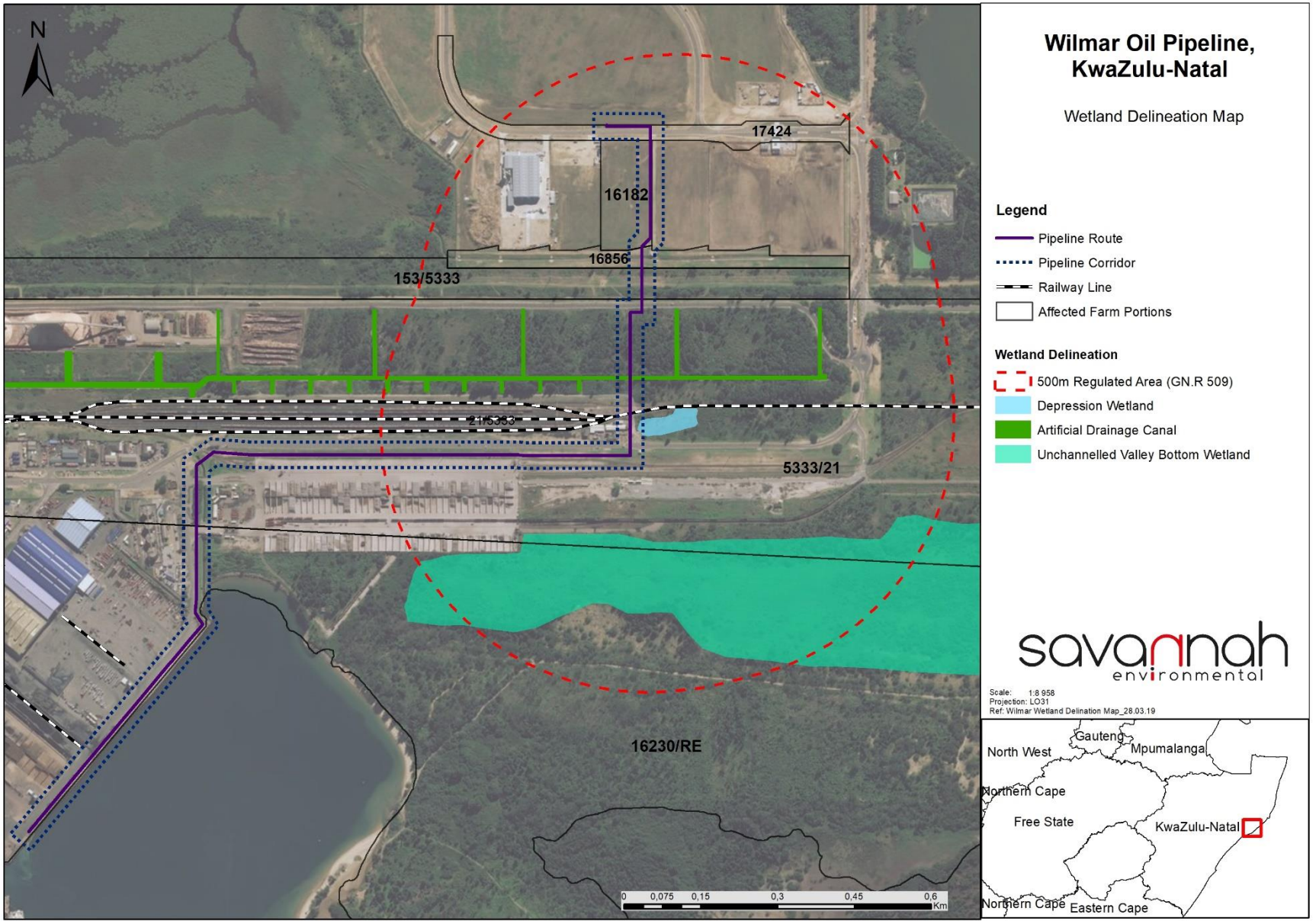

Figure 5.1: Wetland Delineation Map

5.1.1. Depression Wetland

5.1.1.1. Wetland Vegetation

The general description of the area associated with the identified depression wetland, according to the ecological assessment undertaken by Rautenbach Biodiversity Consulting (2018), is described as including impenetrable stands of *Osteospermum moniliferum* thickets, with climbers such as *Rhoicissus digitata*, *Tacazzea apiculata* and *Secomone filiformis* well established. Rautenbach Biodiversity Consulting (2018) additionally maintains that the tree layer was mostly composed of invasive species such as *Casuarina equisetifolia*, *Psydium guajava* and *Schinus terebinthifolius*, with a few scatted indigenous species such as *Brachylaena discolor* and *Searsia nebulosa* present. Apart from these general species that were noted, a number of species known to be associated with wetlands were identified which included a number of graminoid and sedge species. The graminoid species observed include *Phragmites australis* (ow), *Chloris gayana* (fw), *Imperata cylindrica* (fw), *Sporobolus africanus* (fw) and *Sporobolus pyramidalis* (fw) (**Photograph 5.1**). The sedge and rush species noted include *Cyperus congestus*, *C. fastigiatus*, *Juncus* sp. and *Schoenoplectus* sp.

Photograph 5.1: Isolated small patch of *P. australis* observed in the depression wetland in the area affected by historical excavation.

5.1.1.2. Wetland Terrain and Soils

The topography of the landscape is generally flat. The historical excavation activities evident on site have also influenced the formation of the wetland area, but the depression wetland soils could be found beyond the affected area. The wetland is therefore not viewed as an acritical wetland system. Accordingly, the soil samples taken to determine the extent of the wetland revealed an Orthic A horizon followed by a reduced E horizon overlying a soft plinthic B horizon (**Photographs 5.2**). The combination and order of the

soil layers indicate the Longlands Soil Form. According to the Munsell Soil Chart (Munsell Soil Chart, 2009), the hue, chroma and value of the soil samples taken from the E horizon were light gray (2.5Y/7/1). This soil form is associated with seasonally inundated wetlands. The depression wetland is therefore seasonally saturated.

Photographs 5.2: Reduced E horizon shown in a soil sample taken from the depression wetland (left); Mottling soil signatures evident in a soil sample which extended to the soft plinthic B horizon of the depression wetland.

5.1.2. Artificial Drainage Channel

5.1.2.1. Wetland Vegetation

The artificial drainage channel was characterised mainly by obligate wetland vegetation within the artificial V-shaped drainage channel. Given the low groundwater level and climate of the study area, it is not surprising that surface water may well be present for extended periods throughout the year long enough for permanent wetland vegetation to establish. The obligate vegetation species observed included *Cyperus prolifer*, *Typha capensis* and *P. australis* (**Photographs 5.3**). The change in vegetation composition along the

length of the artificial drainage channel is presumably a result of a combination of factors (competition, light, substrate etc.) of which one could include the change in the hydrological gradient from north to south, with denser assemblages of *T. capensis* south of the artificial drainage channel and loose *P. australis* assemblages north within the artificial drainage channel. Other facultative species were also present including mainly *I. cylindrica* along with dense mats of *Pennisetum clandestinum*.


Photographs 5.3: *C. prolifer* (left) and *T. capensis* (right) identified within the artificial drainage channel.

5.1.2.2. Wetland Terrain and Soils

The topography of the site is relatively flat, but drains in a south and westerly direction suggesting a slight slope in towards the south west. The geomorphological structure of the artificial drainage channel has been constructed to create a distinct V-channel, which comprises cement blocks along the walls of the channel. The drainage channel is not lined and porous allowing water to permeate through the soils unhindered. The network is however interrupted by concrete culverts at bend points within the network (**Photograph 5.4**). The artificial drainage channel is part of an extensive network for the greater Transnet Port Authority and related properties. There are two parts that are relevant to the proposed pipeline which include the section in the Transnet Railyard North area, as well as the artificial drainage channel which exits into the Richards Bay harbour area near the berths to the south of the proposed pipeline route. These areas can be seen in **Photographs 5.4** below and **Figure 5.1** above.


Photographs 5.4: Concrete culvert outlet from the artificial drainage channel linking into another channel within the greater drainage network (left); and the section of the artificial drainage channel exiting into the Richards Bay Port area (right).

The soil samples taken from the bed of the channel revealed a reduced E horizon (**Photograph 5.5**), indicating the Kroonstad soil form. According to the Munsell Soil Chart (Munsell Soil Chart, 2009), the hue,

chroma and value of the soil samples taken from the E horizon could be described as gray (5Y/6/1). This soil form is associated with seasonally inundated wetlands. The artificial drainage channel is therefore expected to be seasonally saturated.

Photographs 5.5: Bleached soils drawn from soil samples taken within the bed of the artificial drainage channel showing prolonged saturation.

5.2. Wetland Present Ecological State

The findings of the wetland present ecological state assessments are shown in **Table 5.1** below. A detailed description of the assessment is provided in the sub-sections below.

Table 5.1: Results of the WET-HEALTH present ecological state assessment

Wetland Name	Level of Assessment	Module	Impact Score	Category	Change Score	Change Description	Health Class
Depression Wetland	**Level 2**	**Hydrology**	6,5	E	-1,00	Slowly Deteriorate	E (Greatly modified)
		Geomorphology					
		Vegetation	2,9	C	-0,20	Remain Stable	C (Moderately modified)
		Overall Health Score for entire wetland	5,06	D	-0,6	Slowly Deteriorate	D (Largely modified)
Un-channelled Valley Bottom Wetland	**Level 1**	**Hydrology**	1	B	0,00	Remain Stable	B (Largely natural)
		Geomorphology	1,1	B	-1,00	Slowly Deteriorate	B (Largely natural)
		Vegetation	2,8	C	-1,00	Slowly Deteriorate	C (Moderately modified)

		Overall Health Score for entire wetland	1,54	B	-0,5	Slowly Deteriorate	B (Largely natural)

5.2.1. Depression Wetland

The depression wetland was assessed on the basis of the hydrological and vegetation components of the wetland. The combined health class was assessed to be a **Class D (largely modified) seasonal depression wetland system**.

The hydrological component was found to be affected most by the change in surface roughness in the current state when compared to the reference state of vegetation expected under natural conditions. The current state of the vegetation is mainly short grasses, whilst the reference stated is considered to consist of more robust vegetation species including reed, sedge and rush dominated wetlands, as can be typically expected for sub-tropical freshwater wetland types. In addition, another significant impact to the wetland hydrology is as a result of the excavation in the western area of the wetland. Excavation has exposed wetland soils, creating a deeper drainage area as could be expected for the wetland under natural conditions.

Overall, an impact score of 5,06 was assessed when combining the two components which resulted in the Class D rating. Importantly, the Class D rating is expected to slowly deteriorate over time increased transformation of the surrounding catchment and change in surface roughness.

5.2.2. Un-channelled Valley Bottom Wetland

The un-channelled valley bottom wetland was assessed on the basis of the hydrological, geomorphological and vegetation components of the wetland. The combined health class was assessed to be a **Class B (largely natural) seasonal un-channelled valley bottom wetland system**.

The hydrological component score was found to be affected by both reduction of flows due to alien vegetation present in the wetland, and offset by a perceived increase in flood peaks resulting in an overall small increase in water input characteristics. In terms of the geomorphological component, increased run-off due to the increase of hardened surfaces in the catchment, as well as deposition of materials (dumping) in the wetland was assessed to have affected the wetland, but also to a relatively minimal level. Lastly, the vegetation component scores reflected the knock-on effects of the impacts identified in the hydrological and geomorphological component of the wetland. Alien colonisation presumably due to disturbance and excavation were two factors to mainly influence the scoring of this component. There is was also small area of railway infrastructure present in the wetland detracting from the state of the vegetation of the wetland.

Overall, an impact score of 1,54 was assessed when combining the three components which resulted in the Class B rating. Importantly, the Class B rating for the wetland is **expected to slowly deteriorate** over time due to continued dumping and increased colonisation of alien vegetation.

5.3. Wetland Ecosystem Services

5.3.1. Depression Wetland

The potential wetland ecosystem services assessed to be provided by the depression wetland is shown in **Figure 5.2** below. As can be seen, the **ecosystem services which scored highest included sediment trapping, erosion control and flood attenuation**. The depression wetland therefore offers good potential for stormwater management in the area. There however, are a number of other potential wetland ecosystem services which the wetland can provide. These include biogeochemical cycling in the form of phosphate trapping and nitrate and toxicant removal, a relatively limited role in the maintenance of biodiversity in the landscape as well as streamflow regulation. In general, the depression wetland was not found to offer a high number of potential ecosystem services to a significant degree, owing mainly to the limit extent and degraded current state. Nonetheless, all wetlands have an important functional (albeit to a limited extent) and ecological role in the landscape of which the depression wetland is no different.

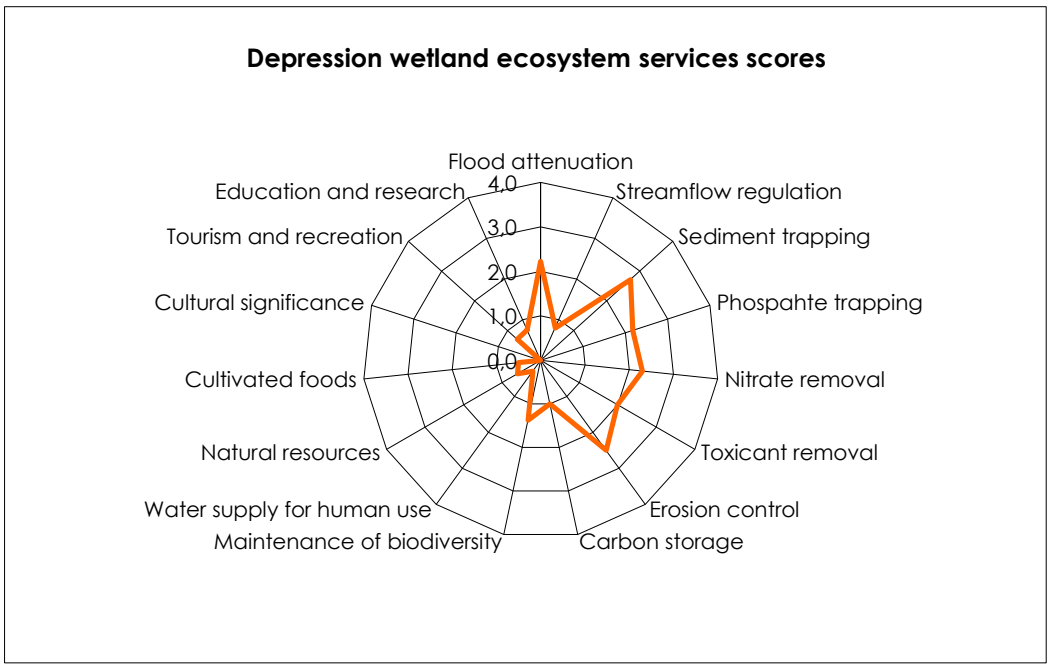

Figure 5.2: Potential Wetland Ecosystem Services for the Depression Wetland

5.3.2. Un-channelled Valley Bottom Wetland

The potential wetland ecosystem services assessed to be provided by the un-channelled valley bottom wetland is shown in **Figure 5.3** below. The **ecosystem services which scored highest included biogeochemical cycling (phosphate and nitrate / toxicant removal), sediment trapping, erosion control, streamflow regulation and flood attenuation**. The wetland therefore offers good potential for water purification and stormwater control in the area. There are also a number of other potential wetland ecosystem services which the wetland can provide. From an ecological perspective, these include maintenance of biodiversity and carbon storage. There is also a value in the wetland providing education and research opportunities as well as tourism and recreation potential. Overall, the wetland has a significant ecological role within the surrounding landscape.

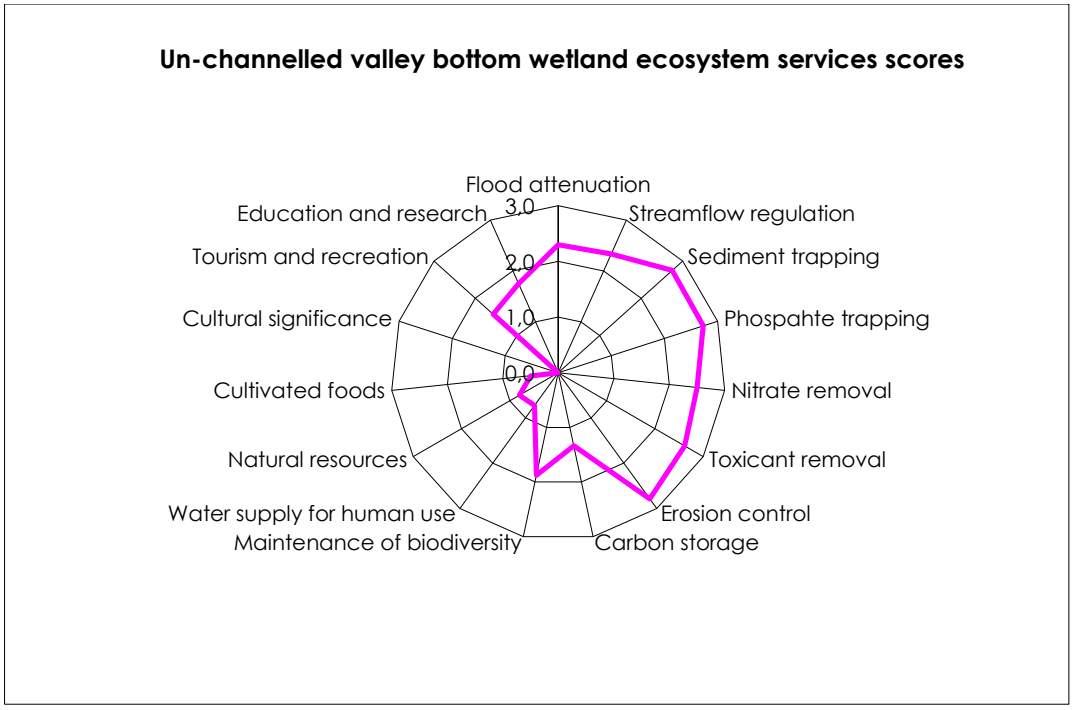

Figure 5.3: Potential Wetland Ecosystem Services for the Un-channelled Valley Bottom Wetland

5.4. Wetland Ecological Importance and Sensitivity (EIS)

The ecological importance and sensitivity (EIS) of the depression, un-channelled wetlands and the artificial drainage channel were assessed taking into account the various determinants of the wetland systems.

The results of the assessment are provided in **Table 5.2** below.

Considering the information below, the most important determinants that the depression wetland scored highest in was in terms of being ecologically sensitive as a result of change in the natural regime of the hydrological component. This was followed by moderately scores for the potential occurrence of red data list species, populations of unique species and species / taxon richness. Despite the diminutive extent of the wetland, the vegetation species present are fairly diverse and some species have a chance of occurrence when the wetland is inundated. The wetland is also situated within an area defined as a Critical Biodiversity Area (CBA) according to the KZNBSP (2014), which contributed to assigning a score of moderate for protected status of wetland. All other determinants however scored low. Overall, the EIS of the wetland was assessed to be a **Class C system** which is considered to be moderately ecologically important and sensitive on a provincial or local scale.

With regards to the unchanneled valley bottom wetland, a number of the determinants scored high. The wetland is substantially bigger than the depression wetland, has an extent of open water and is more secluded from the Transnet Railyard operations. The wetland is therefore able to provide a sizeable area for habitat and exclusivity to sensitive species as identified in **Table 5.2** below, and therefore has a greater chance of occurrence for these sensitive species. In addition to this, the wetland was assessed to be in a fairly decent present ecological state (Class B largely natural system) as per the assessment in **Section 5.2.2**. Overall, the EIS of the wetland was assessed to be a **Class B system** which is considered to be highly ecologically important and sensitive.

Table 5.2: Depression, Un-channelled Valley Bottom and Artificial Drainage Channel Ecological Importance and Sensitivity Results

Wetland Name	**Depression Wetland**		**Reason**	**Un-channelled Valley Bottom Wetland**		**Reason**	**Artificial Drainage Channel**		**Reason**
Determinant	**Score**	**Confidence**		**Score**	**Confidence**		**Score**	**Confidence**	
Primary Determinants									
1. Rare & Endangered Species	2	3	From an avifaunal perspective, according to the SiVEST (2016) study, various stork species (Black Stork - *Ciconia nigra*, Woolly-necked Stork – *Ciconia episcopus*, African Openbill – *Anastomas lemelligerus*, Saddle-billed Stork – *Ephippiorhynchus senegalensis*, and the Yellow-billed Stork – *Mycteria ibis*) could make use of the various vegetation units associated with open wetland areas, and large freshwater bodies. Moreover, it was stated that various eagle species (specifically the African Fish-Eagle - *Haliaeetus vocifer*) are also likely to hunt over the site (2016). Finally, it was also stated that the various other species that may make use of the waterbodies and wetlands on the site, include the African Marsh Harrier – *Circus ranivorus*, the Greater Painted Snipe – *Rostratula benghalensis*, White-faced Duck – *Dendrocygna viduata*, African Pygmy Goose – *Nettapus auritus*, African Finfoot – *Podica senegalensis*, Lesser Jacana – *Microparra capensis*, and the Greater and Lesser Flamingos. These are all species of conservation concern which have a fair likelihood of occurrence in the area. From a floristic perspective, indigenous trees/shrubs were limited to a few scattered specimens such as *Ficus sur*, *Brachylaena discolor* and *Searsia nebulosa* according to Rautenbach Biodiversity Consulting (2019). Furthermore, it was found that no Red Listed floral species were found on the site mainly due to the transformed and degraded nature of the vegetation (Rautenbach Biodiversity Consulting, 2019). It was	3	3	From an avifaunal perspective, according to the SiVEST (2016) study, various stork species (Black Stork - *Ciconia nigra*, Woolly-necked Stork – *Ciconia episcopus*, African Openbill – *Anastomas lemelligerus*, Saddle-billed Stork – *Ephippiorhynchus senegalensis*, and the Yellow-billed Stork – *Mycteria ibis*) could make use of the various vegetation units associated with open wetland areas, and large freshwater bodies. Moreover, it was stated that various eagle species (specifically the African Fish-Eagle - *Haliaeetus vocifer*) are also likely to hunt over the site (2016). Finally, it was also stated that the various other species that may make use of the waterbodies and wetlands on the site, include the African Marsh Harrier – *Circus ranivorus*, the Greater Painted Snipe – *Rostratula benghalensis*, White-faced Duck – *Dendrocygna viduata*, African Pygmy Goose – *Nettapus auritus*, African Finfoot – *Podica senegalensis*, Lesser Jacana – *Microparra capensis*, and the Greater and Lesser Flamingos. These are all species of conservation concern which have a fair likelihood of occurrence in the area. From a floristic perspective, indigenous trees/shrubs were limited to a few scattered specimens such as *Ficus sur*, *Brachylaena discolor* and *Searsia nebulosa* according to Rautenbach Biodiversity Consulting (2019). Furthermore, it was found that no Red Listed floral species were found on the site mainly due to the transformed and degraded nature of the vegetation (Rautenbach Biodiversity Consulting, 2019). It was	2	3	From an avifaunal perspective, according to the SiVEST (2016) study, various stork species (Black Stork - *Ciconia nigra*, Woolly-necked Stork – *Ciconia episcopus*, African Openbill – *Anastomas lemelligerus*, Saddle-billed Stork – *Ephippiorhynchus senegalensis*, and the Yellow-billed Stork – *Mycteria ibis*) could make use of the various vegetation units associated with open wetland areas, and large freshwater bodies. Moreover, it was stated that various eagle species (specifically the African Fish-Eagle - *Haliaeetus vocifer*) are also likely to hunt over the site (2016). Finally, it was also stated that the various other species that may make use of the waterbodies and wetlands on the site, include the African Marsh Harrier – *Circus ranivorus*, the Greater Painted Snipe – *Rostratula benghalensis*, White-faced Duck – *Dendrocygna viduata*, African Pygmy Goose – *Nettapus auritus*, African Finfoot – *Podica senegalensis*, Lesser Jacana – *Microparra capensis*, and the Greater and Lesser Flamingos. These are all species of conservation concern which have a fair likelihood of occurrence in the area. From a floristic perspective, indigenous trees/shrubs were limited to a few scattered specimens such as *Ficus sur*, *Brachylaena discolor* and *Searsia nebulosa* according to Rautenbach Biodiversity Consulting (2019). Furthermore, it was found that no Red Listed floral species were found on the site mainly due to the transformed and degraded nature of the vegetation (Rautenbach Biodiversity Consulting, 2019). It was therefore stated that it is unlikely for most of these species to be present (Rautenbach Biodiversity Consulting, 2019). Frog habitats were limited to the

			therefore stated that it is unlikely for most of these species to be present (Rautenbach Biodiversity Consulting, 2019). Frog habitats were limited to the grassland and the canal, and may provide limited habitat to frog species such as toads and puddle frogs. Overall, Rautenbach Biodiversity Consulting (2019) maintains that the following species of conservation significance have a likelihood of being present - Mammals: African Striped Weasel *Poecilogale albinucha*; Reptiles: Eastern long-tailed seps *Tetradactylus africanus*, Olive house snake *Lycodonomorphus inornatus*; Frogs: Bush squeaker *Arthroleptis wahlbergi*, Spotted Shovel-nosed Frog *Hemisus guttatus*.			therefore stated that it is unlikely for most of these species to be present (Rautenbach Biodiversity Consulting, 2019). Frog habitats were limited to the grassland and the canal, and may provide limited habitat to frog species such as toads and puddle frogs. Overall, Rautenbach Biodiversity Consulting (2019) maintains that the following species of conservation significance have a likelihood of being present - Mammals: African Striped Weasel *Poecilogale albinucha*; Reptiles: Eastern long-tailed seps *Tetradactylus africanus*, Olive house snake *Lycodonomorphus inornatus*; Frogs: Bush squeaker *Arthroleptis wahlbergi*, Spotted Shovel-nosed Frog *Hemisus guttatus*.			grassland and the canal, and may provide limited habitat to frog species such as toads and puddle frogs. Overall, Rautenbach Biodiversity Consulting (2019) maintains that the following species of conservation significance have a likelihood of being present - Mammals: African Striped Weasel *Poecilogale albinucha*; Reptiles: Eastern long-tailed seps *Tetradactylus africanus*, Olive house snake *Lycodonomorphus inornatus*; Frogs: Bush squeaker *Arthroleptis wahlbergi*, Spotted Shovel-nosed Frog *Hemisus guttatus*.	
2. Populations of Unique Species	2	3	See above.	3	3	See above.	2	3	See above.	
3. Species/taxon Richness	2	4	Species and taxon richness is relatively moderate in terms of hydrophytic floral species with a variety of hydrophytic grasses, reeds and rushes.	2	4	Species and taxon richness is relatively moderate in terms of hydrophytic floral species with a variety of hydrophytic grasses, reeds and rushes.	1	4	Species and taxon richness is relatively low given the dominance of either *T. apensis* or *P. australis* present.	
4. Diversity of Habitat Types or Features	1	4	The diversity of habitat types provided by the wetland and surrounding landscape is limited.	2	4	The diversity of habitat types provided by the wetland and surrounding landscape is moderate.	1	4	The diversity of habitat types provided by the wetland and surrounding landscape is limited.	
5. Migration route/breeding and feeding site for wetland species	1	3	The depression wetland is likely to be an important breeding and feeding site for amphibians and waterfowl as noted above, but this is limited given the degree of disturbance within the Transnet Railyard area.	3	3	The un-channelled valley bottom wetland is likely to be an important migration, breeding and feeding site for amphibians and waterfowl as noted above, due to the extent of the wetland and buffer area from the Transnet Railyard area.	1	3	The artificial drainage channel is likely to be an important breeding and feeding site for amphibians and potentially waterfowl as noted above, but this is limited given the degree of disturbance within the Transnet Railyard area.	
6. Sensitivity to Changes in the Natural Hydrological Regime	3	3	The seasonal nature of the wetland means that the wetland will be fairly sensitive to further reductions and changes in the natural hydrological regime. The floral species that make up the vegetation component is likely to transition to more terrestrial species with reduction of water supply.	3	3	The seasonal nature of the wetland means that the wetland will be fairly sensitive to further reductions and changes in the natural hydrological regime. The floral species that make up the vegetation component is likely to transition to more terrestrial species with reduction of water supply. The opportunity for further colonisation of alien species is also a possibility for this wetland.	1	3	The system is an artificial system. It functions with directed stormwater flows through it. It is therefore not deemed to be sensitive to changes in the hydrological regime.	
7. Sensitivity to Water Quality Changes	1	3	The wetland currently acts as sediments sink and therefore is typically associated with relatively high sediment loads. The wetland is not deemed to be sensitive to changes in water quality as it currently accommodates stormwater	1	3	The wetland currently acts as sediments sink and therefore is typically associated with relatively high sediment loads from the surrounding area. The wetland is not considered to be sensitive to changes in water quality.	1	3	The artificial drainage channel currently operates to accommodate stormwater flows and sediment loads from the Transnet Railyard North and surrounding area. This artifical drainage channel is therefore not deemed to be sensitive to changes in water quality.	

			flows from within the Transnet Railyard North area.							
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	1	3	One of the main potential functions of the wetlands is the ability to perform a functional role in terms of sediment trapping and erosion control. In this regard, the wetland is however considered of low significance in terms of the role the wetland performs in the greater landscape given the relatively limited extent of the system.	3	3	One of the main potential functions of the wetlands is the ability to perform a functional role in terms of biogeochemical cycling, streamflow regulation, sediment trapping and erosion control. In this regard, the wetland is significant in terms of the role the wetland performs in the greater landscape.	2	3	One of the main potential functions of the wetlands is the ability to perform a functional role in terms of sediment trapping, erosion control, flood attenuation and streamflow regulation. In this regard, the artificial drainage channel is moderately significant in terms of the role the it performs in the greater landscape.	
Modifying Determinants										
9. Protected Status	2	4	The wetland is within a Critical Biodiversity Area (CBA) according to the KwaZulu-Natal Biodiversity Sector Plan (KZNBSP) (2014). However, the wetland vegetation type is considered to be Least Threatened. Based on this information, the wetland is considered to be moderately protected.	2	4	The wetland is within a Critical Biodiversity Area (CBA) according to the KwaZulu-Natal Biodiversity Sector Plan (KZNBSP) (2014). However, the wetland vegetation type is considered to be Least Threatened. Based on this information, the wetland is considered to be moderately protected.	2	4	The artificial drainage channel is partially within a Critical Biodiversity Area (CBA) according to the KwaZulu-Natal Biodiversity Sector Plan (KZNBSP) (2014). However, the wetland vegetation type is considered to be Least Threatened. Based on this information, the artificial drainage channel is considered to be moderately protected.	
10. Ecological Integrity	1	4	The overall PES of the wetland was assessed to be a Class D (largely modified) system. The ecological integrity is therefore considered to be low.	3	2	The overall desktop PES of the wetland was assessed to be a Class B (largely natural) system. The ecological integrity is therefore considered to be moderately high. The confidence of this assessment is limited since a desktop level assessment was undertaken to determine the PES.	2	4	The artificial drainage channel is an artificial system. Despite this, wetland vegetation growth has taken place albeit with limited diversity and species taxon richness. The overall integrity was determined to be moderate based on visual observation of the state of the system.	
TOTAL	16	34		25	32		15	34		
MEDIAN	1,6	3,4		2,5	3,2		1,5	3,4		
OVERALL ECOLOGICAL SENSITIVITY AND IMPORTANCE	**C**		**The wetland is considered to be ecologically important and sensitive on a provincial or local scale. Biodiversity is not usually sensitive to flow and habitat modifications (i.e. wetlands play a small role in moderating water quantity and quality).**	**B**		**The wetland is considered to be ecologically important and sensitive. Biodiversity is usually very sensitive to flow and habitat modifications (i.e. play a role in moderating water quality and quantity).**	**C**		**The wetland is considered to be ecologically important and sensitive on a provincial or local scale. Biodiversity is not usually sensitive to flow and habitat modifications (i.e. wetlands play a small role in moderating water quantity and quality).**	

The artificial drainage channel has a level of significance primarily due to the location of a portion of the system in a CBA, and the due to the occurrence of other wetland systems in the area which may bring species of conservation concern into the artificially created habitat. The artificial wetland overall does not offer much diversity in species / taxon richness nor ecological functionality with the exception of the primary function to handle stormwater flows for the property. As such, the EIS of the wetland was assessed to be a **Class C system** which is considered to be moderately ecologically important and sensitive.

6. IMPACT ASSESSMENT

The potential impacts to wetland resources that are anticipated to be associated with the proposed development, are identified and assessed in this section.

6.1. Potential Impacts

The assessment of the potential impacts was undertaken using the Savannah impact assessment methodology (see **Section 3.9**), which includes the stipulation of appropriate mitigation measures for the relevant phases of the proposed development. The anticipated impacts are provided below. **Please note:** a small portion (~8m) of the depression wetland falls within the proposed pipeline servitude, however following redesign efforts the pipeline route is now approximately 15m west of the closest boundary of the depression wetland and subsequently no direct impacts on the depression wetland is anticipated. In addition, selective placement of the support structures means no direct impacts on the artificial drainage channel is expected, as these structures will span the feature and thus not be located within the artificial drainage channel itself.

6.1.1. Potential Impacts to the Hydrology and Geomorphology of the Depression Wetland and Artificial Drainage Channel (Construction Phase)

Direct potential impacts to the depression wetland and artificial drainage channel are not expected as the proposed pipeline will span the channel and avoid the wetland following redesign and routing efforts, and as such no mounting or piling structures will be placed directly within the depression wetland and artificial drainage channel. In addition, the revised layout routes the proposed pipeline approximately 15m west of the nearest boundary of the depression wetland. Furthermore, no direct or indirect potential impacts are expected for the nearby un-channelled valley bottom wetland since there are a number of physical barriers (road infrastructure) which already fragment the proposed pipeline from the catchment of the un-channelled valley bottom wetland, and thus create a hydraulic barrier.

Minimal potential impacts to the hydrology and geomorphology of the depression wetland and artificial drainage channel however, may occur due to the construction works adjacent the depression wetland. Minor excavation during construction for the mounting and piling structures of the proposed pipeline sections in the vicinity of the depression wetland and artificial drainage channel, may increase sediment availability and potential drainage via run-off into the natural and artificial wetland systems where rains occur. The rating and significance related to the potential hydrological and geomorphological impacts is shown in **Table 6.1** below.

Table 6.1: Potential impacts associated with hydrological and geomorphological impacts in the depression wetland and artificial drainage channel.

Nature: There is a small potential for additional sediment loads to enter the depression wetland and artificial drainage channel from the excavated soils taken from the areas where the mounting structures are proposed. The sediment can enter the wetlands via surface run-off after rain events.		
	Without mitigation	**With mitigation**
Extent	Local area (2)	Immediate site (1)
Duration	Very short-term (1)	Very short-term (1)

Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**21 (Low)**	**8 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

- Mounting structures are to be monitored post-construction for erosion and subsidence around the depression wetland and artificial drainage channel once every year for a period of two (2) years post-construction by an appropriate agent to check on the structural integrity of the structures.
- No soil stockpiles are to be placed directly within, or within 15m, of the depression wetland or the artificial drainage channel.
- All soil stockpiles within 15m of the depression wetland and the artificial drainage channel are to be adequately bunded to ensure that no sediment enters the wetlands via surface run-off. Bunding can take the form of stacked bricks or wooden planks fixed with pegs surrounding the stockpiles.
- Soil stockpiles are to be removed as soon as possible to limit disturbance. Removed soils can be re-used (where appropriate) for levelling during the construction phase or rehabilitating other areas post-construction, or can be disposed of at a suitable and registered landfill site that has sufficient capacity to assimilate the waste.
- No mounting or piling structures are to be placed directly in the wetland or drainage channels.
- The proposed pipeline must avoid the depression wetland completely (as per the current updated layout).
- Vegetation clearance in general must also be limited as far as possible. No clearance is to be undertaken in adjacent areas, particularly the wetland and drainage line channels.
- No laydown of material, machinery, stockpiles or any other construction equipment may be allowed within the demarcated depression wetland footprint.
- The existing access road and associated bare turning area is to be utilised as far as possible during construction of any support structures near the depression wetland.
- The depression wetland must be demarcated with tape or other similar markers and no worker movement is allowed in the wetland for construction of the proposed pipeline. Worker movement in the drainage channel must be limited as far as possible to minimise disturbance.
- In general, movement of workers must be limited to the servitude / right of way of the proposed pipeline. Workers are not allowed to wonder freely into the surrounding areas, particularly the wetland and drainage channel.
- No vehicles or machinery are allowed in the depression wetland or artificial drainage channel.
- Construction of the proposed pipeline must take place as far as possible in the winter months (April/May to August/September) as these are the drier months in which rainfall is likely to be limited.
- An alien invasive eradication and control management programme must be compiled to manage encroachment of alien species within the wetland and along the entire proposed pipeline. However, it may be required that an alien invasive and control management programme is to be compiled to manage the greater Transnet Railyard North area, as

encroachment is likely from the adjacent areas around the proposed pipeline route. It is likely that there is an existing management plan / programme being implemented by Transnet for the Railyard North Section that can be used and updated to include management of the alien invasive management in the wetland and drainage channel. Importantly, the alien invasive monitoring and control management programme is also to be implemented post-construction for approximately two to five years to ensure alien invasives do not encroach following construction. Should there be an existing management plan, this component should be added to this specifically. Post-construction alien invasive eradication and control management is to be advised by the relevant monitoring agent on a yearly basis, who will monitor the success of the programme and will either identify further management measures or advise whether the control programme has been successful.
Cumulative impacts:
No cumulative impacts.
Residual Impacts:
No residual Impacts after implementation of mitigation measures.

6.1.2. Potential Impacts to the Water Quality of the Depression Wetland and the Artificial Drainage Channel (Construction Phase)

The potential for impacts on the water quality of the wetlands include the possible contamination of water quality as a result of leaks and spillages of oils and fuels directly from construction vehicles working nearby or where hazardous substances and liquids are stored within or near the wetland and artificial drainage channel. There is also the possibility of chemical contamination from any temporary chemical toilets that are placed within or close to the wetland and artificial drainage channel during construction. The rating and significance related to possible water quality impacts is shown in **Table 6.2** below.

Table 6.2: Potential impacts to the water quality of the wetland and artificial drainage channel.

Nature: Water contamination from temporary chemical toilets and due to vehicle oil and fuel leakages, storage of hazardous materials and liquids near the wetland and artificial drainage channel.		
	Without mitigation	**With mitigation**
Extent	Local area (2)	Immediate site (1)
Duration	Short-term (2)	Very short-term (1)
Magnitude	Moderate (6)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	**30 (Medium)**	**8 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » No fuels, oils or any other hazardous materials are to be brought into the wetland and artificial drainage channel or stored within 100m from the edge of the wetland and artificial drainage channel.		

» No vehicles are allowed within the wetland or drainage channel or are allowed to enter or cross through the wetland and drainage channel at any point. » Temporary chemical sanitation facilities must be not be placed in the wetland and artificial drainage channel. Rather these will need to be placed at least 100m away. Temporary chemical sanitation facilities must also be checked regularly for maintenance purposes and cleaned often to prevent spills.
Cumulative impacts: No cumulative impacts.
Residual Impacts: No residual Impacts after implementation of mitigation measures.

6.2. Cumulative Impacts

The assessment of cumulative impacts was undertaken in consideration of the type of developments which infrastructure, and for which cumulative impacts can be identified that are anticipated to affect wetlands in the region. This mainly relates to industrial and infrastructure projects arsing in the region as a result of the development of the RB IDZ and the further expansion of the Transnet Railyard. As the industrial and infrastructure developments vary, the general cumulative impact of concern is the degradation and loss of wetlands in the region as a result of such developments. Industrial and infrastructure encroachment is taking place in the area and it is therefore critical that any wetlands are identified and avoided by development as far as possible. The rating and significance related to possible cumulative impacts is shown in **Table 6.33** below.

Table 6.3: Potential cumulative impacts to the wetlands.

Nature: Direct impacts causing degradation and loss of wetlands in the region due to encroachment. Indirect impacts due to catchment level transformation resulting in altered flows and increased flood peaks.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Immediate site (1)	Regional (3)
Duration	Short-term (2)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**27 (Low)**	**33 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	Yes
Confidence in findings	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: » Wetlands are to be completely avoided as far as possible when planning industrial and infrastructure projects. » Provision must be made for ecological corridors between wetlands as far as possible to maintain ecological connectivity.		

» Where wetlands cannot be avoided and no other option is available, suitable wetland offsets must be implemented where approved by the relevant authorities.
Residual Impacts:
No residual Impacts after implementation of mitigation measures.

7. RECOMMENDATIONS

With consideration of the condition and functionality of the wetlands and artificial drainage channel identified, and the potential impacts expected to as a result of the proposed pipeline, the following recommendations are proposed from a wetland perspective:

- Alien invasive eradication and control management plan is to be compiled for the construction and post-construction phases by a suitably qualified ecological specialist, or where an existing plan is available, that this is updated to include management of the wetland and artificial drainage channel;
- Construction phase monitoring must include inspection of the depression wetland and the artificial drainage channel to monitor the general condition and to ensure that no direct impact occurs.
- Post-construction phase monitoring is to be undertaken as advised in **Section 6.1.1** and **Section 6.1.2** above.
- As the proposed pipeline will be within 32m of the wetlands, Listing Notice 1 Activity 12 must be applied for in order to obtain Environmental Authorisation from the KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) prior to construction. Where other similar listed activities are found to be triggered in terms of wetlands, these must also be included in the application for Environmental Authorisation.
- As the proposed pipeline is within 500m of a wetland, a risk assessment is to be undertaken in accordance with Government Notice Regulation 509 of 2016 for the proposed pipeline to obtain the necessary authorisation from the Department of Water and Sanitation (DWS), prior to construction. This is to be undertaken to determine the need for appropriate water use authorisation in consultation with the DWS.

8. CONCLUSION

This wetland delineation and impact assessment report focused on providing an assessment of the wetlands to be affected along the proposed vegetable oil pipeline in Richards Bay, KwaZulu-Natal Province. Following revision of the proposed pipeline route to avoid wetland features, the updated layout rerouted the proposed pipeline to pass approximately 15m west of the depression wetland identified, although ~8m of the depression wetland boundary still remained within the 50m pipeline servitude.

From a desktop perspective, the proposed pipeline appeared to affect an **estuarine wetland**, an **artificial channelled valley bottom wetland**, and an **un-channelled valley-bottom wetland**. It was also identified at a desktop level that **a CBA area (irreplaceable), covers approximately two-thirds of the proposed pipeline** in terms of the KZN Biodiversity Sector Plan database (2014). The in-field delineation assessment was undertaken to verify all the identified desktop wetlands, and undertake further assessments where required.

The in-field delineation assessment confirmed **one depression wetland** as well as the **unlined artificial drainage channel**[5], along the proposed pipeline route. The depression wetland was not identified in the databases consulted at a desktop level. In the regulated area (<500m) of the depression wetland, the surrounding wetlands identified included the **estuarine wetland** to the south and north of the proposed pipeline route as per the NFEPA (2011) database, as well as the **unchanneled valley bottom wetland** as per the SiVEST (2016) assessment to the south. This assessment was however limited to inland freshwater systems however, and focused on the depression wetland, artificial drainage channel and un-channelled valley bottom wetland (where applicable) accordingly.

The present ecological state of the depression wetland was assessed to be a **Class D (largely modified) seasonal depression wetland system**. The wetland was found to be affected most by the change in surface roughness and excavation in the western area of the wetland. Overall, an impact score of 5,06 was assessed which resulted in the Class D rating. The Class D rating is expected to slowly deteriorate over time with increased transformation of the surrounding catchment and change in surface roughness. For the un-channelled valley bottom wetland, the present ecological state was assessed to be a **Class B (largely natural) seasonal un-channelled valley bottom wetland system**. The wetland was found to be minimally affected by a number of influences which included reduction of flows due to alien vegetation present in the wetland, an increase in flood peaks, increased run-off due to the increase of hardened surfaces in the catchment, deposition of materials (dumping) in the wetland and alien colonisation. Overall, an impact score of 1,54 was assessed which resulted in the Class B rating. The Class B rating for the wetland is expected to slowly deteriorate over time due to continued dumping and increased colonisation of alien vegetation.

The potential wetland ecosystem services assessed which scored highest for the depression wetland included **sediment trapping, erosion control and flood attenuation**. The depression wetland therefore offers good potential for stormwater management in the area. In general, the depression wetland was not found to offer a high number of potential ecosystem services to a significant degree, owing mainly to the limited extent and degraded current state of the wetland. The potential wetland ecosystem services assessed to be provided by the un-channelled valley bottom wetland which scored highest included **biogeochemical**

[5] Note that no present ecological state or wetland ecosystem services assessments were applied to the artificial drainage channel as this is an artificial wetland system for which the aforementioned methodologies are not applicable, and no alternative methodologies may be applied in South Africa

cycling (phosphate and nitrate / toxicant removal), sediment trapping, erosion control, streamflow regulation and flood attenuation. The wetland therefore offers good potential for water purification and stormwater control in the area. Overall, the wetland has a significant ecological role within the surrounding landscape.

The most important determinant that the depression wetland scored highest, in terms of ecological importance and sensitivity, was for being ecologically sensitive to change in the natural regime of the hydrology of the wetland. Despite the diminutive extent of the wetland, the vegetation species present are fairly diverse and some species have a chance of occurrence when the wetland is inundated. Overall, the ecological importance and sensitivity of the **depression wetland was assessed to be a Class C system** which is considered to be moderately ecologically important and sensitive on a provincial or local scale. With regards to the un-channelled valley bottom wetland, a number of the determinants scored high. The wetland provides a relatively sizeable area for habitat and exclusivity to sensitive species, and therefore has a greater chance of occurrence for these sensitive species. Overall, the ecological importance and sensitivity of the **un-channelled valley bottom wetland was assessed to be a Class B system** which is considered to be highly ecologically important and sensitive.

No buffer zone was recommended since the proposed development will include the construction of linear feature that can avoid the wetland and span the artificial drainage channel. A buffer zone was therefore deemed to be impractical and ineffective as the proposed pipeline can avoid the wetlands and span the artificial drainage channel without affecting it directly.

An impact assessment was undertaken to identify potential impacts associated with the proposed development. It was determined that the potential impacts of the project were limited to impacts during the construction phase, **and limited only to the depression wetland and the artificial drainage channel**, and thus not the other wetlands identified. The potential impacts included impacts to hydrology and geomorphology (pre-mitigation significance rating – 21 (Low); **post-mitigation measure rating – 8 (Low)**) and water quality (pre-mitigation significance rating – 30 (Medium); **post-mitigation measure rating – 8 (Low)**). Cumulative impacts were also assessed which focused on the cumulative degradation and loss of wetlands as a result of development pressure in the region due to industrial and infrastructure projects earmarked for future development generally in the area. The impact rating for cumulative impacts was 33 (Medium) in conjunction with other projects in the broader study area, whilst the **impact rating in isolation was rated as 27 (Low)**.

Several specialist recommendations were proposed which include the following:

- Alien invasive eradication and control management plan is to be compiled for the construction and post-construction phases by a suitably qualified ecological specialist, or where an existing plan is available, that this is updated to include management of the wetland and artificial drainage channel;
- Construction phase monitoring must cover inspection of the depression wetland and the artificial drainage channel to monitor the general condition and to ensure that no direct impact occurs.
- Post-construction phase monitoring is to be undertaken as advised in **Section 6.1.1** and **Section 6.1.2** above.
- As the proposed pipeline will be within 32m of the wetlands, Listing Notice 1 Activity 12 must be applied for in order to obtain Environmental Authorisation from the KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) prior to construction. Where other similar listed activities are found to be triggered in terms of wetlands, these must also be included in the application for Environmental Authorisation.

» As the proposed pipeline will be within 500m of a wetland, a risk assessment is to be undertaken in accordance with Government Notice Regulation 509 of 2016 for the proposed pipeline to obtain the necessary authorisation from the Department of Water and Sanitation (DWS), prior to construction. This is to be undertaken to determine the need for appropriate water use authorisation in consultation with the DWS.

Ultimately, the proposed development was assessed to have a low negative impact on the identified affected wetlands and artificial drainage channel with the implementation of control / mitigation measures. **The proposed development is therefore supported, and should be allowed to proceed on condition of the implementation of the mitigation measures and recommendations proposed, and where the relevant environmental authorisation is obtained from KZN EDTEA and the relevant water use license or general authorisation is obtained from DWS.**

9. REFERENCES

Collins, N. B. 2005. Wetlands: The basics and some more. Free State Department of Tourism, Environmental and Economic Affairs.

Department of Water Affairs and Forestry (DWAF). 2005. A practical field procedure for identification and delineation of wetlands and riparian areas (edition 1). DWAF, Pretoria.

Department of Water Affairs and Forestry (DWAF). 2008. Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas, prepared by M., Rountree, A. L. Batchelor, J. Mackenzie and D. Hoare. Report No. XXXXXXXXX. Streamflow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.

Mucina, L & Rutherford, M. C., 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, South African National Biodiversity Institute, Pretoria.

Nel, J. L., Murray, K. M., Maherry, A. M., Peterson, C. P., Roux, D. J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swartz, E. R., Smith-Adao, L. B., Mbona, N., Downsborough, L & Nienaber, S. 2011: Technical Report for the National Freshwater Ecosystem Priority Areas project. Water Research Commission Report No. 1801/2/11. Water Research Commission.

Nhloso Land Resources (Pty) Ltd. (2019). Agricultural land capability assessment for the proposed Wilmar Oil Pipeline near Richards Bay, Kwa-Zulu Natal Province, South Africa.

Ollis, D. J., Snaddon, C. D., Job, N. M & Mbona, M. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa, User Manual: Inland Systems. SANBI Biodiversity Series 22. South African National Biodiversity Institute, Pretoria.

Rautenbach Biodiversity Consulting. (2019). Terrestrial Ecological Assessment, Wilmar Processing (Pty) Ltd Vegetable Oil Pipeline, Richards Bay Port, Kwa-Zulu Natal (Savannah Ref No., SE2306).

SiVEST. (2016). Richards Bay Port Ecological Assessment: Railyard North Wetland Delineation Report.

SiVEST. (2016). Richards Bay Port Ecological Assessment: Cassaurina Wetland Delineation Report.

SiVEST. (2016). Railyard North, Richards Bay Port Ecological, Richards Bay, KwaZulu-Natal.

Soil Classification Working Group. 1991. Soil Classification, A Taxonomic System for South Africa, Soil Classification Working Group, Memoirs on the Agricultural Natural Resources of South Africa No 15, Department of Agricultural Development, Pretoria.